

SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE
DEPARTMENT OF PUBLIC HEALTH



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

By: SIMEGNEW ASRIE (BSC)

Submitted to department of public health in Saint Paul's hospital millennium
medical college in partial fulfillment for the degree of Master of Public Health in
Field Epidemiology

March 2018,
Addis Ababa, Ethiopia

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MENTOR: TAKELEMENNA (PHD)

March, 2018
Addis Ababa, Ethiopia

**SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE
DEPARTMENT OF PUBLIC HEALTH**

APPROVAL SHEET (by advisors and program coordinator)

LETTER FOR DECLARATION (body of work with thesis)

I, the under signed ,declared that this is my bona fide original work, has never been presented in this or any other university, and that all the resource and materials used for the body of work with thesis ,have been fully acknowledged.

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This body of work with thesis has been submitted for examination with our approval as candidate's advisors

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_____ Name of Co-advisor	_____ Signature	_____ Date
_____ Name of FETP Coordinator	_____ Signature	_____ Date

**DEPARTMENT OF PUBLIC HEALTH GRADUATE STUDIES FINAL THESIS
APPROVAL FORM**

As members of the Board of Examiners of the final body of work with thesis open defense, we certify that we have read and evaluated the body of work with thesis prepared by Simegnew Asrie under the title **“Timing And Factors Associated With First Antenatal Care Visiting Among Pregnant Women Attending Antenatal Care In Public Health Facilities In Addis Ababa, Ethiopia, 2017.”** and recommencement for the degree of Master of Public Health in Field Epidemiology.

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List of Acronyms and Abbreviations

AAU	Addis Ababa University
AFI	Acute Febrile Illness
AFP	Acute Flaccid Paralysis
AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
AOR	Adjusted Odd Ratio
AR	Attack Rate
ART	Anti-Retro viruses Treatment
AWD	Acute Watery Diarrhea
BCG	Bacillus Chalmette Guerin
BPR	Business Process Re-engineering
BSC	Bachelor of Science
CDC	Communicable Disease Control
CFR	Case Fatality Rate
CI	Confidence Interval
COR	Crud Odds Ratio
COR	Crude Odd Ratio
CTC	Cholera Treatment Center
DPT	Diphtheria, pertussis, tetanus
EDHS	Ethiopian Demographic Health Survey
EFETP	Ethiopian Field Epidemiology Training
EPI	Expanded Program of Immunization
EWRR	Early Warning Response and Recovery
FANC	Focused Antenatal Care
FMOH	Federal Ministry Of Health
FP	Family Planning
GP	General Practioner
HC	Health Center
HEW	Health Extension Worker
HF	Health Facility

HIV	Human Immune deficiency Virus
HMIS	Health Management Information System.
HPDP	Health Promotion and Disease Prevention
IDSR	Integrated Disease Surveillance and Response
IHR	International Health Regulation
IR	Incidence Rate
ITN	Insecticide Treated Net
IUCD	Intra Uterine contraceptive Device
Kms	Kilometers
MCH	Maternal & Child Health care
MDG	Millennium Development Goal
MMR	Maternal Mortality Ratio
MOH	Ministry of Health
NGO	Non-Governmental Organization
NMR	Neonatal Mortality Rate
NMR	Neonatal Mortality Rate
NNT	Neonatal Tetanus
OPD	Out Patient Department
OPV	Oral Polio Vaccine
OR	Odds Ratio
ORS	Oral Rehydration Salts
ORT	Oral Rehydration Therapy
PHC	Primary Health Care
PHEM	Public Health Emergency Management
PHF	Private Health Facility
PICT	Providing Initiative Counseling and Testing
PLWHA	People living with HIV/ AIDS
PMTCT	Prevention Mother to Child Transmission
PPS	Probability Proportional to Size
PTB	Pulmonary Tuberculosis
RDT	Rapid Diagnostic Treatment

Rx	Treatment
SAM	Sever Acute Malnutrition
SNNPR	South Nation Nationality and People Region
SPHMMC	Saint Paul Hospital Millennium Medical College
SPSS	Statistical Package for Social Sciences
TBA	Trained Birth Attendant
TT	Tetanus Toxoid
UHEP	Urban Health Extension Program
UHEW	Urban Health Extension Worker
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
VCT	Voluntary Counseling Test
WHO	World Health Organization
Yr	Years

Executive summary

This body of work summarizes the required field residency's outputs accomplished at field base during the two years residency that have stayed in Field Epidemiology Training Program, department of Public Health-SPHMMC and at Addis ketema sub city health office field base. This compiled body of works contains two years output that to be submitted to SPHMMC- department of public health for the final accomplishment of master degree in Field Epidemiology. This compiled body of works has six chapters which were completed during the residency time of the program. These are outbreak investigation (AWD outbreaks in Addis ketema sub city, Addis Ababa,2016), surveillance data analysis (magnitude and trend of three year typhoid fever in Addis ketema sub city from 2013-2015), evaluation of epidemic typhus surveillance system (in Addis Ketema sub city during June/2014), description of a health profile report (in woreda9 of Addis Ketema sub city, during March,2016), abstract submission for presentation in scientific conferences (outbreak investigation of Acute watery diarrhea and surveillance data analysis on epidemic typhus), writing proposal & final thesis which is entitled assessment of timing of first initiation ANC visit and associated factors among pregnant women who are attending public health facilities in Addis Ababa ,2017 and other out puts such as epidemiologic bulletin , abstracts and others.

Chapter I- Outbreak investigations: this chapter illustrates about acute watery diarrhea outbreak investigation which was conducted in Addis Ketema sub city, October, 2016. The objective of this investigation was to verify the outbreak, asses the distribution and identify risk factors of the outbreak to implement control acute watery diarrhea. We used a descriptive analysis of the line list (Descriptive Epidemiology) followed by unmatched case-control study (Analytic Epidemiology) during investigations.

Chapter II-Surveillance data analysis: This chapter Presents about report of surveillance Secondary data analysis conducted on typhoid fever in Addis ketema sub city sub city to describe by person, place and time since 2013 to 2015. We retrospectively analyzed .It shows the trend of typhoid fever cases in years, woredas and its morbidity and mortality as sub city level and health facilities level.

Chapter III- Surveillance system evaluation: This chapter discussed about evaluation of surveillance system which was conducted on epidemic typhus in Addis ketema sub city, Addis Ababa from April 28 to May16, 2017. This study assessed the core function, supportive function

and the surveillance attributes: simplicity, flexibility, acceptability, representativeness, timeliness, data quality, sensitivity, cost, predictive value positive and usefulness of the surveillance system were also assessed and presented in the chapter.

Chapter IV- District health profile description: this chapter Describes assessment of Health Profile Description of Addis ketema Sub city, Addis Ababa City Administration. Health and health related data of the sub city populations were evidently presented which is helpful for prioritizing health related problems and implement strategies against the major health problems of the sub city.

Chapter V- research : this Chapter Contain research project which was entitled as Assessment of timing of first Antenatal care visit and associated factors among pregnant mothers who are attending in public health facilities in Addis Ababa, Ethiopia, 2018. The study was conducted by using facility based cross sectional study design on pregnant mothers who attending in public health centers that currently giving antenatal care services as a study population. The findings of the study was share to all stakeholders for possible intervention or action.

Chapter VI- other out puts:

6.1 Abstracts for scientific conference: this chapter contains abstracts of AWD outbreak investigations and epidemic typhus surveillance system evaluation data was presented.

6.2. Public health emergency management weekly bulletin: this Chapter contains a report of Public Health Emergency weekly bulletins in Addis ketema sub city during in the residency period. Of many weekly bulletins I was prepared during the two years field base attachment, I was includes only two of them in this document.

Chapter I – Outbreak Investigations

Acute watery diarrhea outbreak investigation in Addis ketema sub city, Ethiopia, 2016.

Abstract

Introduction: Acute watery diarrhea is global threat to public health for morbidity and mortality and indicator of lack of economic development in Sub-Saharan Africa. Recently acute watery diarrhea outbreaks occurring with increased frequency in several areas of Ethiopia.

Objective: The aim of this outbreak investigation was to assess the distribution and associated factors of acute watery diarrhea outbreak in Addis ketema sub city, Addis Ababa, Ethiopia, 2016.

Methods: Descriptive followed by unmatched case control study was done from Junely12 to August20. A line list were reviewed. 60 cases &120 controls were obtained by interviewed with a semi -structured questionnaire with verbal consent from all participants. Case was defined as a person living in Addis ketema and developed diarrhea and vomiting, Controls were who had similar characteristics with the cases except its clinical features.We selected controls in the community by using random sampling technique. Data were entered and cleaned using Epi Info version7 and exported to SPSS Version 21 to analyze. Bivariate& multivariable logistic regression analyses were conducted to examine the relationships between risk factors and dependent variable. **Results:** The case fatality rate and attack rate of cases were 23/10000 & 27/10000 respectively.91 (50.6%) cases were males. Of these, 24 (40%) were greater than 45 years of age. The mean age for cases was 42.72 ± 19.482 SD and for controls 33.81 ± 14.08 SD. Multivariable analysis revealed that ,having eaten food out of home, being drank holy water, being used communal tap water for domestic purpose and male in their gender were statistically significant (AOR= 2.72, 95%, CI: 1.26, 5.76, p=0.010), (AOR = 3.17, 95% CI: 1.13, 8.89, p=0.028), (AOR= 2.50, 95% CI: 1.09, 5.77, p=0.031), and (AOR= 8.48, 95% CI: 3.82, 18.82, p=0.000) respectively.

Conclusion & recommendation: Factors associated with the occurrence of acute watery diarrhea out break were, male for their gender and having drink holy water, communal tape water exposure for domestic use and having ate food outside from home. 15-44years of age were primarily affected. Communal tape water use wisely with free from contaminated utility and raising community awareness about hygienic practices and Individuals who ate out home should protect themselves.to control diarrheal disease is necessary.

Key words: Acute watery diarrhea, outbreak, Addis ketema, Ethiopia, 2016.

Introduction

Background

Cholera caused by *Vibrio cholera* continues to be a global threat to public health and a key indicator of lack of social development. Once common throughout the world, the infection is now largely confined to developing countries in the tropics and subtropics. It is endemic in Africa, parts of Asia, the Middle East, and South and Central America (1).

In endemic areas, outbreaks usually occur when war or civil unrest disrupts public sanitation services. Natural disasters like earthquake, tsunami, volcanic eruptions, landslides and floods also contribute to outbreak by disrupting the normal balance of nature(1). Cholera, an acute bacterial diarrheal disease, is usually transmitted through water or food contaminated with faecal matter(2). Diarrheal diseases remain a major cause of morbidity and mortality in all age groups in impoverished areas of South East Asia(3). Cholera continues to cause severe diarrheal illness in people with inadequate public health who live in resource-limited settings. Cholera is endemic in countries in Asia and Africa, with new outbreaks reported each year in several countries (4). Estimated that in 2010, about 1,731 billion episodes of diarrhea in children younger than 5 years were recorded worldwide. Every year, nearly 760,000 under-5 children continue to die from diarrheal disease, and the majority of these deaths have been identified as being avoidable(5). Cholera is an acute infection caused by *Vibrio cholera* serogroup O1 and O139 (1). Human beings are the main reservoir of *V. cholera*, and the disease is transmitted through contaminated food or water and from person to person by direct faeco oral contamination. The disease is characterized by the sudden onset of profuse painless watery diarrhea, often accompanied with vomiting, which can rapidly lead to severe dehydration and cardiovascular collapse and Cholera continues to be an important health problem in India. During 1997-2006, 68 outbreaks of cholera were reported from the country, affecting more than 200,000 persons, with 823 deaths. Nearly one-fourth of the outbreaks and 42% of the deaths occurred in West Bengal (6). Diarrheal diseases including cholera are among the leading causes of morbidity in Uganda(7). Globally, one in 10 deaths in children under the age of five years results from diarrhea, with the majority occurring in sub-Saharan Africa and South East Asia, and The 2010 General Household Survey (GHS), a nationally representative inquiry into the livelihood of South Africans, showed that there were over 60,000 cases of childhood diarrhea per month and approximately 9,000 child diarrheal deaths in the same year(8). Poor nutritional status, poor environmental conditions, and illnesses such as HIV/AIDS

make children more susceptible to severe diarrhea and dehydration(8).Without prompt treatment, a person with cholera may die of dehydration in a matter of hours after infection. Cholera outbreaks are generally associated to contaminated food and water supplies. Appropriate sanitation and safe water are the main weapons against this disease. Until the 19th century, cholera was confined to the Indian sub-continent (9).Cholera has been endemic in Bangladesh for centuries (7). Cholera Outbreaks are linked to the consumption of unsafe water and food, poor hygiene and sanitation. Cholera often follows natural or man-made disasters which can lead to internal displacement of persons and subsequent unstable living conditions associated with contamination of food and water sources and also Overflowing of latrines and contamination of wells and surface water, seasonal modification of water sources for consumption and human behavior may play a role in the occurrence of cholera outbreaks (10).Control of cholera outbreaks requires effective surveillance and response systems which are frequently sub-optimal in developing countries often lacking robust data collection, collation, analysis, interpretation and response but Poor detection and delayed response to cholera outbreaks can result in geographical spread of the disease And consequently high attack rates and case fatality rates .However, four countries in Central Africa around the Lake Chad Basin (Cameroon, Chad, Niger and Nigeria) accounted for 62,762 cases, including 2,610 deaths, i.e. 54% of cases and 77% of deaths reported from the continent. Nigeria reported 38% of cases from Africa with 44,456 cases and a case fatality rate (CFR) of 3.9% (10) .On October 21, 2010, toxigenic *Vibrio cholerae* serogroup O1, serotype Ogawa, biotype El Tor, was identified as the cause of a large outbreak of acute watery diarrhea in Artibonite Department, ≈150 km north of Port-au-Prince and by November 7, the outbreak had reached Port-au-Prince, where >1 million persons were living in internally displaced person camps or crowded slums. By December 15, ≈20,000 cases had been reported in the capital (11).On the 20th of August 2008, an outbreak of 118 cases was declared at St. Mary's and Zenengawards of Chitungwiza, a large urban center on the outskirts of Harare (12). Annually about 2.8 million cholera cases are reported globally and deaths from cholera are estimated to range from 28,000 to 142,000.

Statement of the problem

Cholera is still an important public health problem globally (8). There have been several large outbreaks of the disease across the world and About 2.8 million cases of cholera occur annually, the incidence is 2.0 cases per 1000 people at risk. Countries in southern Asia and Africa have the highest incidences ,Approximately 66.0% of global cholera cases and 87.6% of fatalities occur in Sub- Saharan Africa(13).WHO estimates that the officially reported cases represent only 5–10% of the actual number occurring annually worldwide .Of the estimated 3 to 5 million cases that occur globally every year, about 100 000 to 120 000 die(14).In 2010, about 1,731 billion episodes of diarrhea in children younger than 5 years were recorded worldwide. Every year, nearly 760,000 under-5 children continue to die from diarrheal disease, and the majority of these deaths have been identified as being avoidable(5).88% of all diarrheal disease in the world can be attributed to unsafe water, sanitation and hygiene(15).Severe watery diarrhea leading to dehydration and shock in few hours if left untreated ,80% of cases have mild or moderate symptoms and Can kill within hours if left untreated , most deaths in patients who do not reach a treatment facility (16). It becomes also a global threat to public health and a key indicator of lack of social development. In 2008 alone, a total of 190, 130 cases were notified from 56 countries, including 5143 deaths. Many more cases were unaccounted for due to limitations in surveillance systems and fear of trade and travel sanctions. The true burden of the disease is estimated to be 3–5 million cases and 100 000–120 000 deaths annually (17). In Ethiopia it was indicated that, there was acute watery diarrhea (AWD) epidemic in 1990 which persisted with recrudescence of cases till 1998. Moreover, from July 2008 to June 2009 in Ethiopia, there were a total of 9485 cases and 193 deaths (with case-fatality rate 2.0%) of acute watery diarrhea in six regions including Addis Ababa. (17). Currently, Addis ketema sub city is experiencing an outbreak of AWD for the second time. Therefore, the aim of this investigation is to identify the risk factors for occurrence of the outbreak and determine the magnitude of the outbreak in order to design control and prevention measures.

Significance of the study

According to what we search in different web sites, Studies on investigating AWD outbreak and risk factors of diarrhea are very few in Ethiopia , especially in our study area there is no any supportive research finding .However this study tries to identify different risk factors responsible for outbreak. So the study could help in understanding various risk factors responsible for diarrhea and thereby it helps in guiding control and prevention strategies of this outbreak. Furthermore, it initiates other researchers to work on in-depth scope of diarrhea. It is used as a base line for the District Health Office to develop appropriate intervention. Identifying the causes of diarrhea is very crucial for the effective implementation of child health intervention programs. So, this study was assessed the magnitude or distribution and relationship of AWD outbreak with the different demographic and socio-economic, environmental associated factors in Addis ketema sub city. Finding the factors associated with outbreak helps to find possible intervention methods.

Literature review

Case definition of cholera

According to national cholera guide line the case definition of cholera as follow; suspected case a case of cholera should be suspected when: in an area where the disease is not known to be present, a patient aged 5 years or more develops severe dehydration or dies from acute watery diarrhea; In an area where there is a cholera epidemic, a patient aged 5 years or more develops acute watery diarrhea, with or without vomiting. At the health post and at community levels, a suspected cholera case can be defined as follows: Any person 5 years of age or more with profuse acute watery diarrhea and vomiting. Confirmed case: A suspected case in which *Vibrio cholera* O1 or O139 has been isolated from their stool.(13)Cholera is a diarrheal disease caused by infection of the intestine with the bacterium *Vibrio cholerae*, either type O1 or O139; usually(14). Acute intestinal infection with *Vibrio cholerae* O1 or O139 majority of outbreaks by *V. cholerae* O1(15).Cholera is a diarrheic disease caused by *vibrio cholera* and is characterized by a sudden onset of profuse and painless watery stools. It is caused by an enterotoxin that affects the small intestine. The disease manifests through nausea and profuse vomiting in the early course of illness.(16).

Overview and burden of cholera

During the 19th century, cholera spread across the world from its original reservoir in the Ganges delta in India. Six subsequent pandemics killed millions of people across all continents. The current (seventh) pandemic started in South Asia in 1961, and reached African 1971 and the Americas in 1991. Cholera is now endemic in many countries.(17).Approximately 4 billion cases of diarrhea are recorded globally each year leading to 2.2 million deaths, mostly among children under age five (15% of deaths) equivalent to one child dying every 15 seconds(18).

It took another 20 years for the 7th pandemic to reach the Americas: the first cases were reported in Peru in 1991 and within one year the disease had spread throughout Latin America. A new strain appeared in 1992: *V. cholerae* O139. It is not known if this new strain will emerge as the 8th pandemic and replace *V.cholerae* O1 El Tor in Asia(19).Many studies have investigated the regional environmental factors for cholera, mostly concentrated on Southern Asian countries such as Bangladesh and India , Latin American ones such as Mexico and Peru , and some African countries(20).

Since the emergence of cholera in Haiti in October 2010, the Ministry of Public Health and Population (MSPP) has recorded 725,608 suspected cases and 8,813 cholera-related deaths

as of 31 December 2014 (21). Between 01 January and 31 December 2013, a total of 49 465 cholera cases including 1 197 deaths (CFR: 2.4%) were reported from 21 countries. The highest proportion of reported cases were from Democratic Republic of Congo which accounted for 54% (26 944 / 49 465) of cases followed by Angola (13%) and Nigeria (13%) (25). The distribution of cholera cases and deaths is shown in table 2 and figures 3 and 4. In 2012, a total of 94 553 cases and 1 834 deaths were reported from 25 countries resulting in a CFR of 1.9%. DR Congo, Sierra Leone, Ghana, Guinea, Uganda and Niger accounted for 90% (85 293 / 94 553) of the total number of cases and 70% (1 596 / 1 834) of all deaths.(22). Approximately 66.0% of global cholera cases and 87.6% of fatalities occur in Sub-Saharan Africa. It kills an estimated 91,000 annually, the mortality rate varies from 0.1 per 100,000 in developed countries to 15.2 per 100,000 in Africa (23). In 1997, Tanzania had one of the highest case-fatality rates in East Africa (5.6%), with 2,268 deaths in 40,226 cases (24). In Nigeria, the infection is endemic and outbreaks are not unusual. In the last quarter of 2009, it was speculated that more than 260 people died of cholera in four Northern states with over 96 people in Maidugari, Biu, Gwoza, Dikwa and Jere council areas of Bauchi state (1). A total of 76,081 AWD cases and 863 related deaths had been reported between 15 April 2006 and 13 May 2007. According to the World Health Organization (WHO), the most affected regions are Oromia (30,597 cases), Southern Nations and Nationalities People's Region (15,355 cases) and Amhara (13,386 cases). Currently, an average of 800 to 1,000 cases is being reported per week. The World Health Organization AWD update, published on 27 June, indicated a cumulative total of 82,956 cases and 952 deaths(25). Amhara region – were also affected during the week of 8-15 July 2007. Some AWD cases have also been reported in Jijiga town of Somali region (25).

Risk factors and transmission of cholera

Indeed, diarrheal diseases remain linked largely to living conditions, poverty, lack of hygiene, and lack of drinking water in households and in the neighborhood. The differences among cities, villages, neighborhoods, and countries with purified water supply, sanitation, drainage, and waste removal are the factors of inequalities in morbidity and mortality from diarrheal disease.(5). The persistence of cholera in Haiti is mainly due to the lack of access to clean water and appropriate sanitation facilities, and although considerable improvements have been made in this regard, Haiti continues to host the largest cholera epidemic in the Western Hemisphere. Structural issues such as weak water, sanitation and health systems enable cholera, acute diarrhoea and other waterborne

diseases to persist. Haiti has fallen further behind the rest of the region in sanitation coverage since 1990, with the most excluded population living in rural areas³. Only 77 per cent of the population has access to clean water in urban areas and 48 per cent has access in rural areas (21). The general hygiene in the villages was poor. There were stagnant water and mud almost everywhere. Children were playing and walking in the mud with bare feet and at times not fully dressed. The use of pit latrine was common but most of these latrines were poorly maintained (16). Outbreaks can spread quickly especially during the summer months and this constitutes a further health burden especially on most vulnerable groups. The presumed risk of outbreak is not due to conflict but due to the low response capacity which led to the lack of access to health services (26). They have revealed strong links between this prototypical waterborne disease, aquatic environments, and climate (27). End of May, and the dry season runs from the beginning of June until the end of October. In the Southern Region, several districts, including Blantyre, Thyolo and Chikhwawa, experience cholera outbreaks during the wet season. The Machinga, Zomba and Phalombe Districts, which border on Lake Chilwa, experience cholera outbreaks more commonly during the wet season, but also experience outbreaks during the dry season (28). Unfortunately, the quality of water from hand-dug wells is generally poor as confirmed by the regular outbreaks of waterborne diseases such as cholera which always begin from slum areas (29). Behaviors related to personal hygiene and food preparation contribute significantly to the occurrence and severity of outbreaks (30). Despite laboratory identification of *V. cholerae* as the cause of the AWD, the Government of Ethiopia decided not to declare a “cholera outbreak” for fear of economic repercussions resulting from trade embargos and decreased tourism (31). Epidemiologic studies in Africa have clearly documented the association between environmental exposures and occurrence of illness, once introduced into human populations *V. cholerae* rapid (epidemic) transmission is associated with poor sanitation, household contamination, and contamination of food and potable water (32).

Cholera is transmitted by the fecal-oral route. A dose of more than one million organisms is usually needed to cause illness. Cholera is transmitted almost exclusively by contaminated water or food. Transmission by contact, such as touching patients, is rare.

Water may be contaminated at its source. Surface water and water from shallow wells are common sources of infection. In addition, *Vibrio cholerae* can live for years in certain aquatic environments. Water is also frequently contaminated at home when inadequately washed hands come in contact

with stored water. Bathing or washing cooking utensils in contaminated water can also transmit cholera. Moist grains, such as rice, millet, or sorghum, when served at room temperature or lightly warmed, are common vehicles for cholera transmission. Moist foods lightly contaminated after cooking and allowed to remain at room temperature for several hours, provide an excellent environment for the growth of *Vibrio cholerae*. Other foods which can transmit cholera include raw or undercooked seafood, particularly shellfish, and raw fruits and vegetable(13). Contaminated water is the single most important route of cholera transmission. Contamination from fecal matter is due to poor sanitation (or excreta disposal (33)).the cholera epidemics in coastal areas are comprehensively affected by sea temperature, nutrient concentration, sea height and some other environmental factors, though how aquatic environmental factors modulate the dynamics of cholera epidemics have yet not been known(20). Very few households – only 1%– have piped water connections (34).

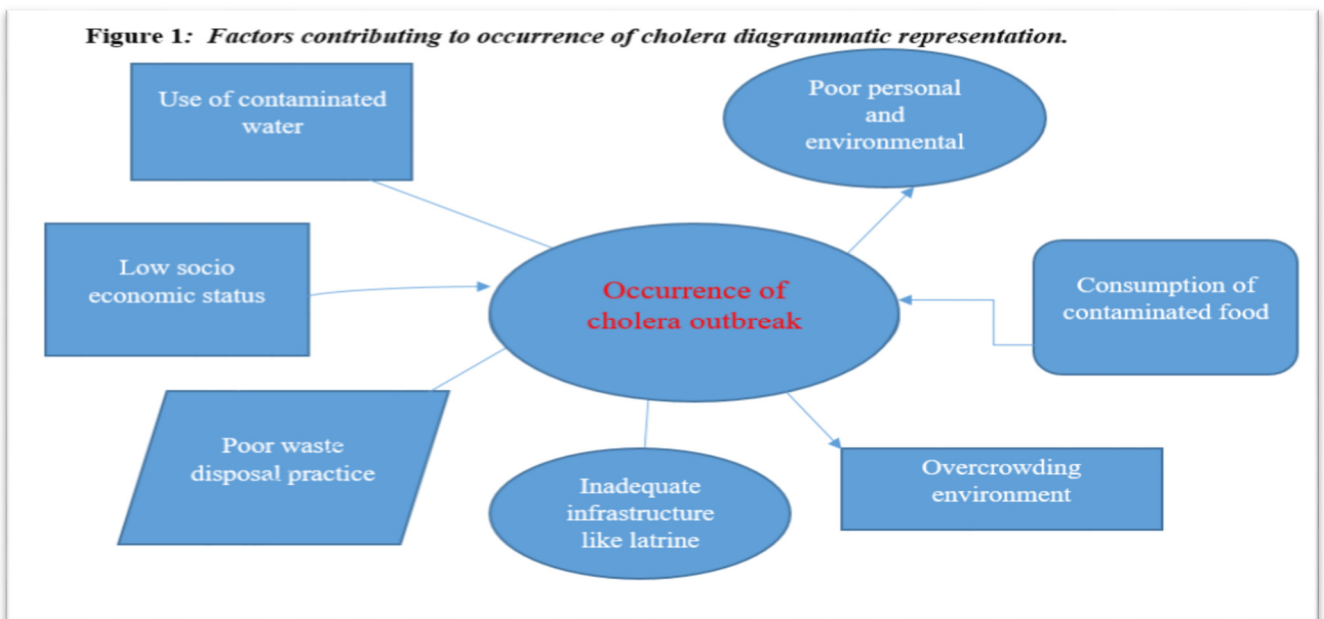


Figure 1: Factors contributing to occurrence of cholera diagrammatic representation from above different literatures

Objectives

General Objective

To assess the distribution and associated factors of Acute Watery Diarrhea outbreak in Addis ketema sub city, Addis Ababa, Ethiopia, 2016.

Specific objective

- To describe the distribution of AWD cases in terms of person, place and time in the woreda.
- To identify factors contributing to the occurrence of AWD outbreak.

Methods and materials

Study area

According to the listed web site links (https://www.wikipedia.org/wiki/Addis_Ketema) and Addis ketema sub city health office report, Addis ketema sub city is one of the ten sub city found in Addis Ababa. The investigation or the study was conducted in Addis ketema sub city starting from June 11- October 18, 2016. The sub city has ten Distracts with the total area of 14.6 square kilometer. According to the data from census statistical Agency (CSA) the population of the sub city in 2016 estimated to be 319,318 which constitute 153,186 and 165,952 males and females respectively. Comparatively the sub-city is among one of the sub-city where the community is densely populated with 17,472 population lives per 1 km². Addis ketema sub-city is the one which found in the north of the city being bordered by Kolfe keranio sub-city in the west, Arada sub-city in the east, Lideta sub-city in the south, and Gulele sub-city in the North. The sub city is where the biggest market in east Africa and Bus station where large number of population of the country travel to and from the city daily is located, this makes the sub city where large number of mobile population exists; it also facilitates the presence of people living in slum area and commercial sex workers. Due to this reasons there are multiple problems that are risk factors for different communicable disease like typhoid fever, dysentery, relapsing fever, even vaccine preventable diseases like measles are prominent. The sub city has adequate health facilities of governmental, nongovernmental and private facilities. There are a total of 82 health facilities. Among those health facilities, 10 health centers are owned by government. All health facilities in sub-city are giving health service for community according to their capacities and their specialties. The health services being provided to population, based on their needs are: In patient department (IPt), outpatient department(OPD), diagnostic and confirmatory laboratory test , Ante –Natal care for pregnant women(ANC), Vaccination service(EPI), Pediatrics care and treatment, Family planning (FP), HIV counseling, Testing, and Treatment (VCT, PICT, ART), delivery service, legal and safe abortion service, TB diagnosis and management, Emergency department, Maternal and Child health, Minor surgical department, Medication dispensing service(Pharmacy), and other health needs. The sub city has a total of 1363 employees out of which 740 are health professionals and 623 are supportive staffs and a total of 29 employees (Health professionals) are working in the sub city health bureau and the remaining 711 are working in woredas and health centers. The sub city has succeeded the target of health center to population ratio set by FMOH which is 1:40,000 100%.

In addition to this to strengthen the health promotion and disease prevention activity, about 85 urban health extension workers with 30 supervisors are assigned in different woredas and are actively working by engaging at the community level to provide health care needs through integration with other health staff who are working statically in the health facilities and household.

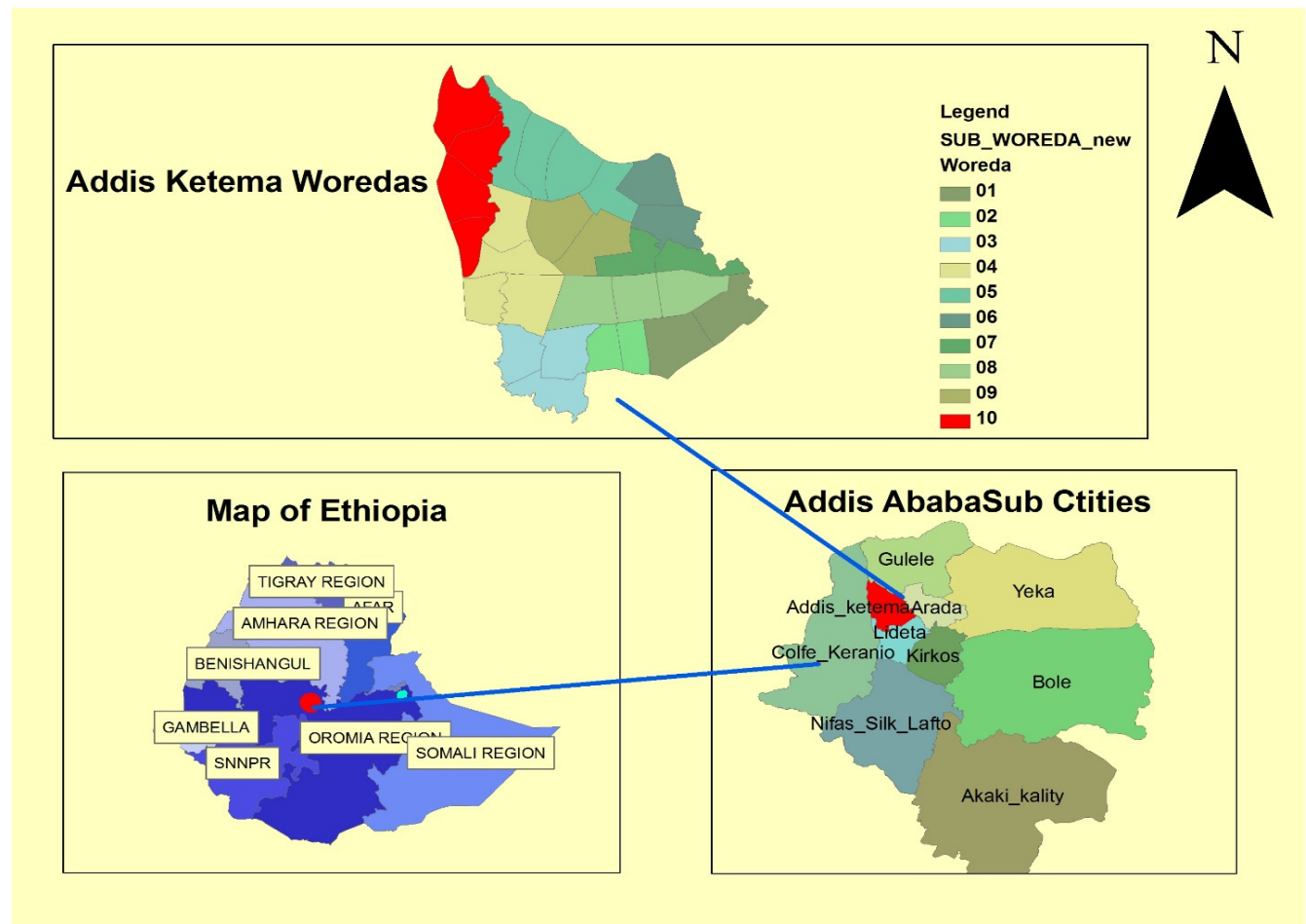


Figure 2: Map of Addis ketema sub city with the respect to its ten districts, 2016.

Study period.

The investigation was conducted from June 11, 2016 to October 18 and data collection period for case control was from July 12 up to August 20, 2016.

Study design

We conducted descriptive followed by un-matched case control study design.

Descriptive

Even if the main objective of this outbreak investigation is primarily for prevention and control of the existing problem of outbreak but in the meantime so as to give intervention and set priority for affected community, we reviewed data in different source such as, in the AWD treatment center, and in the community (any rumor & urban health extension worker report). Therefore, during this outbreak investigation, the number of AWD cases and deaths were collected from health facilities on daily basis and communicate together with different discipline to give appropriate intervention. Magnitude of this outbreak was described or recorded in line list by age, sex, residence, date of onset of cases and exposure status, contact history, laboratory status etc.

Analytical

Unmatched cases control study was conducted to identify associated factors that trigger the acute watery diarrhea outbreak in the sub city.

Source of population

A. Cases: all people with AWD cases who are dwellers of Addis ketema sub city

B. Controls: all AWD free people who are residence of Addis ketema sub city

Study population

A. Cases: five and above years of AWD cases admitted in woreda10 AWD treatment center and positive with RDT who lives in the sub city and Satisfying the inclusion criteria

B. Controls: any AWD disease free five and above years people from the community who live in Addis ketema sub city and Satisfying the inclusion criteria

Study subjects

Cases: randomly selected patients who involved in the study

Controls: randomly selected disease free individual who are in the same woreda with cases and participated in the study

Inclusion criteria

Cases: five and above years of any residents of Addis ketema who had symptoms of AWD and admitted to AWD treatment center and agreed to interview

Controls: five and above years of any residents of Addis ketema sub city during the study period who did not develop signs and symptoms of AWD and agreed to participate or involve in study.

Exclusion criteria

Cases: Any cases living out of Addis ketema, under five ages, seriously ill or unconscious were excluded.

Controls: any individual who faced sign symptom of AWD, under five ages, not resident of Addis ketema sub city and those family members of cases from the same household during data collection period were excluded.

Sample size determination

The total sample size determined was 180 with 60 cases and 120 controls. The sample size was estimated according to the unmatched- case control sample size calculation using Stat Calc in Epi Info Version 7. The assumption taken from previous study conducted in Iran shows that, proportion of controls exposed was 40.3% with an OR of 2.75 and ratio of cases and controls 1:2, power 80% and conventionally alpha level of 0.05 were used to calculate the sample size (35).

Assumptions are the following:

Two sided confidence level $(1-\alpha) = 95\%$, Power (% chance of detecting) = 80% Taking ratio of controls to cases = 2. Expected frequency exposure among controls = 40.3 % Least extreme Odds Ratio to be detected = 2.75 Using Epi info stat calc sample size became for cases = 54, for controls = 108. By using 10% non-response cases = 60, for controls = 120 Total size = 180 (two controls: one case).

Sampling procedure/technique

Simple random sampling technique used for both cases as well as controls.

Selection of cases

We recruited cases from AWD treatment center based on case definition of national cholera treatment guideline, patient aged 5 years or more who develops profuse acute watery diarrhea, with or without vomiting that supported with (RDT positive). That means, the primary study subjects were newly confirmed cases of AWD with RDT positive and admitted into the AWD Treatment Centre (CTC) were included by using simple random type of sampling technique. From those who admitted in AWD treatment center and registered as ,RDT positive in laboratory result and typically fitted clinically in sign and symptoms of AWD cases in the line list each day during the data collection period until achieved the required estimated samples , we used the line list registered number of cases as reference frame to draw samples(based on the number of new cases registered in the line list giving number in each beds and select cases with lottery method) in each day depends on the numbers of cases newly admitted and select randomly depending on

the numbers of cases in each day while starting from data collection date to achieve the required number of samples

Selection of controls

We recruited controls randomly from the same woredas as cases lives, those who had not AWD illness without conducting serological laboratory confirmation. Before selection obtaining informed consent to participate in the study was done. To maximize the power, to show differences in exposures, at least two controls were recruited for each case (1 case, 2 controls), after selection of cases in the same day, we assign the same woreda where the case lives, from that district select one Keble randomly again from that kebles select ketenas until households level randomly by lottery method (since the data collectors were respective woredas, urban health extension workers, they had profile of each kebles up to household level at hand). On selection of households, The first house hold select randomly as stated above and the members of the household were include if any resident would meet the requirements for selection as a control in terms not having AWD in the period when the case presented the symptoms. If multiple members of the household were fulfil inclusion criteria in one house hold, only one control was chosen by lottery, we select one by lottery method. This process had continued on to the next household until two controls were selected for each case. Date of interviewing of controls was in the same day of interviewing cases. To minimize recall bias, asking the exposure status systematically associated with their day to day life activities was done even though it is not possible to avoid recall bias.

Data collection tools and procedure

To conduct case control study (interviewed the participants), we used a semi- structured questionnaire to gather information including socio-demography both for controls and patient characteristics (gender, age, occupation, ethnicity, religion and address), clinical status of the cases (symptoms& sign), and treatment (if any). The contact history status of the respondent, the source of water, exposure and practice for both cases and controls in foods, beverage, hygiene, sanitation and other exposures for cases and controls. The data was collected through face to face interview using semi- structured questionnaire to the respondents (cases & controls). The data collection carried out by two BSc nurse health professionals and ten urban health extension workers, one from each woreda. One half day training was given for data collectors about the objective of the study or investigation, data collection technique or procedure. to ensure the right location of controls, the data collectors properly registering by using the geographical location of individual

households with GPS coordination (latitude and longitude).The data collection process was monitored and coordinated by the principal investigator.This investigation tool (questionnaire)adapted from pilot study which was conducted in the time of AWD epidemic period by Addis Ababa regional health bureau with jointly Ethiopian public health institu. After pretested the investigation tool was modified and added basic socio demographic variables. Cases, randomly recruited from the AWD treatment center (CTC) which established in woreda10 health center compound, who comes in the treatment center, as “cases” and after interviewing the cases those who admitted in woreda10 CTC.

Dependent variable

- Acute watery diarrhea cases (patient)

Independent variables

- ❖ Exposure of untreated drinking water
- ❖ contact history
- ❖ Exposure of contaminated food and beverage
- ❖ exposure status to burial ceremony
- ❖ Socio demographic factors (age, sex, religion, ethnicity...)

Operational definition:

A suspected AWD case is defined as: Any person 5 years of age or more with profuse acute watery diarrhea and vomiting without laboratory confirmation in Addis ketema sub city in the data collection period.

A laboratory confirmed case: - is a suspected case in which RDT laboratory results shows positive in the data collection period.

Epidemiologically linked case: - is a suspected case, which has contacts (possibly got the virus) withlaboratoryconfirmedcase.

AWD-related death: - is a death in an individual with laboratory confirmed (RDT or culture) AWD cases rather than other unrelated or other causes.

Admission: any patient who had entered the AWD isolation wards following outpatient triage, instead of being managed and discharged directly from the outpatient department regardless of subsequent length of stay on the ward.

Cases: Any person living in Addis ketema sub city who presented with sudden onset of acute watery diarrhea and vomiting during data collection period.

Controls: Any person living in Addis ketema sub city who has no sign and symptom of acute watery diarrhea and vomiting since data collection period.

Communal tape water: tape water used by group of people in the compound

Data processing and analysis

Before and after started analytical study (case control study) at the mean time we analyzed the line list data by person, place and time in descriptive part. After completing the data collection process data were entered in to Epi-Info version 7.1, then exported into and analyzed using SPSS version 21. The data first presented with frequencies, mean etc for different variables. To identify risk factors both Bivariate and multivariate logistic regression analysis were utilized by taking 95% confidence limit, 80% statistical power, ratio of controls to cases is 2:1, with 0.05 margin of error. Results were presented using graph, table and spot map. Attack rate and case fatality rate were also calculated. Variables with P-value less than 0.2 in the bi-variate logistic regression analysis were taken in the multivariable analysis to Control or manage confounders that means we put risk factors found significant in binary logistic regression analysis into the multivariable binary logistic regression analysis model to find the significant factors associated with diarrhea diseases. The p-value < 0.05 was considered significant.

Data quality control

Before proceeding data collection on real study subjects, questionnaires were tested by interviewing 5% of the samples who are living the sub city from both groups' cases and controls. Then with some modifications was done on the questions. Data collection was carried out by urban extension workers and health professionals. Before the start of data collection, brief orientation was given for data collectors. The questionnaire was prepared in English language but the data collectors interviewed by translating the interview questions to local language. The collected data was rechecked for any missing information every day by principal investigator before it was entered into the database that means before analysis, data was also cleaned for any missing and logically inconsistent values each. Completed questionnaire was reviewed by the principal investigators to monitor the data quality.

Ethical consideration

Official support letter from Addis Ababa regional health bureau was obtained as we deploy to investigate this outbreak in Addis ketema sub city. Supportive letter was obtained from Addis Ketema sub city Health Office to respective woredas. Oral informed consent was obtained from participants to participate in the study. Confidentiality was assured and no personal details (name) was recorded and placed in secured environment.

Dissemination of the result

After complete this Written result of the field investigation (AWD outbreak investigation) was submitted to the Addis Ababa Regional Health Bureau, Addis ketema sub city health office and its respective districts , and present to Saint Paulos Millennium Medical College department of Public Health (EFETP program).

Result

Descriptive analysis:

Distribution of cases by Person

According to line list data base, a total of 862 cases, and two facility deaths of acute watery diarrhea were recorded in line list throughout the epidemic period which was starting from 11 June to October 18, 2016 in all ten districts of Addis ketema sub city. Among the study subjects 541(62.76%) were male while 321(37.24%) were female. The attack rate was higher for female as compared to male. the sex specific attack rate for females was 210/1000 population and males 330/1000. In this outbreak the most affected age group were between 15-44 years old 508(58.93%), 5-14 years were 42(4.87%) and greater than 45 years old were 290(33.64%). the mean age for cases was 32.8 ± 14.6 SD (table 1). The overall attack rate of the case was 270 cases per 100,000 populations. The overall case fatality rate were 230/100,000 and each respective woredas attack rate and case fatality rate stated in below (table 2).

First case (Index case)...

The index case (the first AWD case in the sub city) was reported from district 3, Keble 7 on June 11, 2016. The case was 60 years old male; married and with 5 children. The patient was pensioned. Once upon a day he experienced watery diarrhea but he suggest that this may be due to the effect of PUD (peptic Ulcer Disease), then he spent 2-3 days without get treatment and after 3 days he went to woreda 3 health center nearby his residence. the clinician gave Omeprazole for his treatment by considering PUD and he turn back to his house after some hour he suffer again to the previous symptom then he went to Teklehaymanot general private hospital, after they admit and resuscitate the patient they send to Mikililand CTC (AWD treatment center) in Kolfe sub city, he stayed around 3-5 days from that treatment center and finally he cured and discharge but after two days later, his wife was faced like the same clinical feature went to mikililand AWD treatment center following this the outbreak is dramatically expand throughout the sub city. The index case spent most of the time in local beer or tej house in woreda 10 Keble 18 around Atenatera, due to he has no work i.e. pensioned. Since this tej house is located in the border of kolffe and Addis ketema, majority customer are from Kolffe sub city residences, by chance as that time cholera outbreak was happened in kolffe sub city. Not only is this but also as we observed the overall sanitation of the tej house no well.

Table 1: Distribution of AWD cases by age group in Addis ketema sub city, Addis Ababa Region, Ethiopia, 2016.

Age group	frequency	percent
<5	22	2.55%
5-14	42	4.87%
15-44	508	58.93%
>45	290	33.64%
Total	862	100.0%

Table 2: AWD Attack rate (AR) and case fatality rate (CFR) by district in Addis ketema Sub city, Addis Ababa, Ethiopia, 2016.

District	Total population	# case	Number of death	Attack rate/1000	CFR
District1	27,183	94	0	3.46	0
District 2	31,959	78	0	2.44	0
District 3	34,338	153	1	4.46	0.65%
District 4	40,001	77	0	1.92	0
District 5	31,312	49	0	1.56	0
District 6	29,309	80	0	2.73	0
District 7	35,272	107	1	3.034	0.93%
District 8	35,444	106	0	2.99	0
District 9	34,096	76	0	2.23	0
District 10	22,224	42	0	1.89	0
Sub city	319,138	862	2	2.70	0.23%

Table 3: AWD sex specific case distribution by person and place, Addis ketema sub city, 2016.

District	population Total	Population by sex		Case total	Case by sex		Sex Specific Attack rate		
		Male	Female		Male	Female	CAR	Male	Female
District1	27,183	13048	14135	94	62	32	0.35%	0.48%	0.23%
District 2	31,959	15340	16619	78	45	33	0.24%	0.29%	0.20%
District 3	34,338	16482	17856	153	94	57	0.45%	0.57%	0.32%
District 4	40,001	19200	20801	77	50	27	0.19%	0.26%	0.13%
District 5	31,312	15030	16282	49	35	18	0.16%	0.23%	0.11%
District 6	29,309	14068	15241	80	35	45	0.27%	0.25%	0.30%
District 7	35,272	16931	18341	107	67	40	0.30%	0.40%	0.22%
District 8	35,444	17013	18431	106	60	46	0.30%	0.35%	0.25%
District 9	34,096	16366	17730	76	40	32	0.22%	0.24%	0.18%
District 10	22,224	10668	11556	42	20	24	0.19%	0.19%	0.21%
Sub city	319,138	153,186	165,952	862	508	354	0.27%	0.33%	0.21%

Distribution of cases by Place

Among the total cases, 153 (17.7%) were from district3, 107 (12.4%) were from district7 and 106(12.3%) were from district 8. The highest attack rate was registered in district3, 446 cases per 100,000 populations and followed by district7 and district8, 303, and 299 cases per 100,000 populations respectively (table:2) this implies that from district 3, the highest proportion of cases was seen followed by district 7and district 8. In district 3 the date of onset of the first case (index case) was on 11 June, 2016.From this date to 18th of October 2016, 862 cases and 2 deaths were reviewed from the sub city health office and health facility registry (CTC) which gave over all case fatality rate of 0.23%.

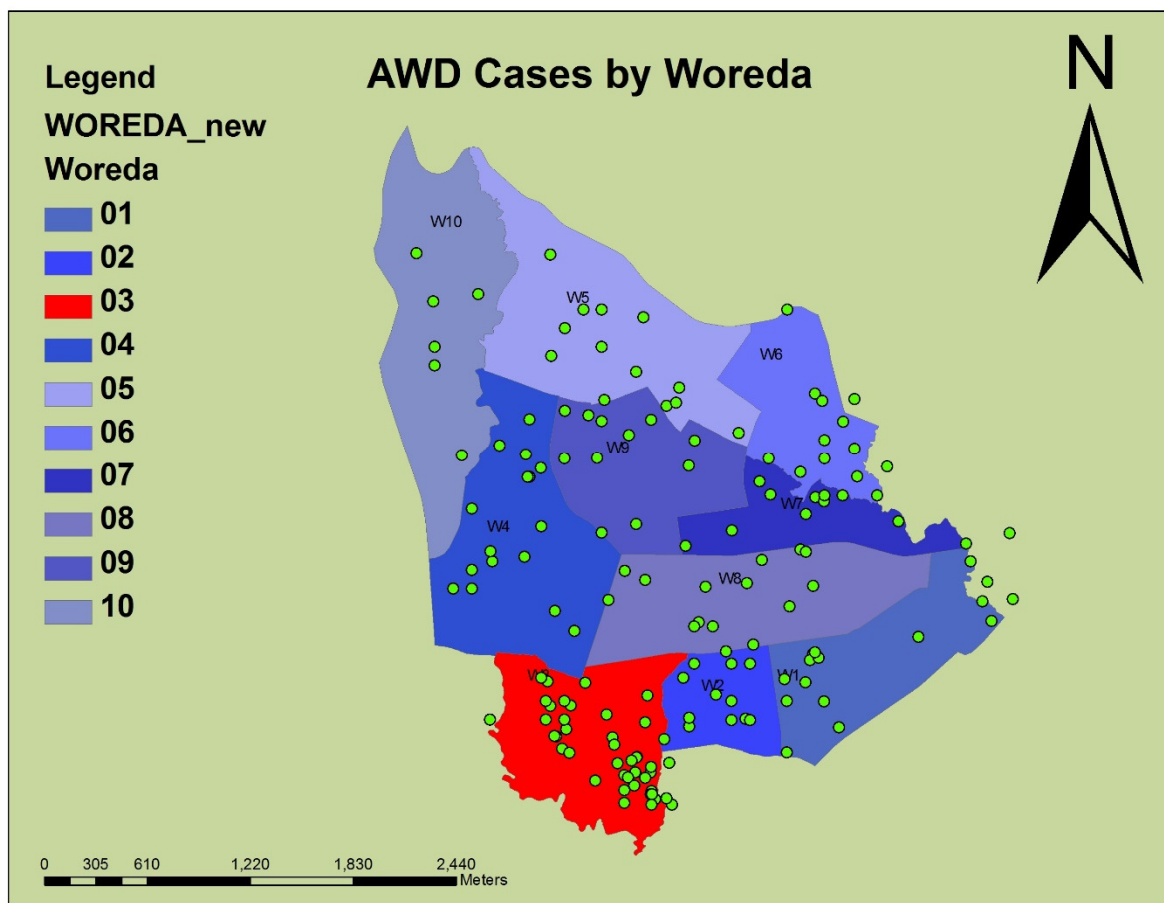


Figure 3: Spot map showing AWD Cases Distributions during out break by districts in Addis Ketema sub city, Addis Ababa, 2016.

Distribution of cases by time

The first index case was started onset of symptoms on 11/6/2016. The peak numbers of cholera patients were seen on the middle of June and middle of July 2016. Through interview we found that the index case had not had any travel history to other kebeles or districts. Even though the detection of the outbreak (the cases) was early, the outbreak stayed for about 16 weeks (four months). This might due to multiple risk factors all over the 10 districts. Most of the affected kebeles are have low socio economic and poor sanitation practice .The case builds up gradually to reach its peak on June 14 and, 2016 and has multiple peaks.

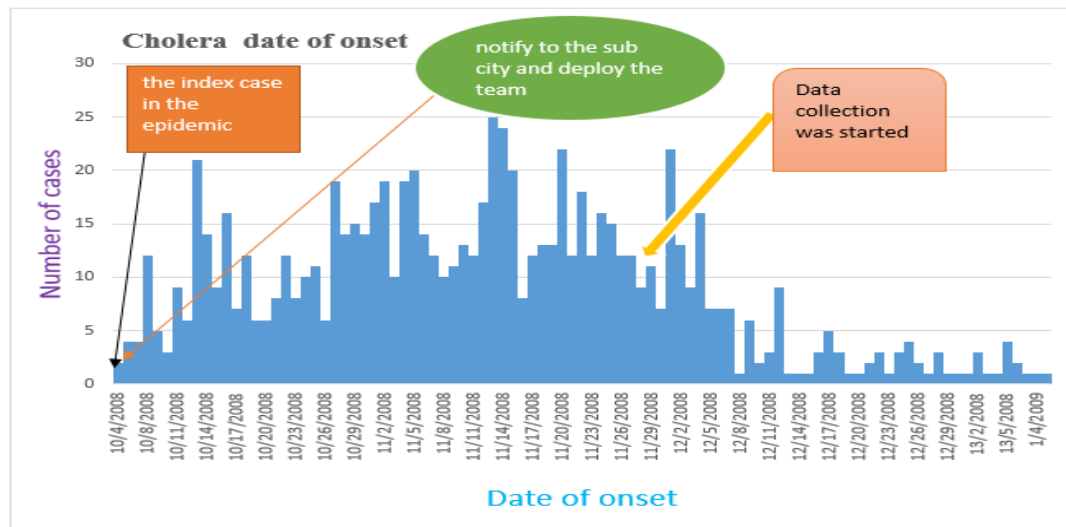


Figure 4: AWD index cases and respective cases distribution by date of onset in Addis ketema sub city, Addis Ababa, Ethiopia, 2016.

Laboratory result

Between beginnings of June 11, 2016 to October 12, 2016, among the total of 862 cases registered in the line list .some samples were taken RDT to identify the case status i.e. weather positive or negative, and 546 samples were positive for AWD and 36samples were negative for AWD.

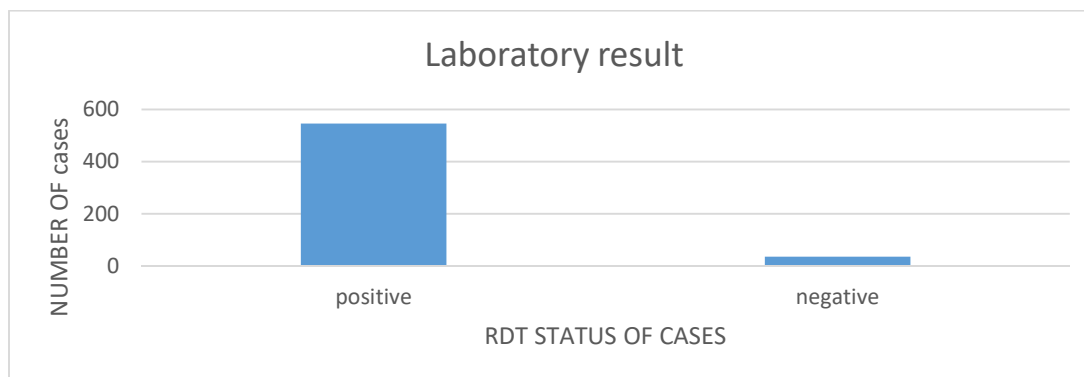


Figure 5: laboratory result of AWD cases in Addis ketema sub city, 2016.

Epidemic preparedness and response

None of the districts including the sub city had an epidemic preparedness plan and an epidemic preparedness committee in place prior to the outbreak. The protective materials and IV fluids were provided after the occurrence of the outbreak from MSF (medicine sans frontier) and Addis Ababa health bureau. Disinfectants were available at all health districts that we visited. The federal ministry of health distributed chlorine for water treatment in the two AWD treatment. AWD treatment centers were established in District 10 and District 8 independently. District 10 AWD treatment center supported the whole consumable and personal equipment's by MSF (medicine sans frontier) non-governmental organization

Analytical

Socio economic characteristics.

Response rate of the study was 100%. From the total respondents, 91(50.6%) were males and 89(49.4%) were females. Out of the 60 cases, 49(55.1%) and 11(12.1%) were females and males respectively. Overall mean age of the respondents were 36.78 ± 16.572 SD in the range of 79 with minimum 10 years and maximum 89 years old, of which, The mean age for cases was 42.72 ± 19.482 SD and for controls 33.81 ± 14.08 SD. twenty five (33.8 %) of the cases and 66.2% (49) controls were Orthodox in religion. 36.8% (14) cases and 63.2% (24) control were Amhara in ethnic, 41.2% (14) cases and 58.8% (20) control were Oromo, 27.4% (20) cases and 72.6% (25) controls were Gurage and 34.3% (12) cases and 65.7% (23) were Tigray, most of the cases, 24 (47.1%) were >45 years, 14 (26.4%) were 25-34 years, 11 (37.9%) were 35-44 years and 11 (23.4%) were 5-24 years (See below table:6). the least affected age group was happened in the range between 5-24 years. AWD cases had a history of vomiting, (90%), 93.3% had watery diarrhea and 53% had dehydration. almost all AWD cases had a history of watery diarrhea. Among the cases, more than one fourth 11 (36.7%) Government employee and 24 (29.6%) didn't have occupation whereas, among the controls, those who work privately and Nonemployee accounts 44 (63.8%) & 57 (70.4%) respectively.

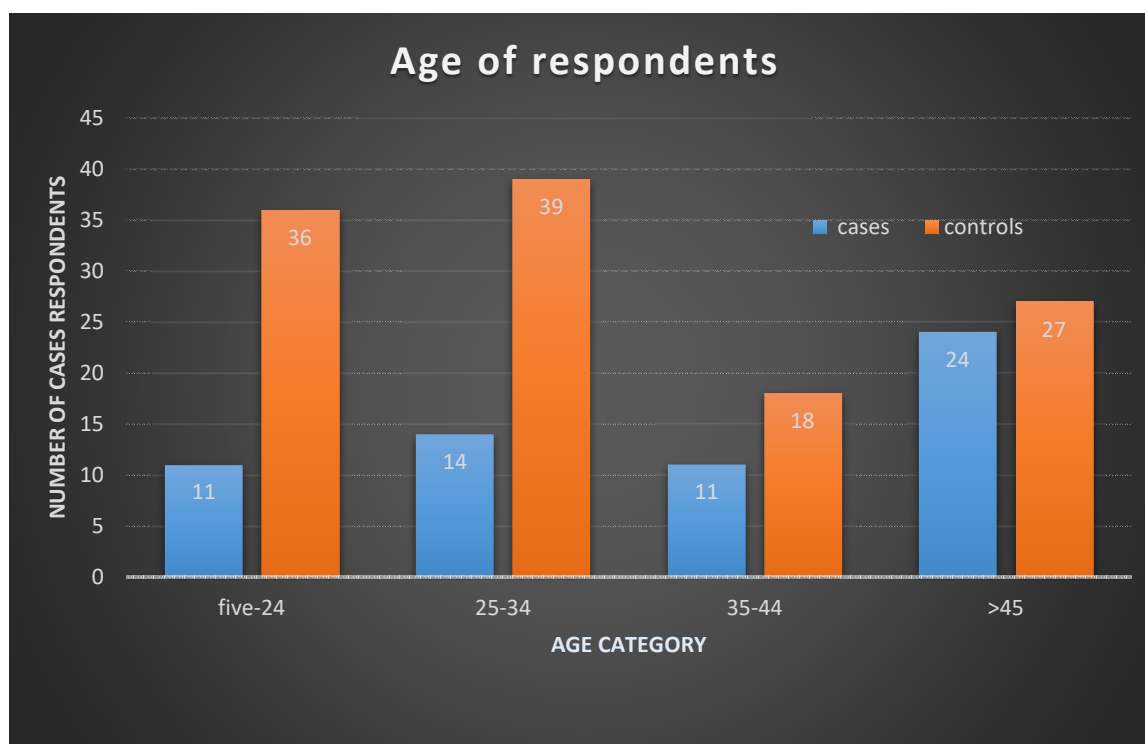


Figure 6: age of distribution of AWD case- control study in Addis ketema sub city, Addis Ababa, 2016.

Table 4: Socio-demographic information of cases and control of AWD in Addis ketema sub city, Addis Ababa region, Ethiopia, 2016.

variable		case		control	
		number	%	number	%
Sex	female	49	(55.1%)	40	(44.9%)
	male	11	(12.1%)	80	(87.9%)
Occupation	Government employee	11	36.7%	19	63.3%
	Nonemployee	24	29.6%	57	70.4%
	private	25	36.2%	44	63.8%
Religion	orthodox	25	33.8%	49	66.2%
	protestant	20	33.3%	31	66.7%
	Muslim	15	32.6%	31	67.4%
Ethnicity	Oromo	14	41.2%	20	58.8%
	Amhara	14	36.8%	24	63.2%
	Tegrie	12	34.3%	25	65.7%
	Gurage	20	27.4%	23	72.6%

Exposure status and associated Factors for cases and controls towards AWD outbreak

38.1 %(43) of cases and 61.9 %(70) of controls get drinking water from communal tap water. Of which only 32.2 %(29) cases and 67.8 %(61) of controls used treated water for drinking. 31.8 % of cases and 68.2% controls of the respondents have access to latrine & from these 58(33.3%) cases & 116(66.7%) controls use communal latrine and 2(33.3%) cases & 4(66.7%) controls use private latrine. Among the respondents About 33(47.8%) cases and 36(52.2%) controls ate outside their home, of which around 13(43.3%) cases and 17(56.7%) controls ate from hotel & 5(27.8%) cases and 13(72.2%) controls are from restaurant and also 8(34.8%) of case respondents 15(65.2%) control respondents drank among one of locally –made beverages i.e.Besso. 47 (31.5%) cases and 102(68.5%) controls of the respondents wash their hands before having eat any food & 50 (34.7%) cases and 94 (65.3%) controls of respondents having practice of hand washing after latrine usage (after defecation), Of which Only 22.4 % of the interviewed cases and 34% controls practiced hand washing with soap after latrine while 89.7 % (52) and 56%(76) of them made hand washing with soap before any meal respectively. Eating in a restaurant& traveling outside the current residency was low. Only 16(59.3%) % of the cases and 11(40.7%) of the controls drink holy water. of which source of holy water piped water accounts 15 (60%) for cases and 10 (40%) controls. Though almost all respondents had water treatment (agar) in their houses, there were no practice of using it due to its test. Eighteen (50%) and ten (38.5%) percent of the cases has history of exposure (eat) any raw meat and partially roasted meat respectively. In terms of close contact, 52.6% of the cases had contact history with a person of facing or experiencing watery diarrhea and vomiting in the family, while only 47.4% of the controls had similar exposure. None of the cases use water guard and pure on their home but used boiling and binshangare 17(31. %) for cases and 37(68.5%) for controls & 8(36.4%) for cases and 14(63.6%) controls respectively for water treatment while 33.3% of the controls use aqua tab. Additionally 53.8% and 46.2% of the cases and controls respectively use cold left over foods outside their houses. None of the total participants have exposure of travel to the place affected with diarrhea vomiting illness. Since in Addis ketema most houses are Keble or public owned houses, more than three quarters of the cases and controls (80%) were using communal latrine and communal tap water rather than private tape water.

Bi-variate analysis was performed to determine the strength of association of associated factors and its statistical significance for AWD cases as compared to controls. In bivariate analysis with the consideration of p-value of 20% and below, the statistically significant variables which fulfill in the above figure (p-value $\leq 20\%$) were found to be associated with AWD as listed below: among respondents which 21.7% (13) cases and 38.3%(46) controls were being used household tap water for domestic used (OR: 2.25; 95% CI: 1.10-4.60; P: 0.027), 18.3 %(11) cases and 66.7%(80) controls were being male in sex (OR: 8.91; 95% CI: 4.18-18.98; P: 0.000) . 78.3% (47) patients and 62.5%(75) controls were being used communal tap water for domestic used (OR: 2.25; 95% CI: 1.09-4.56; P: 0.027), 26.7% (13) cases and 9.2%(11) controls were having drink water from a holy water site (OR: 3.60; 95% CI: 1.55-8.38; P: <0.003), 25% (15) cases and 18.3%(10) controls were being the source of holy water site piped (OR: 3.67; 95% CI: 1.53-8.77 ; P: 0.003), 30% (18) cases and 45%(18) controls were having eaten any raw meat in the last five days (OR: 2.43; 95% CI: 1.15-5.12; P: 0.02), 91.7% (55) cases and 98.3%(118) controls were having latrine (OR: 5.36; 95% CI: 1.01-28.51; P: 0.049), 45% (27) cases and 70%(84) controls were having history of eat food outside their home (OR: 2.85; 95% CI: 1.50-5.42; P: 0.001), 54% (7) cases and 46%(6) controls were having history of eat left cold food (OR: 2.51; 95% CI: 1.80-7.83; P: 0.113). The detail information was illustrated in below table.

Table 5: Bivariate analysis for different exposure of AWD cases, Addis ketema sub city, Addis Ababa region, 2016.

Exposure	Case (n=60)	Control (n=120)	COR(95%CI)	P-value
Household tap water for domestic use				
Yes	13(22%)	46(78%)	Ref	0.027
No	47(78.3%)	74(61.7%)	2.25(1.098,4.599)	
Communal tap water for domestic use				
Yes	47(38.8%)	75(61.2%)	2.25(1.098, 4.599)	0.027
No	13(22%)	45(78%)	Ref	
Drink holy water				
Yes	16(59.3%)	11(40.7%)	3.60(1.55, 8.378)	0.003
No	44(28.8%)	109(71.2%)	Ref	
Piped water Source for holy water				
Yes	15(60%)	10(40%)	Ref	0.003
No	45(29%)	110(71%)	3.67(1.53, 8.77)	
Eat any raw meat				
Yes	18(50%)	18(50%)	2.43(1.5,12)	0.020
No	42(29.2%)	102(70.8%)	Ref	
Eat food outside home				
Yes	33(47.8%)	36(52.2%)	2.85(1.5, 5.42)	0.001
No	27(24.3%)	84(75.7%)	Ref	
Eat cold leftover food				
Yes	10(53.8%)	10(46.2%)	2.51(1.8,7.83)	.113
No	50(31.7%)	110(68.3%)	Ref	
Eat food outside home from hotel				
Yes	13(43.3%)	17(56.7%)	1.68(1.75,3.73)	.206
No	47(31.3%)	103(68.7%)	Ref	
Have latrine				
Yes	49(31.8%)	110(68.2%)	Ref	0.049
No	11(71.4%)	10(28.6%)	5.36(1.01,28.51)	
Contact history with family				
Yes	10(52.6%)	9(47.4%)	2.47(1.94,6.45)	0.065
No	50(31.1%)	111(68.9%)	Ref	
Sex of the respondents				
Female	49(55.1%)	40(44.9%)	Ref	0.000
Male	11(12.1%)	80(87.9%)	8.91(4.18,18.98)	
Age of the respondents				
5-24	11(23.4%)	36(76.6%)	1.78(.15, 20.86)	0.016
25-34	14(26.4%)	39(73.6%)	3.02(1.24, 7.39)	0.031
35-44	11(37.9%)	18(62.1%)	2.48(1.09, 5.63)	0.430
>45	24(47.1%)	27(52.9%)	Ref	-
Overall age				0.054

In the bivariate analysis any possible confounders were not controlled and assessing the independent effects of the covariates was difficult. To avoid excessive number of variables and unstable estimate in the final model, only variables with P-value less than 0.2 in the bi-variate logistic regression analysis were taken in the multivariable analysis. In other words, To identify risk factors that were independently associated with AWD cases and to Control or manage confounders, we put risk factors found significant in binary logistic regression analysis into The multivariable binary logistic regression analysis model to find the significant factors associated with AWD diseases. The $p\text{-value} < 0.05$ was considered significant. However, on multivariable analysis the factors that remained statistically significantly associated with illness were : having eat food outside home (AOR = 2.72, 95% CI (1.26-5.78) ; P: 0.010) , use of communal tap water for domestic use (AOR = 2.50, 95%CI (1.10-5.77) ; P: 0.031), males for their sex (AOR = 8.48, 95% CI [3.82-18.82] ; P: 0.000) And having drink holy (spiritual) water (AOR = 3.17, 95% CI (1.13-8.89) ; P: 0.028) have statistically significant association . Even though having latrine, having been eat any raw meat and being used the source of holy water piped water are statistically significant in bivariate analysis, they have no any association for developing the disease With an odd ratio (AOR) of 2.65(95% CI = 0.383-18.26, P= 0.323) and AOR= 0.37(95%= 0.013-10.77, P=0.566) respectively in multivariable analysis but as we explained above four variables were risk factor for developing the diseases and statistically Significant. Therefore, the odds that eat food outside home was because of poor hygiene and sanitation was 2.72 higher to develop AWD as compared to not eat out side home, the odds that males were 8.48 times higher to develop AWD disease than females, the likelihood of using of communal tap water for domestic purpose were 2.50 times higher to developing AWD diseases than these not use communal tap water for domestic purpose. The likelihood of drinking holy water were about 3.17 times higher to develop AWD disease than for those who did not drink holy water.

Table 6: Bi-variate Vs multivariable analysis of factor associated with cholera outbreak among cases and controls of Addis ketema sub city, Addis Ababa Region, 2016.

Risk factors	Case	Control	COR(95%CI)	AOR(95% CI)	Adjusted P-value
The respondent drink holy water					
Yes	16(59.3%)	11(40.7%)	3.60(1.55, 8.38)	3.17(1.13, 8.89)	0.028*
No	44(28.8%)	109(71.2%)	1		
communal tape water for domestic use of water of the					
Yes	47(78.3%)	75(62.5%)	2.25(1.09,4.59)	2.50(1.109, 5.77)	0.031*
No	13(21.7%)	45(37.5%)			
Sex of the respondent					
Female	49(55.1%)	40(44.9%)	8.91(4.18,18.98)	8.48(3.82,18.82)	0.000**
Male	11(12.1%)	80(87.9%)	1		
Exposure Eat food outside home					
Yes	33(47.8%)	36(52.2%)	2.82(1.50,5.42)	2.72(1.26, 5.78)	0.010*
No	27(24.3%)	84(75.7%)	1		

* = statistical significance

**= highly statistical significant

Public health action (Intervention undertaken to control the outbreak)

Following the confirmation of this cholera outbreak the sub city health office in collaboration with the district health office sensitized the health workers working in the area health institution weather public or private about the occurrence of the cases and organized teams accordingly in composed of field epidemiologist residents, clinician ,laboratory technologists ,environmental health personnel, and other with jointly with partners (WHO staff), there were five teams namely: surveillance team. Community mobilization team, case management team, logistic team and spray and infection prevention team. Each team core activity in the prevention and activity is described detailed as below;

Case management team:

This is the team which is responsible for controlling over all activity of medical service in the CTC with jointly clinicians (health professionals), assist Cases were managed with appropriate medication, Technical assistance was given for health workers (clinician) on case management, recording each patient profile consciously and reporting timely for higher officials. Communicate with assigned referral sites if there is any highly critical patients to further investigation and give

any advance medical service to prevent further spread; and reduce morbidity and mortality attributed to cholera.

Surveillance team

This group consists field epidemiologist residents, WHO surveillance officers, sub city PHEM officers and urban health extension officers. the main tasks of this team was An active searching of cases which was conducted in the community to identify additional cases ,detail investigation of each case and contact tracing and line listing of cases, and follow up until the incubation period (for five days)so as to prevent secondary infection, perform routine surveillance activities was enhanced and the situation was closely followed at each level on a daily bases, verification rumor and death auditing if there is any in the community or health facility ,Daily reporting of cases was done across the surveillance structure from Health facility up to the regional system with the proper format.

Community surveillance

Active case search was integrated to women development army activity and all of them were engaged in awareness creation and reporting zero case to their respective health extension workers and also health extension workers report to health extension program coordinators and through the coordinators they report to the sub city daily. A total of 30 cases were detected by community surveillance and treated at Millennium and woreda 10 CTCs.

Facility based surveillance

All governmental health facilities and private health facilities were engaged in detecting, isolating, resuscitating and referring AWD cases to AWD treatment center and total of 839 cases were detected at health facility. Among the total of 58 private health facilities 24 of them reported zero case on daily bases and included in a daily and weekly surveillance activities

Community mobilization team

this team mainly carried out give health education about AWD case definition, transmission and prevention mechanism in the community members to prevent the transmission of the disease, to motivate health seeking behavior and treatment if there is sign and symptoms of AWD and The

team visited, observed and identified vulnerable risk areas in each different Keble's of the district in the sub city. The following figures were among the place where identified as risk areas



Figure 7: risk are in woreda1 sub keble17 during AWD out break in Addis ketema sub city, Addis Ababa, 2016.



Figure 8: risk are in woreda2 during AWD out break in Addis ketema sub city, Addis Ababa, 2016.



Figure 9: risk are in woreda1 (America gebi) during AWD out break in Addis ketema sub city, Addis Ababa, 2016.

Water Hygiene, and sanitation

After identifying these risk areas at the sub-city level, hygiene and sanitation activities has been planned and done throughout the epidemic time: - the team has identified major community problems as shortage of latrine, overflowing toilets, toilets which are connected to rivers and solid and liquid waste problems. The sub city have planned and implemented basic interventions to overcome the problems as the result of these in all the woredas 1740 toilets was planned to be evacuated and 1053 was accomplished which is 61%, 244 toilets was planned to be repaired and accomplished which is 100%, 65 toilets were planned to be constructed but only 30 toilets were constructed, which is 46%, but nothing has been done on toilets which are connected to rivers. In related to construction of hand washing facility after toilet use 1015 was planned and 646 were accomplished. Regarding solid waste disposal 1002 solid waste places have been planned to clean by campaign out of which 1320 was accomplished which was >100%. In order to relieve water and sanitation hygiene problem AMREF international has prepared and given 3 days training for 30 youth on hygiene and promotion for selected risky woredas namely 3, 1,7, and 8. These groups have actively participated in hygiene and promotion for about two months. OXFAM also provided WASH equipment's for the CTCs.

Advocacy communication and community social mobilization coordination

Accordingly in all the sub city woredas awareness creation on AWD has been given for 156,428 people from different community parts. Besides to the fore mentioned awareness creation was also provided to butcher shops and vegetable and fruit venders. In order to create the community awareness in different level 110,443 IEC, BCC materials like Brochures, Posters and Banners have been distributed. The Ethiopian red cross society have been actively involved in social mobilization and education through transmitting key messages of AWD in all woredas of the sub city.

Environmental Investigation

Most houses were Keble owned in this sub city especially District 8, District 2 and District 7 which are not well built and low socio economic individuals are lived. Since the sub city is the most crowded environment in Addis Ababa due to the presence of main bus station who comes there in different corner of the country as well as the biggest market in Africa which is called merkatoWe collected water samples from tape water and woreda3 river case patients and sent to Addis Ababa health bureau regional laboratory. From these sent water samples the river and one tap water was

positive in culture in addition to this from different sites samples was taken where the patient complain to have exposure that especially in butcher shop, holy mineral water, juice house , kebele kebele restaurant etc. Due confidentiality and other purpose the regional laboratory personnel did not informed or responded each samples results

Logistic

This team involved to supply any necessary medical equipment, pharmaceutical drugs, infection prevention materials including PPE and others by communicating with Addis Ababa regional health office and partners such as medicine saints frontier (MSF). The Finance and economy minister and sub city leadership has allocated 345,000 Birr for overall AWD prevention and control activities and patient care. MSF Ethiopia has been provided support for woreda 10 treatment center since the beginning of the epidemic. To mention some of the supports; equipping the CTC with the required infection prevention materials, constructing temporary bath rooms and toilets for admitted cases, constructed temporary store for logistics, deployed 2 Health officers and 4 nurses to support the man power of the CTC in different shifts and two logistic officers.

Spray and infection prevention (IP) team

This team worked both CTC and community by doing disinfection with chlorine solution which was prepared according to cholera national guide line protocol depending upon the type of disinfectant to reduce contamination of patient's defecation and vomiting waste. All The teams has closely working within each other and other different bodies in the affected districts by Coordination woreda rapid response teams (RRTs) and the entire neighboring districts to prevent/control the outbreak from spreading to these areas, and alarming the community, health extension workers and community leaders to strength the local surveillance system.

Challenges

- There were latrines directly linked to river bank which are failed to be solved.
- Extreme latrine problem due to shortage of places due to this open defecation problem in most woredas are not solved.
- The over flow of liquid waste problem around Hotels were still not solved.

Discussion

The outbreak of AWD in Addis ketema sub city had taken long time to control .i.e., from June 11, 2016 to 18 October 2016. The attack rate of the sub city population were 27/10,000. The index case was reported from district3, Keble 7 on June 11, 2016, the date of onset of this case was on June 11/6/2016 and due to contact after three days, (14/6/2016) the second case (family of the index case) develop sign and symptom of AWD. According to descriptive result, this investigation revealed that AWD outbreak occurred in Addis Ketema sub city with a total of 862 suspected cases, of which 508(58.9%) affected persons were aged 15-44 years old. A study conducted in India which is almost similar with the findings stating that more cases of AWD were reported from the age group 20 - 60 years (38). This might be due to this groups are highly vulnerable for different exposures. However, this finding is inconsistent with a study done in Congo republic, which stated that The most affected age group was the 5-9 age group (22%) followed by under-five age group (13%) and the 25-29 age group (13%) (19) . this might be due to the study setting and number of enrolled participants .our finding is also consistent with a study done in Seirraleon, where the highest morbidity rate was found in the 15- 30 years age group(34). This could be related to differences in lifestyle, time spent outside home and expose meal outside home, contamination of different utility without safe care or other aspects of inadequate disease prevention among the young. The overall attack rate was (0.27%) and case fatality rate (CFR) was (0.23%) of this outbreak which was lower than the attack rate reported in some other studies in sierra lone ,The attack rate was 374/10,000 in the estimated population (2). This may be due to type epidemic pattern, duration which spent. Nigeria, A total of 784 deaths were documented given an overall CFR of 5.1% (10). This might be due to case management quality, denominator difference. North Jakarta , Indonesia, (3),We found an overall incidence of AWD of 0.5/1 000, India (40). but The attack rate was high as compared with a study done in the Buea Health District of Cameroon that stated as; no fatality was recorded from the data collected during this outbreak investigation with an attack rate of 0.03 % (41). According to this case- control study result: Based on the findings of our investigation, overall mean age of the respondents were $36.78 \pm 16.572SD$ with the range of minimum 10 years and maximum 89 years old and The mean age for cases was $42.72 \pm 19.482SD$ and for controls $33.81 \pm 14.08 SD$; this result is higher in a study conducted in Nigeria (10) showed The mean ages for cases were 24 ± 3 years and controls 30 ± 2 years. In this outbreak, males are more affected than females which constitute males 49(81.7%) and females 11 (18.3%). This finding

is inconsistent to a study conduct in central Africa which state that Women were more affected by the outbreak than men. Out of 172 notified cases, 90(52.5%) were women and 82(47.7%) were men.(19). 51.5% were female (10,651 out of 20,688) (10). This could be attributed to different factors like, cultural habit, working situation etc.an other study which conduct from Medipally Village show that inconsistent to our result which stated as follow, Both genders were equally affected (40).and Among the 135 participants, 57 (42.2 %) were males and 78 (57.8 %) were females (41).this might be the number of participant enrolled .

Our study also showed that having History of contact with suspected or confirmed AWD case and presence of infected person in the house are not statistically significant for this outbreak transmission .Our findings were not in line with another case control study conducted in Ethiopia ,Afar national region state (17).

According to this case-control study, the risk factors for AWD infection were as follows: In this study, in multivariable logistic regression model, we found several factors contributed to the occurrence of this AWD outbreak. The Majority of AWD cases independently associated with following factors: From the socio demographic factors; sex of respondents were showed significant association after adjusting the other variables (male for their sex (AOR = 8.48, 95% CI (3.82-18.82)) Controlling the other variables, having eat food outside home (AOR = 2.72, 95% CI (1.26-5.78])) , use of communal tap water for domestic use (AOR = 2.50, 95%CI (1.10-5.77)), And having drink holy (spiritual) water (AOR = 3.17, 95% CI (1.13-8.89)) were the only exposure factors which have showed statistically significant association with AWD diseases. the odds that eat food outside home was because of poor hygiene and sanitation was 2.72 higher to develop AWD as compared to not eat out side home , This findings is inconsistent from a study conduct in Cameroon which describe as (OR: 1.06, CI: 0.46–2.43, p = 1.00) (41). This Varity may be due to socio demographic and economic situations, hygiene and sanitation condition. Having eaten food out of home. Inconsistence to this, results of The current case control study carried out in Ethiopia ,Afar national region state , has also found that people eating foods out of their home had higher rates of morbidity(17) ,This may be due to the fact that, contaminated food or water containers almost in and around households, construction sites, factories and may be cross contamination .

The study also shows that the odds that males were 8.48 times higher to develop AWD diseases than females. This findings was inconsistent with study conducted in Haiti , showed that similar

proportions by females and males(42). This might be difference of cultural and personal habit in both males and females in different countries (settings).

On multivariable analysis, our study showed that, the likelihood of using of communal tap water for domestic purpose were 2.50 times higher to developing AWD diseases than these not use communal tap water for domestic purpose . This may be due to cross contamination with users, contaminated of utilities or containers, linkage of the pipe.

The likelihood of drinking holy water were about 3.17 times higher to develop AWD disease than for those who did not drink holy water. This might be due to contact of the infected person, contaminated utility and also contaminated of source of place of the holy water,

Limitation of the study

- ✚ Controls were not tested for serological evidence of recent cholera infection. Because naturally 80% cases remain asymptomatic.
- ✚ There might be recall bias regarding to remember for last five days exposure, especially for controls.
- ✚ It was not be able to study and interview more controls to increase power of study due to time and resource.

Conclusion

Confirmed acute watery diarrhea outbreak was occurred in Addis ketema sub city .People in the 15-44 years age group were more affected. In this outbreak the overall case fatality rate was greater than the nation .male for their gender and having drink holy water, communal tape water exposure for domestic use and having ate food outside from home. The hygiene and sanitation condition in each woreda residents were worst and multiple risk factors were found, and passive response for some responsive bodies which could resulted in increased number of cases and prolonged duration of an outbreak.

Recommendation

- Sub city health office should be give health education in the community and effective case management should be provide in CTC in order to prevent further complications and death
- Individuals who used foods out of their home should protect themselves from unsanitary hotels and restaurants
- Addis ketema Water authority office Provide safe water to the community
- Community use appropriate Sanitary disposal of human waste
- Males protect themselves from exposure of risk for AWD
- Sub city laboratories case team random checks chlorine concentration and presence of organisms (v. cholera) jointly with water authority.
- Community use communal tape water wisely with free from contaminated utility.
- Religious institutions ensured that all mineral holy water sites should be protected.

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Annex1: Cholera outbreak investigation tool: Part A: general information

s.no	Variables serial no/code	Response -----	Skip pattern
1	Patient status	Date of onset (dd/mm/yy) A/ case B/ Control	-----
2		Presenting symptoms	1/Watery diarrhea 2/vomiting 3/dehydration 4/other (specify)
3	Hospitalization	Hospitalized? C/ student D/ no job	1/ yes 2/no
4		Date of private hospitalization (dd/mm/yyyy) G/ house wife H/ employee I/ guard J/ others	
Religion:		A/ orthodox B/ Muslim C/ catholic D/ protestant E/ others	
Ethnicity		A/ Oromo B/ Amhara C/ tegrie D/ Gurage E/ wolaity F/ others	
Residential address:		Sub city..... Woreda..... Keble..... /House number.....	
Telephone number			

s.no	Variables	Response	Skip pattern
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Chapter II- Surveillance Data analysis Report

2.1. Surveillance Data Analysis report for Typhoid Fever in Addis Ketema Sub City, Addis Ababa city administration, Ethiopia, 2013 - 2015.

Abstract

Introduction: Typhoid fever is a serious systemic disease caused by Salmonella Typhi and characterized by fever and, abdominal symptoms. It is one of the most important public health problem in developing countries. It was estimated that over 2.16 million of typhoid occurred worldwide, and also a leading cause of morbidity in Addis ketema sub city.

Objective: the aim of this study was to describe distribution of typhoid fever Surveillance data in Addis Ketema Sub City.

Methods: Typhoid fever is defined as a patient with gradual onset of remittent fever (rising in step ladder fashion) in the first week, headache, arthralgia, anorexia, constipation and abdominal pain. Descriptive cross-sectional study was used .Reviewing the registration book as source from PHEM and HMIS report retrospectively from those who have suspected or clearly confirmation of widal fliex positive for typhoid fever from June 2013 -2015.Analyzed surveillance data of typhoid fever by using Microsoft Excel 2013.

Results: A total of 18,901 typhoid fever cases were reported with 6,300 cases per year. The mean ages were 18 years. The most affected Age group 5-14 and >15 year were 14.4% and

1. What is your regular source of water for domestic use in the last 5 days?	1/Household tap water 2/ communal tap water 3/ river 4/well 5/Borehole 6/ spring 7/ street vended water 8/Tanker water (roto) 9/bottled water 10/others (specify)	
2. What is your regular source of drinking water with in the last five days?	1/Household 2/tap water vended water 3/communal tap water 4/river water 5/ well 6/Borehole 7/spring 8/street 9. anker water (roto) 10//bottled 11/other (specify	
Did you treat the water before drinking?	1/yes 2/ no	If yes go to Q4
If yes, how did you treat it?	1/filter 2/boiling 3/aqua tab 4/water guard 5/bishangari 6/pure 7/other (specify)...	
5. Did you drink water from a holy water site in the last five days?	1/ Yes 2/no	If yes go to Q 6
6. If yes, what is the source of the holy water site?	1/spring 2/ Piped water 3/Well 4/ other (specify)...	
Food and beverages		
Did you eat any of the folloeing in the last 5 days?	1/Vegetable salad 2/fruits 3/raw meat 4/partially roasted meat 5/Fish 6/.milk 7/other (specify)...	

Where did you get (or buy) food for your household?	1/Local market 2/private garden /farm 3/street shops 4/Super markets 5/other (specify).....	
Did you eat food outside your home in the last 3 days?	1/ Yes 2/no	If yes go to Q10
If yes, where?	1/Sold by street vendors 2/hotel 3/restaurant 4/other (specify)...	
Did you eat any cold left-over food in the last 3 days?	1/Yes 2/no	If yes go to Q12
If yes, where is the source of the food?	1/Home 2/hotel 3/restaurant 4/University 5/other (specify).....	
Did you drink any of the following locally – made beverages in the last 3 days?	1/Shamata 2/ borde 3/besso 4/other (specify)...	
Hygiene and sanitation		
Do you systematically wash your hands with soap before eating?	1/Yes 2/No	
Do you have a latrine?	1/Yes 2/No	If yes go to Q16 If no go to Q17
If yes, communal or private?	1/Communal 2/private	
If no to Q.15, where do you discharge human waste (faeces)?	1/Open defecation 2/in the river 3/bury in the soil 4/other (specify)	
Did you wash your hands every time with soap after defecation?	1/Yes 2/No	
Where do you dispose of your refuse?	1/Open dumping 2/Open fit 3/in the river 4/bury 5/burn 6/other (specify)...	

Other exposures		
	In the last one week, did anyone in your household have diarrhea or vomiting?	1/Yes 2/ No
	Did you visit anyone having diarrhea or vomiting?	1/yes 2/ no
	Did you attend a funeral within the last five days?	1/ Yes 2/no
	Did you travel to a place affected with diarrhea and vomiting illness?	1/Yes 2/no
	if yes, where?	name of woredas ,kebele/ketene

84.15% respectively. 67.2%, of the cases were reported from Health Center followed by clinics 28.8%. Of the three years report, the highest cases were reported in 2015, which was 9547 (50.5%) with the prevalence rate of 4554 cases per 100,000 residents per year and the lowest report was in 2013, which was 4656 case (24.63%) with the prevalence rate of 1605 cases per 100,000 residents per year.

Conclusions: typhoid is a public health problem in Addis ketema. Individuals in age group of >15 years were the most affected. Majority of the cases were treated at outpatients department during past three years. There is no death occurred. Most of the cases were from Health Center. So better to give awareness to the community on typhoid fever transmission, control and prevention mechanisms by continuous health education for those affected >15 years age groups.

Keywords: Trend, Typhoid fever, Data analysis, Addis ketema, Addis Ababa, 2016.

Introduction

Background

Typhoid fever, a systemic infection caused by *Salmonella enterica* serotype Typhi (S. Typhi), is an important cause of morbidity and mortality globally(1). The disease remains an important

public health problem in developing countries. In 2000, it was estimated that over 2.16 million episodes of typhoid occurred worldwide, resulting in 216 000 deaths, and that more than 90% of this morbidity and mortality occurred in Asia(2). Diagnosing typhoid fever among the many causes of fever in sub-Saharan Africa is a huge challenge(3). With declining malaria rates and more widespread deployment of *Haemophilus influenza* and pneumococcal vaccines in many parts of the continent, the relative proportion of typhoid fever patients among patients with severe febrile illness presenting for care is likely to increase. The current gold standard for diagnosis of typhoid fever is blood culture. However blood culture requires a well- equipped laboratory, skilled staff, and may take up to seven days(3). Typhoid fever is a common illness in developing countries like India(4). The causative bacteria are transmitted fecal-orally. After ingestion, a 7 to 14 day symptomatic period ensues whereupon bacteremia presents as a persistent non-focal fever with malaise. The bacteria can induce a protracted illness that lasts several weeks, and while rarely fatal, the disease can result in life threatening complications including hypotensive shock and intestinal perforation(5). The systemic involvement in typhoid fever can result in extraintestinal complications such as encephalopathy, meningitis, hepatitis, myocarditis and pneumonia, while the most common gastro-intestinal complication is haemorrhage(6). According to the WHO, an estimated 22 million cases of typhoid fever occur annually, with at least 200,000 deaths. More than 90% of these cases are estimated to occur in Asia(7). In some underdeveloped areas of China, typhoid fever is still a serious infectious disease that severely affects lives of the patients. Stringent measures should be taken by the local government to decrease the occurrence of typhoid fever and avoid major health problems for patients based on the severity and high incidence rate of typhoid fever. Therefore, the need arises for a modeling approach that can provide decision makers early estimates of future typhoid fever incidence based on the historical time series data. The goal is to monitor and predict the trends in typhoid fever incidence to facilitate early public health responses to minimize morbidity, mortality and the adverse clinical outcomes of the patients. Several complex statistical models have been proposed to forecast the occurrence of typhoid fever and a typical example is the type of mechanistic models proposed by Cvjetanovij (7). Accurate diagnosis of typhoid fever at an early stage is important not only for diagnosis of etiological agent, but also to identify individuals that may serve as a potential carrier, who may be responsible for acute typhoid fever outbreaks(8). Although Widal test has been in use for more than a century, the value of the test to diagnose typhoid fever has been debated for as many years as it has been available(8).

Typhoid fever is an exclusively human enterically transmitted systemic disease caused by infection with the bacterium *Salmonella enterica* serovar Typhi. Although largely controlled in Europe and North America, typhoid remains endemic in many parts of the world, notably Asia, where it is an important cause of febrile illness in crowded, low-income settings(9). In the early twentieth-century, public health officials were debating the best methods of evaluating typhoid vaccine effectiveness, and whether vaccination was a distraction from improvements in sanitation and hygiene(10). Recent evidence suggests that environmental reservoirs of infection may also support disease transmission. The risk of typhoid fever is associated with environmental factors, including proximity to open sewers and highly contaminated water bodies, residence in low elevation areas, and rainy season(11). Prevention and control of typhoid fever in endemic areas involves a comprehensive approach, including increasing access to safe water and sanitation, promotion of proper hygiene and food safety, and, in some settings, typhoid vaccination. Two typhoid fever vaccines have proven safety and efficacy, and one, the typhoid Vi polysaccharide vaccine, Typhim Vi (Sanofi Pasteur SA, Lyons, France), has been prequalified by the World Health Organization (WHO) (12). Infants, children, and adolescents in south-central and south-eastern Asia experience the greatest burden of illness(13). Typhoid and paratyphoid fever most often present as clinically similar acute febrile illnesses and accurate diagnosis relies on laboratory confirmation(13). However, there is no specific recommendation for typhoid vaccine use in post-disaster settings, and use in endemic settings remains limited. Recently, typhoid vaccination is increasingly being considered an important intervention in high incidence settings, because substantial time and resources are required to implement the long-term infrastructure and behavior changes needed to reduce disease burden, and antibiotic resistance of Typhi strains are emerging, which limits treatment options.(14). We set out to compare incidence of *Salmonella enterica* serovar Typhi (S. Typhi) bacteremia in a densely populated urban slum and a rural community in Kenya, hypothesizing higher rates in the urban area, given crowding and suboptimal access to safe water, sanitation and hygiene and the high rates within urban settings in Asia with similar characteristics.(15). Malaria and typhoid fever are a major public health problem in tropical and subtropical countries caused by very different organisms, protozoa and Gram negative bacilli, respectively, and transmitted via different mechanisms(16). The estimated total number of world typhoid fever episode in 2010 was 13.5 million(16).

Statement of the problem

Typhoid fever remains an important public health problem in developing countries. In 2000, it was estimated that over 2.16 million episodes of typhoid occurred worldwide, resulting in 216 000 deaths (2). The cases were increased in 2010 and reached 26.9 million episodes per year. More than 99% episodes and deaths were from Sub Saharan Africa and South Asia and Latin America/Caribbean counties. Mainly, it affects children and young adults from 5 to 25 years of age. From the total burden of the world Sub Saharan Africa took place about 47.5% and median incidence rate per 100 000 p-years (IQR) in 2010 was 724.6 (603.6, 845.6). (5, 6) Recent evidence suggests that environmental reservoirs of infection support disease transmission. The risk of typhoid fever is associated with environmental factors, including proximity to open sewers and highly contaminated water bodies, residence in low elevation areas, and rainy season(11). Infants, children, and adolescents the greatest burden of illness(13). Typhoid and paratyphoid fever most often present as clinically similar acute febrile illnesses and accurate diagnosis relies on laboratory confirmation(13). Prevention and control of typhoid fever in endemic areas involves a comprehensive approach, including increasing access to safe water and sanitation, promotion of proper hygiene and food safety, and, in some settings, typhoid vaccination. 6 Two typhoid fever vaccines have proven safety and efficacy, and one, the typhoid Vi polysaccharide vaccine, Typhi Vi (Sanofi Pasteur SA, Lyons, France), has been prequalified by the World Health Organization (WHO (12). However, there is no specific recommendation for typhoid vaccine use in post-disaster settings, and use in endemic settings remains limited. Recently, typhoid vaccination is increasingly being considered an important intervention in high incidence settings, because substantial time and resources are required to implement the long-term infrastructure and behavior changes needed to reduce disease burden, and antibiotic resistance of Typhi strains are emerging, which limits treatment options.(14). The current gold standard for diagnosis of typhoid fever is blood culture. However blood culture requires a well- equipped laboratory, skilled staff, and may take up to seven days(3). Although Widal test has been in use for more than a century, the value of the test to diagnose typhoid fever has been debated for as many years as it has been available(8).Ethiopia, as part of Sub Saharan Africa and developing country, Typhoid fever is common public health important; Clinically reported data by Anti-Epidemic Service from 1959-1969 indicated that 17.3 cases per 100,000 populations. Studies in 1990s show that typhoid fever was cause of hospital admission in adults and also Ethiopian children were child(7). Since 2012 Ethiopia comprised strong surveillance system to truck burden of Typhoid fever in the community and now the

infection has routine surveillance system(8) and it is one of the seven weekly reportable diseases on PHEM guideline (9).The aim this data analysis is to asses magnitude of typhoid fever which is compiled by the surveillance system.

Rationale of the analysis:

Ongoing analysis of surveillance data is important for detecting outbreaks and unexpected increases or decreases in disease occurrence, monitoring disease trends, and evaluating the effectiveness of disease control programs and policies. This information is also needed to determine the most appropriate and efficient allocation of public health resources and personnel. Analyses should be performed at regular intervals to identify changes in disease reporting. These analyses can be performed using standard or scientific approaches .Findings of analyses should be reviewed regularly and provided as feedback to medical providers and others in the community who are asked to report cases. Often additional, special analyses are needed to answer specific questions that arise; these analyses may require additional customized approaches beyond what are routinely performed .So in Addis Ketema Sub City there is starting of PHEM and communicable diseases control experts and also the trend of doing surveillance data analysis were not performed regularly and they do not use data for decisions making purposes. Therefore, this surveillance data analysis study will help to identify Addis Ketema Sub City incidence and trends of typhoid fever disease for three years duration from June 2013 up to 2015.

Literature review

The clinical presentation of typhoid fever varies from a mild illness with low-grade fever, headache, myalgia/arthritis, dizziness, severe clinical picture with abdominal discomfort and multiple complications such as diarrhea, vomiting, anorexia, weakness, sore throat, nausea, chest discomfort, constipation (1). These clinical manifestations and severity of the disease vary by ethnicity, geography, initiation of appropriate therapy, the choice of antimicrobial treatment, age, the previous exposure or vaccination history, the virulence of the bacterial strain. (1, 2) Severe forms of disease may involve delirium, shock, and intestinal perforation or hemorrhage. Immunocompromised people are at are more likely exposed to severe disease. (3). Humans are the only natural host and reservoir of Typhoid fever. It is transmitted by ingestion of food or water contaminated with faeces and urine. After ingestion, a 7 to 14 day symptomatic period ensues whereupon bacteremia presents as a persistent non-focal fever with malaise. The bacteria can induce a protracted illness that lasts several weeks, and while rarely fatal, the disease can result in life threatening complications including hypotensive shock and intestinal perforation(5). Ice cream is recognized as a significant risk factor for the transmission.(1) The transmission is less in industrialized counties and very common and endemic infection in developing countries.(4) The systemic involvement in typhoid fever can result in extra intestinal complications such as encephalopathy, meningitis, hepatitis, myocarditis and pneumonia, while the most common gastro-intestinal complication is hemorrhage(6).

Typhoid fever causes an estimated 22 million illnesses and 216,000 deaths annually worldwide, with the majority in resource-poor countries in south Asia and sub-Saharan Africa(24). Typhoid fever causes considerable disease burden, with recent estimates at 21.6 million illnesses in 2000 and 26.9 million in 2010(17). Typhoid fever remains a significant threat to the health of individuals in developing countries.(18). Infants, children, and adolescents in south-central and south-eastern Asia experience the greatest burden of illness(13). Children and young adults are the most vulnerable population for developing typhoid fever(25) The major sources of *S. typhi* infections in developed countries, including the United States and the United Kingdom, are from travelers returning from the Indian subcontinent or other endemic regions.(26). Two typhoid vaccines, an injectable VI polysaccharide (ViPS) and an oral, live-attenuated Ty21a strain of *Typhi*, are licensed in many countries for persons ³ 2 years of age. The ViPS vaccine is ~70% effective and is administered as one dose with immunity lasting 3 years, and the Ty21a vaccine is 53–78%

effective and is administered as 3–4 doses with immunity lasting 5 years(27). There are a variety of hypotheses that could explain the large increase in typhoid fever cases in Blantyre, including(28). A number of cultural, social and environmental factors are associated with the occurrence of typhoid in different endemic settings(29). Surveillance data is conducted in Nigeria showed that Nigerian isolates of genotypes 2.2.0 and 2.3.1 were closely related to isolates from neighboring Cameroon and West African countries and not found elsewhere, supporting regional transmission similar to the dominant genotype 3.1.1 (30). Beginning in June 2009, an outbreak of unexplained febrile illness occurred in villages along the border region between southern Malawi and western Mozambique(31). Transmission of the pathogen is via the fecal-oral route, with humans as the sole reservoir of infection. Transmission is via consumption of contaminated food/water or contact with chronic asymptomatic carriers(32) . Case-control studies indicate that the predominant route of transmission of typhoid fever varies both in time and location.(33) . The Kenya Medical Research Institute-Centers for Disease Control and Prevention collaboration (KEMRI-CDC) has conducted active population-based surveillance for febrile illness(34). Routine vaccination along with a one-time catch-up campaign is predicted to lead to the largest decline in incidence(35).

Objectives

General objective

- ❖ To describes distribution of typhoid fever Surveillance data in Addis Ketema Sub City from June2013 to 2015, Addis Ababa, 2016.

Specific Objectives

- To describe the distribution of typhoid fever cases by person, place and time from June
- To determine the magnitude of typhoid fever in Addis Ketema Sub City
- To assess trend of typhoid fever in the last three years in Addis ketema sub city

Materials and Methods:

We conducted retrospective study of descriptive cross sectional surveillance data analysis of typhoid fever diseases by reviewing the registration book of surveillance(PHEM report) and HMIS which comes different health institutions those who have suspected or clearly confirmation of widal positive for typhoid fever for three years period of time or annual report of three consecutive years from June2013 up to 2015 , then typhoid fever surveillance data of the sub city was obtained from registration books or HMIS by Surveillance focal person of Addis Ketema Sub City .Analyzed routine weekly surveillance data of typhoid fever by using micro soft Excel 2013 and manage by others as necessary such as Zotero standalone software for citation and referencing so as to organize or describe the surveillance data appropriately.

Study area and period

The study of analysis of typhoid fever surveillance data was conducted in Addis Ketema Sub City (retrospectively last three years period of time i.e. June 2013 up to 2015) from may25-June2, 2016. Surveillance data for typhoid fever cases was collected at all levels of the health delivery system using checklist from the above listed source in Addis Ketema Sub City

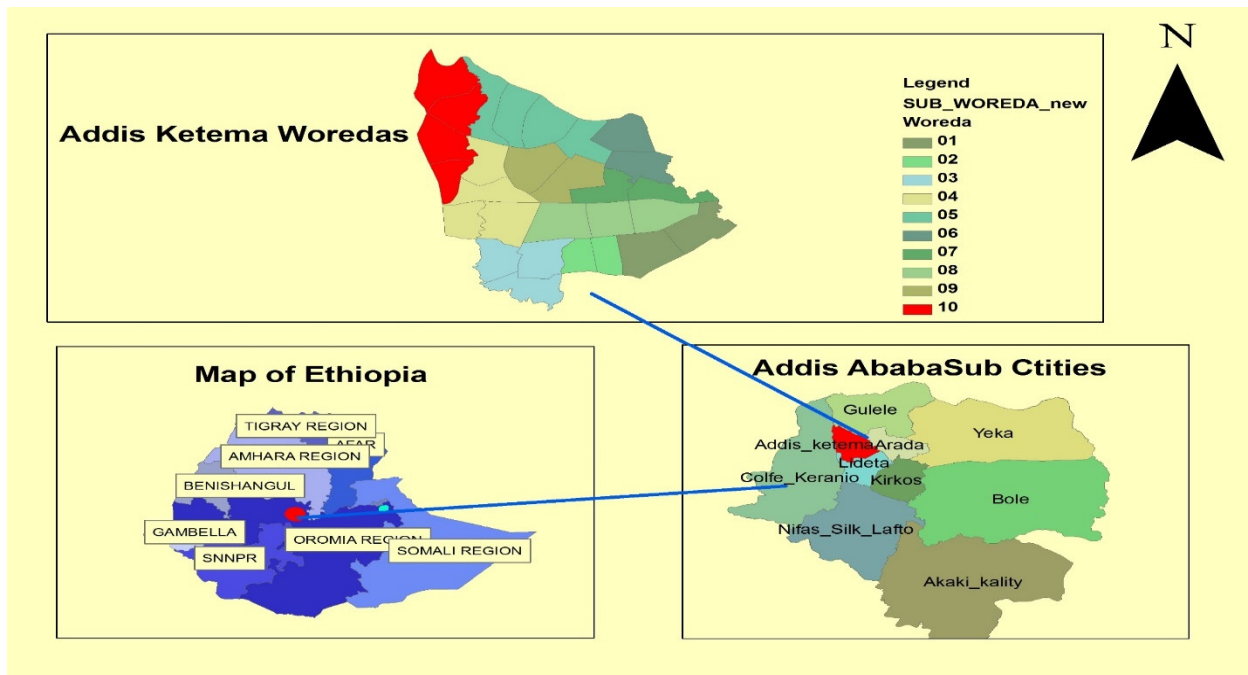


Figure 10: map of Addis ketema with respective woreda, Addis Ababa, 2015.

Study Design

Descriptive cross-sectional review of secondary data of typhoid fever cases based on reports from Addis Ketema Sub City during June 2013 up to 2015 was done.

Source of data

Data was obtained from data base of HMIS and surveillance registration book of the sub city, the data was represent typhoid fever patients from whom laboratory results were received or clinically suspected during 2013-2015.

Data Analysis Procedures

The data analysis was entered and analyzed by using Microsoft office excel 2013.

Sample size and sampling method

The study included all typhoid fever cases reported for last three year period of time from June, 2013 to 2015 from the sub city presented in PHEM and HMIS data base. Purposive sampling technique was used to select years in sub city based on considering the year which might have include complete data of typhoid fever in the data base and the case based its burden.

Inclusion criteria

Reports registered was included from the time period of June 2013- 2015.

The variable includes the total typhoid fever out patients and inpatients related with the sub city and each its districts (Place) and also with Week, Months, and Year (Time). Deaths caused by typhoid fever also included in the variables.

Exclusion criteria

Reports registered prior to 2013 as well as the line lists with incomplete data elements (variables) were excluded.

Dependent variables

- Typhoid fever cases

Independent variables

✚ Age

✚ Sex

✚ Residency

✚ Time

Case definition

➤ Suspected typhoid fever case:

Is any person with gradual onset of remittent fever (rising-in step ladder fashion) in the first week headache, arthralgia, anorexia, constipation and abdominal pain.

➤ Confirmed measles case:

A suspected case with Widal test, 'o' titer of 1/160 and more, is very suggestive, a suspected case with positive blood culture at the first week or positive stool culture at 3rd, 4th and 5th week of illness very definitive.

Data Quality Management

Before entering and analyzing variables that are documented in HMIS and PHEM data base, we check the variables whether they complete or not.

Ethical consideration

Official Permission letter was obtained from Addis ketema sub city Health office Health promotion and disease prevention Core Process Owner to the study area of concerned body from that sub city. The purpose and objective of the study was briefly explained to the responsible authorized personnel of the sub city based on their level of responsibility.

Dissemination of the Results

As soon as the surveillance data description was finalized, the Report /result of this Typhoid Fever surveillance data analysis study was prepared to present Saint Paul's Hospital Millennium Medical College, departement of public health, disseminate and shared timely Addis for Ketema Sub City, by hard copy and electronic soft copy and for other stakeholders or relevant offices for using as a report baseline and can also be presented in different review meetings.

Results

Trends of typhoid morbidity and mortality

a total of 18,901 cases and no deaths (CFR=0.0%) were registered or reported concerning cases of Typhoid Fever among persons from all woredas in Addis ketema sub-city during the last three years from 2013 to 2015. Among them, 8114(42.9%) were males and 10,787 were females. The proportion of males and females among these cases reported for the period 2013 – 2015 was a male to female ratio of 8114:10,787) of almost 1: 1.3. The mean was 6300 cases per year, ranges between 4656 and 9547. On the other hand, out of which 278 (1.5%) were under 4 year (144 males and 134 females); 2718 (14.4%) were 5-14 years (from these 1331 males and 1387 females); 15,905 (84.15%) were >15years (among them 6639 males and 9266 females).

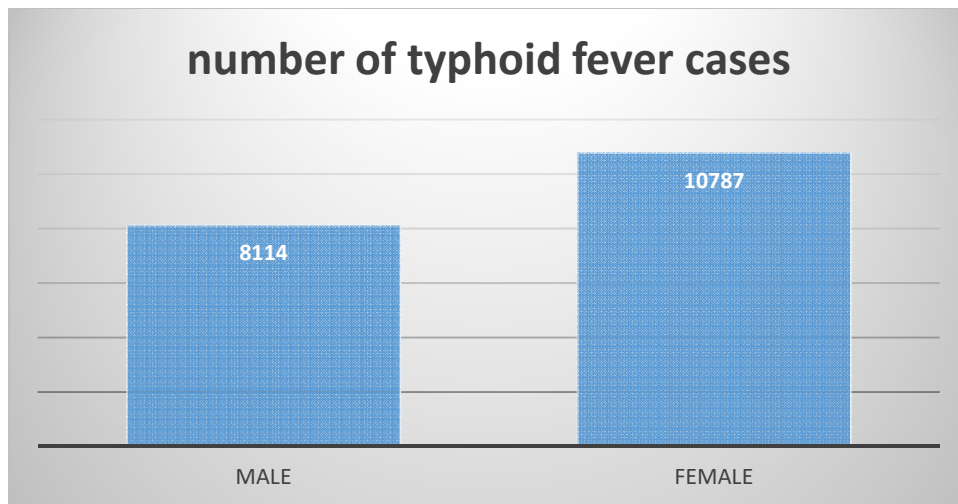


Figure 11: Distribution of Typhoid fever case by sex in Addis ketema sub city, Addis Ababa from 2013 to 2015.

The most affected age group is >15years 15905 (84.15) next to 5-14 year age groups which accounting for 2718 (14.4%). The least of reported cases were from below 4 years age groups which accounted for 278(1.5%).

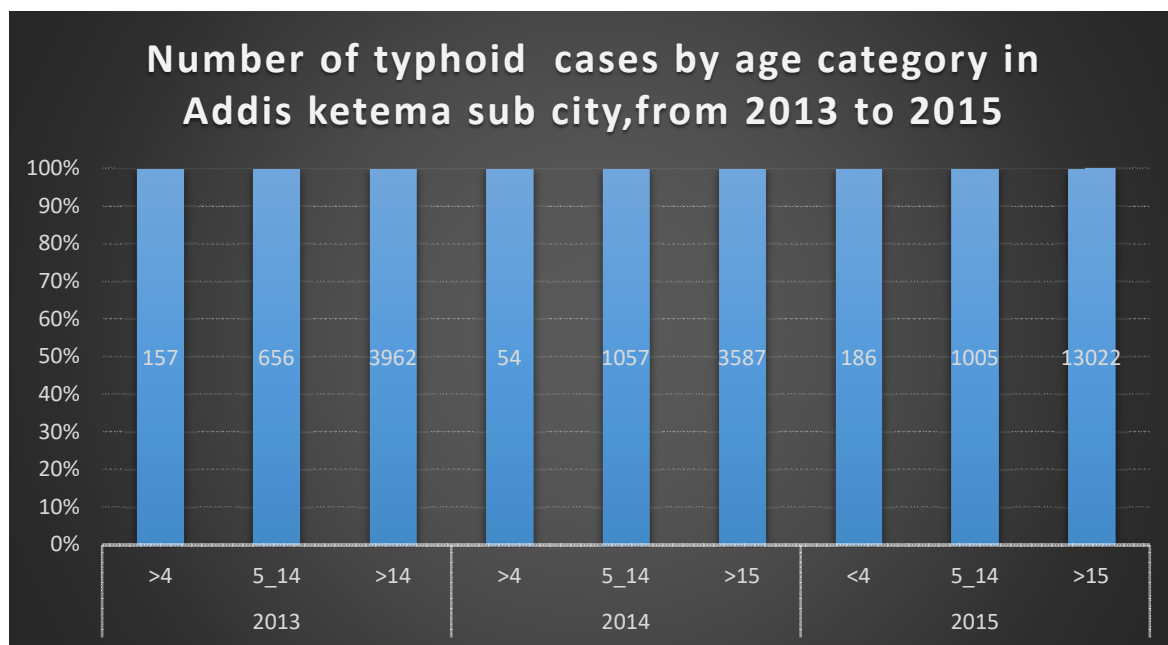


Figure 12 : Distribution of typhoid fever case by age groups and years in Addis ketema sub city, Addis Ababa city administration, 2013 to 2015.

The total typhoid fever reported cases in Addis ketema sub city were; 1708(9%) in woreda1, 1391(7.4%) in woreda2, 1752 (9.3%) in woreda3, 2548(13.5%) in woreda4, 1719(9.1%) in woreda5, 1714(9.1%) in woreda6, 2059(10.9%) in woreda7, 2226(11.8%) in woreda8, 1740(9.21%) in woreda9 and 2044(10.8%) in district10cases were reported from each district.

Table 7: Number of cases, death and prevalence of typhoid fever by woreda in Addis ketema sub city, Addis Ababa, 2013-2015.

Woreda	Population At risk (2013-2015)	No of cases	No of death	percent		Case fatality ratio	Prevalence per 100000
				case	death		
Woreda1	112833	1708	0	9%	0	0	1514
Woreda2	92030	1391	0	7.4%	0	0	1511
Woreda3	98697	1752	0	9.3%	0	0	1775
Woreda4	112308	2548	0	13.5%	0	0	2269
Woreda5	101302	1719	0	9.1%	0	0	1697
Woreda6	78636	1714	0	9.1%	0	0	2180
Woreda7	96897	2059	0	10.9%	0	0	2125
Woreda8	67216	2226	0	11.8%	0	0	3312
Woreda9	97272	1740	0	9.21%	0	0	1789
Woreda10	57061	2044	0	10.8%	0	0	3582
Sub city	914368	18901	0	100%	0	0	2067

Table 8: cumulative number of cases and deaths by year in Addis ketema sub city, Addis Ababa, 2013 to 2015.

year	Population At risk	# cases	# death	percent		Case fatality ratio
				cases	death	
2013	297553	4656	0	1.67	0	0
2014	304694	4698	0	1.54	0	0
2015	312121	9547	0	3.058	0	0
Total	616815	18901	0	3.06	0	0

When we see number of reporting cases in terms of times 4656(54%) in 2013, 4698(24.9%) in 2014 and 9547(50.5%) case were reported. This shows the incidence rate was higher and there were no deaths not only both 2013 and 2014 but also 2015 year. There is no constant peak time throughout the three years. However, there was a small peak in year 2013. Furthermore, there was a peak in 2015. Overall, the prevalence was not uniform, but it was an increasing mode. Further information presented on figure 10.

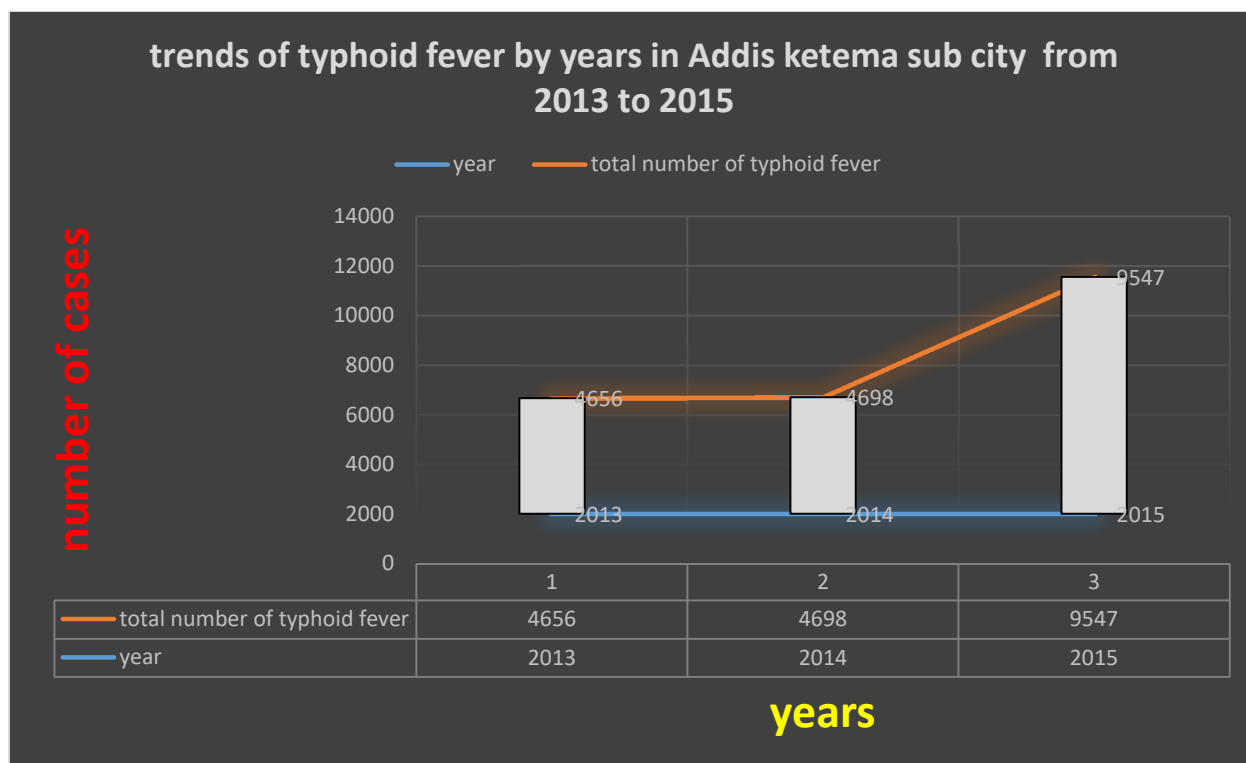


Figure 13: Trends of Typhoid Fever by year in Addis ketema sub city, Addis Ababa, from 2013-2016.

Majority of cases were reported as an outpatient and some are as inpatient. Comparing each reporting woredas of the sub city much numbers of the cases were reported mainly from 2 woredas namely woreda4 and woreda8 .woreda1, woreda2, and woreda6 reported few numbers of typhoid fever cases in relative to from other woredas. Typhoid fever prevalence rates were 1602, 1579 and 3133 cases per 100,000 populations per year for 2013, 2014 and 2015 respectively. Different pattern in the distribution of cases was seen in three years period. In 2015, peaks in the number of reported cases occurred and the first two years minimum in related to the second peaks. There is no registered occurrence of deaths in each years .From the total typhoid fever reported cases there is no clear figure about whether laboratory confirmed, confirmed by epidemiological linkage and clinical compatible.

number of typhoid fever cases by each woreda within each year in Addis ketema sub city from 2013 to 2015

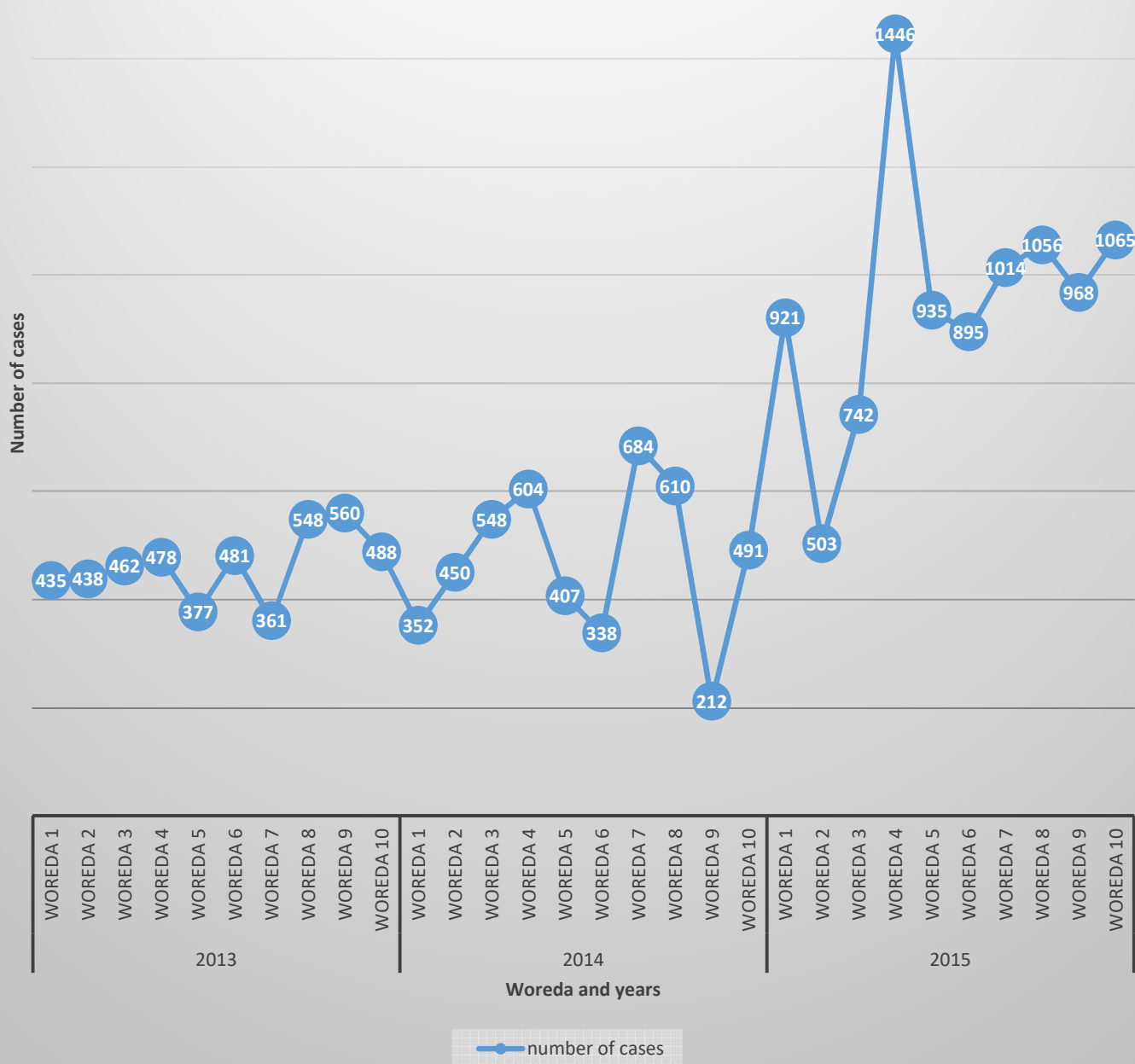


Figure 14: Trends of Typhoid Fever by year and woreda in Addis ketema sub city, Addis Ababa, from 2013 to 2016.

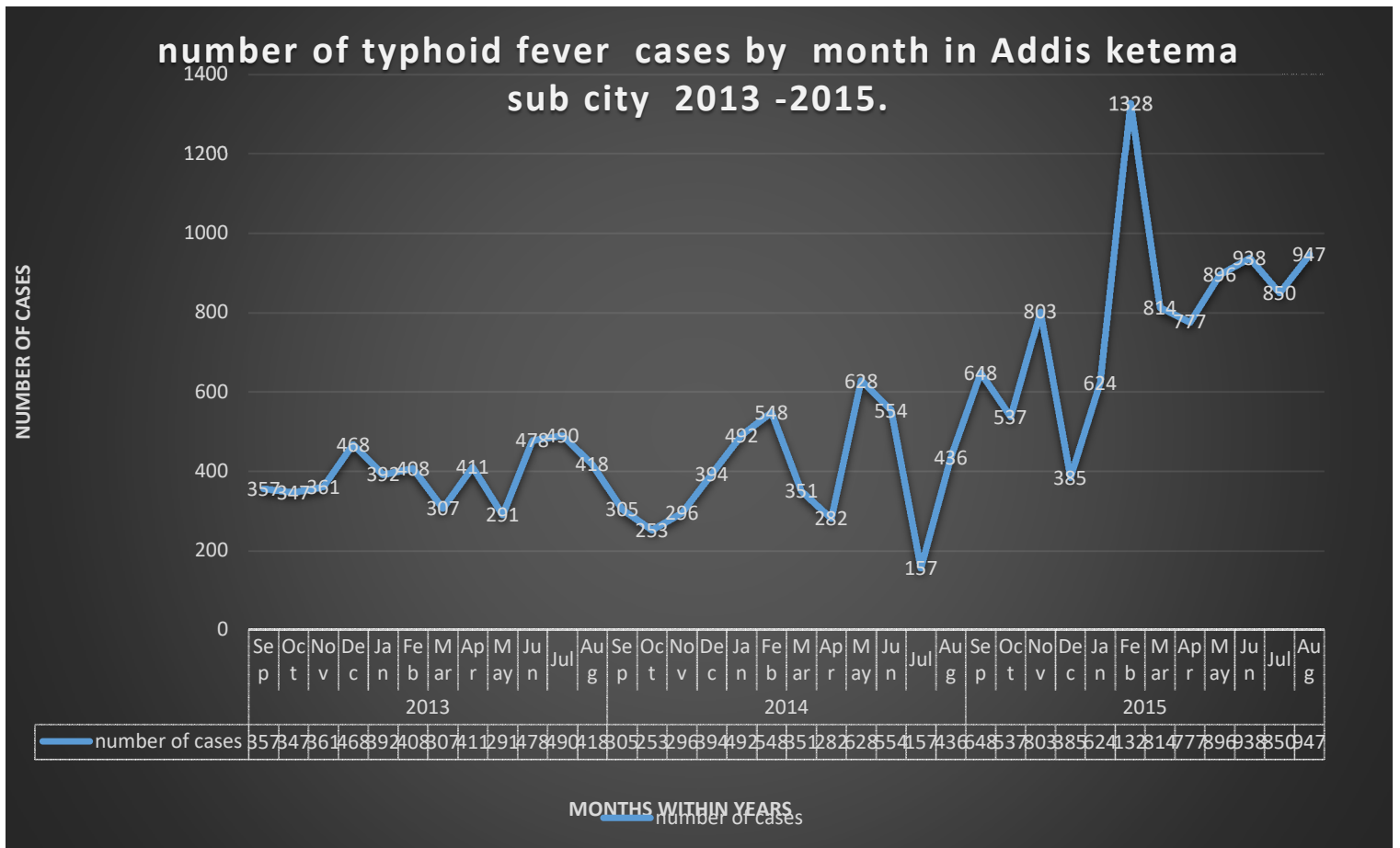


Figure 15: trend of typhoid fever cases by month and year in Addis ketema sub city, Addis Ababa city Administration, from 2013 to 2015.

Source: Addis ketema sub city health office PHEM report from 2013-2015.

There is no constant peak time throughout the three years. However, there was a small peak on July from 2014, May from 2013 and December to 2015. Furthermore, there was a peak on February and August in 2015 and on November 2015. Overall, the prevalence was not uniform, but it was an increasing mode. Further information presented on above with the prevalence per 10000 in each year and month.

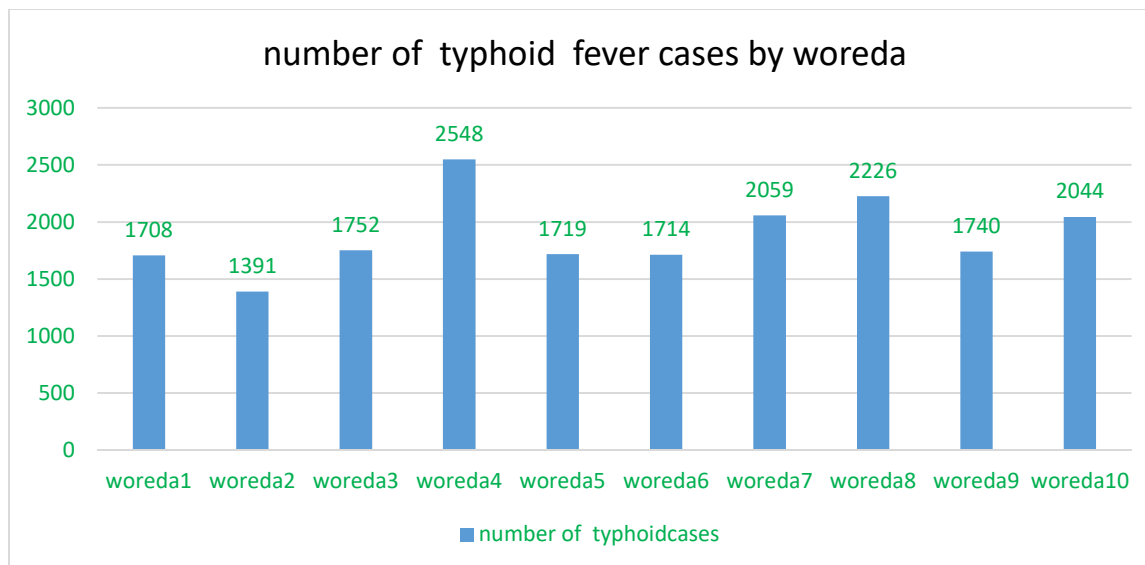


Figure 16: Distribution of typhoid fever cases by woreda Addis ketema sub city, Addis Ababa city Administration, 2013-2015.

In over all, woreda10 had high prevalence which was 3582 case per 10,000. In all years, this woreda had greater prevalence rate than other woredas. Woreda 8, highest prevalence rate registered next to woreda10, which were 3312 cases per 10,000 and Followed by woreda4, 2269 cases per 10,000 in the same year. The lowest prevalence registered in some woredas like woreda1, woreda2, and woreda5 less than cases per 10,000 were recorded in the other woredas.

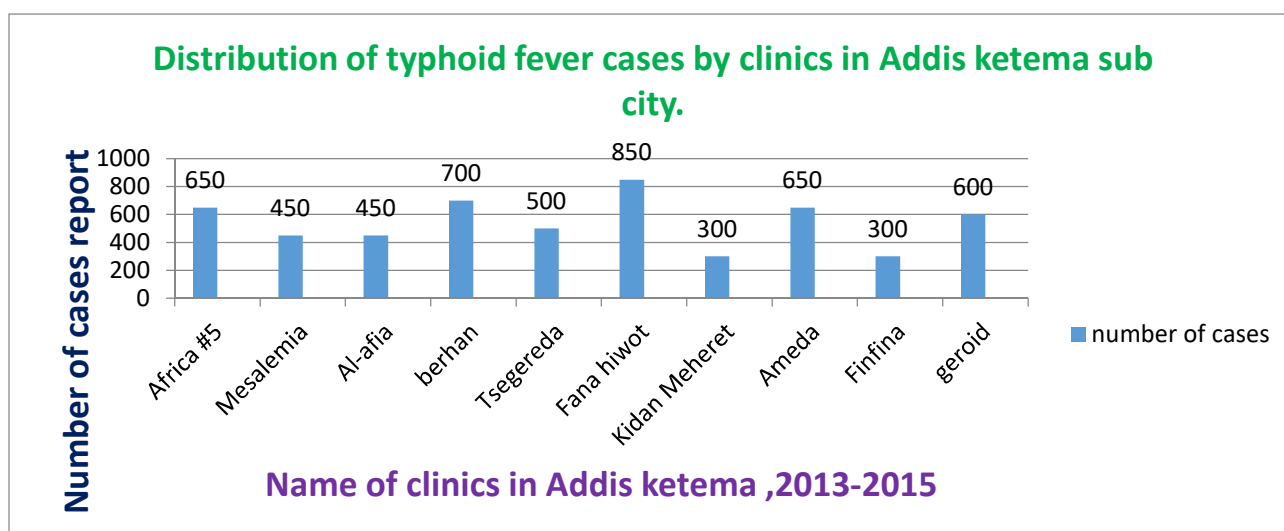


Figure 17: Average Number of cases by clinics in Addis ketema sub city, Addis Ababa from 2013 to 2015.

Of the total 5450(28.8%) of typhoid fever cases reported from 10 Clinics; majority 850(15.6%) of typhoid fever cases were reported from Africa #5 Higher Clinics.

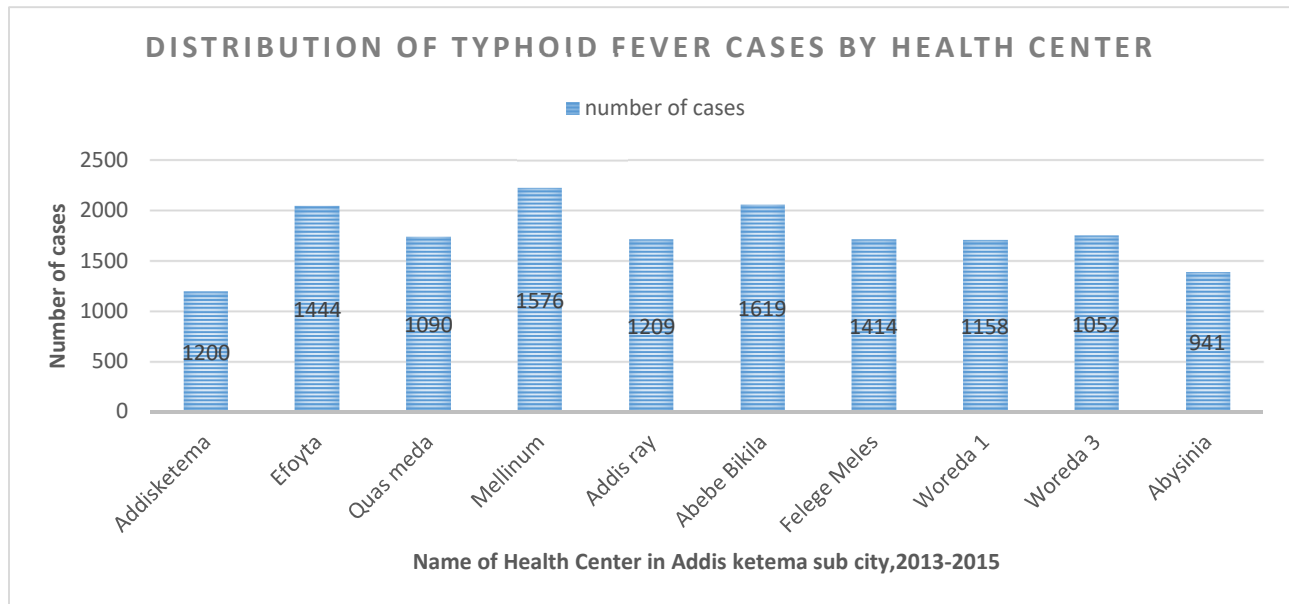


Figure 18: Distribution of typhoid fever cases by Health center in Addis ketema sub city from 2013-2015, Addis Ababa, 2016.

Of the total 12703(67.2%) of typhoid fever cases reported from 10 Health Center; majority 1576(12.4%) of typhoid fever cases were reported from Millennium Health center.

Discussion

The burden of typhoid fever increased in Addis ketema sub city over the last three years. All Woredas reported typhoid fever cases from 2013-2015. Majority 2548 (13.5%) of typhoid fever cases were reported from woreda 4 followed by Woreda 08, woreda 07 and woreda 10, 11.8%, 10.9% and 10.8% respectively. The majority of typhoid fever cases were treated as outpatients, only 35% of typhoid fever cases were admitted to hospital and also another study conducted in Pemba, Zanzibar shows that Two thirds of the typhoid fever patients were treated as outpatients and the remaining one third typhoid fever cases were admitted (36). This is similar to our study findings. The prevalence rate of typhoid fever cases in outpatient department increased dramatically through a year of 2013 to year of 2015 in Addis ketema sub city, The increment might be occurred because of establishment of new either private or public health facilities and health facilities those are not reporting before started reporting under HMIS or PHEM which was a total of 45 health facilities in 2013) increased to 71 health facilities in 2015). In 2013. A study conducted in Kathmandu, Nepal, showed that Males and females with number of typhoid fever did not differ (5). But this finding is differ from our result findings which stated as follow; Majority 78.3% were males and the rest 21.7% were females. Our study result show that majority cases are females this is similar to a study conduct in Zimbabwe in 2012 (1) this is may be due to a greater risk of exposure through household activities, including exposure of contaminated food and caring for children. Majority of the patients were (55.7%) in the age group of 15-30 years, (39.6%) and another study in Asia revealed that majority age group were diagnosed in between 5-15 years (17,2). These results are inconsistent with our study finding such as, the most affected age groups were the above fifteen years (>15). This finding is consistent from the study conducted in Ethiopia which showed the Out of the 46 typhoid patients 28 (61%) were female (3). In Addis ketema sub city, mostly performed diagnosis is Widal test at all health institution i.e. Health centers and hospitals. Although robust and simple to perform, this test lacks sensitivity (the ability to detect true positive) and specificity (the ability to detect true negative), and reliance on it alone in areas where typhoid is endemic may lead to over diagnosis. Therefore, due to the lack of specificity and sensitivity, the identification of true cases is very difficult for diagnosis and the Positive cases for Widal test might not be positive for typhoid fever. Therefore, the imperfection of the test makes very difficult for the diagnosis and treatment of typhoid fever early and may affect the incidence rate this is similar with the study done in St. Paul's general Specialized Hospitals (8). The sub city prevalence in 2013,

which was 1605 cases per 10000 population ,1542 cases per 100000 population in 2014 and 4554 cases per 10000 population in 2015 . This finding has similar increasing pattern compared with a study conducted in Guangdong, China from 2007–2012, showed an increasing trend from 2007 to 2012(37). The infection is more common from February to April in this sub city when the rain helps spread already contaminated water supplies this is consistence the study which is done in South Dumdum municipality, West Bengal, India , which is From February to April (38). Due to this each year sensitization training was given to health professionals and the community to ready themselves for prevention and control regarding to seasonal diseases like acute watery diarrhea including typhoid fever and other related disease, this may be rain start in this month. In addition, health centers staffs also are giving health education in health center as routine activities in the morning session. For this reason, the awareness of the community is increased and the health seeking behavior of the community also increased. Cases, from 2013-2015 a total of 18901 typhoid fever cases were reported or recorded in Addis ketema sub-city. When we look at the trend the reported cases from 2013-2015, 4656(24.63) in 2013, 4698(24.85) in 2014 and 9547(50.5) in 2015 years .Each year showed increasing trend this might be due to increased awareness of the health workers on active case search or might be improvement of diagnostic materials in each health institutions. All Woredas reported typhoid fever cases from 2013-2015. Majority 2548(13.5%) of typhoid fever cases were reported from woreda 4 followed by Woreda 08 ,woreda07 and woreda10, 11.8%,10.9 and 10.8% respectively. This can be due to environment of low socio economic status of the community, overcrowding and since these woredas are located near the country across bus station there are so many immigrants each day from each region of the country side (rural). Due to the above causes not only typhoid fever but also other communicable disease such as at the study period of this finding, there was rumor of relapsing fever outbreak. High increment relapsing fever in these woredas especially woreda7 and woreda1 in Addis ketema sub city. Majority 67.2% of typhoid fever cases were reported from Health center followed by Hospitals and Clinics 8.5% and 28.8% respectively.

Limitation

- Since data are not available regarding to each age group of the population, it was impossible to analyze the data by each age groups and sex because not only the PHEM reporting Format but also vital statics lacks those personal information's.
- majority of private clinics were not included in this surveillance data analysis because

They were not in line the reporting system. Therefore, number of Cases could be greater.

- There is a great discrepancy of recorded data between HMIS and PHEM.
- Large gap in age grouping system especially in adults was the other problem in HMIS. This could obscure to know which one is the most affected group.
- The data availability of case did not incorporate in the network for all health facilities this may underestimate the typhoid fever cases.

Conclusion

In general, in this data analysis, Typhoid is a major public problem of the region and increasing over the last three years in Addis ketema sub city. Cases were highest in Individuals in age group of >15 years and lowest among 5-14age of groups. Majority of Typhoid fever cases were treated at outpatients department during past three years. In other words we determined that the highest rates of typhoid fever occurred at outpatient department .the highest number of typhoid fever cases was reported from Health Centers, of which woreda4 and woreda8 was the leading one. In addition, when we see the reported cases by year, the highest number of typhoid fever cases reported in 2015. Majority of cases were females. There is no death occurred.

Recommendation

1. Awareness creation activities, health education on personal hygiene and environmental sanitation activities should be conducted in a strengthen way in the sub city.
2. The PHEM reporting formats lack some personal information some important Information concerning personal identification should be included.
3. Continuous surveillance should be data analysis done and the findings should be distributed to the concerned bodies or stakeholders for response.
4. Records or registers of HMIS and PHEM should be compare contrast each other with a fixed time schedule and solutions should be made to correct further errors on timely basis.
5. Bureau of different institutions and other concerned sectors should be working in collaboration with the health offices and facilities to implement preventative and control measures for typhoid fever.
6. Typhoid fever surveillance system should be strengthening in the sub City, especially Woredas with high typhoid fever cases.

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Annex 1: Typhoid fever surveillance data analysis tools.

Informed Consent:

Dear Addis ketema sub city health office head and workers, this is a questionnaire designed to collect information for last 3 years 2013-2015 Typhoid fever surveillance analysis which is being conducted from different health institution in under Addis ketema health office to analyze and interpret the surveillance data. Hence, you are kindly requested to cooperate with me throughout the period of data collection and analysis (May 1/2016 to June 2/2016). I thank you for your collaboration with me.

For your agreement please select one option: Yes ☐ **No** ☐

Name of Sub City: _____ Region _____

Name of academic Mentor: _____

Name of field supervisor: _____

Name of Investigator: _____

1. Number of outpatient, inpatient and death cases Typhoid fever weekly Addis ketema sub city health office from 2013 to 2015.

Reporting year (in weeks)	Out patient	In patient	Death	Remark
2013/14/15				
Week1				
Week2				
Week3				
Week4				
Week5				
Week6				
Week7				
Week8				
Week9				
Week10				
Week11				
Week12				

Week13

Week14

Week15

Week16

Week17

Week18

Week19

Week20

Week21

Week22

Week23

Week24

Week25

Week26

Week27

Week28

Week29

Week30

Week31

Week32

Week33

Week34

Week35

Week36

Week37

Week38

Week39

Week40	
Week41	
Week42	
Week43	
Week44	
Week45	
Week46	
Week47	
Week48	
Week49	
Week50	
Week51	
Week52	

Number of typhoid fever cases monthly in Addis ketema sub city health office in terms of sex and age from 2013_2015.

Month of 2013 GC	Sex	Age	Number of cases
September	Male	<=4	
		5-14	
		>=15	
	Female	<=4	
		5-14	
		>=15	
October	male	<=4	
		5-14	
		>=15	
	female	<=4	
		5-14	
		>=15	
November	male	<=4	
		5-14	
		>=15	
	female	<=4	
		5-14	
		>=15	
December	Male	<=4	
		5-14	
		>=15	
	female	<=4	
		5-14	

January	male	>=15
		<=4
		5-14
	female	>=15
		<=4
		5-14
February	male	>=15
		<=4
		5-14
	Female	>=15
		<=4
		5-14

March	male	<=4	
		5-14	
		>=15	
	female	<=4	
		5-14	
		>=15	
April	male	<=4	
		5-14	
		>=15	
	female	<=4	
		5-14	
		>=15	

May	male	<=4	
		5-14	
		>=15	
	female	<=4	
		5-14	
		>=15	
June	male	<=4	
		5-14	
		>=15	
	female	<=4	
		5-14	
		>=15	
July	male	<=4	
		5-14	
		>=15	
	female	<=4	
		5-14	
		>=15	
Augst	male	<=4	
		5-14	
		>=15	
	female	<=4	

Chapter III- Surveillance system evaluation

3.1. Evaluation of surveillance system of epidemic typhus in Addis ketema sub city, Addis Ababa, 2017.

Abstract

Introduction: Public health Surveillance is corner stone for public health action and decision-making .The purpose of evaluating public health surveillance system is to identify problems of public health importance. Typhus is the leading causes of morbidity in study area.

Objective: aim of this study was to assess typhus surveillance system of in Addis ketema.

Methods: descriptive cross sectional study was conducted from April 28 to May16, 2017 in Addis ketema .Total of 13 study units were selected randomly. One priority weekly reportable diseases (typhus) was selected based on its public health importance. Data collection was conducted through face to face interview with semi structured questionnaire for PHEM officers, surveillance focal persons and other concerned experts and observation of reviewed document of study sites. Data analysis was analyzed with MS. excel version 2013.

Result: All visited sites had no posted standard typhus case definition at available place. All health providers understood the case definition of typhus. Data were not analyzed and interpreted in all of the visited health facilities, which were received supervision by higher level, but no avail documented written feedback was observed . Completeness of typhus surveillance report for five months were 84.26% in the sub city facilities and overall completeness of the visited districts for 16 weeks were 86.96% and timeliness of the sub city not available but district 4 timelines was 87%.typhus.surveillance system was flexible, and all health facilities laboratory had capacity to utilized weil felix.

Conclusions and recommendations: There was no trend of analyzing, interpreting, and utilizing the collected data for action in all visited sites. There was no allocated budget for surveillance activities at all district level. There is no written feedback, epidemic preparedness and response plan, regularly base of supportive supervision at all visited health facilities. Typhus surveillance systems was simple and flexible, well accepted and enable to estimate morbidity and mortality but not show risk factors. The completeness of the Addis ketema sub city was more than targeted (84.26%) (WHO week 3/2016 – 27/2017). PHEM should be analyzed data routinely& FMOH should be allocate budget.

Key words: Typhus, Surveillance System Evaluation, Addis ketema sub city, 2017.

Introduction

Background

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health.(1). Data disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation, and formulating research hypotheses. In addition, public health information systems have been defined to include a variety of data sources essential to public health action and are often used for surveillance(1).Public health surveillance is considered to be an essential public health function(2). The purpose of evaluating public health surveillance systems is to ensure that problems of public health importance are being monitored efficiently and effectively and Public health surveillance systems should be evaluated periodically, and the evaluation should include recommendations for improving quality, efficiency, and usefulness(3). Evaluation of a public health surveillance system focuses on how well the system operates to meet its purpose .A public health surveillance system is dependent on a clear case definition for the health-related event under surveillance (3). The case definition of a health-related event can include clinical manifestations (i.e., symptoms), laboratory results, epidemiologic information (e.g., person, place, and time), and/or specified behaviors, as well as levels of certainty (e.g.confirmed/definite, probable/presumptive, or possible/suspected). The use of a standard case definition increases the specificity of reporting and improves the comparability of the health-related event reported from different sources of data, including geographic areas(3).After a case definition has been developed, the persons conducting surveillance should determine the specific information needed from surveillance to implement control measures. For example, the geographic distribution of a health problem at the county level might be sufficient to identify counties to be targeted for control measures, whereas the names and addresses of persons affected with sexually transmitted diseases are needed to identify contacts for follow-up investigation and treatment. How quickly this information must be available for effective control is also critical in planning surveillance (4). The evaluation of public health surveillance systems should involve an assessment of system attributes, including simplicity, flexibility, data quality, acceptability, sensitivity, predictive value positive, representativeness, timeliness, and stability(5).The evaluation should assess how well the public health surveillance system is integrated with other surveillance and health information systems

(e.g., data exchange and sharing in multiple formats, and transformation of data). Streamlining related systems into an integrated public health surveillance network enables individual systems to meet specific data collection needs while avoiding the duplication of effort and lack of standardization that can arise from independent systems (5). A related concern in protecting health data is data release, including procedures for releasing record-level data; aggregate tabular data; and data in computer-based, interactive query systems (1). Surveillance serves at least eight public health functions. These include supporting case detection and public health interventions, estimating the impact of a disease or injury, portraying the natural history of a health condition, determining the distribution and spread of illness, generating hypotheses and stimulating research, evaluating prevention and control measures, and facilitating planning and Another important public health function of surveillance is outbreak detection (i.e., identifying an increase in frequency of disease above the background occurrence of the disease)(6). Evaluation is a collection of activities designed to determine the value or worth of a specific programme, intervention or project, In other words, it is the determination of the relevance, effectiveness and impact of a program with respect to its objectives that involves three steps: information, expectation, and attribution which uses the same methods as in surveillance to collect information. But it goes two steps further than surveillance (2). The FMOH of Ethiopia identified 21 top priority diseases and health conditions which are epidemic prone, public health importance, of international concern and diseases that have eradication and elimination programs for surveillance activities. These diseases are monitored by a designated bodies through available means of communication, telephone, paper based reporting etc. These diseases are mandatory notifications which are immediately reportable diseases and routine surveillance reported weekly These diseases and conditions are selected based on one or more criteria (7). Typhus which is one of the 21 priority disease reported on the weekly bases .Typhus report include all confirmed or suspected cases of typhus weekly. Its standard case definition is stated as follow; Any person with an abrupt onset of headache, chills and rapidly mounting fever, malaise, prostration and rash(7).Typhus group rickettsioses are distributed worldwide. Rickettsial typhus has two forms: endemic (murine) typhus and epidemic typhus. Endemic typhus is caused by *R. typhi*, usually transmitted to humans by the rat flea, *Xenopsylla cheopis*. Epidemic typhus is caused by *R. prowazekii* and transmitted by the body louse, *Pediculus humanus* (8). Louse-borne typhus (epidemic typhus or exanthematic typhus) is a vector-borne disease caused by *Rickettsia prowazekii* and transmitted through infected

faeces of the body louse *Pediculus humanus humanus*. Louse-borne typhus is responsible for large epidemics in populations with poor sanitary and overcrowded conditions. The disease can be severe with a mortality of up to 60% without antibiotic treatment. But this can be reduced to below 5% with antibiotic and supportive treatment(9). Epidemic typhus (also known as louse-borne typhus, camp fever, ship fever, jail fever, and others) is an acute febrile illness of humans. The causative agent, *Rickettsia prowazekii*, contaminates the feces of its vector, the human body louse, and *Pediculus humanus*. Aerosolized dried feces can be inhaled to induce infection, but the rickettsiae-laden feces are primarily self-inoculated through scratching of the site of the louse bite(10).

Flow of the surveillance system data and information

The district surveillance system for typhus resides within the national surveillance system which had different levels of reporting in the health system of the country. A simplified flow chart of the surveillance system illustrates as below (figure 20) showing that data flow pathway from the health facilities to the national level has been found and functioning at all levels. Identification of suspected cases was being done when a suspected case presents to the health facility, the clinicians diagnose based on case definition and confirmed using WeilFelix for typhus. Using weekly standard reporting form, the collected data is reported from clinics or health facilities to the district office (district PHEM) on Monday of each week through either a delegated person, telephone, mobile texting or paper form. Reports from health facilities are compiled at the district and submitted to the sub city office (sub city PHEM) by paper based manually on Tuesday. Reports from districts are compiled at sub city and sub city PHEM officers entered the data by excel and report to regional health office by e-mail and phone as necessary the summarized report till mid Wednesday. At the regional level reports are compiled and sent to the Ministry of Health on Thursday using standard PHEM weekly reporting forms. Data and information flow from lower level to higher level and feedback of Ethiopian public health surveillance system is shown as below diagrammatic representation

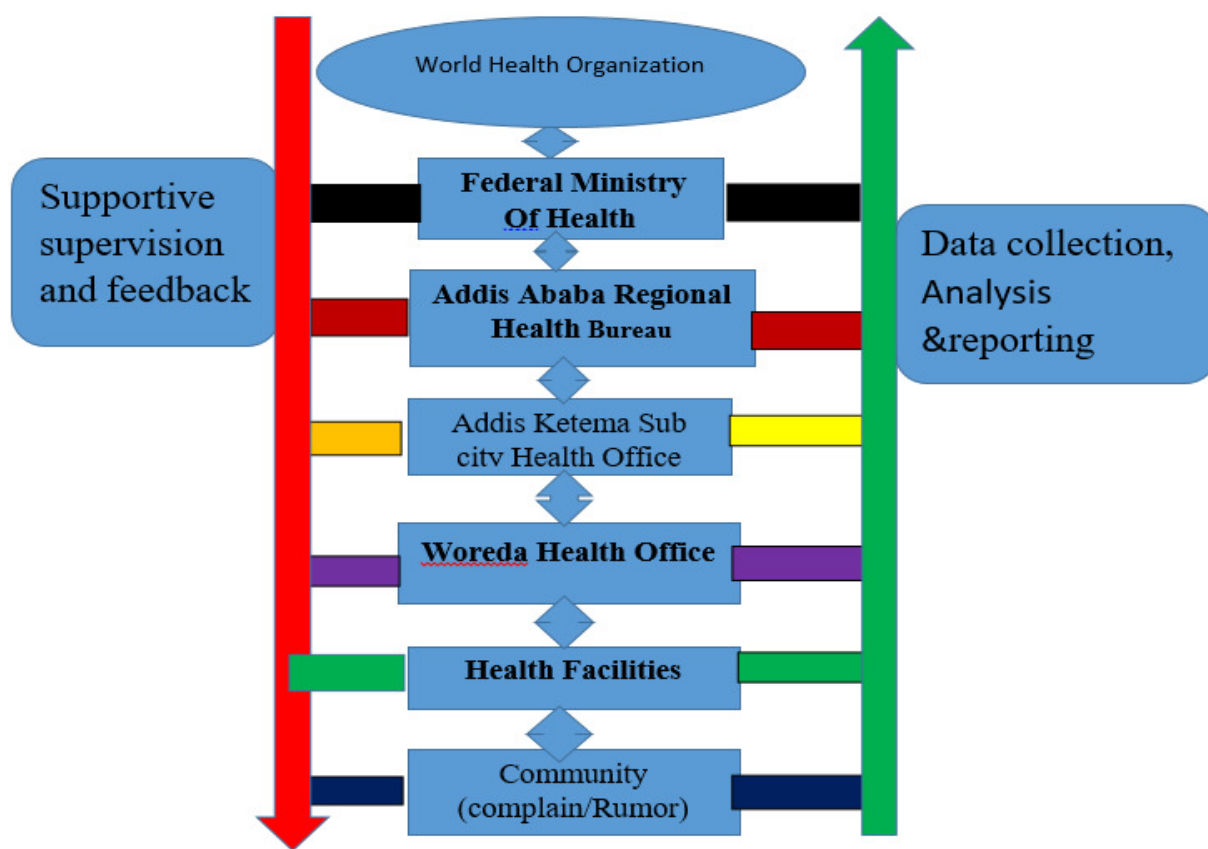


Figure 19: The Formal Flow of Surveillance Data and Information throughout the Health System,2017.

Statement of the problem

Epidemic typhus is a serious infectious disease caused by the obligate, intracellular, gram-negative bacterium *Rickettsia prowazekii* and transmitted by body lice (*Pediculus humanus corporis*) and This disease is recognized for its high mortality rate throughout human history, particularly before modern sanitary practices and the availability of antimicrobial drugs (11).*R. prowazekii* has been found worldwide. Foci of disease currently exist in many countries in Asia, central and east Africa, and the mountainous regions of Mexico, Central and South America. War and famine can result in explosive outbreaks of disease(12).The case–fatality rate is up to 40% in the absence of specific treatment. Louse-borne typhus fever is the only rickettsial disease that can cause explosive epidemics (8). During World War I typhus caused three million deaths in Russia and more in Poland and Romania and Delousing stations were established for troops on the Western front but the disease ravaged the armies of the Eastern front, with over 150,000 dying in Serbia alone

(13).The overall case fatality rate for untreated infections is 10 to 40%; the mortality rate increases with age. Infections are rarely fatal in children less than 10 years old; in people over 50 years old, which can be as high as 60% without treatment (12).Typhus spreads where conditions are crowded and unsanitary. Historical epidemics often followed war, climate extremes, famine, and social upheaval , epidemic typhus might have claimed more human lives during war than combat, and it could reemerge as a serious infectious disease in areas of the world where social strife and underdeveloped public health programs persist(11). Political instability in Eastern European and African countries has recently caused conflicts in regions where the risk for typhus outbreaks is very high (14) .Untreated infection results in approximately 20%, increasing to 50% or more among older, immunosuppressed, or otherwise weakened patients (10). The risk for epidemic typhus has not been eliminated from more industrialized regions because body lice infestation still occurs in homeless populations in the United States, Europe, and the Netherlands(11). U.S. forces were protected by the first vaccine applied on a large scale, the Cox-type vaccine. Epidemic typhus began to decline at the end of World War II when DDT started to be used as an insecticide (14) .Despite the massive civilian outbreaks, implementation of Typhus Commission recommendations, which included command-enforced cleanliness, application of dichlorodiphenyltri- chloroethylene (DDT), immunization with the Cox-type vaccine, and other preventive measures, resulted in only 104 cases and no deaths among U.S. forces In addition to DDT dusting and administration of the Cox-type vaccine, spraying with newer insecticides proved effective(10). An effective modern subunit vaccine was developed at NMRI in the early 1980s. Military scientists also developed improved animal models, sero diagnostic assays, and molecular diagnostic and identification assays in that decade. Finally, protective immune responses to this agent were demonstrated to be dependent on specific antibody and cellular immunity, including natural killer and cytotoxic and helper T cell dependent-mechanisms(10). Efforts to develop an effective scrub typhus vaccine in the 1940s using yolk sac-propagated rickettsiae⁴⁸ or in the 1970s using purified cell culture-derived organisms yielded vaccines that were protective against homologous murine challenges but fared poorly with heterologous challenges(10). Ethiopia reported 1,931 cases in 1983 and 4,076 cases with a death rate of 3.8%. However, these data were difficult to interpret because serologic testing was usually performed with inadequate techniques, and epidemiologic data were unavailable (14). The sub city is where the biggest market in east Africa the so called Merkato and the main Bus station where large number of population of the

country travel to and from the city daily is located, this makes the sub city where large number of mobile population exists; it also facilitates the presence of people living in slum area and commercial sex workers. Due to this reasons there are multiple problems that are risk factors for different communicable disease like typhoid fever, typhus, dysentery, relapsing fever, even vaccine preventable diseases like measles are prominent. According to reported health management information system (HMIS) data source, in Addis ketema sub city, typhus is the highest leading causes of morbidity following to typhoid fever. The increment of number of cases is continued dramatically with comparing with previous number of cases.

Rationale of the evaluation of epidemic typhus surveillance system

Surveillance system is ongoing collection of data on health status and risk factors of disease in a population and to analyze, interpret, utilize and communicate the data in a manner that will lead health care providers and officials to prevent and control of disease. Therefore evaluating public health surveillance systems is to ensure that problems of public health importance are being monitored efficiently and effectively (3). Public health surveillance systems should be evaluated periodically, and the evaluation should include recommendations for improving quality, efficiency, and usefulness. Evaluation of a public health surveillance system focuses on how well the system operates to meet its purpose (3). The public health surveillance system should operate in a manner that allows effective dissemination of health data so that decision makers at all levels can readily understand the implication of the information. Due to this Public health surveillance systems should be evaluated periodically, to assess the quality, efficiency, efficacy and its usefulness (5). According to 2008 EFY Addis ketema Sub city health office district base plan/ annual report, Typhus is a major public health importance in Addis ketema sub city in which most parts of its population is at risk to typhus and other priority diseases due to the crowdedness of the area and low environmental sanitation. The data generated from surveillance evaluation was important to understand gaps, suggest possible intervention and also help to improve public health decision making. In Addis ketema sub city, there were no well documented findings emanated from the surveillance system evaluation of any public health significant health problem that could help in public health decision making. In addition, Surveillance system evaluation for typhus were not done in the area before and no more is known about the effectiveness and efficiency of the system. We believe that evaluating of the surveillance system using commonly reported disease in the area could be used as indicators of the surveillance system of the sub city. There is no publish

or online accessible evaluation studies conducted in the study area regarding the current practiced surveillance evaluation system. Therefore, evaluation of surveillance system for typhus will help to improve the provided evidence based information that guides decision maker and sub city stakeholders to ensure that the disease is being monitored effectively and efficiently and identify the early challenges of surveillance in sub city which can give crucial information about the current status of surveillance system. This study shows the overall typhus surveillance system in the sub city, which assists to identify major challenges in overall attributes of the surveillance, which in turn leads to improving the overall typhus system of the districts.

Objectives

General objective

- To assess the surveillance system of epidemic typhus in Addis ketema sub city, Addis Ababa, 2017.

Specific objectives

- ❖ To assess the core functions of the surveillance system.
- ❖ To assess supportive functions of the surveillance system
- ❖ To assess the main attributes of the surveillance system.

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Method and materials

Study Area

Among those sub-cities in Addis Ababa, Addis ketema sub-city is one of the ten sub cities in Addis Ababa city administration which is found in the north of the city being bordered by Kolfe keranio sub-city in the west, Arada sub-city in the east, Lideta sub-city in the south, and Gulele sub-city in the North. The size of sub-city is about 14.6 km² with a total population of 319,318 from which 153, 186 male and 165,952 female living in 10 districts, comparatively the sub-city is among one of the sub-city where the community is densely populated with 21901 population lives per 1 km². The sub city is located the place where the biggest market in east Africa (merkato) and Bus station from which large number of population of the country side travel to the city daily, this makes the sub city where large number of mobile population exists; it also facilitates the presence of people living in slum area and commercial sex workers. Due to this reasons there are multiple problems that are risk factors for different communicable disease like typhoid fever, typhus, relapsing fever, even vaccine preventable diseases like measles are prominent.

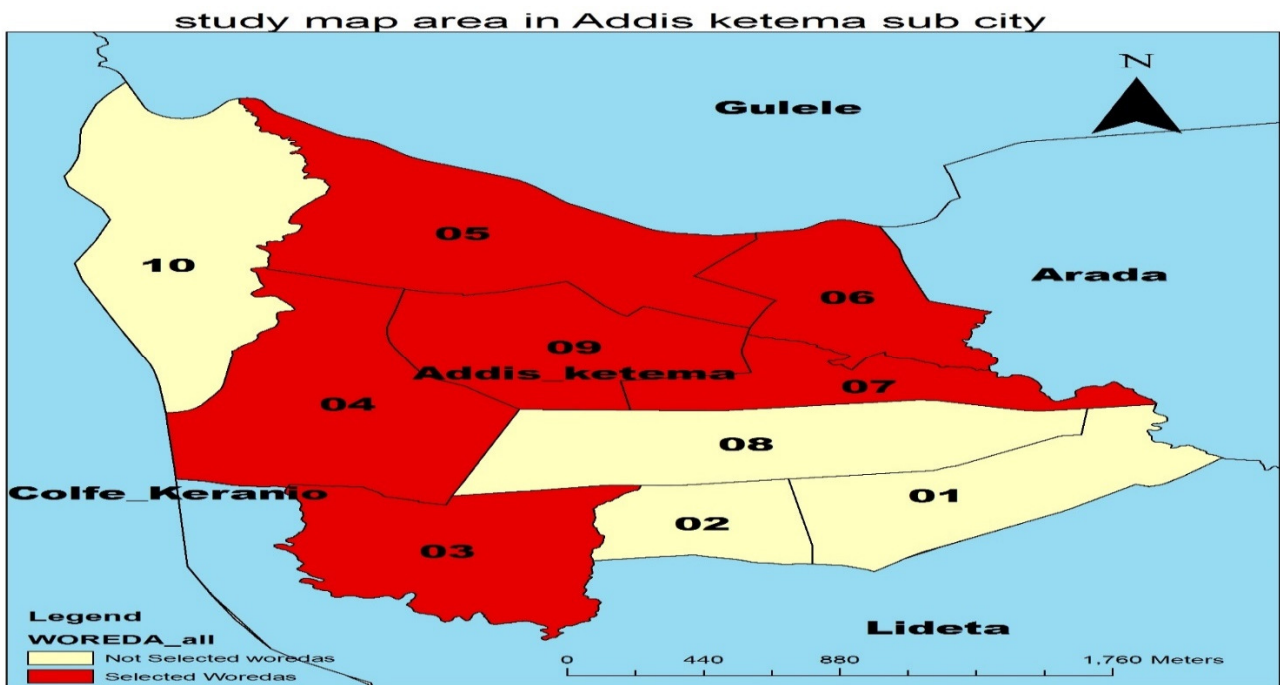


Figure 20: map of visited sub city and districts for surveillance system evaluation, Addis ketema sub city, Addis Ababa, Ethiopia, 2017.

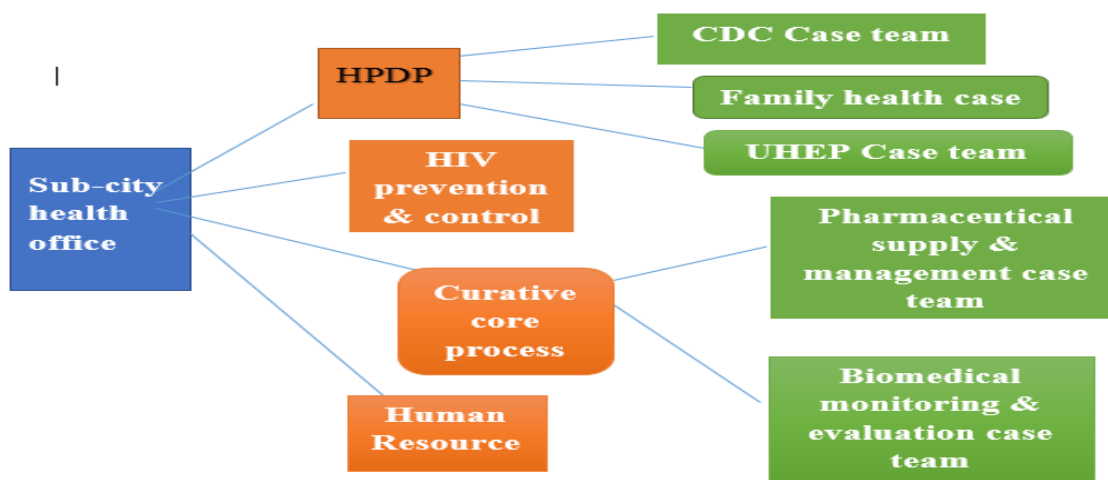


Figure 21: Addis ketema sub city health office sub department and organizational structure, 2017.

The sub city has health facilities of governmental, nongovernmental and private facilities with a different level of health service standard, specialization and quality. There are a total of 82 health facilities including private medium and higher clinics. Among those health facilities, 10 health centers are owned by government. The health services being provided to population, based on their needs are: In patient department (IPt), outpatient department(OPD), diagnostic and confirmatory laboratory test , Antenatal care for pregnant women(ANC), Vaccination service(EPI), Pediatrics care and treatment, Family planning (FP), HIV counseling, Testing, and Treatment (VCT,PICT,ART), delivery service, legal and safe abortion service, TB diagnosis and management, Emergency department, Maternal and Child health, Minor surgical department, Medication dispensing service(Pharmacy), and other health needs. The sub city has a total of 1363 employees out of which 740 are health professionals and 623 are supportive staffs and a total of 29 employees (Health professionals) are working in the sub city health bureau and the remaining 711 are working in districts and health centers. The sub city has succeeded the target of health center to population ratio set by FMOH which is 1:40,000 100%. In addition to this to strengthen the health promotion and disease prevention activity, about 85 urban health extension workers with 30 supervisors are assigned in different districts and are actively working by engaging at the community level to provide health care needs through integration with other health staff who are working statically in the health facilities and household.

Study period

The surveillance system evaluation study was conducted from April 28 to May 16, 2017

Study design

A descriptive cross-sectional study was conducted.

Source population

All functional health facilities and health office which are found Addis ketema sub city

Study population

Selected health facilities and health office for this study.

Study units

The study units or study subjects were sub city health office, district health office and health facilities (Hospital, Health Centers and clinics) which lay in the sub city. A total of 13 study sites were included in the study, these include governmental health center (5) and district PHEM (5) and sub city health offices (1) and private hospitals (2).

Data collection tools and procedure

The CDCs updated guidelines for evaluating public health surveillance system was used by adapting for the evaluation to achieve the stated objective of the study. Primary data collection was conducted by principal investigator using both face to face interviews using semi-structure questionnaire, and through practical observation of documents was also conducted as a measurement mechanism and referencing with the above updated guidelines for this surveillance system evaluation in the selected study units using this instrument to interview district head and surveillance officers in the selected districts, at health facilities surveillance focal person or officers and at the sub city level PHEM officer were interviewed. Secondary data source, such as surveillance report for evaluate the last one year completeness and timeliness of typhus surveillance data, supervision report, registration books, minute of meeting, plan of action, result of data analysis and surveillance indicators, district health plan and written feedbacks and Review of weekly surveillance report submitted by all selected health facilities were reviewed.

Data quality control

The principal investigator cross checked. The data obtained at district and health facilities from different levels i.e sub city health department, district health offices and health facilities and its completeness, accuracy, clarity and consistency throughout the data collection period before summarizing at each level for its accuracy and consistency. Questionnaires were adapted after

thoroughly read of CDC Surveillance evaluation guideline and semi structured questionnaires were administered. Single interviewer to keep the consistency of administering the questions to maintain the quality of data.

Sample size and Sampling technique

We enrolled the sub city PHEM, districts health office, health centers and hospitals. Even though all reportable disease has public health importance, it is difficult to address all in the valuation due to resource disease under surveillance (Epidemic Typhus) was selected based on the public health importance of the study area purposively. Among these seven health facilities, and five districts health office and sub city health office were randomly selected using lottery method for the evaluation and the study area was not evaluated for those diseases previously.

Selection of sites

We conducted the study in Addis ketema sub city districts. The study units were district health office and health facilities. A total of 13 study sites were included in the study, these include five governmental health center, two private hospitals and five district health office and the sub city health office included.

A. Selection of sub city

Addis Ababa city is one of the city administration in the Federal Democratic Republic of Ethiopia. According to regional health bureau report, administratively, the region is divided into 10 administrative sub city Addis ketema sub city was selected purposively. Out of ten sub cities by discussed with our department coordinator we assigned field base for both EFETP residency I and residency II in place of where we work previously (Addis ketema sub city). So, we conduct surveillance system evaluation to assess the surveillance system evaluation and the status of surveillance system before in this sub city.

B. Selection of districts.

Addis ketema sub city administration is divided in 10 district. From these 10 districts, five districts (district 3, district 4, district 6, district 7 and district 9) were selected by using simple random sampling technique.

C. Selection of health facilities

Regarding health facilities, there were a total 10 functional health centers in the sub city. From selected districts, five health centers (district 3 health Center, kuas media health center, Addis

ketema health center, feleg meles health center, and Addis ray health center) and private hospitals (Girum and Ethio-tebib) were included in the assessment.

Operational definitions of terms

- Case detection:** capability of the surveillance system identifying cases
- Case registration:** documenting under surveillance cases in registration format

Completeness: the proportion of reporting sites that submitted the surveillance report irrespective of the time when the report was submitted

- Case/outbreak Confirmation:** laboratory capacity for confirmation of the suspected cases.
- Reporting:** the way of sending collected and registered cases from lower to higher position for response.
- Epidemic preparedness:** Refers to the existing level of preparedness for potential epidemics
- Stakeholders:** authorized or responsible person or organization for surveillance and related activities.
- Usefulness:** the capacity of the system to give response and show direction when problem is happened or before happened.
- Simplicity:** the easiness of the system to handle the whole operation of duties in the surveillance system.
- Flexibility:** the ability to changing information or situation that needs in the current within minimal additional time, man power and resource
- Quality:** The quality of data reflects the completeness and validity of the data recorded in the sub city Health Department.
- Acceptability:** the willingness of focal persons, institutions or organizations to involve in the surveillance system.
- Sensitivity:** the ability of the system to capture cases or outbreaks by using the surveillance data.
- Positive predictive value:** refers to cases that actually have the health condition in question.
- Representativeness:** to the extent to which the surveillance system accurately describes the community health problems.

•**Stability:** Stability refers the consistency or sustainability of the surveillance system in regarding to financial and operational issues.

- **Timeliness:** Is the ability of the system to receive appropriate data in time.
- **core functions :** variables that measure the processes and outputs from the system
- **supportive functions:** those that facilitate implementation of the core functions
- **attribute functions:** the extent of the improvements in the quality of surveillance systems

Data analysis

Data analysis was carried out by using Microsoft office Excel version 2013.

Ethical clearance

This study was conducted to assess the core and supportive function of the surveillance system for typhus diseases under surveillance. The study subjects were health institutions, districts and sub city health office, which were found in the sub city. Therefore Ethical clearance was not necessary for this study, because there is no direct contact with patients or community. However, permission letter to conduct the study was obtained from SPMMC public health department. Formal letter was written to all district health offices and health facilities from Addis ketema sub city health office. The purpose and objective of the study for which the data required was briefly explained to the head of the sub city health offices and visited health facilities prior to the interview and discussion ,and a letter of request was provided for the selected health department and health offices for their participation on the study. Consent was taken from all responsible health professionals for interview as well as document review after informing the purpose of the study, and keep confidentiality of the information and data they were provide us.

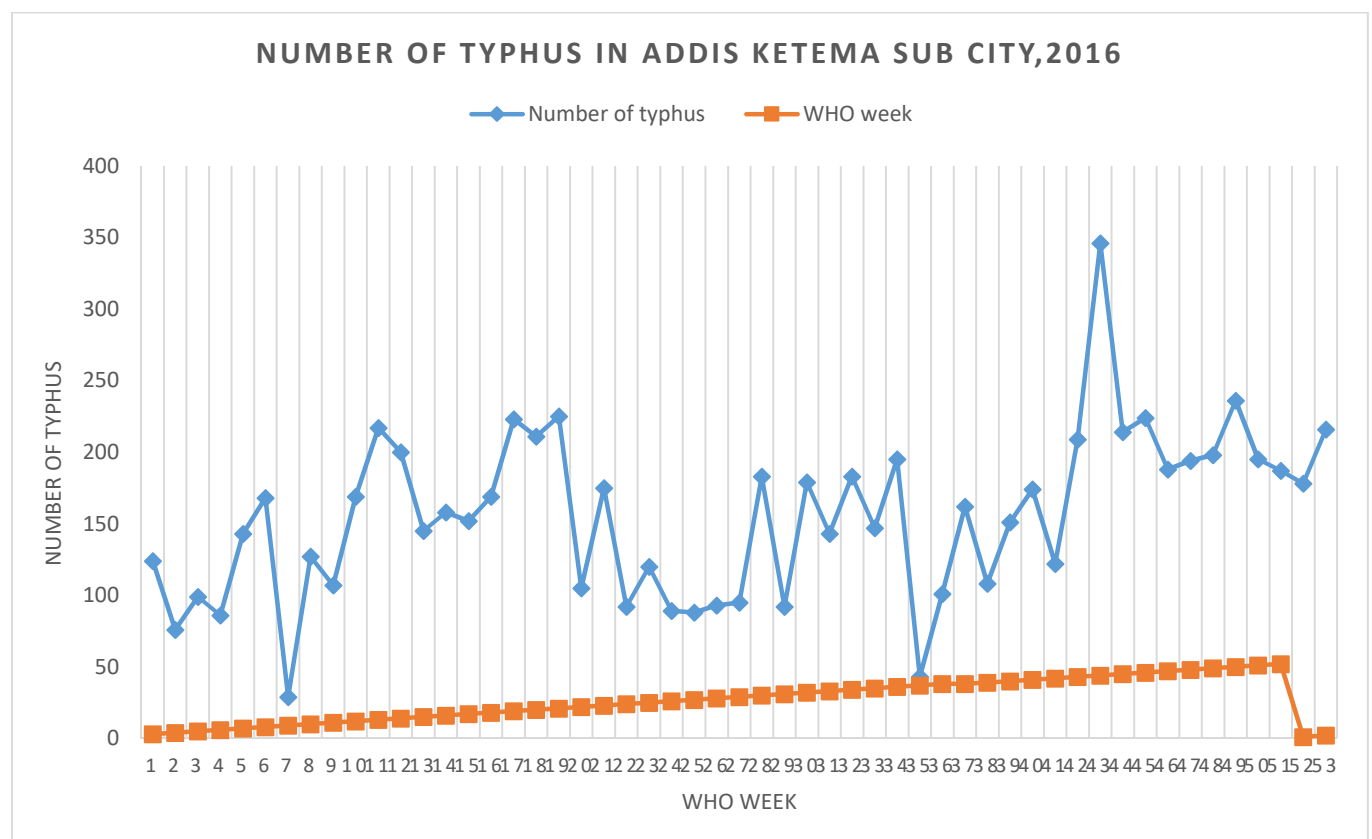
Dissemination of study result

As this evaluation report was finalized, the study result of this written report both in hard and soft copies was shared or disseminated to St. Paul's Hospital Millennium Medical college school of Public Health department of Ethiopia Field Epidemiology training program (EFETP), Addis ketema health office disease control and prevention core process health, visited district health offices disease prevention and PHEM core process , to partners these who work on surveillance program and also to regional public health emergency management (PHEM).

Result

Importance of the surveillance of Typhus

Typhus is among the major diseases of the 21 priority diseases under surveillance in the sub city which are reported from all districts in Addis ketema sub city except the magnitude difference between each district in reporting number of typhus throughout the reporting period. In addition, from the total 51 typhus cases 1.96% cases was treated by admitting to hospitals (inpatient in Girum & Ethio-tebib hospital). Addis ketema sub city, a total of 5651 cases were reported in the year of 2016. Of which, 2971 total typhus were males, 2680 (13%) cases were females and all confirmed typhus cases are treated in outpatient department (OPD) in all health centers but a few cases are treated by admission in hospitals. among those visited districts, district 4 and district 7 leads by the magnitude of typhus cases 3454 & 543 respectively. In Addis Ketema sub city, typhus took 18.1% (1,168,291) of the cases in 2016/17, of all outpatient and inpatient visits, among which district 4 took 12% (3454 cases).district7, 543 cases.



Source: Addis ketema PHEM facility report, 2016.

Figure 22: Trends of typhus cases by WHO week in Addis ketema sub city, Addis Ababa, 2017. (3/5/-12/7/2016, 52 weeks).

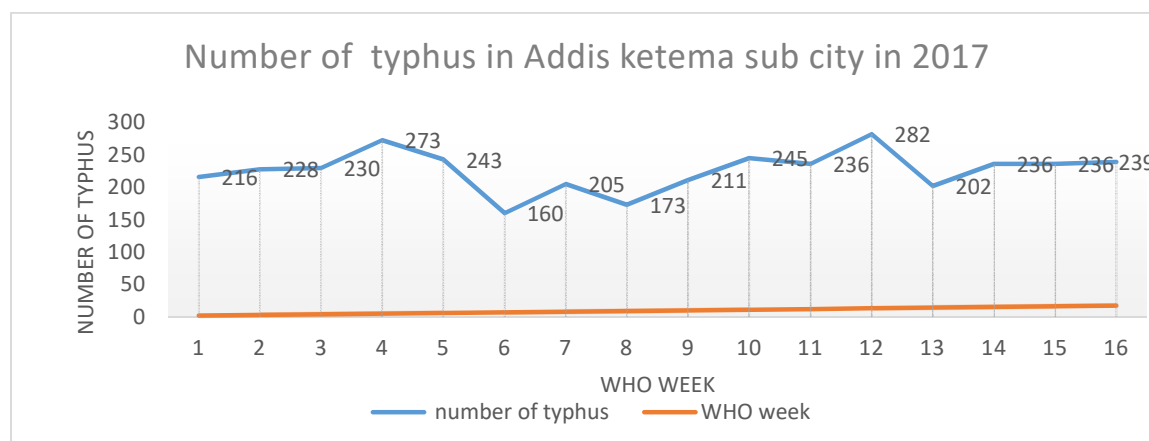


Figure 23: Trend of typhus case in Addis ketema sub city, Addis Ababa, 2017(WHO Week).

Table 9: distribution of typhus cases by district in addis ketema sub city, 2016/2017.

S.No	Districts	Typhus cases	Percent (%)	Total population	prevalence /population
1	Woreda1	217	3.84	27,183	8/1000
2	Woreda2	319	5.65	31,959	10/1000
3	Woreda3	546	9.66	34,338	16/1000
4	Woreda4	142	2.51	40,001	3/1000
5	Woreda5	774	13.7	31,312	25/1000
6	Woreda6	604	10.69	29,309	21/1000
7	Woreda7	505	8.94	35,272	14/1000
8	Woreda8	1170	20.70	35,444	33/1000
9	Woreda9	889	15.73	34,096	26/1000
10	Woreda10	485	8.58	22,224	2/1000
11	Sub city	5651	100%	319,138	18/1000

Core functions of the surveillance system

Case definitions

A.1 Standard Cases definition of typhus:

Suspected typhus Cases: Any person with an abrupt onset of headache, chills and rapidly mounting fever, malaise, prostration and rash.

Confirmed typhus Cases: A suspected case with Weil-Felix reaction of the proteus strain OX-19 with fourfold rise in titer, or a single titer equal to or greater than 320 in the second week of illnesses

A.2 Community case definition:

Typhus: Any person with abrupt onset of headache, chills and rapidly mounting fever, malaise and rash

Population under surveillance

The population in the catchment area of under the selected health centers was included. The surveillance system encourages community participation to detect and respond to disease epidemics through the health extension program. Public health emergency management targets all the population to be under surveillance for twenty one priority diseases in the region and Addis ketema sub city. According to Sub city data base, the sub city has two private hospitals, 10 public health centers, and 70 clinics (higher, medium and dental). The health care coverage of the sub city was 100% with health centers. In all assessed health facilities, the respondents agree that the population under surveillance have increment of health seeking behavior because there is improvement through the effort of the health extension program

Table 10: population under surveillance of the assessed administrative areas by place of residence in Addis ketema sub city, 2017(from 28/2/2017-15/8/2017).

Areas under assessment	population projected in 2017	Male	female	Total number of typhus	Prevalence /population
District 3	34,338	16,482	17,856	546	16/1000
District4	40,001	19,200	20,801	142	4/1000
District 6	29,309	16,931	18,341	604	21/1000
District 9	34,096	16,366	17,730	889	26/1000
District 7	35,272	16,931	18,341	505	14/1000
Sub city	319,138	153,186	165,952	5651	18/1000

Table 11: Number of health facilities in Addis ketema sub city and selected districts, 2017.

Administrative area	Total population	Number of health facilities expected to report			Health coverage
		Health center	hospital	clinics	
Addis ketema sub city	319,138	10	2	70	100%
District3	34,338	1	0	4	100%
District4	40,001	1	1	4	100%
District6	29,309	1	0	4	100%
District7	35,272	1	0	8	100%
District9	34,096	1	0	11	100%

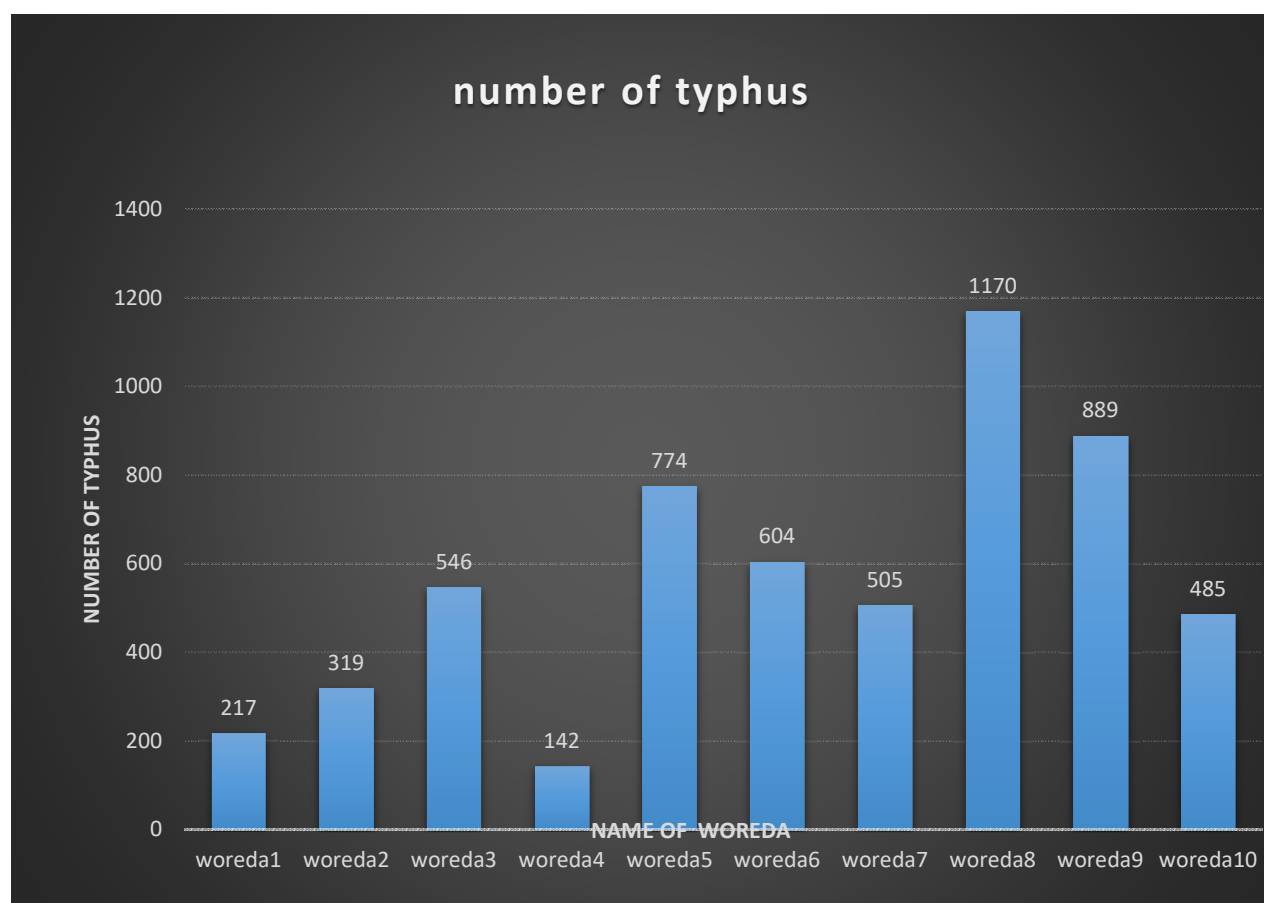


Figure 24: number of typhus by district in Addis ketema sub city in 2017.

Case detection and registration

The clinical register was found in all of the visited health facilities, but one (20%) of health facility, handling of these registers was poor (i.e. not registered cases properly and continuously). Concerning weekly PHEM reports, except one, all of the assessed facilities has reported consistence data with their clinical register records to the higher level during the evaluation of one month period reports (four weekly reports). Among the visited health facility, all of the selected facilities have not posted standard case definition of typhus at any department unit (emergency, under five, outpatient department etc.) in both types of institution (health center & hospitals). However, all health care providers have knowledge of the cases definitions of typhus by asking the case definition while we interviewing them at the time of the field visit.

Reporting, Data analysis and interpretation

In all assessed health facilities and health offices ,even though there was assigned responsible person for surveillance to perform overall activity such as , compilation, report, and data analysis, among these visited health facilities and district PHEM level , none of them analyzed and used the collected data for surveillance action. Instead they used directly send the raw data for the next higher level at health facility level for the sake of report. In other words, in the visited health facilities data analysis not done. Generally, data was not analyzed not only at health center level but also at district level. i.e the analysis was also not practical at district PHEM level. Surveillance activities are done by nurses and other health professionals who have other professional activities in their health facility. At sub city level very limited basic data analysis has been done situationally at the time of epidemic and when ordered by higher body to prepare for any purpose which was not routine, and also graphs and charts showing trends of diseases were not updated and interpretation and discussion on the results were not routinely done.

Outbreak investigation& case confirmation

All the respondents from assessed district health offices replied that, they have experienced in investigation of two outbreaks in the last six months , such as AWD outbreak from 11/6/2016-18/10/2016 which were investigated by together with jointly partners (WHO-Ethiopia &MSF) , sub city health office ,district health office and Field epidemiology residents, and relapsing fever outbreak in three districts especially woreda3, district 1 and district 7 in the last three months prior to this study. As a result they were used gave response for intervention, but there was neither written document nor standard procedures for outbreak investigation was seen during the

assessment. However, all of them had established RRT which is coordinated by district chief administrator (district head office), however epidemic management committee and RRT are activated only during the occurrence of the epidemic and also there is no experience of post epidemic assessment by the team. The epidemic management committee & rapid response team that do not involved on time in epidemic response to evaluate their performance regularly. For both out breaks confirmation of cases was done by laboratory.

Epidemic preparedness and response

Although partners were support in all visited health offices, they had experienced any shortage of drugs and supplies during epidemic time especially in AWD epidemic due to its long epidemic duration. Of visited health offices, none of them had prepared written document for epidemic preparedness plan. In the assessed health facilities, there was no allocated any available budget used for epidemic response. However, in case of facing any emergency, the sub city or the district have been mobilized budget for response to Epidemic prevention and control based on the available regional budget. None of them had emergency drugs and supplies in the store. All of them were established RRT but it lacks continuous functionality in all health offices. Each district health department didn't allocate budget for epidemic preparedness and response activities (table 19). Not only the sub city health department but also the district health department have not epidemic preparedness and response plans for priority diseases.

Table 12: Availability of Epidemic Preparedness and Response Resource in Visited Sites of Addis Ketema, 2017.

S.N	Variables	District health office(N=5)	Sub city health department (N=1)	Health facilities (N=5)
1	Availability of Epidemic response and preparedness plan	0	0	-
2	Availability of Emergency stock of drugs and supplies	0	0	-
3	Availability Outbreak investigation check list	1	1	-
4	Availability of Rapid Response Team (RRT)	0	0	5
5	# of epidemics responded in the last six month		2	
6	Availability of task force committee	0	0	-
7	Availability of budget for epidemics/ emergency	0	0	-
8	Experienced shortage of drugs and supplies during recent epidemics	3	1	-
9	Observed epidemic management meetings minutes	0	0	-
10	Written emergency preparedness plan for an outbreak	0	0	-

Supportive functions of the surveillance system

Supervisions and Feedback

In all visited health institutions including sub city health office, regular specific supportive supervision was not conducted to lower levels. The assessed health office (Sub city Health office and district health office) were conducted supportive supervision but not regular and also in most visited sites integrated supportive supervision was conducted irrespective of regularity and some surveillance activities were included in the check list in supportive supervision. Any of visited offices were not prepared specific supportive supervision plan for their lower level. None of the district and sub city health offices had experience of dissemination of the surveillance specific information feedback to the respective health facilities (from the sub city to the district and district to the health facility) in written form; but they respond that, there were verbal feedback at all level.

Table 13: Availability of supportive supervision, plan and feedback in visited sites, addis ketema sub city in 2016/2017.

Training

S. N	Variable	Sub health office (N=1)	city district health office (N=5)	Health center (N=5)	Hospital	Total (N=18)
1.	Regular supportive supervision to lower level	0	0	-	-	0
2.	Integrated supportive supervision to lower level	1	5	-	-	6
3.	Availability of supervision plan	0	0	-	-	0
4.	Availability supportive supervision checklist	1	0	-	-	1
	Availability feed back	0	0	-	-	0

All staffs working in sub city PHEM department were trained short term training for seven days on surveillance and basic PHEM about four to five days by collaboration with the regional health bureau and Ethiopian public health institute (EPHI). From all visited sites, 5/5 (100%) districts health offices and 5/5 (100%) health centers were assigned PHEM officer/ focal person respectively. Of those assigned PHEM officers, 5/5 (100%) of them were trained on the updated approaches of basic PHEM and selected surveillance priority diseases. On the other hand, according sub city urban health extension case team report, all health extension workers which is working in the sub city were trained for 2-5 days on surveillance system and selected priority diseases to strengthen community surveillance. But during the data collection period the respondents replied that, due to worker turnover and other personal issues if the surveillance focal person absent from working area, the whole surveillance activities are cease because of inadequate trained personnel in each service entities.

Availability of case definition, clinical register and surveillance manuals

According to the assessment, from 13 visited sites, all of the visited institutions site had case definition for typhus. That means the cases definition of typhus was no posted available place of each department units (under5, emergency, OPD etc.) in all of the visited health facilities. On the other hand, Health professional who were interviewed during the assessment all of them were understood the case definition clearly and they were used to diagnose suspected cases of typhus on their day to day diagnosing activities of patients .Even though reporting format is prepared and distributed from central level to regional and sub city health offices, there was shortage of updated reporting format in 2/5(40%) visited health facilities in the past 6 months. Due to this reasons all

of the visited health facilities were not using harmonized reporting formats. In some visited health facilities and district they faced shortage of surveillance formats like weekly reporting formats, As the Health professionals (district PHEM) and health extension workers informed us, until now there was no any prepared organized community case definition to distribute in the community for typhus and each priority disease those included under surveillance

Table 14: Assessment of availability of PHEM guide lines, standard case definitions and clinical registers in visited health institutions of Addis ketema sub city, Addis Ababa, and APRIL, 2017.

s.n	Variable	Health center	hospital	district health office	Sub city health office	Total
1	Availability of case definition typhus	5	2	5	1	13
2	Availability of case definition of typhus posted	0	0	0	NA	0
3	Availability of clinical register	-	2	5	-	7
4	Availability of PHEM guide lines	0	0	3	1	4
5	Knowledge of respondent about standard case definition (%)	5	2	5	1	13
6	Availability of standard or community typhus case definition (%)	0	0	0	0	0

Communication and Reporting System assessment

All assessed health facilities had clinical case registration format. Observation of monthly report submitted to higher level was conducted and we found similar number of cases registered in clinical registration log book with left reported pad. Reporting formats are available and a shortage was encountered for one health facilities.

Resources available used to operate surveillance system& computer skill

There is available PHEM guideline in visited sub city and district health offices. According to interviewed staffs response in sub city PHEM department, all sub city PHEM officers can use Microsoft office applications (MS word, MS excel and power point); and also since they are masters (MPH) stakeholder, they have any clue on Epi-Info utilization, On the other hand, from district health office and health center only 4/5(80%) and (1/5)20% of them were have computer skill on Microsoft office application(MS word, MS excel and power point) respectively. Regarding availability of computer and printer, not only district PHEM but also sub city PHEM unit have

no computer, printer and telephone for data management and communication but they share from their respective health office, that means sub city & district PHEM unit has no dedicated computer or telephone for data management and communication for specific to PHEM unit. Furthermore, all of visited health centers had no computer and printer for the purpose of surveillance activities. There has been high staff turnover meaning there is no enough trained personnel (no more than one) in each health facility And the Surveillance units at the district and health facility level did not have communication ways- like, fax machines, internet and so on. At health facility level there was no separated room for PHEM focal person to organized data appropriately. Most of the visited health centers and hospital used under five clinics or emergency room as PHEM unit and the rest used other. The logistic and budget constraints were observed at all the visited site. Although all district office have vehicle, the visited district health offices have no their own vehicle and they share from district administrative office for the transportation services. Lacks of these logistics and vehicles were mentioned frequently as the reasons for poor supervision, and monitoring of the health facility reports. All of the visited health facility has no any means of communication for reporting rather than their own phone and even there is no any fee for the purpose of communication and for network access in district PHEM and each health facility focal persons. This might affect the timeliness of reports of both immediately and weekly reportable diseases. Availability of resources related to data management and communication in visited sites is presented in detail in table 12 below.

Table 15: Availability of resources for data management, communication, and PHEM activates in visited sites of Addis ketema sub city, 2017.

S. N	Materials/ Item	Sub city (N=1)	Sub city PHEM unit	Districts (N=5)	District PHEM unit	Health facilities (N=7)
3	motor cycle	100%	0	100%	0	0
4	Vehicle	100%	0	100%	0	0
5	Computer	100%	0	100%	0	0
6	Printer	100%	0%	100%	0	0
8	Telephone	100%	0%	100%	0	0
9	Internet service	Interrupt some time	0%	0%	0	0

Description of each system attributes

Usefulness

All the health facilities and districts reported typhus surveillance data to sub city, again sub city to regional on weekly reports basis accordingly. Collecting typhus surveillance data through weekly basis is very important but not sufficient by itself to improve public health problems through preventing and controlling the impact of priority diseases because the surveillance data was not analyzed and interpreted for public health action at each level except the sub city PHEM. Even though the surveillance focal persons are responsible for data analysis at each level, they have limited technical skills to analyze data in addition to the work load, Surveillance activities was considered as additional duty, most of them were engaged in routine patient diagnosis. All the interviewees respond that, in all visited sites, typhus surveillance system was helpful at all level to detect outbreaks early on time. It also enables to estimate the magnitude of morbidity and mortality typhus. Districts respondents replied that; lack of concerned experts, less attention from the higher level, low enforcement to private facilities, Surveillance activities was considered as additional duty in all health facility of surveillance focal persons, lack of budget on surveillance was identified problems to be solved in order to improve the usefulness of the surveillance system .Although it enables to estimate the magnitude of morbidity and mortality of typhus, typhus surveillance system cannot show or indicate factors because the system is served simply for the matter of data transfer from lower to higher (from health facility to higher officials) and the timeliness of the system almost unknown (no registered timeliness in each facility) and Typhus case definition was not posted at available place.

Simplicity.

The simplicity of a public health surveillance system refers to both its structure and ease of operation. The case definition of typhus for identification of suspected cases are easily understandable and simple to apply by any Health care providers. Moreover, Collection of specimen and to perform a single typhus data was found to be taking less than 5-10 minutes on average. The reporting formats being used are also very easy to understand, fill data by all health workers. Data generated at health facility level passed through defined reporting route using the standard reporting formats as set by the guideline. Collection of data at district level by paper based should be converted to electronic form in the sub city as a result, it did not takes time to send for next higher level. All system use Registration book of the Health Facilities as the source of

information. The reporting format lacks some socio demographic information such as; sex and age of the cases. Route of the data flow for typhus is clear as it was set in the PHEM guideline and the reporting entities were also simple and understandable by all staffs.

Acceptability

The acceptability of the surveillance system assessed based on their active participation in surveillance system. All focal persons, surveillance staffs are willing to participate in surveillance system activities reporting districts and facilities accept and well engaged to the surveillance activities and implementing the surveillance system. Even though they mentioned that they send the report from their mobile without the presence of assigned budget, lack of refreshment trainings, logistic supply, all surveillance officers believe that surveillance system is helpful and important , in other words, Even though there was no any per diem, transport access and mobile card fees for active surveillance and communication purposes, all of the interviewed surveillance focal persons in health facilities and all of the health workers in districts and sub city were interested(accept) and satisfied by the surveillance system. Therefore, all the surveillance officers accept and are well engaged to the surveillance activities.

Flexibility

The current reporting format is more flexible to report other newly occurring health event without much complication. The formats are assumed to be easy and complete e.g. Typhus surveillance can capture any acute febrile illness (AFI) related events without any complication all the visited health facilities of the district health offices and respective focal persons responded that any change in the existing procedure of case detection, reporting and formats will not be difficult to implement, that means the reporting format is open for newly emerged and reemerging diseases and conditions without affecting other contents. All sub city PHEM officer respondents are replied that the existing typhus surveillance system (PHEM) is flexible in the structure and reporting format i.e. surveillance system made the reporting format flexible to report other new events under immediately reportable case based conditions.

Sensitivity

Sensitivity is the proportion of cases (or other health-related event) detected by the surveillance system. It was difficult to evaluate or calculate sensitivity of typhus without knowing false negatives and true positives that identified by the system and also Weil flux is the type of laboratory test for typhus which is not confirmatory test, and culture was not being done for all

cases routinely. Therefore, we cannot determine this Sensitivity attributes using data from the current typhus surveillance. According to the response of the surveillance focal persons, the typhus surveillance captures typhus disease in the community/district. But this can be affected by the presence of case definitions, ability of the health professionals and laboratory capacity to detect cases at each level.

Positive predictive value

Predictive value positive (PVP) is refers the ability of the case to detect true positive cases. We were not able to calculate the PVP for typhus surveillance , because the total number of persons actually with disease was not determined, even though Weil flux is the type of laboratory test for typhus, if the test is done as stated in the guideline such as; a suspected case with weil-felix reaction of the proteus strain OX-19 with fourfold rise in titer ,or a single titer equal to or greater than 320 in the second week of illness we can determine from both negative and positive results by taking laboratory registration but the assessed health facilities done slide agglutination ,this is not standard confirmatory laboratory method and then culture was not being done for all cases routinely due to resource issue. Therefore, we cannot determine these Positive predictive value attributes using data from the current surveillance system.

Representativeness

The representativeness of the surveillance system was assessed by health service coverage, the reporting rate of the health facilities and the technical capacity of the health care providers. All visited districts have their own functional health centers and some have private hospital and clinics which are available with giving the health service to community in their catchments area of the visited districts. The sub city health service coverage was 100%.and all the sub city total population are under surveillance. Typhus is the common disease following to typhoid fever in the sub city .The health seeking behavior of the communities was also changed from time to time due to awareness creation done HEWs in rounding house to house in all of the households catchment (ketene) of residence of communities in the sub city .The routine surveillance covers all governmental health facilities sub city, district health office, health enter and private health facility, and all population under surveillance in the catchment area. The surveillance system has includes all public health importance in the community by community surveillance Here 20%(1/5) health facilities focal persons and 20%(1/5) district PHEM of the participants responded that even

though the surveillance system enables to describe the existing and occurring health events by time and place.

Stability

Stability refers to the reliability (i.e., the ability to collect, manage, and provide data properly without failure) and availability (the ability to be operational when it is needed) of the public health surveillance system (15). However data from health center are collected in hard copy and will be sent to district health office (district PHEM) by delegating one health professional. However, when they communicate information by telephone they will not be charged by the system when they do the work by their own cost. Therefore, the government does not allocate fund for surveillance activities. When trained surveillance personnel leave the position, there will be difficulties in data compilation from registration and reporting. Because untrained staffs were not volunteer to fill the vacant position as the system has no incentives such as trainings, refreshment .All participants responded that any restructuring did affect the surveillance activities demanding to have different capacity building. Staff high turnover and lack of resources had affected surveillance activities to sustain. Therefore, man power and financial inputs are play vital role for stability and sustainability of public health surveillance but from each visited sites there is no any performance according to state the CDC guideline such as ; any cost involved to repair the system's computer , the time of the system operating fully.

Timeliness

Timeliness for typhus surveillance is defined as the proportion of expected reports received on time (timeliness). Timeliness of the typhus surveillance is usually considered that the total number of reporting facilities which expect to report on time in the respective districts or sub city accordingly. Thus, timeliness of reporting was measured according to the PHEM guideline i.e., the proportion of the total sites reporting typhus disease on time divided by the total sites expected to report. When we assessed the timeliness report of the sub city and districts, the timeliness of the report of typhus in the sub city in last year, 2008 EFY 21 weeks was unknown. The timeliness of visited district was 87 % for district 4, but timeliness of the rest districts is unknown because they do not have any format that help to know or measure the number of facility which are reported timely or the number of facility which not reported timely. Concerning timeliness, data were not available in all visited sites; because of that the timeliness of weekly surveillance report of visited sites were not measured except district 4 health department level(PHEM) because this district

PHEM officer was prepare registration format for those send weekly report delay(Late) and those who report on time (Timely) so we can calculate timelines for this district . The rest districts including Addis ketema sub city health office PHEM, timeliness rate was not measured due to lack of any prepared registration format for both those who report timely and late. That means in almost all reports of visited sites, date of report sent to next level was not documented and was challenging during evaluation of report timeliness. In some visited district, surveillance focal persons and district PHEM officer usually uses their personal mobile phones to send the report using simple SMS (text message) and complained for not refunding them in some places. Most visited site has a constraint of logistics like internet.

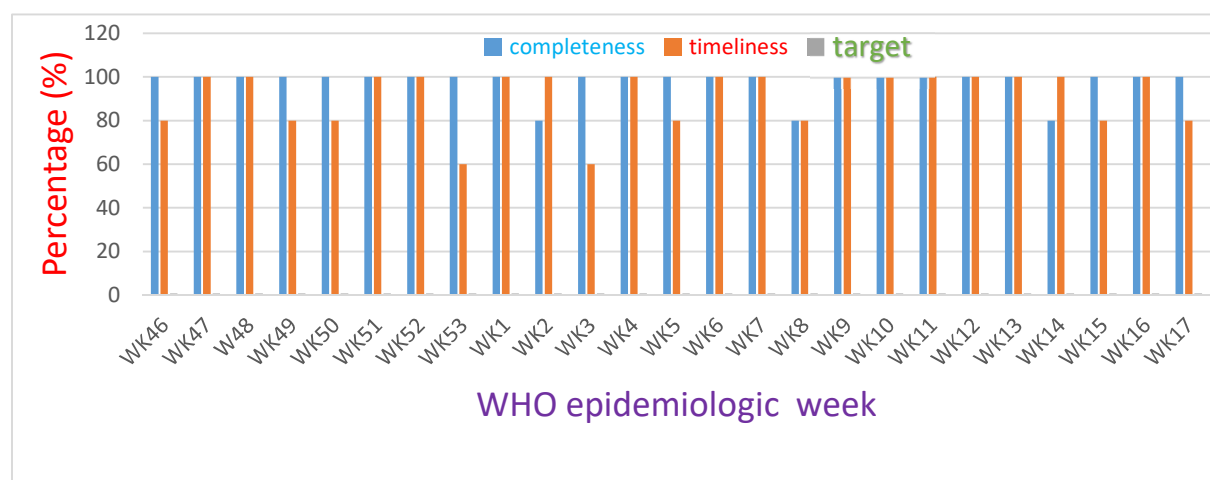


Figure 25: Average timeliness and completeness of weekly PHEM report by WHO weeks of visited health facilities in district 4, Addis ketema sub city, from WHO week 46/2017-17/2017.

Report completeness

Completeness is defined as the proportion of expected reports received. Completeness of typhus surveillance weekly report is measured by dividing the number of facilities that sent report divided by the number of total facilities expected to report. For health facilities we counted and compared the reported typhus with summary report to go to higher level and laboratory registration books for the previous one year until now. I tried to assess the completeness of the typhus weekly surveillance report for 2016/17 in all the selected districts, health facilities and sub city for this study. The sub city PHEM unit and all the assessed five districts, five health centers have the

address of their respective higher and/or lower authorized officers. The average weekly reporting rates (completeness) of the visited health facilities in this sub city over the past 21 weeks WHO week (3/2016 – 23/2017) were 78.97% for others (NGO, private clinics), and 93.81% for health centers (from below table 9). The overall reporting rates of the study districts to the sub city health department in 2016/17 following establishment of PHEM at district level, starting from 11/8/2016 until the study end up period of the assessment was 97.5% for district 4, 98.44% for district 3, 71.81% for district 7, 96.25% for district 6, and 69.69% for district 9 (below table 23). completeness of reporting was high in district 3 (98.44%) followed by district 4 (97.5%). whereas the reporting rate (completeness) of the sub city office in 21 weeks period (Epi weeks 3-23) was 84.26% and also the reporting rate of the visited districts in the last 16 weeks starting from establishment of PHEM in district level in Addis ketema sub city districts was 86.96%. All the reports were sent to the next level via telephone and sometimes with e-mail (sub city to the region). Generally, in all assessed health facility and districts, the report completeness and timeliness were more than expected or targeted (80%) in sub city and districts which is 84, 26 & 86.96 respectively but timelines is not calculated in sub city and districts except district 4. Almost all the districts PHEM officers and health facilities responded that their communication with their respective lower and/or higher PHEM departments is by weekly situation are delayed than that of expected. The reasons explained by the respondents were Network inaccessibility, no refunding mechanisms of personal mobile for the purpose of surveillance communication.

Table 16: average reporting rates of weekly PHEM report by its weeks of visited districts in Addis ketema sub city, Addis Ababa region from its week 46/2016 - 8/2017.

reporting(WHO week)	district 3			district 4			district 6			district 7			district 9		
	E	R	C%	E	R	C%	E	R	C%	R	E	C%	E	R	C%
46	4	4	100	5	5	100	5	4	80	5	9	56	12	7	58
47	4	3	75	5	4	80	5	5	100	5	9	56	12	9	75
48	4	4	100	5	4	80	5	5	100	5	9	56		10	83
49	4	4	100	5	5	100	5	5	100	6	9	67	12	9	75
50	4	4	100	5	5	100	5	4	80	6	9	67	12	10	83
51	4	4	100	5	5	100	5	5	100	7	9	78	12	9	75
52	4	4	100	5	5	100	5	5	100	7	9	78	12	9	75
1	4	4	100	5	5	100	5	4	100	7	9	78	12	8	67
2	4	4	100	5	5	100	5	5	100	7	9	78	12	8	67
3	4	4	100	5	5	100	5	5	100	7	9	78	12	7	58
4	4	4	100	5	5	100	5	5	100	7	9	78	12	7	58
5	4	4	100	5	5	100	5	5	100	7	9	78	12	10	83
6	4	4	100	5	5	100	5	5	100	7	9	78	12	8	67
7	4	4	100	5	5	100	5	5	100	7	9	78	12	7	58
8	4	4	100	5	5	100	5	4	80	6	9	67	12	7	58

When we see the report completeness of governmental health facilities by district, almost all 4/5(80%) of visited districts which found in Addis ketema sub city had completeness rate of 80% and above (above the national target). On the other side, in all districts, private health facilities reporting completeness rate was less than 80% and the maximum was 76.9% reported on march , followed by December 59%, january 61.5%, February 66.7% and may 71.8%. On the other hand, at sub city level there is a big difference between governmental and non-governmental health facilities by weekly report submission. In the last five months (21 weeks), on average the sub city governmental health facilities reporting completeness rate was above 80% i.e. 96%. In contrary, the reporting completeness rate of private health facilities were less than expected national target

(79.6). As the same reporting period (five months) with governmental health facilities, the completeness rate of private health facilities were 67% on average and the maximum was 76.9%.

Table 17: average reporting rates of weekly PHEM report in visited health facilities, Addis ketema sub city, from WHO week 3/2016- 23/2017.

Report ing week(WHO week)	Health center			hospital			Others (clinics, NGO)			Total number of health facilities		
	E	R	C%	E	R	C%	E	R	C%	R	E	C%
3	9	10	90	2	0	0	24	19	79	30	36	83
4	9	10	90	2	0	0	24	18	75	29	36	81
5	9	10	90	2	0	0	24	22	92	33	36	92
6	9	10	90	2	0	0	24	20	83	31	36	86
7	9	10	90	2	0	0	24	22	92	33	36	92
8	9	10	90	2	0	0	24	18	75	29	36	81
9	8	10	80	2	0	0	24	20	83	30	36	83
10	9	10	90	2	0	0	24	20	83	31	36	86
11	10	10	100	2	0	0	24	20	83	32	36	89
12	10	10	100	2	0	0	24	18	75	30	36	83
13	10	10	100	2	0	0	24	18	75	30	36	83
14	10	10	100	2	0	0	24	20	83	32	36	89
15	10	10	100	2	0	0	24	18	75	30	36	83
16	10	10	100	2	0	0	24	20	83	32	36	89
17	10	10	100	2	0	0	24	20	83	32	36	89
18	10	10	100	2	0	0	24	19	79	31	36	86
19	9	10	90	2	0	0	24	15	63	26	36	72
20	8	10	80	2	0	0	24	19	79	29	36	81
21	10	10	100	2	0	0	24	21	88	33	36	92
22	9	10	90	2	0	0	24	10	42	21	36	58
23	10	10	100	2	0	0	24	21	88	33	36	92

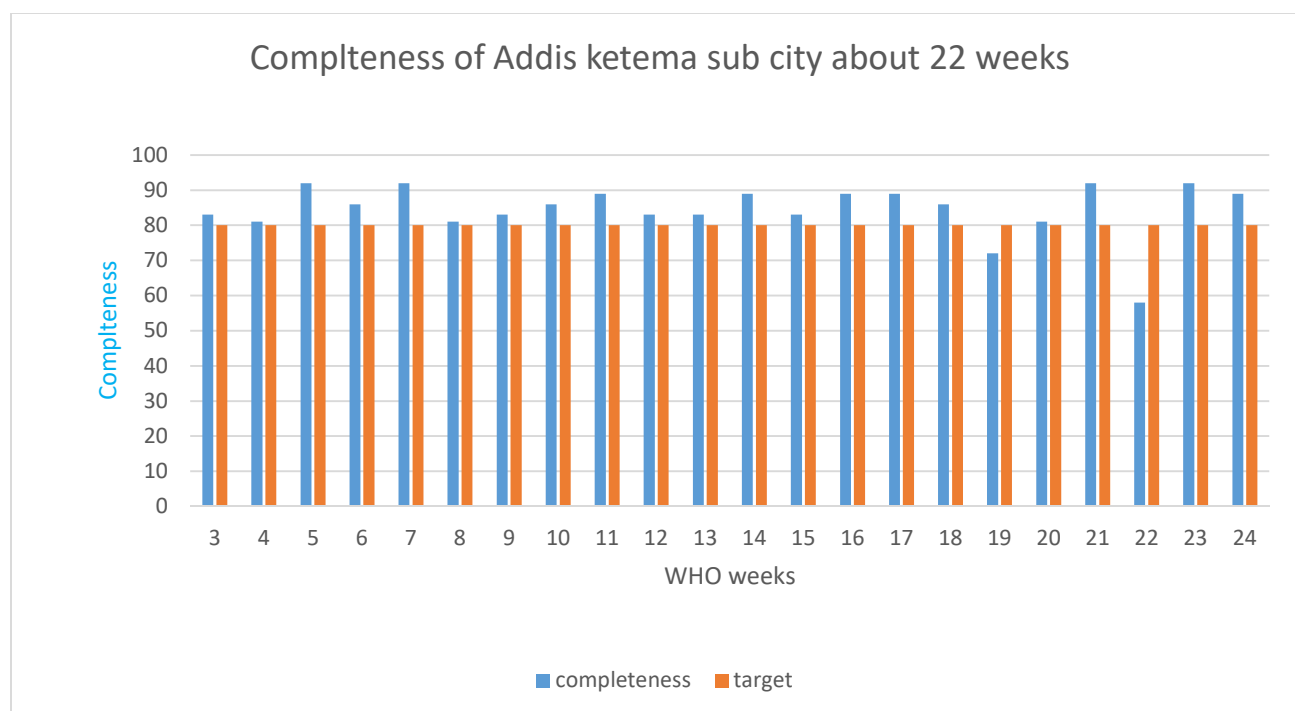


Figure 26: Completeness of report of Addis ketema sub city, Addis Ababa region, 2016/17(WHO 3-24).

The quality of data

Data quality was measured by the validness of the number of cases in registration and those in reporting format, inclusion of all the necessary variables that should filled in reporting .Data quality was assessed by completeness of the reporting form. According to the copies of weekly reports of visited sites, at two health facilities and two health offices the reporting format lacks reporting date. At sub city level, six months of weekly reports of 2009 EFY were assessed and there was no blank/ unknown space. On the other hand, from visited district and health facilities 80% of the reporting formats were complete with necessary information. At health facility level (Health centers and Hospitals) there are also commonly missed essential variables, the missed variables in the weekly reporting formats was sent by saying date of report (but week of report), and the expected number of health facilities to report, and in the registration format: date of onset, place residence etc. while reporting using line list during outbreak. most of the health staffs didn't understand as they can use the blank variables to fill missed like date of admission, vaccination history, locating information and the others variables of interest .This has its own challenge during data analysis. The major reasons were not considering some of the variable as important, reporting

sites were not well regularly supervised in all visited sites and there were no any regular crosschecking of the data and feedback.

Laboratory

The surveillance system data result supported by laboratory diagnostic tools and management materials for typhus disease. The material used for typhus are as follow : weil felix reagent (kit), test tube, syringe and needles, cotton and alcohol, gloves, centrifuge ,shaker, waste disposal materials, recording books, reporting forms, computers and others like that. All the total visited health facilities were perform Weil flux laboratory test for typhus cases at any time when clinically suspect by rule out typhus. At these level, laboratories were able to test typhus by Weil Felix to check the status of typhus. All visited sites including district and health facilities, the laboratory has a capacity to collect, test, handle and transport biological specimens of blood, and have roles in the surveillance of typhus. the cases were tested both at the health facility level and if there is any need of further investigation send to the next level (regional or national laboratory) for further analysis and confirmation. At national level, the Ethiopia Public Health Institute health and nutritional research laboratory is responsible to test the specimen and have capacity to collect, inform the result, analyses and send the result to lower level ,perform the test for all diseases in addition more advanced tests are performed based on the standard on the national guideline. Regarding the laboratory capacity at district level, almost all health centers have complain that, the feedback from national laboratory was delayed. It take more than three or more months to get the feedback. From the visited health centers, who sent the specimen in year 2017, all were not received laboratory result before three months.

Discussion

The surveillance system of typhus in Addis ketema sub city, selected districts and facilities was evaluated by describing the system and measuring attributes in the system. It was found that typhus was the major disease burden in Addis ketema sub city. This might be due to high population mobility in the area from different part of country side and presence of poor sanitation in the community. There was a surveillance focal person in all the visited health facilities but the focal persons had professional tasks in addition to surveillance activities. Due to this health facilities have not doing data analysis regularly. There was no practice of data analysis, interpretation and utilization of typhus surveillance data at facility and district level, simply compile data from the next lower level and submitted to higher level without further analysis. This may be they don't have continuous training how to analyze and interpreted their surveillance data for action ,and also high turnover in surveillance focal persons and lack of computer at health facility level might be the reasons for not exercising the collected data for analysis and interpretation to take public health actions. Thus even though typhus surveillance is useful, the collected data had be unable to show risk factors (15). The surveillance system of typhus is flexible for newly occurring health and health related events it can capture all acute febrile illness case through typhus surveillance and reporting formats of typhus is easy and clear to fill for PHEM officer at district level which helps for early detection and identification of cases for timely response and prevention, this finding is consistent the study conducted in Sudan (16). In all the participant health facilities cases definitions typhus were not posted to the available health department (under5, emergency &OPD etc.) this is due to material constraint and have restriction of post papers in painted walls of health facilities .The structure of data reporting flow from the lower to the higher level is well organized, defined role and responsibility of each reporting entities. But the flow has so many obstacles with regarding to reporting materials such as telephone, internet access and computers for data management and analysis. This might be due to absence of budget allocation for surveillance. According to the finding, the Addis ketema sub city weekly surveillance report completeness is 84.26% which is greater than the national target, 80% (7). This might be due to becoming involvement of some private facilities under surveillance .When reports are sent and received on time, the possibility of detecting a problem and conducting an effective response is greater. So that, ministry of health prepared an indicator to measure the timeliness of the report and aimed to reach a target of 80% (7). As indicated in the result, the Sub City reporting timeliness was less than the national target.

This might be due to lack of strong follow up for higher authorized personnel and non-preparation of format that help to measure timing of reported facilities. This disparity will hamper the quality of work towards typhus disease surveillance. As indicated in the result, the district 4, the lonely district which prepare format for monitoring the facilities to report timely or lately, reporting timeliness was 97.5% which is higher than the national target (7). This is an important indicator for detecting a problem and conducting an effective response early that means, Timely reports will give timely information which helps to predict future outbreaks, trends of diseases occurrence, cases for further studies, future impact of diseases surveillance and action for problems identified on time. This finding is consistent with the study conducted in Atlanta, Georgia(17). This might be due to preparation of tools that guide to measure the status of facilities reporting times. The reporting facilities by ownership, participation of private health facilities in sending weekly surveillance report is lower (76.9%) than expected national target (80%). However, the governmental health facilities completeness was (96%). This may be loose attention and follow for private facilities than public health facilities .At all visited level there is no regularly supportive supervision and strong written feedback. There is no written epidemic, preparedness and response plan at all visited health facilities. This may cause weak case detection and response during epidemics .Epidemic management committees are formally established in all health facilities jointly with district PHEM but none of visited site have formal and regular minute of meeting for epidemic management issue and did not evaluate their preparedness and experience as per the national guideline.

Limitation of the study

- Private clinics were not included in the assessment.
- Date of receipt and reported were not registered in reporting format because of this we did not calculate timeliness of the report in sub city and districts.
- Unavailability of data to see trends in visited facilities and inadequate literatures of similar study for better approach.
- The PHEM weekly surveillance data lacks age and sex variables, unable to describe the number of cases by person.

Conclusions

There was no trend of analyzing, interpreting, and using the collected data for action in all visited health facilities and districts in the sub city. In addition, there was no budget line either from government or nongovernmental organizations (NGO) for surveillance activities at district level. There is no written feedback, epidemic and preparedness and response plan, regularly base of supportive supervision at all visited health facilities. Typhus surveillance systems are simple and flexible and well accepted by all assessed sites. The surveillance system of typhus useful was limited to detect risk factors in the study area. The reporting site completeness of the Addis ketema sub city was more than targeted (84.26%) (WHO week 3/2016 – 27/2017). There is poor surveillance regular supportive supervision at all level. The feedback give from higher to their respective lower health facility were not continuous in the last eleven months. Most of the visited sites have surveillance manual. Standard case definitions for typhus were not posted in all of the health facilities .All visited health facilities (Hospital, Health center) have diagnostic capacities to confirm typhus by using weil felix. None of visited site have minute of meeting for epidemic management committee and did not evaluate their preparedness and experience as per the guideline of the national and regional recommendation.

Recommendations

- ✚ PHEM officers should be analyzed, interpreted and described Surveillance data by person, place and time, and used for action at all district and health facility level.
- ✚ Written feedback, epidemic preparedness and response plan, and supportive supervision should be given at regular basis to all level to strengthen for more improvement of the completeness and timeliness and/or surveillance system as whole at sub city level and district.
- ✚ Data quality assessment should be conducted at all facilities.
- ✚ Availability of reporting formats and registration book should be checked and provided on regular basis at each level of health facility.
- ✚ Epidemic committee (RRT) should be alerted all the time in respect to preparedness and response and also post epidemic assessment has to be strengthened.
- ✚ Laboratory result should be communicated to the district and health facility on time.
- ✚ FMOH should allocate budget for surveillance activities at all level to ensure sustainability of the system.
- ✚ The region should distributed case definition and reporting formats to the district and health facility.
- ✚ using communication technologies at districts and facilities by e-mail
- ✚ Conduct joint supportive supervision quarterly to strengthening the completeness and timeliness of surveillance data report.

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Annex 2: Surveillance system evaluation Questioner:

Sub city Level Questionnaire

Region _____ Respondent _____ Telephone _____ Interviewer _____ Date _____

General

Total population-----male-----female----- Total woreda-----
-----kebles----- Total Hospitals-----H.Cs-----H.clinics-----any private clinics-----
NGOs-----other private health facilities

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, **Observe** [1 to n priority diseases] whether it 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 forms 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 woredas
Immediately: -----/times the number of woredas
9. Number of weekly reports received on time: ____/12 times the number of woredas
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 f. Other (specify)
13. Does the zone level describe data by person (case based, outbreaks, and sentinel)? Yes/ No
If yes, (Observe) 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, observe, line graph of cases by time and list disease(s) for which line graph is plotted

16. Observed a. _____ b. _____ c. _____ d. _____ e. _____

17. Does the zone have an action threshold defined for priority health diseases? 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 E. As needed

20. Do you have appropriate denominators to establish the threshold? Yes / No

21. **If yes, Observe presence** of demographic data (E.g. population by woreda and hard to reach Groups)

Outbreak Investigation

22. Is there any outbreak in the zone in the 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 woredas that looked for risk factors [observe in reports]

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

Epidemic preparedness (relevant for epidemic prone diseases

28. did the zone established epidemic management committee? Yes/No

29. Do you have plan for epidemic preparedness and response? Yes/No

If yes, Observe, 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 1year? Yes/ No

31. Has the sub city experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)? Yes/ No

32. Does the standard case management protocol for Relapsing fever exist in all health facilities?
Yes/No

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

If yes, Observe minutes (or report) of meetings of epidemic management committee

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

Response to epidemics

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

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

Feedback

36. Does a report is regularly produced to disseminate surveillance data from the sub city? Yes/No

If, yes observe: the presence of a report of surveillance 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 a reason 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 trained in surveillance? _____

Resources

43. For data management Computer & Printer Yes/No) Photocopier Yes/No) Data manager Yes/No) Statistical package Yes/No

44. Communications availability

a) Telephone service Yes/No) Fax Yes/No) Radio call Yes/No) Internet Yes/No

Surveillance

45. Is there a budget line for surveillance at zone? Yes/No

If yes, is it sufficient Yes/No

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

a) Usefulness:

48. Total population under surveillance in the zone _____

49. How many cases and deaths reported in the zone last year?

Relapsing Fever 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 this disease? 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 **If yes, 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, **Observe:** 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 e) If Others: _____

f) Representativeness:

61. What is the health service coverage of the woreda/ sub city / region? _____ %
 62. Do you think, the populations under surveillance have good health seeking behavior for these diseases? Yes/ No
 63. Who do you think is well represented by the surveillance data? Urban / rural

g) Timeliness:

64. a. What proportion of woredas reports in acceptable time? ----- %
 b. When do you report to the next level?

h) Stability

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

2. District Level Questionnaire

District name _____ **Respondent** _____ **Date** _____ **Interviewer** _____

General Information

1. Is there a national PHEM /IDSR Guide line or manual at this site? Yes/No
 If yes, **Observe** national PHEM /IDSR Guide line/manual: _____
2. Does the District have the **capacity** to transport specimens to a higher level lab? Yes/No
3. If No, Reason _____
4. Does the woreda have guidelines Or SOP for specimen collection, handling and transportation to the next level? Yes / No
5. Have you lacked forms recommended for the country at any time during the last 6 months? Yes/ No
6. . 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
7. Number of weekly reports submitted on time: ____/12 times the number of health facilities
(On Monday)

8. Number of immediately reports submitted on time: _____/3 times the number of health facilities (**within 30minutes of events**)
9. How do you report Weekly or immediately to the next level? a/ Mail b/Telephone c/ Fax d/Radio e/ Electronic f/ Other
10. How can reporting system be improved?_____
11. Did you analysis surveillance data? Yes/No a) If yes, is data described by person for any case based, outbreaks or sentinel? Yes/No
12. Is there description of data by place (locality, village, work site etc)? Yes / No
13. Is the description of data by time? Yes/ No
14. If yes, observed description of data by person, time and place?
15. Is there a trend analysis for the Relapsing fever? a) Yes/ No
16. If yes, **Obs.** line graph of cases by time
17. Do you have an action threshold for any of the country priority diseases? Yes/ No
18. Did you have appropriate denominators? Yes/ No
19. If yes, Obs. demographic data at site (E.g. total population by village, <5 yrs,---)
20. Who is responsible for surveillance data analysis? _____
21. How often do you analyze the surveillance data? a Daily b. Weekly c. Every 2 weeks d. Monthly e. Quarterly f. As needed.....

Outbreak investigation

24. Is there any Outbreak or suspected in the District in the past year6 months? Yes/No
25. **If yes**, number investigated_____ (Observe reports and take copies if possible)

Epidemic preparedness

26. Dose the worda epidemic preparedness plan? Yes/No
27. **If yes, observe**a written plan of epidemic preparedness and response.
28. Has the worda had emergency stocks of drugs and supplies at all times in past 1 year?Yes/No
29. **If yes, Obs,** Observed the stocks of drugs and supplies at time of assessment
30. Has the worda experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)? Yes/ No
31. Is there a budget line or access of funds for epidemic response? Yes/ No
32. Does the worda have a rapid response team for epidemics? Yes/No

33. If yes, **Obs**Observed minutes (or report) of meetings of epidemic management
34. Did epidemic response team evaluate their preparedness and response activities during the past year? Yes/ No
35. **If yes**, (observe written report to confirm)

Responses

36. Has the District implemented prevention and control measures based on local data for at least one reportable disease or syndrome? Yes/No
37. Present of epidemic that responded by Districts within 48 hours of notification of most recently reported outbreak?_____

Feedback

38. How many feedback written reports has the worda produced in the last year?_____ **Obs**Observed the presence of a written report that is regularly produced to disseminate

Supervision

39. Did you supervise the health facilities in the last 6 month? Yes/No
40. **If yes**, how many times have you been supervised in the last 6 months?_____ (**Obs** supervision report)
41. If No, the most usual reasons for not making all required supervisory visits.(Text)

Reason1 _____ Reason2 _____ Reason3 _____

Training

42. Have you trained PHEM disease surveillance? Yes/No
43. **If yes**, specify when, where, how long, by whom? _____.
44. What percent of your staffs in the worda trained on PHEMsurveillance?____%

Resources

45. Logistics Available a) Bicycles Yes/No b) Motor cycles Yes/No c) Vehicles Yes/No d) Stationery Yes/No e) Computer & Printer Yes/No
46. Communication available
- a) Telephone service Yes/No b) Fax Yes/No c) Radio Yes/No d) Computers that have modems Yes/No
47. Information education and communication materials
- a) Posters Yes/No b) Megaphone Yes/No c) TV Screen Yes/No d) Projector (Movie) Yes/No

48. Availability of hygiene and sanitation materials a) Spray pump Yes/No b) Disinfectant Yes/No

Surveillance

49. Is there an surveillance focal person in the woreda epidemic management committee? Yes/ No

50. Are you satisfied with the current surveillance system? Yes /No *If no*, why? _____

Attributes

a) Usefulness

42. Total population of the woreda under surveillance _____

43. How many cases and deaths reported in the woreda from the following disease past 6 months?

a) Relapsing fever 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 yes, **Obs:** Review the last month's 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 nknown 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) 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? _____.

3. Health facility Questionnaire (Hospital & Health center)

Identifiers

Woreda _____ Name of health facility _____ Type of health facility _____

Respondent _____ Date _____ Interviewer: _____

General Information

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

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

2. Is there a clinical register in health facilities? Yes/ No

If yes, **observe 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 for Relapsing fever? Yes/No

If yes, observe the standard case definition for relapsing fever

5. Do health facilities use standardized case definitions for the country's priority diseases?
Yes/ No

If yes, Observe; the respondent correctly diagnosing one of the country's priority diseases using a standard case definition (Interview about of these)

5. Do the health facilities have the capacity to collect the following specimens?

a) Sputum Yes No N/A b) Stool Yes No N/A c) Blood Yes No N/A d) CSF Yes No N/A

6. If yes, Observe 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

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

If yes, Observe the presence of status cold chain at health facility

8. Does the health facility that has the capacity to ship specimens to a higher level lab? Yes No N/A

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

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

Yes No N/A **If yes,** what the reason? _____

10. 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])

B. Relapsing fever Yes No N/A

11. 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

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

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

Observe Number of immediately reports submitted on time: ____ / -- times the number of sites

13. How do you report? a/ Telephone b/ Fax c/ Mail d/ Radio e/ Electronic f/ Other

14. How can reporting be improved? Your suggestion _____

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

If yes, Observe data

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

If yes, Obs line graph of cases by time

17. 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)? Relapsing fever cases ____ % increase

18. Who is responsible for data analysis? _____

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

Population) Yes No

Epidemic preparedness

21. 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

22. 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

23. 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

24. 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

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

26. 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

27. 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

28. Have you trained in disease surveillance and epidemic management? Yes No N/A

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

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

Resources

30. Logistics

a) Electricity Yes/No) Bicycles Yes/No) Motor cycles Yes/No) Vehicles Yes/No

31. For data management

a) Stationery Yes/No) Calculator Yes/No) Computer Yes/No) Software Yes/No)
Printer Yes/No

32. Communications available

a) Telephone service Yes/No) Fax Yes/No) Radio call Yes/No) Computers Yes/No

33. Information education and communication materials

a) Posters Yes/No) Megaphone Yes/No c) TV Yes/No) Other: Yes/No

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

35. List Personal Protection materials (PPE) available in health facility_____

Attributes

a) Usefulness

49. Total population of the woreda under surveillance_____

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

a) Malaria cases _____Deaths _____ b) 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) 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

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

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

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

58. Average number of *unknown or blank responses* to variables in each of the reported forms_____

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

e) Acceptability

60. 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 participate)? _____

61. 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

62. What is the health service coverage of the woreda? _____%

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

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

g) Timeliness

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

h) Stability

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

If yes, how did you manage it?_____

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

Chapter IV- District health profile description

4.1. Health Profile description of District 9 Community, Addis ketema sub city, Addis Ababa, 2016.

Abstract

Introduction: Health profile is describing health and health related data and important indicators associated with health in a certain community. The health profile of district was not done before and no organized and well documented information.

Objective: to assess the health profile of district 9, Addis ketema sub city, Addis Ababa, 2016

Methodology: Descriptive cross-sectional study design was conducted from 21 April to 5 May 2016. Health and health related data was collected from different sector offices of the district using semi structured questionnaire, reviewing of annual reports, and observation of charts. Interviews was conducted with stakeholders and heads of different sector offices to identify the leading public health problems of the district. The collected data was compiled and analyzed using Microsoft excel. Frequencies, proportions, tables and figures was employed.

Results: the district has 6 kebeles with a total population of 33,196, of which female constitute 52.3% and male 47.7% and male to female sex ratio of 1:1.09. 93% pregnant mothers were received at least 1st ANC services while (71%) reached the 4th ANC follow-up. Similarly 57% of pregnant mothers delivered in health institutions and 95% were received PNC services. Penta 3 and measles was 98% and 77% respectively. Endemic typhus, typhoid fever and acute upper respiratory tract infections were the leading causes of morbidity in both adults and under-fives. one health center was serving for 33,196 populations.

Conclusion and recommendation: Typhus, typhoid fever and acute upper respiratory tract infections were leading cause morbidity adults and pediatrics. Therefore prevention and control measures should be strengthened through early detection of cases and improving the immunization. Additionally, the District should register data of vital statics should be strengthened through registering vital and other events.

Keywords: Health profile, Addis ketema, Addis Ababa, 2016

Introduction

Back ground

Health profile is summarizing and discussion of health and health related data. It is important to describe health and health related social, economic, political and cultural factors in geographic area under discussion. It is vital for prioritizing any health and health related problem of the community. It is important for planning and appropriate intervention besides being an entry point for action research. Stakeholders of health and health related issues will access evidence based information from well compiled health profile. Community health profile is a comprehensive compilation of information about a community. The profile reflects the health of given community from many different angles. The profile includes a narrative description of the given community health status in align with historical, geographical, and economical back ground of the area. The purpose of most investigations in community medicine, and in health field generally, is the collection of information that will provide a basis for action, whether immediately or in the long run (1). There is a trade-off between relatively simple and inexpensive information to collect and the degree of precision of the information or its validity. Even when appropriate information is collected it has to be synthesized in such a manner that it can be utilized for management purpose. Improvement in health and socio economic situation are mutually supportive(2), therefore primary health care is an integral part of the overall development of society. This is a crucial theme in primary health care philosophy resolving the now obsolete controversy that incriminates health as only a consumer sector. A planner who addresses the health problems of a community is trying to alleviate developmental problems. This inherent nature of health renders the task of a health planner arduous and complicated. It is very well demands a systematic and objective approach of these problems. In order to meet the objectivity and scientific clarity demanded of in planning, we should look for a coherent and self-sustaining information system. There exist tremendous disparities among nations of the world, and the gap is growing. Disparities also exist within the societies. In order to illustrate disparities, some of the main basic indicators are listed. Most deaths in developing countries are from infectious disease. They are closely related to prevailing social and economic conditions, and impede social and economic development. About a tenth of the life of an average person in a developing country is seriously disrupted by disease. The infectious disease in particular are chronic and debilitating and they are endemic in most poverty stricken countries (3).

Nevertheless, these problems are to a great extent preventable. Implementation of an integrated multi sectorial approach to health is essential for the health of the community cannot be improved solely through efforts of the ministry of health. To add to the difficulties, health systems are poorly organized in most countries of the world. In developing countries approximately two-thirds of the population do not have reasonable access to any permanent form of health care (5, 6). In most countries, developed and developing alike, the overwhelming proportion of resources for the delivery of health care is concentrated in the large cities. Even in the cities, most of the resource goes to hospitals (4, 5). Communicable diseases and nutrition deficiencies are the main health problems in Ethiopia. Shortage and high turnover of human resource and inadequacy of essential drugs and supplies have also contributed to the burden (6). The planning and management of health services in developing countries often proceed within an environment of inadequate information about the health status of the population served and the occurrence of important determinants of health. This is particularly the case at the district level where health services have traditionally underdeveloped and information systems lacking (7). Despite major efforts to improve the health of the population in the last one and half decades, Ethiopia's population still faces a high rate of morbidity and mortality and the health status remains poor. In Ethiopia, particularly at the district level an organized health and health related indicator which determines the health status of the community is insufficient and these contribute to a gap in planning and taking evidence based information for action.

1.1. Rational of the study

Assessing the health profile of a community is very important to understand the health status of the community and clearly present their needs and issues. It is possible to plan and prioritize public health action and interventions based on a health profile. Moreover, the health profile can give base line information to other sectors of the targeted setting. . Nevertheless, the health profile of district 9 was not done before and there is no organized and well documented information related to it. But there are various health and health related data at different departments of the district though not organized and analyzed systematically. . Therefore, the main aim or purpose of this study is to assess and describe the health and health related profile of district 9, Addis ketema sub city, Addis Ababa city administration from April 27 to May12, 2016 in order to identify major health problems and address the current gaps in planning, priority setting and evidence based interventions. Furthermore, the information that will be obtained from this study believed to help as a base line for further researches with wider scopes.

Objectives

General objective

To assess and describe health status, health related indicators and identify problems for priority setting of district 9, Addis ketema sub city, Addis Ababa, 2016.

Specific objectives

- To describe socio demographic and geographic status of district 9.
- To assess the characteristics of current health services and health infrastructures in the district
- To assess health and health related indicators of district 9.
- To identify priority health problems in the district

Methods and Materials

Study period and study area

Compilation of health profile was conducted in Addis Ketema sub city, district-9 from April 27 to May12/2016. District-9 is one of the ten districts found in Addis Ketema sub city.

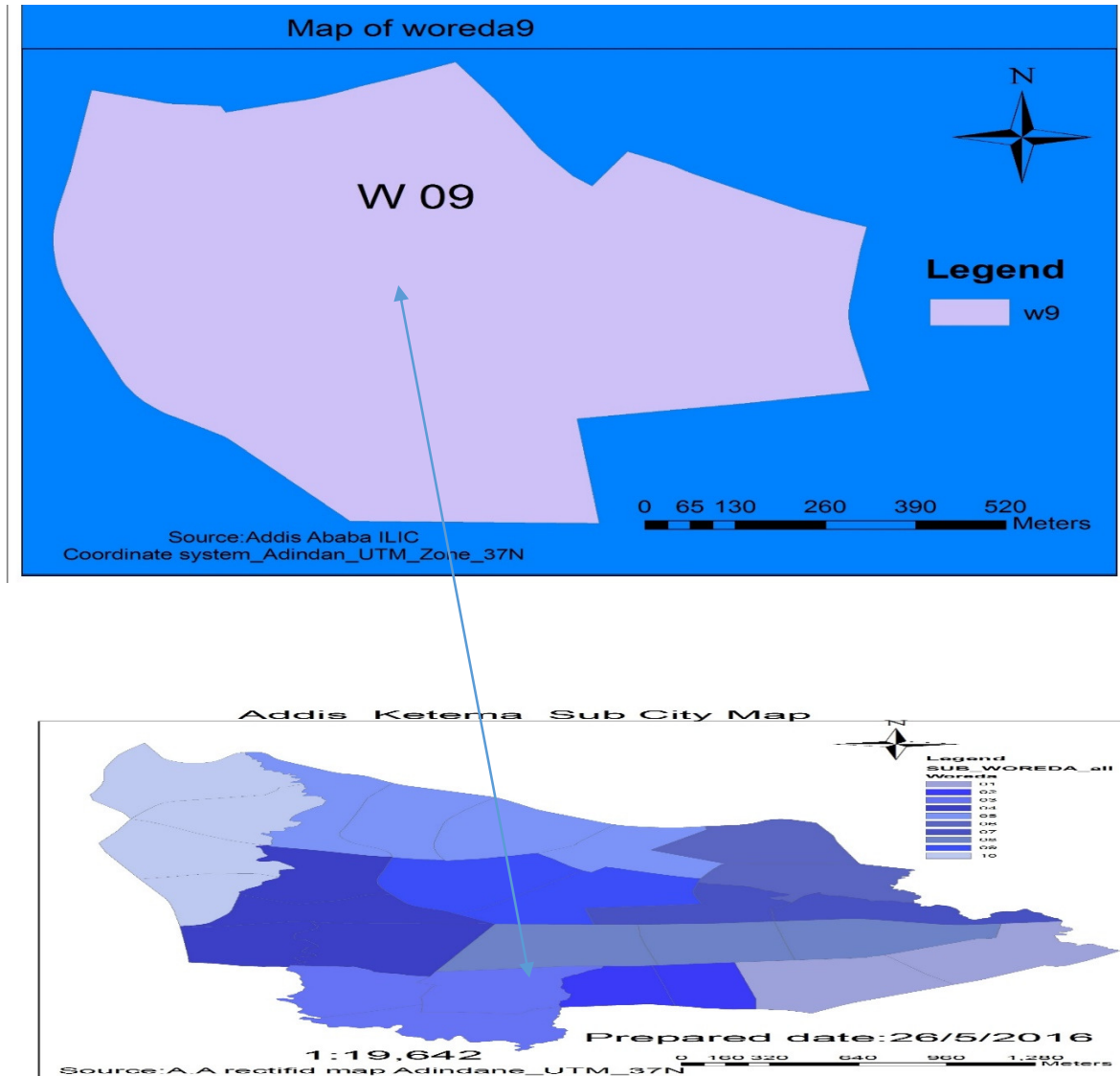


Figure 27: map of Addis ketema sub city and district9, 2016.

Study design

Descriptive cross sectional study was conducted using semi-structured questionnaire and check list for review hard copy and soft copy of available data in district 9 health office, health institutions, education bureau, and water office. In addition, interviewing and discussed with concerned bodies was conducted.

Data collection methods

Permission was asked from Addis ketema sub city health office to collect the data and brief discussion on the purpose and benefit of this study that was done in the district -9. Semi-structured questionnaire compiled with different instruments like checklists were used as tools for data collection from various governmental organizations such as district health office, health facilities, education sector, finance office, district water resource office, district electric power authority and district political administration office, and We interviewed concerned health office heads, experts, health professionals of various disciplines and heads and experts of other sector offices. We examined posted charts on the walls of the office for a list on top causes of morbidity, mortality, organizational structure and others were evaluated. We reviewed annual reports of the relevant sectors that have sent to the sub city or region. We also collected, analyzed, and interpreted the available data in health office and health institutions.

Data Analysis Procedure

Data was analyzed by using Microsoft Excel 2013 to organize data appropriately. Frequency distribution tables and figures (descriptive statistics) was used to show the results.

Ethical Consideration

Official letter was obtained from Addis ketema sub city Health office to the study area of district health office and other relevant offices to accept the legality of this study. The purpose and objective of the study was briefly explained to the respected Officials based on their level of responsibility.

Data Quality Assurance

First, the mentor was comment on the prepared data collection check list and the data was checked its incompleteness before analyze to assure the reliability and validity of the data.

Dissemination of Findings

As soon as the Health profile data description was finalized, the report was prepared and presented to Saint Paul's Hospital Millennium Medical College, Department of public health FETP and shared to Woreda-9 Health Office and other relevant offices.

Results

Back ground information/Historical Background)

Geography

As the Woreda communication office mentioned verbally, it was established or organized as District level one year after the establishment of the new Business process reengineering(BPR) ,17 years ago (1999 GC). The name of the District derived randomly, there is no any evidence or reason why it is called District 9 or its name has got. It constituting about 356 square kilometer of the total surface area of the sub city and it situated or Its boundaries are on the south by District8 (Amanual phsycatric specialized hospital), on the West by District 4 (AAU branch of school of health science), on the North by District 6 and on the East by District7 (Country across Bus station near Merkato marketing center). The altitude of this District ranges from 550-2450 meters above sea level. The rainy season is mainly from May to September with an annual rain fall range of 100-1200mmwith and The climate varies seasonally between within each years, and rainfall or the rainy season from June to September months, cool months November -January, the dry season, from October to June, and the annual temperature varies between 10.5 and 23.70c Additionally there is small rainy season during March and April. There are six kebeles in District 9. Namely, kebeles27, kebeles28, kebeles19, kebeles18, kebeles21 and kebeles20 in descending order according with respect to their surface area.

Administration and political structure

Addis Ababa, the capital city of Ethiopia is a century year's old .It is situated in the central part of the country and is sub divided into 10 sub city administrations. In which a sub city is headed by Chief executive body and has its own council and representative in the federal parliament is the basic decentralized administrative council composed of elected members. Addis ketema is one of among the ten sub cities found in Addis Ababa city administration which has 10 administrative Districts and 28 Kebels. It located central part of Addis Ababa whereas District 9 is one of the ten Districts found in Addis Ketema sub city administration. It composed of 6 Keble (keble27, Keble 28, keble21, keble18, keble19, keble20). It is bordered on the south by District 8 (Amanual phsycatric specialized hospital), on the West by District 4 (AAU branch of school of health science), on the North by District 6 and on the East by District7 (bus station near Merkato marketing center).

Population characteristics

According to information collected from District health office and District administration and other District offices, the total population of District 9 in the year 2015, was 33196, of which 15934(47.7%) are males and 17262(52.3%) which makes or yields sex ratio of 92 males to 100 females this indicates the sex ratio between male and female is almost equal. The population density averagely is estimated 231 persons per sq.km and the average size of house hold is estimated 4.3. And also in the reproductive age group estimated to account 35% of the total population. It is difficult to find exact figure about each age category according as EDHS age classification in this District due to this it is impossible to prepare population age -sex pyramid. According to the District administration office leader explanation, in this District there are young population pattern, for the District this may be a reflection of the problem of high fertility and moderate reduction in infant mortality. In any case the high percentage of population under 15 years of age is indicative of the high growth potential of the population. High fertility in the District is partly. The belief in, and practice of having large families cuts across all religions and ethnic groups. Divorce is also common in this District. The other main problem is this District not only men tend to marry more than one girls but also commercial sex working activities are widely practiced, a younger one with each succeeding marriage, and continue to have more children. The youth age structure of the District indicates that the dependency burden upon those in the working age group is high.

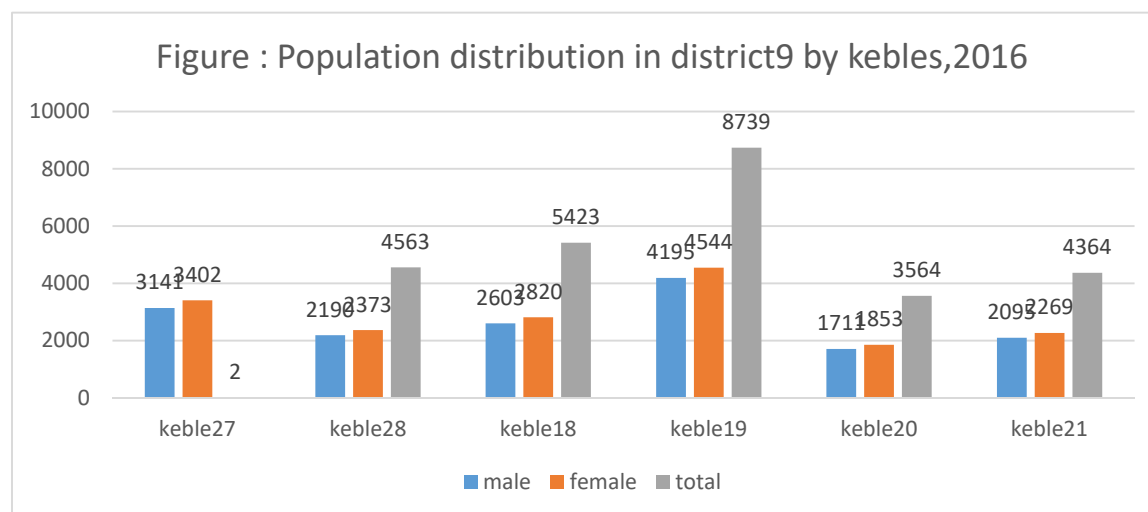


Figure 28: Population distribution in district9 by Kebles, Addis Ababa, 2016.

Religion, Ethnicity composition and language usually spoken

Ethnic group of a person is the tribal origin with which he/she identified himself/herself. In District 9 administration, There are many or distinct nationalities or ethnic groups living in these six kebeles, these are as indicated below, the majority are Gurage as comprising 8739(26.3 %) of the total population. This is followed by Amhara, Oromo, and Tigray wolayeta, making 19.7%, 16.3%, 13.7% and 13.14% respectively.

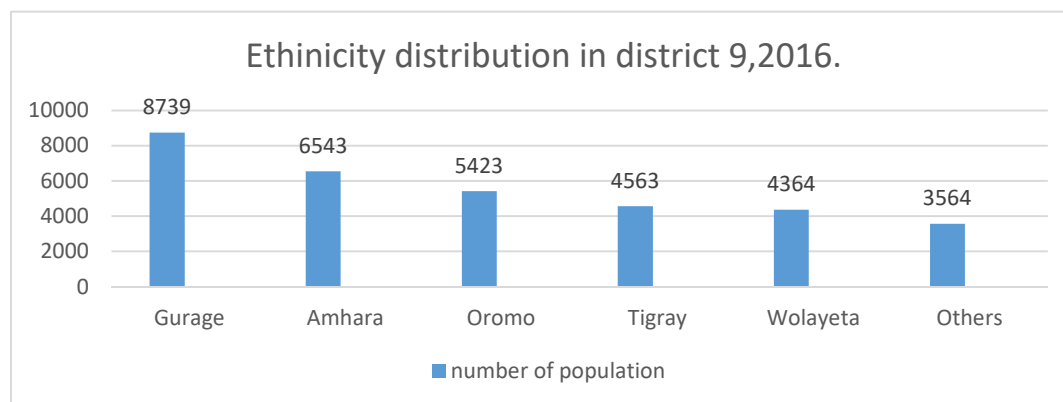


Figure 29: Distribution of ethnicity in district9, 2016.

Religion is an affiliation with an organized group having specific religious or spiritual principle. About 76% of the total population this District orthodox Christian followed by Muslim, protestant and catholic, 12%, 9% and 3% respectively. Language usually spoken at home, it is expected that house hold members use for communication at home the administration, like Addis Ababa, Amharic language is the official language in the District However, from the total population Amharic language was spoken more than 99%. Language or dialect of their ethnic group. Since this District is one part of the city.

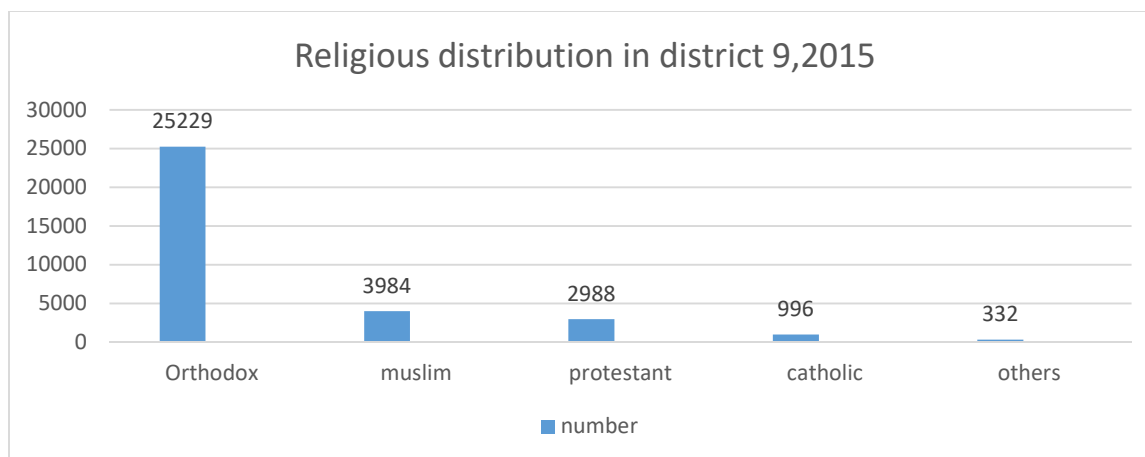


Figure 30: Distribution of religion in the district, 2016

Marital and occupational status

The marital status composition of the population of District 9, aged 18 years and above revealed that when the variable of marital status of District 9 administration is the rate of single and divorced when aggregated is not exact known. Especially the proportion of divorced is higher in females. This situation encourages informal jobs such as prostitution which has an impact on children, socio-economical distribution and finally affects health. The issue of sexually transmitted disease (AIDS) has also a big place since this situation invites sexual promiscuity.

Health determinants

Since health service is part of the overall development process, we cannot achieve our goals without coordinated efforts of other sectors such as communication, education, agriculture and social organizations etc.

Education

Literacy is of major importance for health. It enables people to understand their health problems and way of solving them and facilitates their active involvement in community health activities. Whereas the adult literacy rate is optimum in industrialized countries, it is only less in the least developed countries compared to developed countries. In District 9 administration, there are 13 schools run by under the ministry of education in control of District 9 education office with a total enrollment of 5549 students and 287 teachers and the teacher to student's ratio was 1:20. In another words data from the District education office has shown that all over the District there are six (6) elementary schools namely Eshet, Genemaie, Keste demean, Asina, Natanam, Abader and seven (7) kindergarten schools namely Eshet, Genemaie, Keste demean, Asina, Natanam, Newlight

and Keble18. Of which four (4) are private schools and nine (9) are public or governmental schools. There are 287 teachers in this District of which 168(59%) are females, and 119(41%) are males and male to female ratio teachers is 71% (M:F), and 5549 students currently enrolled in 13 schools(table5). Female students constitute only-54% of the total student in all of school categories population and male to female ratio is 86% .Primary education coverage of the District was 98.2%. The ratio males: females in school is relatively females predominant in each grades .this may be explained by the fact that many males are participate in different daily labor work and other activities. Some students withdraw their class. From these students who have withdrawn or drop their class 30% are grade eight(8) students following to grade 7,grade5&4 by many reasons ,among these some are due to economical problem, change of living environment(residency),discipline and with unknown causes. On the other hand, female students drop their class than male students in elementary. . All of schools have water supply, and latrine with separate male and female in their compound. In each elementary schools there many clubs, such as sport club, language club, citizenship and ethics club, gender club etc.

Table 18: Elementary schools, students & teachers by sex and Keble in District 9 administration, A.A city administration, 2016.

Name of schools	Kebles which is found	Students			Teachers		
		male	Female	Total	male	Female	Total
Eshet	27	678	920	1598	48	32	80
Genemaie	28	474	551	1025	28	21	49
Keste	27	283	391	674	19	15	34
demean							
Asina	18	142	155	297	18	18	36
Natanam	18	21	23	44	4	1	5
Abader	28	44	56	100	2	3	5
Total		1642	2096	3738	119	90	209

There were 6 kindergarten schools with student population of 2702 and 78 teachers in the District. Surprisingly from these 78 teachers all are females this indicates that female participation above 100%.

Table 19: kindergarten schools, students & teachers by sex and kebele in District 9 administration, A.A city administration, 2016.

Name of schools	Keble's which schools found	Students			Teachers		
		male	female	Total	male	female	Total
Eshet	27	158	143	301	-	6	6
Genemaie	28	212	187	399	-	13	3
Keste	27	171	175	346	-	14	14
demean							
Asina		103	99	202	-	11	11
Newlight	28	42	53	95	-	7	7
Keble18	18	98	102	200	-	16	16
Natanam	18	134	132	266	-	11	11
Total		918	891	1811	-	78	78

Economic activities

Productive activity was defined as work which involves the productive of goods or services that can be sold in the market for cash or can be exchanged for other commodities. The economic situation has also a direct bearing on health .There is no doubt that the improvement of economic status of the community would result in better health. The existing employment rate, unemployment rate and income level for the worda9 are not precisely known, as the Leve hood of the District population derives from both formal and informal sectors i.e. public and private. The economy of the District 9 administration population is majorly dependent to an extent on labor work, government and private employee, and some the population are also depend private business or merchant life. There are some petty trading activities and others which are privately owned and with a minor contribution in employing human labor.

Safe water supply

Lack of safe water supply, basic sanitation are responsible for the death of many infants and children around the world. This mainly happens in the developing countries of which Ethiopia is one. Although much effort is put into improving the access to safe water supply and basic sanitation, there remains much work to be accomplished to meet the desired goal.

Like other Districts, in the District 9 main sources of water supply is from akaki and legedadi surface water by means of tap water among the housing units in District 9 administration which own a private tape either in the house or in the compound. And the other are share their water

source from tap inside or outside the compound from public tap (“bono”) and tap from other individuals or institutes.

Environmental health and sanitation

In District 9, The environmental sanitation is poor due to poor housing conditions, crowding of the living condition of the community, improper functioning and inadequate of latrine, shortage of Municipal trucks and lack of dry waste collecting drums in Keble. These factors predispose to poor handling and transportation as well as storage of water at home. In this District there is activity of solid disposal systems. The main and which the majority of the population used is municipal collection of solid wastes from households along the main roads in each kebles. And the a few people use is throwing (dumping) house hold waste on any open space around the house.

Transportation and Communication

Transport service is a necessity for implementing social and economic development plan. kebles of woreda9 administration and neighbor District is linked to each other by weather roads, asphalt and cobble stone roads. There is a daily public and others transport service in and from each of Ethiopian regions. In District 9 there is crowding of transport activities since it locates near the main bus station. in woreda9, there is public transport facility one per day in across of country side transport and also more than two transport service. The District is served with government transport service and there are also private transport service.

Electric power supply

The District has a total of household have access to electric power supply. And also each District sector office has 24 hour electric supply, mobile and cable based telephone services in each sector of District office, Postal service and Bank. the district have the following types of roads asphalt, cobble and kerb stone etc.

Budget allocation for health (finance)

District 9 administration is composed in 22 different sectors. For these the annual budget allocated by the ministry with itemization to the institution in 2015, in the District was summed to be 8,623,007 birr per annually among them from this total expense 8,288,372 birr goes for salary making 96.1% of annual budgets and the rest 334,635 birr making 38.8% goes for different medical equipment, supplies and other operations. The expenditure on health office

per capital for the District was 3,298,734 birr, of the total expenditure for curative and preventive activities is estimated to be 30%, birr per annual.

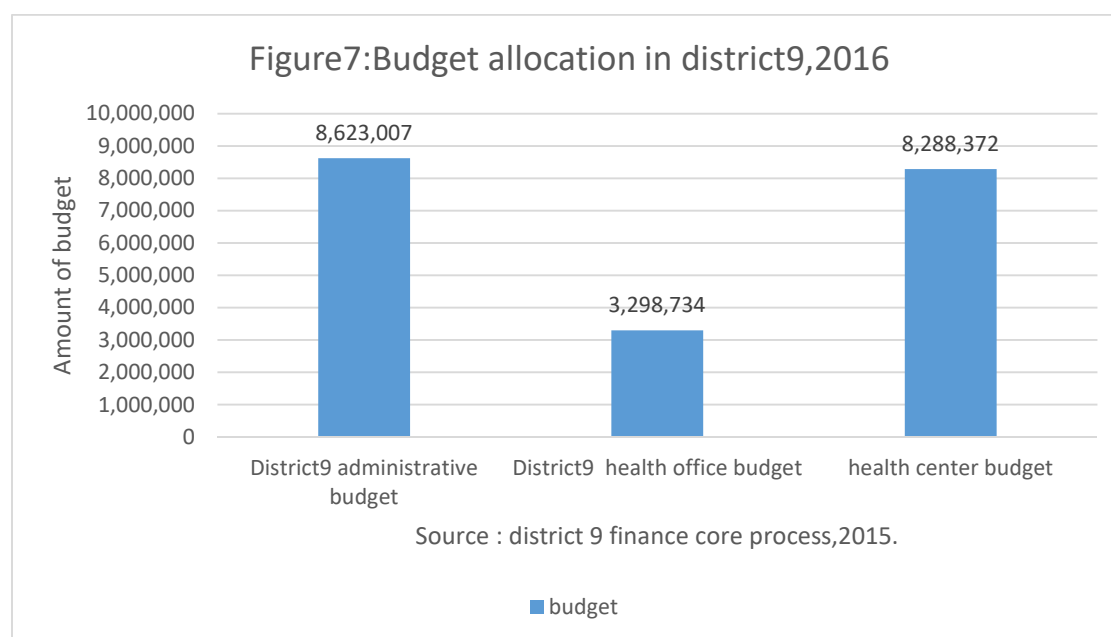


Figure 31: Budget allocation of district9 in health office, 2016.

Health profile of Quas meda health

Health information was collected from each health unit within District 9, on number, locations, ownership, types of service rendering, health man power distribution, budgets, facilities and activities according to 2016 Quas meda health center data.

Health Infrastructure (Health service)

In district 9 different health institutions exist to care for the community's health well-being. The organization, distribution and activities of these health institutions are discussed below; there are 1 health center, 6 private clinics, 2 Pharmacy and one Drug store in this District. Regarding the availability of telephone service, water and electric power supply in the health facilities, that of health center or the health facility i.e. Quas meda health center or District 9 health center has wireless and cable based telephone service and piped water supply. And also that health facility or health center has 24 hour electric power supply and public bus transportation. The potential health service coverage for District 9 is 100%.

Quas meda health center/ District 9 health center

Quas meda health center is one of the ten health centers in Addis ketema sub city health office. According to medical director of this health center response, it was established in 2003 GC. It is bordered or located by West District 5, by South District 4, by North District 6 and by East District 7. This health center is located about 15km to south of the district 9 health office with asphalt road connecting it with, this was the health center which was coordinating and controlling all health activities of the district. In related to service delivery and any performance this is the second popular health institution (health center) in under Addis ketema sub city health office next to Addis ketema health center. New rebuilding has been completed and started its functionality for the last three (3) years ago. The health center staffed with different departments such as medical director, all health professional personnel, human resource and management staff, ICT personnel, finance, statistician personnel, parking and sanitation worker and guard etc.

Health center is run with government allocated recurrent budget. The annual budget is 5,933,780 birr of which birr 2,259,791 goes for salaries, birr 3,673,989 is allocated for running cost, drugs, per diems, maintenance, supplies etc. However UNICEF and other health sectors supported the health center for the implementation of different programs. There is one car (ambulance) in this health center. The car is supposed to collect drugs and equipment from regional health distribution and distribute these materials to this health center. In addition to this for all health center activities (outreach EPI programs) and also serves as an ambulance for emergency referrals to nearby hospitals. The services of the center include; Outpatient services, Antenatal care(ANC), delivery, EPI, PMTCT, Laboratory, Pharmacy, VCT, TB, ART, Triage, Emergency, Inpatient, Injection and dressing, Health extension worker bureau, Registration and statistics and currently starts Cervical center and minor surgery.

Human Resource

Based on 2015 data from Quas meda health center human resource core process, health workers (professionals) found in Quas meda health center, there were 12 Health officers, 21 Nurse (9 BSC and 12 diploma), 10 Midwifery (0 BSC and 10 diploma), 7 Pharmacist (2 BSC and 5 diploma), 8 Laboratory personnel (3 BSC and 5 diploma), and 11 Health extension workers (HEW).

Table 20: number of health Professionals in Quas meda helth center of District 9, Addis Ababa city administration, 2016.

Seri no	Professions	Number of profession				total	Percentage
		male	%	female	%		
	Health officer	6	50%	6	50%	12	13%
	Nurse(BSc)	4	44%	5	56%	9	19%
	Nurse (diploma)	8	62%	5	38%	13	4%
	Laboratory(BSc)	1	33%	2	67%	3	7%
	Laboratory(diploma)	3	60%	2	40%	5	0%
	Midwifery(BSc)	0	%	0	%	0	1%
	Midwifery(diploma)	4	40%	6	60%	10	3%
	Pharmacy(BSc)	1	50%	1	50%	2	7%
	Pharmacy(diploma)	3	60%	2	40%	5	2%
	Health extension worker	-	%	11	100%	11	16%
	Total	30	43%	40	57%	70	100%

Table 21: Professional to Population Ratio, District 9, Addis Ababa city administration, 2016.

Profession	Profession to population ratio Woreda9
Health officers	1:2766
Nurses	1:283
laboratory technician/technologist	1:4150
pharmacy technician/Pharmacist	1:4150
Midwifery	1:3320
HEWs	1:3018
Physicians	0

Private clinics

In District 9, there are six private clinics, two pharmacy and one drug store, among these majority are medium clinics and the rest are lower clinics. Show in table below.

Table 22: distribution of private clinics, in District 9, Addis Ababa, Ethiopia, 2016.

Name of clinic	Type of clinic	Kebles which found
Andu Amelak	Medium clinic	Keble28
Finfina	Medium clinic	Keble19
Mesalemia	Medium clinic	Keble27
Dr Abreham	Medium clinic	Keble19
Mekane hiwot	lower	Keble27
Getachew	lower	Keble18

District Health System

Under the District health office there so many sub process teams mainly in the health center ; medical director, Under medical director there are case teams which are Health Promotion Disease Prevention sub process, health service and curative sub process, human resource sub process ,and finance and purchasing sub process case teams. Show in the organogram below.

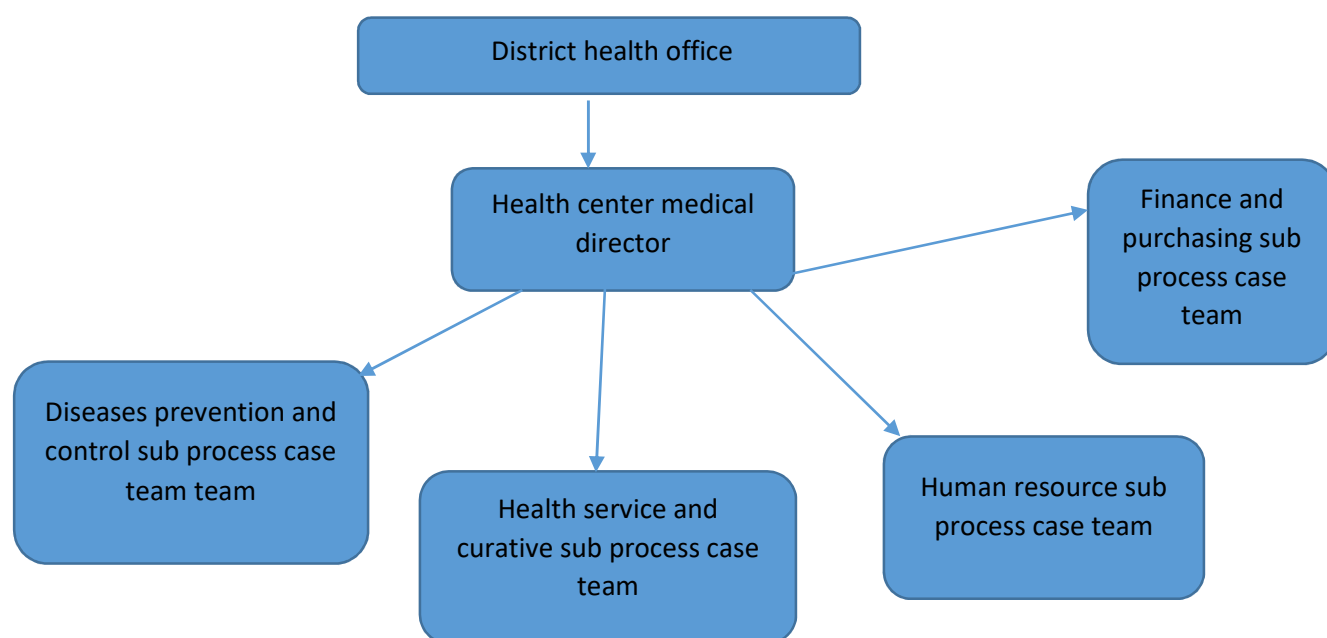


Figure 32: Organogram of District 9 health office, Addis ketema sub city, Addis Ababa, 2016.

Maternal Health Service

Pregnancy is one of the most important periods in the life of a woman, a family and a society. Extraordinary attention is therefore given to antenatal care by the health care systems of most countries. The goal of antenatal care is to prevent health problems in both infant and mother and to see that each newborn child has a good start. The District antenatal care coverage by itself could

prevent both the infant and maternal mortality and morbidity before delivery since the coverage is high (71%). It should be followed by deliveries attended by skilled health personnel. All women should have access to skilled care during pregnancy and at delivery to ensure detection and management of complications. An effort to reduce or eliminate maternal death focuses on assessment of risk mothers and risk factors, increasing access to skilled delivery care and strengthening reproductive health and family planning. Even though maternal death was not occurring during this year, emergency obstetric care, skilled birth attendants and postpartum care are important measures to reduce maternal mortality. In 2014/15 GC, there were 579 eligible pregnant women in the District, of which or among the total 579 pregnant women in the district, 555(93%) attended the 1st antenatal care visit (ANC) while 413(71%) reached the 4th ANC follow-up. Sixty five percent (57%) of the deliveries were attended by skilled birth attendants. Family planning coverage of the District is 75% and the most commonly used family planning methods was pills, injectable, intrauterine contraceptive devices (IUCD) and implants. From the total women in the child bearing age, 24,897 women used contraceptive making the contraceptive prevalence 75%. Only 496 pregnant women were tested for HIV with prevention of mother to child transmission (PMTCT) service during ANC visit. The information regarding the outcome status of the tested pregnant women was not found, in addition to this now in a days there is no any HIV test activities due to absence of KIT. In general this indicated that maternal health service delivery relatively better in District 9. Whereas, District proportion of deliveries attended by skilled health personnel is low (57%), which is insufficient to reduce maternal pregnancy related mortality and morbidity and neonatal death. Postnatal coverage in District 9 was 95 %, achieving the over the target due to back referral from nearby health institution. TT1 vaccination providing for pregnant women in age between 19 and 44 was 115%. But not any clear figure in related to pregnant and non-pregnant women and also the status of pregnant women in the other TT full vaccinations (TT2 up to TT5).

Table 23: maternal health service coverage in Addis Ketema sub city, Addis Ababa, Ethiopia 2016.

Sr.no	Description	Coverage	Remark
	ANC 1 coverage	9334(131%)	
	ANC 4 coverage	6724(94.7%)	
	Institutional (skilled) delivery coverage	8813(124%)	
	PNC coverage	6724(76.29%)	
	Contraceptive acceptance rate	85634(81.1%)	
	TT2 coverage for pregnant	7078(99.9%)	
	TT1 coverage	15000	

Table 24: maternal health service coverage in District 9, Addis Ababa, Ethiopia 2016.

Sr.no	Description	Coverage	Remark
	ANC 1 coverage	551(93%)	
	ANC 4 coverage	413(71%)	
	Institutional (skilled) delivery coverage	333(57%)	
	PNC coverage	544(95%)	
	Contraceptive acceptance rate	-	
	TT2 coverage for pregnant	-	
	TT1 coverage	-666(115%)	

Expanded program of Immunization /EPI

Table 25: EPI coverage by type of antigen in district 9, Addis Ababa, 2016.

Sr.no	Type of service	Coverage	Remark
	BCG	576(90%)	
	Polio1-3	568 (98%)	
	Penta1-3	557 (96%)	
	Measles	390 (77%)	
	TT1	666(115%)	

Family Planning

The District contraceptive prevalence rate in 2015 was 24,897(75%) and sub city contraceptive prevalence rate was 81.1% which indicate the District's prevalence rate was less than the sub city performance.

Table 26: Contraceptive utilization in Quas meda health center, Addis ketema sub-city, Addis Ababa city administration 2016.

<i>Type Contraceptive</i>	<i>Number (%)</i>	<i>Remark</i>
Condom	9657(45%)	
Depo-Provera+condom+pills	1145(22%)	
Long contraceptive	1091(25%)	
15-49 uses implant	378(23%)	

Leading causes of outpatient visit

There is a total of 8413 outpatients and 18 inpatient client in Quas meda health center in 2015. from this, endemic typhus and typhoid fever are the District's major public health problem in OPD for adult and Acute upper respiratory tract infection for under five or pediatrics are leading causes of morbidity. To compare the District 9 Top Ten Leading Causes of Morbidity with Addis ketema sub city presented in the follow table.

Table 27: Top ten and top five Leading Causes of Morbidity in Quas meda health center, Addis Ababa, 2016

diagnosis Case

Rank	Top Ten Leading Causes of Morbidity in Adult Case	Percent (%)	Top five Leading Causes of Morbidity in Under five Case	Percent (%)
1	Endemic typhus	462(20%)	Acute upper respiratory tract infection	243(48%)
2	Typhoid fever	412(18%)	Diahhrea(non bloody)	118(23%)
3	Hypertension and related	383(16%)	Other unspecified disease of GI	63(12%)
4	Urinarytractinfection	355(15%)	Skin infection&subcutanoustissue	59(12%)
5	Disease of GI	274(12%)	Other unspecified eye,adenexia etc.	26(5%)
6	Diabetic mellitus	114(5%)		
7	AURTI	101(4%)		
8	Dyspepsia	94(4%)		
9	AFI	77(3%)		
10	Other unspecified	61(3%)		
	Total	2333(100%)		509

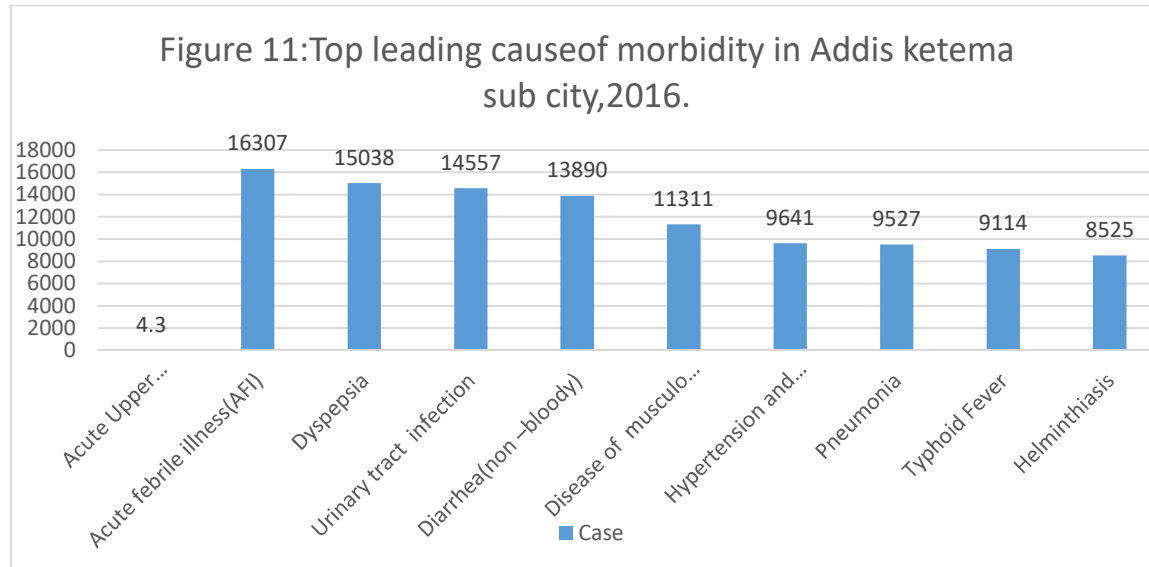


Figure 33: Top leading cause of morbidity in Addis ketema sub city, 2016.

Nutrition

In the District a total of 2 outreach therapeutic program site are present but it's not well organized for the intervention of malnutrition

Provision of Essential Drugs

The provision of essential drugs aims at making these (essential) drugs available to the users of the health system at all levels of primary health care, all over the country, at all times by instituting an efficient system of drugs, acquisition, storage, distribution and utilization. This is the WHO definition of the concepts. There are fewer drugs which are necessary than the number at present on the market, and the demand coming from the consumer as well as the professionals sector, the ministry of health has attempted to formulate a "basic drug list" to implement at each level of the health care system.

From what is shown in the health office the following are consumed District 9 health center. It is hard to conclude that the Essential consumed drugs are safe for distribution. Ampicillin, Chloromazine, Amoxicillin, Metronidazole, Tetracycline, Cotrimoxazole, Mebendazole, Doxycycline, Nifedipine, Enalaprine, Propranolol, Acetazolamide, Ranitidine, Acetazolamide, Antacids, Metoclopramide, Norfloxacin, Azithromycin

Endemic Disease prevention and control

The available list of endemic disease in this woreda is not clearly presented and does not show a clear picture of locally endemic disease ; Despite the above facts it appears by observing HMIS registration the major locally endemic disease are related to communicable disease as that of all developing countries .To mention some of the endemic disease ; Locally endemic disease in the District are: Endemic typhus typhoid fever, HIV/AIDS ,TB etc.

Endemic typhus

Endemic typhus is one of the endemic diseases in the woreda9. There were a total of 1228 cases of Endemic typhus.

Tuberculosis/leprosy

A total of 103 suspected tuberculosis (TB) cases were reported in District9, of which, 48 were confirmed negative while 39 were confirmed positive. The remaining 16 were extra pulmonary TB, 4 cases MDR and one case drop or withdrawal treatment. There was no death reported from TB. From the total suspected TB patients, all were screened for HIV among these 15 are HIV positive (reactive) and the rest 35 were HIV negative (non-reactive). There were no leprosy cases reported in the respective year.

Table128: distribution of tuberculosis cases by District 9 administration, Addis Ababa city administration, Ethiopia 2016.

<i>S.no</i>	<i>Description</i>	<i>Cases</i>	<i>Remark</i>
1.	Total TB patients HIV non-reactive	35	
2.	Total TB patients HIV reactive	15	
3.	Total TB patients positive	55	
4.	Total TB patients negative	48	
5.	Extra PTB	16	
6.	Pulmonary TB	39	
7.	Total TB patients withdrawal treatment	1	
8.	MDR	4	
9.	Total TB cases screen	103	
10.	Unknown status due to lack of KIT	5	

Discussion

The total population of District 9 in the year 2015, was 33,196, of which 47.7% were males and 52.3% were females this findings of males and females proportion is the reverse to the national figure (10). According to our study results orthodox religious is the leading in related to religious view. This is similar the EDHS 2011 report (9). By ethnic composition about one-third of respondents (33% of women and 36 percent of men) belong to the Oromo ethnic group, and similar proportions (33 percent of women and 32 percent of men) are Amhara. Typhus, typhoid fever and hypertension and related were the leading causes of morbidity in adults. Inconsistently, pneumonia and acute upper respiratory tract illnesses were the top causes of under-five and adult morbidity respectively in 2006 EFY for Ethiopia (10). The ten top diseases were not only the major problems but also TB and HIV/AIDS had their impact on the community health. Acute upper respiratory tract infection, Diarrhea (non bloody) and other unspecified disease were the leading top five causes of under-five morbidity in 2015 for District 9. The overall health worker ratio per 10000 population was (2.1) which is below the national threshold (4.1) (13). The measles vaccination coverage in District 9 was 77% a little below the target set at the regional and national level 89.5%, 83.2% respectively (10). The over achievements may be due to planning problem or overestimation of the target groups. Moreover it may also be because they achieved more than their plan. To reduce maternal mortality ratio and to achieve millennium development goal, different activities are delivered at health center level in the District, the district's ANC coverage was 83% which is below both the national and regional performance respectively (97.4% & 97.9%)(10). However, the postnatal care coverage of the district was 90%. This result is almost above the national target (50.5%) because of referrals of delivery come to this health center for postnatal care i.e. back referral from saint hospital. To reduce maternal mortality rate and to achieve sustainable development goal, different activities are delivered at Quas meda health center. TT1 service is one of the activities done in health facilities and greater than 100% of the pregnant women in the District 9 within one year of 2014/15. Delivery attended of 2014/15 at Quas meda health center in District 9 was 57% by skilled professional this is below Addis Ababa region performance, 72.9. However, federal ministry of health working on it to increase utilization of delivery services by implementing health developmental armies, by train health workers on clean and save delivery, and supplying delivery kits to health facilities and others. Looking in to the human power distribution, in health facilities of District 9 one health center serve for 33,196

populations it is greater than Addis Ababa region (1:50,355,population) that means The health center coverage is far below the national urban coverage standard, which states a health center to give service for 26,416 populations(10). To give quality health service to the community and to get acceptance from the community, infrastructure is the major and the key component. On the other hand, to give delivery and other services water supply and electric power is important. Quas meda health center had water and electric power supply in the health facility. In Addis Ketema, not only woreda9 but also all woredas can have one health center. In District 9 one health center serve for 6 kebeles/1 woreda/33196 population, it is greater compared to national performance. According to the assessment of the woreda there were health workforce densities of about 2766, 283, 3320, and 3018, per total population for health officer, nurse, mid wife and health extension worker respectively this result finding is quite inconsistency from Addis Ababa region and national figures , (H.O 1:5,52&15,252 , Nurse 1:784&1,884, M. Wife 1:7,505&14,847, and HEW 1:-&34,850) respectively, but most probably similar to the study of survey which is conduct in Addis Ababa city administration in 2006 EFY (10,11). Education is one means of empowering women and ensuring their participation in social and Economic aspects of the society. The overall educational coverage of the district 9 is 100%, according to our study findings results female students constitutes 54% from over all students. This is similar to study in Addis Ababa city administration health bureau in 2004 E.C. (11). Regarding the data quality and completeness the district has reported a data completeness of 85%. However still much of the data elements in the report are not full and difficult to summarize the overall health status of the district based on HMIS report as private health facilities may serve a significant amount of the population and they are not included in HMIS system.

Limitations

- I could not describe mortality and morbidity for specific indicators (maternal mortality, infant mortality and under five mortality etc.) because data was not available in this district. Limited resource of records not only at the health departments but also other sectors about health events, disease conditions and economic status was a limitation for further description of the health profile.
- There was name of culture and tourism office in the district but not functional. Therefore, relevant information regarding district background and how it gets its name was not

obtained.

- Even if the only one health center which gives inpatient and outpatient service; data for top leading causes of admissions and mortality was not found.
- There was no compiled death and vital statistics report at health facilities as well as district health office
- there was a discrepancy of data about estimated population, altitude, average temperature, rain fall and others data between different sector offices.

Conclusion

- Typhus, typhoid fever and acute upper respiratory tract infection were the most commonly occurring disease both in adults and pediatrics.
- The availability and utilization of latrine and adequate and safe water supply in the community is mainly not sufficient in opportunity for health service and for health promotion and disease prevention.
- .the District has a youthful population. This indicates a high potential for the growth of the population. This should be taken into account because shortage of housing, overcrowding, and unemployment are already problematic.
- In District 9 divorce is much higher for females than for males, this should be seen in light of informal work such as prostitution which intensifies the problem of sexually transmitted disease (STI) and other social problems.
- The major health problems of the district are communicable disease, which are caused by overcrowding, poor hygiene and others.

Recommendation

- In District 9, utilization of health service was good like first visit of ante natal care (ANC), postnatal care (PNC) and TT1. On the other hand, some health indicators are under the target or the standard and it needs improvement. Those gaps which needs improvements such as low skilled birth institutional delivery etc. In general different sectors like District administrative government, NGOs and the sub city should participate to solve the problem.
- Services which were in a good status during the study time should be improved and maintained like ANC, TT1 and family planning service.
- Services which was less than the target or expected during the study period should be need improvements within short period of time for the better health of the community as well to achieve national and global targets.
- Although, we were not able to access data on (infant, child and maternal health) and top ten cause of OPD admission visit in different age groups in the District. These data are very important data to measure the health service quality and the magnitude of the problem in the district. Thus, we recommend health facilities should register and report this important data appropriately.
- There is no data population distribution by each age group or category like EDHS (0-4, 5-9, 10-14 etc) and others in district 9 administration sectors this should be improved.
- Additional health professionals should be employed for health center such as BSc midwifery and others as per the standard.

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Annex 3: Data collection tools for health profile

Historical Aspects of the area (Culture & tourism office).

Woreda Name-----When was the woreda established-----

Geography and Climate (including map, altitudes.)

Woreda map-----

Geographical coordinate

Latitude -----Longitude ----- Annual rain fall-----Annual temp (average) -----

--- Climatic zones----- (high land %) ----- (mid land %) ----- (lowland %) -----

Woreda boundaries North ----- South----- East----- West-----

Political and Administrative Organization

Population and Population structures Total number of kebeles-----

Demographic data

Total Population----- Male----- Female----- -sex ratio-----

Population under 1yrs (<1) ----- Population under five yrs.(1-4) -----

Population < 15 years (6-14) ----- Population >64 years-----

Women 15_49 years of age(Reproductive age)----- Total population by Kebele(each kebele pop)-----

Annual population growth rate (----- %) Population pyramid by age and sex-----

Ethnic/language

Wolayeta (----- %) Tigre (----- %) Oromo (----- %) Amhara(--%)

Gurage----- (----- %) Other----- (----- %)

Religion

Muslim (----- %), Orthodox (--- %), Catholic (---- %) Protestant (----- %), Other (----- %)

Marital status

Single-----Married-----Divorced-----Widowed-----

Economy(average income levels & source)**Main income sources**

Government employee-----Private work-----Trade-----

Labor worker----- Other business-----

Education and school Health**Number of educational institution**

K.G. -----Primarily School-----Secondary-----Preparatory-----College/ University -----

Total School Age Children (target) -----

Total Enrolment -----Male-----Female-----

School dropout in 6 months or year 2016 -----If there is school dropout why ----

Educational status of the community

Read and write (----- %) Complete primary school (1-8) (----- %)

Complete secondary school (9-12) (----- %) Diploma holder (----- %)

Degree holder (----- %) Male (----- %) Female (----- %)

Number of teacher in the worda -----Male-----Female-----

_school service activities :

Water supply : schools with water supply----- Toilets : schools with functional latrines(male& female)

Schools with HIV /AIDS other health clubs -----

Water

Total safe water coverage of worda (----- %) Safe water supply coverage by Keble -----

Kebeles getting safe water ----- (--- %)

Woreda Health system

The general health system structure of the woreda(flow chart)-----

Is there health management team (HMT) at woreda level? Yes/No-----

If yes , describe the HMT composition and function-----

Do you have NGOs working on health and health related issues? Yes/No

List the NGOs and their work in related to health-----

Vital Statistics and Health Indicators

Infant Mortality Rate (IMR) ----- (total <1 yr deaths this 2008/016yr. -----)

Child Mortality Rate ----- (this year's total <15 yr deaths-----)

Maternal Mortality Rate ----- (2008/016total maternal deaths -----)

ANC rate (how many of the total expected pregnancies attended 1st ANC) -----

ANC rate (how many of the total expected pregnancies attended 4th ANC) -----

Percentage of deliveries attended by skilled birth attendants -----

Immunization Coverage (for children and Women);

BCG (--- %). OPV0 (--- %), OPV1 (---- %), OPV 2 &3 (---- %) Penta1 (----- %), penta2 (----
- %) penta3 (---- %) Measles (----- %).

TT coverage

Family planning coverage (for reproductive age group)

Depo-Provera (--- %) IUCD (---- %) Implanon/Jedell (--- %) Condom (----- %)

Permanent (----- %) Pills (----- %) Emergency pills (----- %)

Health Service

Type and Number of Health Institution

Type	Number
Gov. Hospital	
Gov. Health center	
Private H.Fs (clinics/diag. lab/drug stores)	Clinics (all type) Diag. Lab. Drug store
NGOs	H.Cs Hospitals Clinics HC Hospital

Health institution to population ratio :- Hospital: Population-----HC: Pop-----

Type and Number of health professionals

Type	No.	Remark
General practionare(GP)		
Health officer (HO)		
Nurses (BSC)		
Nurses(Diploma)		
Midwifery (BSC)		
Midwifery(Diploma)		
Medical lab. technician		
Medical lab.technologist		
Pharmacist		
Draggiest		
Env. Health (Degree)		
HEWs		
Others		

Doctor: population Ratio ----- Nurse: population Ratio -----

Midwifery : population Ratio -----HEW: population ratio -----

C. Top causes of morbidity and mortality

Top leading causes of OPD visit (morbidity):

	Adult	under five/ < 5 years
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Top leading causes of admissions in woreda-9 health institution.

	Adult	Pediatrics/ <5 year
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Top ten causes of deaths (mortality) in woreda-9administration health institution report.

	Adult	Pediatrics or under five/ <5 year
1		
2		
3		
4		
5		
6		
7		
8		
9		

D. Health budget allocation:

Government

Annual budget allocated for the woreda(birr) -----

Annual budget allocated for health or health institutions ----- (---- %)

Annual budget allocation increment percent comparing to the previous year-----%

Funds from Non-Governmental Organization (NGO)/Total -----(purpose/programs) -----

Community Health Services;

Status of services provided by community health workers namely

No. of TBAs ----- and their responsibility ----- Responsibility of HEWs -----
----- Others -----

Environmental Health & sanitation.

Latrine coverage -----Solid waste management -----Liquid waste management -----

TB

Total TB cases -----PTB negative ----- PTB positive -----

Extra PTB -----Death on TB Rx -----Total TB patients screened for HIV -----

Total Leprosy cases -----on Rx -----

HIV/AIDS;

Total people screened for HIV (last one year) -----VCT -----PICT -----PMTCT -----

HIV prevalence -----HIV Incidence(new cases /year)-----

Total PLWHA -----ON ART -----on Pre-ART -----Other HIV prevention
activities -----

Essential drugs (shortage);-----

Chapter V- Thesis

5.1. Timing and factors associated with first antenatal care visiting among pregnant women attending antenatal care in public health facilities in Addis Ababa, Ethiopia, 2017

Abstract

Introduction: Early starting Antenatal care is key indicator to identify risk factors in pregnancy and to improve maternal and child but as different findings shows that many pregnant women in sub-Saharan Africa start antenatal care attendance late. As Ethiopian Demographic and Health Survey 2016, Antenatal care coverage of Ethiopia is 62% and only 20% pregnant women start timely. This shows majority pregnant women not initiate first Antenatal care services early.

Objective: assess timing and factors associated with first antenatal care visiting among pregnant women attending antenatal care in public health facilities in Addis Ababa, Ethiopia.

Methods: health facility based cross sectional study design was carried out from October 29 to November 31, 2017 by using pre-tested and interviewer administer semi-structured questionnaire. A total of 579 pregnant women were interviewed at exit from antenatal clinic those attending antenatal care service at selected public health centers using systematic Sampling technique. Data was checked for completeness, cleaned manually and entered in to EPI INFO Version7.2.1 and exported to SPSS Version21 for further analysis. Descriptive were used to for measure of central tendency and dispersion of study subjects. Multivariable logistic regression model was used to predict timing of first ANC initiation and associated factors and also OR & 95% CI was used to measure the associations.

Result: Out of 597 study participant, 253(42.4%) pregnant mothers initiated the first ANC visit early and 344(57.6%) pregnant mothers initiated late. According to the Multivariable analysis result, mothers get information from their friends about first antenatal care initiation (AOR=1.81, 95%CI (1.16, 2.83)), decide to initiate their first ANC visit without others influence (AOR=9.84, 95%CI (4.04, 23.98)), family size less than three in their family (AOR=1.88, 95%CI(1.01, 3.49)) and age of mother in the range of 30-34 years(AOR=0.142,95%CI(0.053,0.379)) were found to be statistical significant factors for timely initiation of first Antenatal care visit.

Conclusion and recommendation: In this study the proportion of pregnant mothers who practiced timely initiation of first ANC is low. Therefore, improving initiation of first ANC visit by providing accurate information as WHO recommended time and empower mothers through education so as to maintain appropriate family size through strengthen family planning program.

Key words: Initiation time, First antenatal visit, Factors, Addis Ababa, 2017.

Introduction

Back ground

The world health organization (WHO) defines a maternal death as the death of women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and sites of the pregnancy, from any cause related to or aggravated by pregnancy and its management but not from accidental causes(1).Globally every year 529,000 maternal deaths occur, 99% of this in developing countries (2). Despite positive and enjoyable time of motherhood, women's faced a lot of suffering ill-health and death. According to 2013 estimation there were 289000 maternal deaths worldwide. According to the United Nations Millennium Development Goals , every year, at least half a million women and girls needlessly die as a result of complications during pregnancy, childbirth or the 6 weeks following delivery, Almost all (99%) of these deaths occur in developing countries (3). The lifetime risk for a woman in sub-Saharan Africa from pregnancy related causes is about 1 in 16 which is more than 500 times higher than for a woman in northern Europe (4).Reduction of maternal and neonatal mortality remains a major challenge to attaining global social and economic development; worldwide, more than 515,000 women die each year from pregnancy and childbirth complications while four million babies die within the first week (neonatal period) of life. (5). Developing countries continued to account for 99% (355 000) of the deaths. Sub-Saharan Africa and South Asia accounted for 87% (313,000) of global maternal deaths (6). In 2010, for Papua New Guinea (PNG), the infant mortality rate (deaths per 1,000 live births) was estimated at 57.2% (7). According to a survey conducted in Zambia, it was reported that maternal mortality ratio stood at 591 per 100 000 live births while neonatal mortality was estimated at 34 per 1000 live births (8). Infant mortality rate is defined as the risk for a live-born child to die before its first birthday which is known to be one of the most sensitive and commonly used indicators of the socioeconomic and health status of a country (9).Ethiopia shares the highest level of maternal mortality and morbidity levels in the world. According to 2016 Ethiopia Demographic Health Survey (EDHS) report, the Maternal Mortality Ratio (MMR) in Ethiopia was 412 per 100,000 live births(10).

From the interventions used to reduce maternal mortality one is ANC (ante natal care) service. Data found from EDHS 2016 showed that only 62% of women with pregnancy receive ANC from skilled provider(10). Antenatal care refers to the interventions to curb maternal and infant mortality which is a planned programme of medical management of pregnant women directed towards;

making pregnancy and labor a safe and satisfying experience that concerned mainly with prevention, early diagnosis and treatment of general medical and pregnancy associated disorders (11). Mostly sub-Saharan Africa and Asia contributing to 87% of such deaths globally, as reported by the United Nations. This is the reason that pregnant women are encouraged to attend antenatal care (ANC) (5). The primary aim of ANC is ensuring prevention, early detection and prompt management of pregnancy related complications(12). Antenatal care (ANC) is one of the four pillars of the Initiative for Safe Motherhood (11). the EDHS conducted in 2016 showed that, the percentage of women attended ANC service for four or more times during live births of five years before the survey is 32% and 11% of pregnant women visit their first ANC service during recommended period of pregnancy (before four months of pregnancy). The median duration of pregnancy at the first visit was 5.2 months (11). Antenatal care (ANC), along with family planning, skilled delivery care and emergency obstetric care, is a key element of the package of services aimed at improving maternal and newborn health(13). According to WHO (2001) only 60% of women receive antenatal care in Nigeria, and not all of them attend the antenatal clinic regularly (14). Antenatal care (ANC) attendance helps pregnant women to benefit from preventive and curative services(15). The new model for antenatal care recommended by the World Health Organization (WHO) separates pregnant women into two groups: who are likely to need only routine antenatal care, which constitute about some 75% of pregnant women, and those with specific health conditions or risk factors who need special care and constitute about 25% of pregnant women(16). Most women in sub-Saharan Africa, however, make their first ANC visits very late which ranges from 53% to 89% (16).

Statement of the problem

Pregnancy related causes are among the top reasons for death in women of reproductive age in almost all developing countries. Over eight million women suffer from complications of pregnancy or childbirth and over half a million women die giving birth annually worldwide (17). Antenatal care improves a wide range of health outcomes for women and children and provides an opportunity to provide interventions for improving maternal nutrition, to encourage skilled attendance at birth and use of facilities for emergency obstetric care (18). Delayed entry into antenatal care may result in missed opportunities to diagnose pregnancy induced hypertension, gestational diabetes, or sexually transmitted infections. Although efforts have been made to achieve the Millennium Development Goal (MDG5) on maternal health to reduce the maternal mortality ratio (MMR) by three-quarters by 2015, this goal has not been achieved yet. This is mainly because of the low utilization of maternal health services (19) . Since long ago, however, it is well known that maternal mortality can be significantly reduced in low-income settings by increasing access to skilled attendants which has close link to ANC, emergency obstetric care and family planning services (3, 4). In spite of this clear importance of maternity care which includes ANC, poor access and low utilization of such services continue to be important determinants of maternal mortality and morbidity throughout the world (20). In developing countries, particularly in most sub-Saharan Africa has high maternal morbidity and mortality, but ANC are initiated more likely at the second and third trimester (21). The newly proposed ANC model recognizes that every pregnant woman is at risk for complications and four ANC visits are recommended for most pregnant women. Ideally, the first visit during first trimester; the second, close to week 26; the third around week 32; and the fourth and final visit between weeks 36 and 38 (22). Low ANC coverage, few visits and late attendance at first antenatal visit are common problem throughout sub-Saharan Africa, both in rural and urban. This makes it difficult to accomplish the WHO recommended ANC schedule (23). Different studies showed that delays in obtaining prenatal care or receiving no prenatal care have been associated with increased frequencies of low birth weight and other adverse pregnancy outcomes. It has been also showed in the evidence base prenatal care that folic acid supplementation before conception and up to 12 weeks of gestation reduces the risk of having a baby with neural tube defects (24). Another study also conducted in Debre Berhan health institutions about(26.2%) pregnant mothers started their first ANC visit early while the rest, (73.8%) started ANC late(25). Data from Ethiopia also show that about 83% of pregnant women

nationally (26) and 59.8% of pregnant women in the capital city, Addis Ababa, initiate their first visits late(27). Timing of first ANC has been affected by different associated factors like maternal education, parity, past experience of health service, knowledge and attitude towards pregnancy and its complication (28).In Ethiopia, eleven percent of women made their first ANC visit before the fourth month of pregnancy(29). Study done in Hadiya Zone, SNNPR, Ethiopia, discloses concerning timing of initiating first antenatal care, only 8.7 percent of the ANC attendants initiated care during the first trimester of pregnancy as WHO recommendation (30). Many studies revealed on factors relating to late entry to ANC in the world. The related factors include place of residence, age, education, employment status, parity, intention to get pregnant, use of contraceptive method, economic status, health insurance and travel time (31).There are available health facilities which providing health services including ANC .according to EDHS 2016,ANC coverage of the city is 96.8% which much higher than the countries and regions coverage. Despite this high coverage of ANC only 40% of pregnant women come timely as WHO recommended ANC visits (27), while the remaining 60% comes lately. Initiation of first ANC are associated with maternal morbidity and mortality. Ministry of Health (MOH) and respective institutions try to improve the situation by training of health professionals (midwives and others), expanding health education and community mobilization activities through integration of clinicians and Urban Health Extension Workers (UHEWs). However, the initiation of mothers' first ANC visit activities are below 50%.

Significance of the study

Even Though basic ANC services were provided free in Ethiopia including Addis Ababa , according to Demographic and Health Survey of 2016, only 62% and 11.2% of women made at least one visit and their first ANC visit before the fourth month of pregnancy respectively(10). According to WHO, at least four ANC visits are recommended for normal pregnancy .Of these four visits, the first visit is recommended to be carried out at first trimester (before three month of pregnancy). Despite of this, the majority of pregnant women in Addis Ababa are not initiate ANC timely rather during their second and third trimesters. Even though there is an increase in number and professional mixture of human resources, and accessibility and number of health care facilities providing perinatal care free of cost and without discrimination to any status of the woman, maternal initiation of ANC timely is still among the tackle in our country. There are no latest studies that have examined the factors contributing to initiation of first ANC, despite high overall service coverage and antenatal care coverage in Addis Ababa. This study will be intended to fill

the gap by identifying the existing time of ANC initiation and the factor for timely entry into first ANC. Therefore, the result of the study will be give information about factors affecting timely initiation of first Antenatal care which will be used as input for planning and implementation of quality antenatal care service in the respective sub cities. The result will be useful to utilized in policy maker or further investigation and it will be used as input for Ministry of Health and the respective health institutions and sectors, as well as, other interested and concerned partner organizations (NGO) those who work maternal & child health for implementation of Maternal and Child Health (MCH) program. This study it will be benefit as a base line for future researcher.

Literature review

Time of first antenatal care visit

A key objective of maternal health care programs has been to ensure that women present for ANC early in pregnancy in order to allow enough time for essential diagnosis and treatment regimens such as treatment of STIs and management of anemia (29).

In Indonesia, 80 percent of pregnant women attended first antenatal care visit before the fourth month of pregnancy, the median number of months pregnant at the first antenatal care visit is 2.4(32). Community based study done in rural Western Kenya to assess the use of antenatal service among women, 87% of women started their first ANC visit after end of first trimester of pregnancy, (64%) started in the second trimester, (23%) in the third trimester (33). Another cross sectional study conducted in Kassala, Eastern Sudan to assess use of ANC service of pregnant women reported that 59.6% of pregnant women are booked in the recommended first trimester(34). Study conducted in South Western Nigeria to assess late ANC booking and Its predictors among pregnant women reported that mean gestational age at booking was 20.3 ± 6.2 weeks, with Prevalence of late entry to antenatal care 82.6% (35).

According to Uganda Demographic and Health survey 2011, only 21 percent of women made their first antenatal care visit before the fourth month of pregnancy (36) and in Tanzania, only 29 percent initiated ANC booking within the first four months of pregnancy as recommended by WHO and the Tanzanian FANC guidelines (37). In Nigeria, the study shown that 53.3 percent of the women booked late that means 17 weeks as national antenatal care guide line of the country due to number of associated factors (38). In Uganda on average, 17 percent of mothers initiate the first antenatal visit in the first trimester and 47 percent attain at least four antenatal visits (39). Study done in New Zealand reported that 26.6 % of pregnant women initiated the care after 15 weeks of gestation(40) . In study done in Nigeria, to assess some characteristics of the booking visit reveals that the mean gestational age at first booking was 23.7 weeks with range of 9 to 38 weeks (41). Analysis on Kenyan Demographic and Health Survey, 1993, showed that the distribution of the timing of the first antenatal care visit is fairly normal, ranging from the first to the ninth month, with a mean of about 5 months (42).

The majority of pregnant women from self-report survey in south-eastern Tanzania explained that they initiated antenatal care attendance with an average of 5.1 gestational months. Among the 405

pregnant women participating, only 29% initiated ANC attendance within the first four months of pregnancy as recommended by WHO (28).

According to EDHS 2016, only 20% of pregnant women made their first ANC visit before the fourth month of pregnancy (26). Study conducted in Addis Ababa revealed that the proportion of respondents who had their first ANC visit within the recommended time (before or at 12 weeks of gestation) is 40.0% The timing of first ANC booking ranges from first month to ninth months of gestation(27).

Socio-demographic Factors associated with timing of first Antenatal care

Several factors affecting the utilization of antenatal care in developing countries have been identified. These include: maternal education, husband's education, marital status, availability, cost, household income, women's employment, media exposure and having a history of obstetric complications (39).

Maternal age

Study done in Lao people's Democratic Republic revealed that women of age greater than 18 years at first pregnancy are more likely to start ANC service early in first trimester(43). Another study conducted in Wakiso district, central Uganda reported that adolescent mothers were more disadvantaged group in terms of early antenatal service compared to adult mothers (44). Women of older age have late first ANC visit and fewer number of visit compared with younger one in a cross sectional study done in Addis Ababa Ethiopia in identifying factors for first ANC visit(27).

Marital status

Study that done in Ghana, Kenya and Malawi illustrated that pregnancy disclosure influenced timing of ANC adolescents and unmarried younger women secreted their pregnancies and delay ANC to avoid the potential social implications of pregnancy: exclusion from school, expulsion from their natal home, partner abandonment and stigmatization(14). Unplanned pregnancy which means unmarried pregnancy is associated with late timing of ANC booking(47).

Occupation

Women have triple roles burden which has direct link to ANC attendance. Thus, they often have an exhausting experience for women and the journey to health facilities represented a physical burden. Delays in ANC initiation are not however merely due to the associated indirect and direct costs (13). Study done in Hadiya Zone, SNNPR, Ethiopia shows that there is direct association

between women occupation and timing ANC booking and number of visits (46). respondents' husband occupational status also showed significance as the respondents whose husbands were professionals (lower, middle and higher) were most likely to attend ANC clinic compared to those whose husband were skilled and unskilled (47) .

Maternal Educational level

A study done in Bangladesh from prospective survey to assess maternal morbidity, concluded that female education retains the net effect of maternal health use. Late booking is also associated with less educated mother (48). Study in Nigeria shown that late antenatal care booking is significantly influenced by the client's level of education. 91% of women with more than secondary education received ANC from a skilled provider compared with 25 percent of women with no education (49). A cross-Sectional Study done at University of Gondar Hospital, Northwest Ethiopia, indicated that, those having formal education were 1.06 times more likely to book earlier compared to those who cannot read and write. In this study, women having formal education were more likely to initiate ANC visit earlier than their counterparts. This could be explained by the fact that women with secondary school or higher education were more likely to attend ANC (4). Another study conducted in Tanzania indicated that women with primary education and above were twice more likely to be booked timely for ANC visit and acquire knowledge on birth and complications (20). A study done in Kwale District, Kenya revealed that women with secondary education or above were more likely to attend for ANC (17).

Family size and Income

In Nigeria, 9.2 percent of pregnant women could not attend antenatal care due to financial shortage. Attending ANC required direct or indirect costs (38). According to EDHS 2011, a 75 percent of women who received ANC are among those in the highest wealth quintile and on the other hand, 17 percent among women in the lowest wealth quintile. A cross-sectional study conducted in Kembata-Tembaro Zone, Southern Ethiopia, showed that, monthly income found to be a strong predictor for the late utilization of ANC. Among pregnant women who had a monthly income of less than 1000 ETB 229 (59.1%) attend ANC late as compared to those whose monthly income was greater than 1000 ETB 36 (9.3%) (30). Study done in Vietnam showed that women in the richest quintile were 4.1 times more likely to initiate timely ANC and 2.8 times more likely to have three or more ANC visit compared with women in the poorest quintile (50). In another qualitative study conducted in Cape Town, South Africa, the reason given for delay to ANC was financial

constraints in which mother delay to accumulate user's fee (51) . Family size was a strong determinant of antenatal care service utilization. Mothers who live within a household size less than three people were eight times more likely to utilize ANC than those living in a household size greater than five (52). Women who had high incomes were 2.6 times (95% CI = 1.2–5.7) more likely to have obtained ANC services than women with low incomes. In other cross sectional study conducted in Addis Ababa public health centers revealed that, physical and financial accessibility alone cannot assure effective service utilization of ANC (27).

Past obstetric history (particularly parity)

There is significant reduction in maternal health service utilization and early booking with increase parity (53). Study done in Bangladesh, reported that parity seems U-shaped (48). Another study in Addis Ababa, reported that as parity increase there is a decline in ANC utilization (27). Study done in Nigeria revealed that parity being main proximate determinant of first ANC visit. It has reported that the higher the parity, the more likely the parturient feels experienced enough in childbearing not to require early booking (38). Similar study conducted in Kenya showed that lower parity is an important predictor of early and more frequent visit (42). Study done in Addis Ababa, Ethiopia showed that as parity increases the experience of timely booking decreases. Respondents with first pregnancy were about two times more likely to be booked for ANC within the recommended time compared to those with parity one and above (27). But another study in Mozambique reported that mothers who were experienced a life-threatening condition use ANC early two times more likely than the others (54). A research done in south-eastern Tanzania showed time of antenatal attendance was associated with number of pregnancy (first pregnancy strongly associated with an earlier ANC attendance) and previous miscarriage or stillbirth (55). The study done in Ghana, Kenya and Malawi pointed out that some primi gravida are unfamiliar to the associated signs and symptoms of pregnancy as a result they are more likely to seek advice and assistance and initiate timing of ANC booking earlier and in contrast, older multiparous women were at particular risk of delaying ANC (13). In Nigeria, 53.3 percent of women were lately booked ANC and parity was indicated as influencing factor (48). But, in Indonesia, 85 percent of mothers received antenatal care for a first pregnancy compared with 69 percent of mothers who were pregnant six and above pregnancy (39). According to EDHS 2011, 46 percent of Women were almost twice as likely to receive antenatal care from skilled provider first births but only 23 percent of women received ANC at birth sixth and above births (56). A facility based cross-sectional study conducted in

KembataTimabaro zone of Southern region, reported that women with one parity and above were more likely to register lately compared to those who have no parity (30). Facility based cross-sectional study conducted at the University of Gondar Hospital reported that, among the proportion of respondents who have had their first visit within the recommended time in the preceding pregnancy was 47.3%, while 56.9% of these pregnant women who booked ANC within the recommended time in the previous pregnancy were booked within the current pregnancy(57).

Past experience of ANC service utilization

Good interaction of care providers and pregnant women influences timing of ANC booking and number of visits (58). Another study showed that those women who had no history of abortion were more likely to book earlier than women with abortion history. This depicted that women were appropriately informed on time of booking from counseling and health education sessions during previous pregnancies(59). Study done in Nigeria showed that mother's previous experience of undesired birth outcome, like stillbirth, has significant effect on early booking (48). Previous negative birth experience was also found to be influential factor for pregnant mothers to make too many visits and early booking as indicated study done in Sweden (60). Study in Addis Ababa showed that past experience on antenatal care service utilization did not come out as a predictor for timely booking of ANC rather respondents who received advice on recommended time of booking, and their pregnancy is first, were more likely to book timely compared to others (27).Study done in rural South Africa indicate that most women's primary reason for not seeking ANC and one late ANC visit is only to receive an antenatal attendance card that is required to deliver at a health facility (51)

Knowledge of women on timing first ANC

As indicated in different studies that knowledge and attitude of pregnant women towards timely booking of ANC plays crucial role (61). However study done in Nigeria showed that despite three quarter of the women felt that the first three months of pregnancy was the best time to register for ANC, booking pattern suggests that most of the women were not convinced that there was any gain in registering for ANC early or had constraints hence the discordance between knowledge and practice in most of them appeared (58) .Study done in Indonesia reported that women who has no plan to be pregnant had higher percentage of inadequate and late initiation of ANC than those who planned their pregnancy(62). Study done in rural western Kenya reported that lack of quality (incomplete and inadequate) ANC service is associated with late first ANC

visit and women with this service are more likely to start ANC in the third trimester (63). In Kham District, Japan a 73.9 percent of pregnant women lacked sufficient knowledge on antenatal care utilization (64). Among the most frequent reasons given for late attendance ANC where; women did not know that they are pregnant which accounts 21.7 percent and women have no time to follow up as recommended by WHO which accounts 20.8. percent from women included in the study (64). In Nigeria, 22.8 percent pregnant women lately initiated their ANC booking due to the lack of knowledge of booking time (48). In Hadiya Zone, 19 percent of women did not attend ANC due to lack of awareness of pregnancy complications as pointed out in study (52).

Husband involvement on decision making

In Pakistan, study discovered that lack of permission from husband hinders to use ANC service. Amongst the women who did not use antenatal care 60 percent did not have permission from their husbands(65). As study indicated, decision-making of wife only or husband only is associated with less antenatal care utilization as compared to joint decision-making (30). Similar study conducted 2011 in Pakistan was husband's attitude towards ANC utilization: 41% said that their husbands were supportive in giving permission for ANC. 35% said that their husbands were against it.(65). Study done in Kenya, India and Nepal indicated that gender inequality within a family has significantly associated with access to reproductive health (42,52,66). In western Kenya, study indicated that assuming ANC as 'Female role' hinder husbands from accompanying their wives for ANC service utilization and also considered as the responsibility of mother-in-law or co-wives rather than the male head of household and provider (63). In study conducted in Nigeria, the decision to seek maternal health is done by the husband alone in 52% of mothers who participated in the study (67). In another study in Nigeria, reason for delay to seek ANC was reported by 17.2% of mothers was husband's denial of care (47).

Conceptual Framework

According to Anderson and Newman Socio-behavioral model which was used to conceptualize this study, individual's access to and use of health services is considered to be a function of three characteristics (70). These are predisposing factors (the socio cultural characteristics of individuals that exist prior to their need of health service), enabling factors (the logistical aspects of obtaining care) and need factors the most immediate cause of health service use, from functional and health problems that generate the need for health care services.

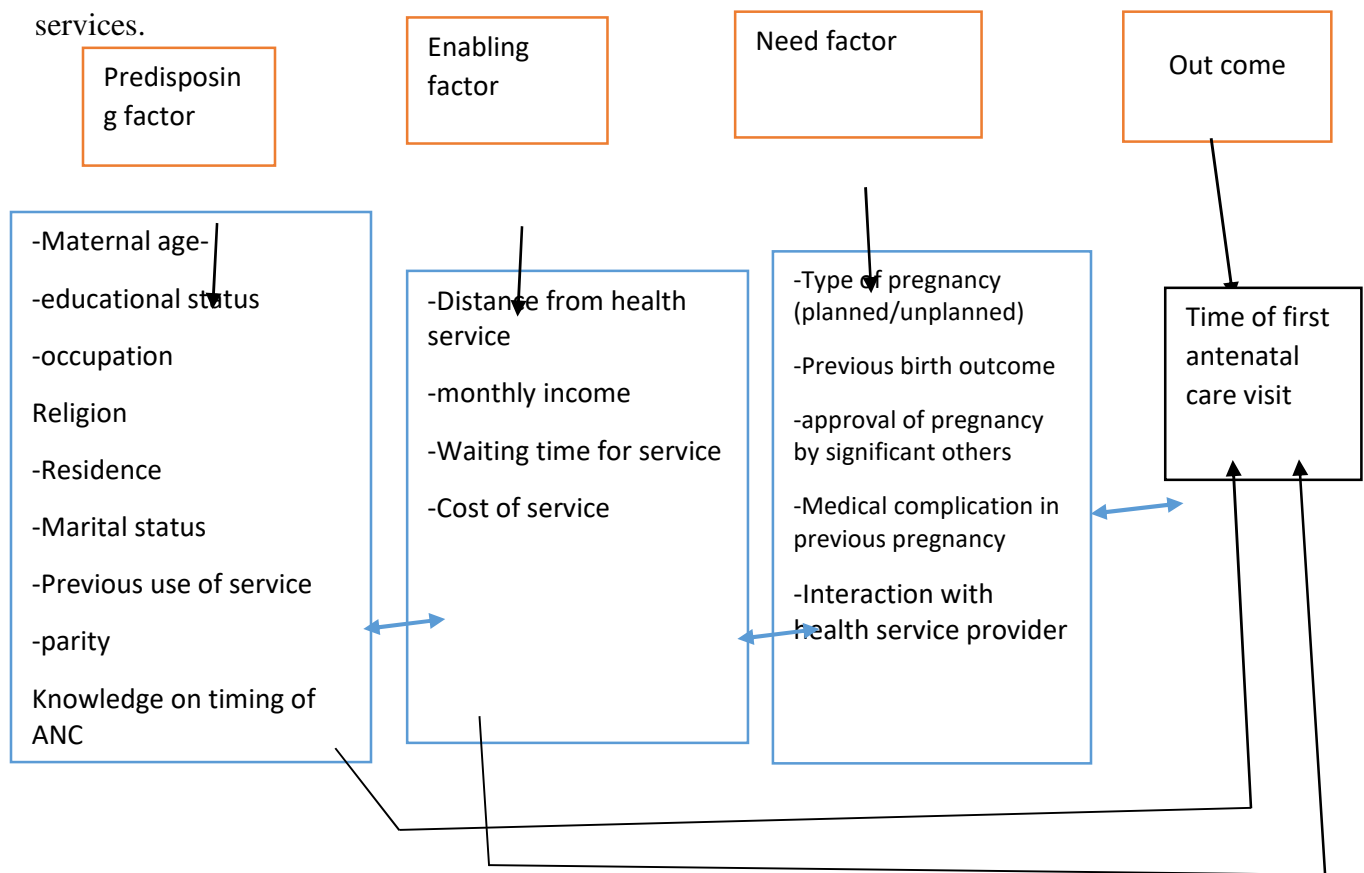


Figure 34: Conceptual framework for time of first ANC visit (adapted from Anderson, 1995)

Objectives of the study

General objective

- To assess timing of initiation of first antenatal care visit and associated factor among pregnant women attending Antenatal care service in public health facilities in Addis Ababa, Ethiopia 2017.

Specific objectives

- To assess timing of first antenatal care visit initiation among pregnant women
- To identify associated factors for timing of initiate of first antenatal care visit among pregnant women

Methods & materials

Study area

This study was conducted in seven selected public health centers in Addis Ababa city administration. Addis Ababa is the capital city of Ethiopia, and the seat for the African Union. The city is divided into ten sub cities and 116 Woredas. The city is located at the middle part of Ethiopia, Addis Ababa lies 9° 01' 48'' N latitude and 38° 44' 24' E longitude. The city is located at the heart of the country at an altitude ranging from 2100 meter at Akaki in south to 3000 meter at Entoto hill in the north. The average altitude is about 2324 meter. The city occupies a total area of 540 km² (69). Estimated population of Addis Ababa is 3,384,569. Out of the total population 1,679,998 are females. According to data from FMOH, 2008/9 Health and Health related Indicators. There were 91 government health centers in the city that were more or less evenly distributed in the ten sub cities. In addition, there were 11 public hospitals, 33 private hospitals, 520 private clinics, 257 specialized clinics and 06 NGO clinics and health centers.

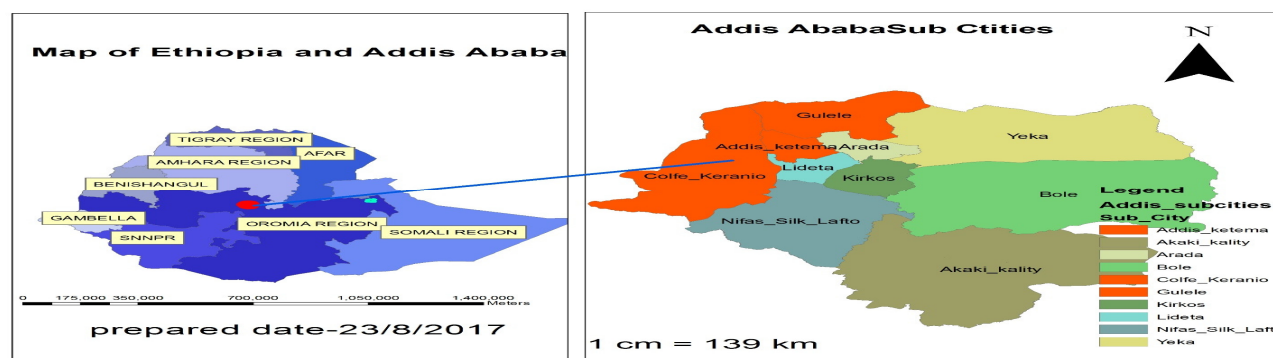


Figure 35: Map of Addis Ababa and selected sub cities, Addis Ababa, Ethiopia, 2017.

Study period

The duration of the research project was from July to January, 2018 and the data collection period was from October 29 to November 31, 2017

Study design

Health facility based cross sectional study design was conducted among pregnant women who attending ANC service at selected health centers in Addis Ababa city administration.

Source population

Source population was all pregnant women in Addis Ababa city administration and using public health centers for ANC.

Study population

The study populations was pregnant women who are attending ANC service at selected health facilities in selected sub cities health centers and who found during data collection period.

Inclusion and exclusion criteria

Inclusion criteria

- All Pregnant women who came to the public health center for ANC service and resident of the study area (about 6 months and above) during data collection period.
- Women who are mentally capable of being interviewed.
- Those who are volunteer to participate in the study

Exclusion criteria

- ✓ Pregnant women who are unable to hear and speak
- ✓ Pregnant women who were seriously sick

Sample size and sampling procedure

Sample size determination

A. Sample size calculation for the first objective

Sample size was estimated using single population proportion formula by using Study conducted in Addis Ababa on timing first antenatal visit (27). Therefore, the prevalence of 40.2% was taken to estimate the sample size. Significance level was calculated at 95% confidence interval and margin of sampling error tolerable was assumed to be 5%.

$$n = \frac{(Z_{\alpha/2})^2 p (1 - p)}{d^2}$$

Where, **n**= the number of individuals to be participated in the study

Z= Z value at 95% CI = (1.96)

p= the previous prevalence of timing of first ANC visit = 40.2% (0.402) (27).

d=margin of error to be tolerated=5 % (0.05)

$$n = \frac{(Z_{\alpha/2})^2 p (1 - p)}{d^2} = \frac{(1.96)^2 \cdot 0.402 (1 - 0.402)}{(0.05)^2} = \frac{(1.96)^2 \cdot 0.402 (0.598)}{(0.05)^2} = 369.4$$

B. Sample size determination for associated factors

Factors associated with initiation of first antenatal care among pregnant mother who attend antenatal clinic by considering Decision on current pregnancy, maternal educational status , Perceived right time, means of pregnancy recognition, mother Previous use of ANC service utilization, and knowledge of mothers on timing initiation of ANC as major determinant of pregnant mother was taken from study done in different study areas. Sample size was calculated by using EPI-Info 7. considering confidence interval of 95%, power 80% and outcome in exposed and outcome in unexposed conducted from researches and finally non response rate was assumed to be 10%.

Table 29: Sample size determination for associated factors, 2017

associate factors	prevalence		Ratio	Powe r	Confide nce level	Odds ratio	Samp le size
	Outcome in exposed	Out come in unexposed					
Decision on current pregnancy (70)	37.9	20.3	1	80%	95%	2.39	230
Knowledge on timing of ANC (71)	51.3	16.8	3	80%	95%	5.22	86
Educational status(72)	41.1	23.9	2	80%	95%	2.22	281
Previous use of ANC service (59)	64.4	35.6	2	80%	95%	3.27	119
Perceived right time(57)	74.1	45.9	2	80%	95%	3.37	122
Pregnancy means of recognition(70)	46.6	24.1	2	80%	95%	2.75	173

From these both objectives, the highest sample size was taken ($n=369.4$). So the larger sample size which is 369.4 was chosen. Due to The design effect we multiply by least number 1.5. So $369.40 \times 1.5 = 554.103$ and by considering non-response rate of 10%, $nf = 554.103 + 55.4 = 609.5$. Therefore, the final sample size was = 610.

Sampling Techniques

Among 10 sub cities thes which are found in Addis Ababa city, three sub-cities was randomly selected. From health centers found in these three sub cities, seven health centers was selected based on their second quarter ANC performance report of 2009E.C. Then the total sample of 610 was distributed to each health centers based on their performance of monthly attendant of pregnant mothers using ($k=4.7$). Therefore, every five mothers were interviewed.

A three -stage sampling procedure was used to select the required study subjects. First , three sub cities from each of the 10 sub-cities of Addis Ababa was selected using a simple random sampling procedure second , from those selected sub cities, two or three health centers from each of the 10 health centers of each sub cities was selected using a simple random sampling procedure. Third, eligible pregnant women who came for their ANC visits in the respective selected health centers was enrolled by using systematic sampling method until the required sample size was achieved. Participants was allocated proportionate to the monthly ANC client load of each selected health facility (See below figure 37).

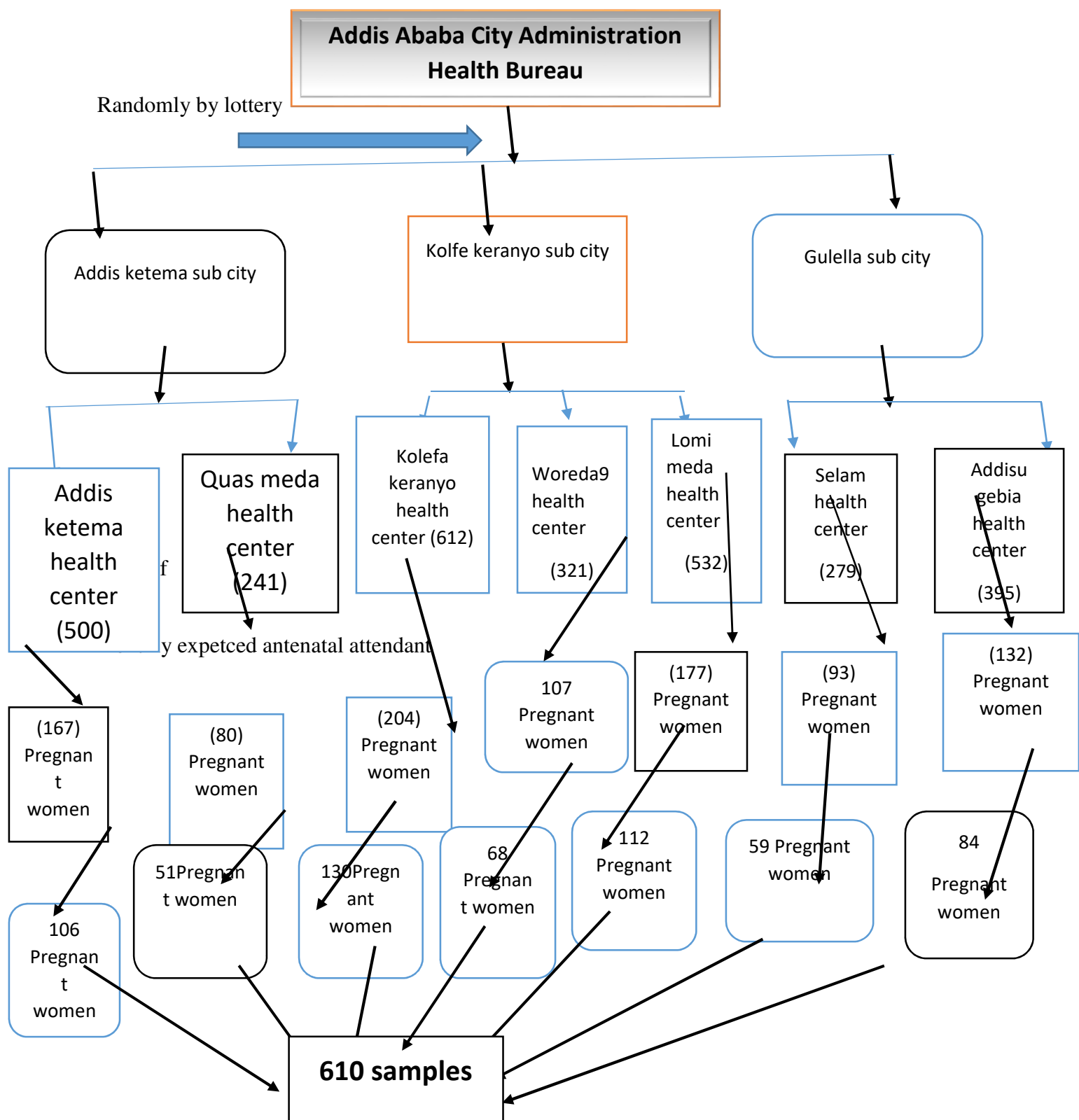


Figure 36: Schematic representation for sampling procedure in Addis Ababa city, 2017.

Variable of the study

Dependent variable

- Timing of first ANC visit

Independent Variables

- age of mother
- marital status occupation
- educational status of mother and husband
- previous use of service
- Parity
- Pregnancy planned
- monthly income

Operational definitions of terms

Late ANC initiation: the first ANC visit made by pregnant women after 12 complete gestational weeks

Early ANC initiation: the first ANC visit made by pregnant women with in and before 12 complete gestational weeks

Perceived time for initiating ANC: what the women thought is the correct gestational age to initiate the first ANC visit

Antenatal clients: Pregnant women attending the antenatal clinic in the health center.

Skilled provider: Persons with midwifery skills (physicians, health officers, nurses/midwives) who can manage normal deliveries and diagnose, manage or refer obstetric complications.

Decision to use ANC: Mothers ability of deciding by themselves or jointly with their partner to utilize current ANC.

Gestational age: the age of the fetus in weeks from the last normal menstrual period of the mother.

Data collection procedure and Instrument

The data collection tool was developed based on the Ethiopian Demographic and Health Survey (EDHS) data collection tool and other previously done relevant research which was first prepared in English and then translated into Amharic language. The second version of the tool was retranslated in to the original one by senior researchers to keep its consistency. Edited final version

of questionnaire was used to collect data. The information includes in the collection tool; socio-demographic background of the mothers (age, religion, ethnicity, level of education of the pregnant woman and her partner, their occupation and marital status), obstetric history (parity), past maternal service initialization, history of current pregnancy, history of current ANC and women decision making on ANC services. Data collectors were diploma nurses who received one day training on the objective of the study, interview technique and details of the questionnaire. The total number of data collectors was seven trained female diploma nurses, one for each health center. The data collector was not employee of that institution. They collected data by interviewing the Eligible pregnant women after getting informed consent at exist of ANC clinic and face to face interview technique was used to collect data with semi-structured and pretested questionnaire. The interview was conducted in Amharic. They did not wear Gown as the staffs, this might help to interact freely with the clients which are good to get accurate information respondents. Supervision of data collectors was made three times per week at each health centers by the principal investigator and every day by supervisors (BSc Midwives). One supervisor was assigned in each health center. The data was carefully checked for completeness. Any confusion on data collection procedure and/or responses handled timely.

Data quality assurance:

To keep data quality of the questionnaire, pretested pretest was conducted in a similar level of health center (Felege melese health center) that was not included in the actual data collection. After the pretest, the revised questionnaire was included in the final tool. Training was given for data collectors and supervisors about research objectives, data collection tools and procedures or interview techniques for one day. The principal investigator, together with supervisors (BSc Midwives) was done regular follow up or supervision of data collection to check data completeness and clarity, and feedback was given to the data collectors as mean time.

Data processing and analysis

The questionnaire was checked its completeness by the principal investigator. Totally unfilled and partially filled questionnaires were excluded. The complete filled questionnaire was entered in to EPI info version 7.2.1 and exported to Statistical Package for Social Science (SPSS) version 21 software for further analysis. Descriptive summary was performed to describe the characteristics of the study participants. The results were presented in the form of tables, figures and texts using frequencies and measure of central tendency (MCT) such as median, mean and

measure of central dispersion (MCD) such as standard deviation and percentage. The dependent (outcome) variable is dichotomous, that is timely (≤ 12 weeks of gestation) or late visit of ANC (> 12 weeks of gestation). Bivariate and multivariable logistic regression analyses was performed by entering the dependent and independent variable to identify associated variables and to assess the strength of association between them with 95% confidence interval. The data was first analyzed using bivariate Logistic regression and then all Variables having with P- value of up to 0.2 in bivariate analysis was entered into the multivariable model With 95% confidence interval to determine the effect of various factors on the dependent variable and to control confounders.

Ethical clearance

Ethical clearance was obtained from the ethical clearance committee of Saint Paul hospital millennium medical college. After getting the ethical clearance, written permission was obtained from Addis Ababa regional health bureau to the respective sub cities health offices and each sub city health offices was provide supportive letter for the respective of all selected health institutions. Written informed consent was obtained from each study participants. Each study participants was informed about the purpose, methods of collection, anticipated benefit and risk of study by the data collector. The name and other identifying information of participant was not written for their confidentiality, and privacy of participants was ensured at all levels throughout the study by keeping the data and records in a safe place.

Dissemination of results

After conducting the research, result finding of this study was presented to SPHMMC, department of public health as partial fulfillment of master's degree field epidemiology and It was disseminated or submitted to Addis Ababa regional health bureau and each selected sub cities health office with in respective health facilities and will be communicated to other concerned institution. The results findings of this study was presented in different seminars, field epidemiology training program annual conference, other meetings and conferences and was sent for publication on scientific journals in related fields. Hard and soft copy was available in the green online library of SPHMMC for under graduate students, field epidemiology and other post graduate and it was disseminated to federal Ministry of Health and the respective health institutions and sectors.

Result

Socio demographic characteristics of respondents

From these pregnant women attending antenatal care, 610 women were initiated to be Included in this study. 597 (97.8 %) women were responded to the Interview while 13 (2.1%) did not respond to the interview. Among these majority of women, 252 (42.2%) were in the age group of 25 – 29 years and the least 41(6.9%) were age group above 35-39 years. The median ages of the respondents were 25 years (IQR 23-29) with ranging from 17 to 39 years. 593 (99.3%) mothers were married and 4 (0.7%) mothers were others (unmarried, single and divorced).Ethnic composition of the respondents 189(33%) was Gurage and Others (Woliyta, Tigre, Dorze and Sidama) 25(4.2%). Majority of respondents' religion that follow were Orthodox Tewahedo Christianity 300 (50.3%) followed by Muslim 246(41.2%), Protestant51 (8.5%).Concerning mothers educational status, 51(8.5%) formally uneducated. 307 (51.4%) women were primary school education, 182(30.5%) were secondary and 57 (9.5%) were diploma above. Regarding mothers occupation status, Majority of respondents mothers were house wife 357 (59.8%) 160 (26.8%) were private employee, 65 (10.9%) were government employee and 15 (2.5%) were others (daily workers and others). Concerning the socio economic background of the participants, majority of respondents have house hold income of above 2000 Ethiopian birr per month 415(69.5%).The median monthly income of the households were 2800(IQR 2000-3775 ETB) with range of 500 to 9875 ETB (Table 2). About 126 (21.1%) of the respondents had a family size greater than three person and 471 (78.9%) less than three family size. Regarding means of transportation majority respondents 356 (59.6%) travel by taxi or transportation and 241 (40.4%) travel on foot and to reach health families (table 29).

Table 30: Socio demographic characteristics of the respondents in Addis Ababa city administration, Ethiopia, January, 2017

Variables	Category	late(>12 weeks of gestation)	Time(=<12 weeks of gestation)	Total number (%)
Age in years n=597	15-19	19(70.4%)	8(29.6%)	27(4.5%)
	20-24	107(54.6%)	89(45.4%)	196(32.8%)
	25-29	157(62.3%)	95(37.7%)	252(42.2%)
	30-34	46(56.8%)	35(43.2%)	81(13.3%)
	>35	15(36.6%)	26(63.4%)	41(6.9%)
Marital status	Married	341(57.5%)	252(42.5%)	593(99.3%)
	unmarried	3(75%)	1(25%)	4(0.7%)
Age in marriage	< 18 years	92(62.2%)	56(37.8%)	148(63.5%)
	18-25 years	221(58.3%)	158(41.7%)	379(6.9%)
	>25 years	30(43.5%)	39(56.5%)	70(11.7%)
husband occupation	Gov,t employed	44(44.9%)	54(55.1%)	98(16.4%)
	Private employed	284(59.5%)	193(40.5%)	477(79.9%)
	Others	16(72.7%)	6(27.3%)	22(3.7%)
Educational status of your husband(	<Primary(1-8)	153(65.3%)	87(34.8%)	250(41.9%)
	Secondary	126(55%)	103(45%)	229(38.4%)
	Diploma & above	55(46.6%)	63(53.4%)	118(17.8%)
Religion	Orthodox	158(52.7%)	142(47.3%)	300(50.3%)
	Muslim	162(65.9%)	84(34.1%)	246(41.2%)
	Protestant	24(47.1%)	27(52.9%)	51(8.5%)
Ethnicity	Amhara	77(45%)	94(55%)	171(28.6%)
	Oromo	75(52.8%)	67(47.2%)	142(23.8%)
	Gurage	130(68.8%)	59(31.2%)	189(31.7%)
	seltie	47(67.1%)	23(32.9%)	70(11.7%)
	Others	15(60%)	10(40%)	25(4.2%)
Educational status of mother	formallyuneducated	37(72.5%)	14(27.5%)	51(8.5%)
	Primary(1-8)	186(60.6%)	121(39.4%)	307(51.4%)
	Secondary	96(52.7%)	86(47.3%)	182(30.5%)
	Diploma & above	25(43.9%)	32(56.1%)	57(9.5%)
Maternal monthly income	< 712.5 ETB	240(60.8%)	155(39.2%)	395(66.2%)
	712.5 -1425ETB	44(60.3%)	29(39.7%)	73(12.2%)
	>1425 ETB	60(46.5%)	69(53.5%)	129(21.6%)
family monthly income	=< 887.5 ETB	4(80.0%)	1(20.0)	5(0.8%)
	887.5 -2000ETB	129(72.9%)	48(27.1%)	177(29.6%)
	>2000 ETB	211(50.8%)	204(49.2%)	415(69.5%)
maternal occupation	Gov,t employed	35(53.8%)	30(46.2%)	65(10.9%)
	private Employed	86(53.8%)	74(46.3%)	160(26.8%)
	House wife	211(59.1%)	146(40.9)	357(59.8%)

	Others	12(80.0%)	3(20.0%)	15(2.5%)
Family size	≤ 3	85(67.5%)	41(32.5%)	471(78.9%)
	>3	259(55.0%)	212(45.0%)	126(21.1%)
means of transportation	on foot	148(63.2%)	86(36.8%)	241(40.4%)
	by transport	196(54.0%)	167(46.0%)	356(59.6%)
Transportation cost	< 3 ETB	236(58.9%)	165(41.1%)	401(67.2%)
	3 -9ETB	102(55.4%)	82(44.6%)	184(30.8%)
	>9 ETB	6(50.0%)	6(50.0%)	12(2%)

Timing of first ANC visit

Out of 597 respondents, the proportion of pregnant mothers who made their first ANC according to the WHO recommended time (≤ 12 weeks of gestation) were 253 (42.4%) while those 344 (57.6%) were initiated lately (> 12 weeks of gestation). The median timing was 12 12 weeks (IQR 12-16) weeks with ranging from 2 to 24 weeks (Fig 38) .

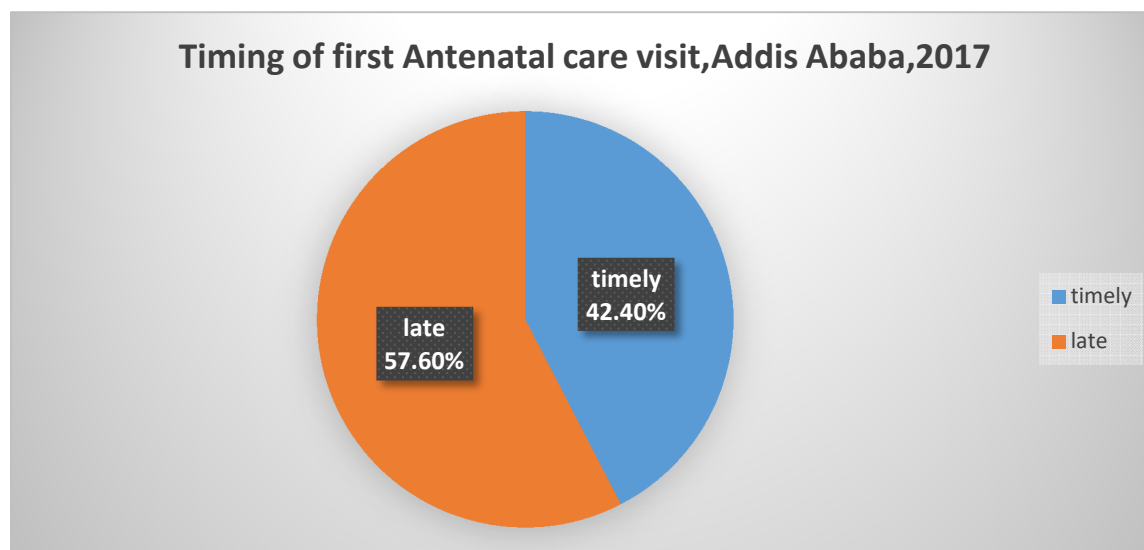


Figure 37: Proportion of respondents by timing of first ANC visit at selected Health centers, Addis Ababa, Ethiopia, 2017.

Knowledge of mother on of ANC service utilization and timing of first ANC visit

Almost all the respondents 596 (99.9%) replied on the importance of ANC for the health of the mother and all responds 597(100%) that initiation of ANC is important for fetus. Among those all respondents, 597 (100%) reported that timely initiation of first ANC was important for both mother and fetus. Regarding the perception of appropriate time of ANC initiating, 228(38.2%) women

respond within and before 3 months of gestation, while 369 (61.9%) were after three months of gestation. Of which 584(97.8%) perceived that greater than four ANC visits were sufficient throughout the whole pregnancy period. Among the women who reported as four and more visits are necessary, 216(80.9%) initiated early for the current pregnancy. 334(57.2%) % perceived that the correct time of ANC initiating was before 12 weeks of gestation, 250(42.8%) perceived the correct time ANC initiating was after 12 weeks of gestation. Majority of respondents, 567(95%) perceived that All pregnant women are not at risk of pregnancy related problems at the time of pregnancy period. 164 (27.5%) reported or thought that waiting time is one of the problems that hinder ANC service utilization in the health institution which affected the timing of first Antenatal care visiting, but majority of the respondents 433 (72.5%) didn't complain it as hindering factor for timing of the first ANC initiating.

Table 31: knowledge on ANC service utilization by timing of first ANC initiation at selected Health centers, Addis Ababa, Ethiopia, 2017.

Variable	Category	Late starting(> 12 weeks of gestation)	Timely initiating(≤12 weeks of gestation)	Total number (%)
Timely start ANC important	Yes	253(42.4%)	344(57.6%)	597(100%)
	No	0(0.0%)	0(0.0%)	0(0%)
ANCimportant for mother	No	1(100.0%)	0(0.0%)	0(0.2%)
	Yes	343(57.6%)	253(42.4%)	596(82.2%)
ANC important for fetus	Yes	253(42.4%)	344(57.6%)	597(100%)
	No	0(0%)	0(0%)	0(0%)
appropriate time 1st ANC	≤12weeks	179(48.5%)	190(51.5%)	369(61.9%)
	>12 weeks	165(72.4%)	63(27.6%)	228(38.2%)
Number of visit need	<4 four	10(76.9%)	3(23.1%)	130(0%)
	>4 Visits	334(57.2%)	250(42.8%)	584(0%)
All pregnant at risk	Yes	159(58.0%)	115(42.0%)	30(5%)
	No	185(57.3%)	138(42.7%)	567(95%)

Obstetric history and timing of first ANC visits

In this study about 263(44.1%) of the study participants have been pregnant or gravida one followed by 306(51.3%) gravida between 2-4. Among these total respondents, 283 (47.4%) of

respondents were with parity zero (nullipara), while the rest of respondents 314 (52.6%) were parity one and above (multi para). Among para zero women 159(56.2%) of them initiated early for the current pregnancy whereas among multi para women 124 (43.8%) were initiated early for the current pregnancy. 552 (92.5%) of the respondents have had one alive child.

Table 32: Number of respondents by obstetric history and timing of first ANC, Addis Ababa, 2017.

Variable	Category	Lately initiating (>12weeks gestation)	Timely initiating (≤12weeks gestation)	Total number (%)
Gravida parity	1	148(56.3%)	115(43.7%)	263(44.1%)
	2-4	177(57.8%)	129(42.2%)	306(51.3%)
	>5	19(67.9%)	9(32.1%)	28(4.7%)
	Null parity	159(56.2%)	124(43.8%)	283(47.4%)
	≥1 Parity	185(58.9%)	129(41.1%)	314(52.6%)
Number of children alive	1	314(56.9%)	238(43.1%)	552(92.5%)
	2-4	28(66.7%)	14(33.3%)	42(7%)
	>5	2(66.7%)	1(33.3%)	3(0.5%)
Current fetus gestational age	≤20 weeks	86(51.8%)	80(48.2%)	166(27.8%)
	21-34 weeks	199(60.5%)	130(39.5%)	329(55.1%)
	≥ 35weeks	59(57.8%)	43(42.2%)	102(17.1%)

Experience of Antenatal care service utilization

According to this study, majority of respondent 519(86.9%) have no history of abortion. 586 (98.2%) have had no history of still birth and 11 (1.8%) of the respondents had history of still birth .Out of the total respondents who had history of previous ANC, 215 .28(8.5%) reported that they have had history of caesarean section (C/S) delivery while the remaining 303 (91.5%) have not. 4(1.2%) of respondents had history of any pregnancy related complication or health problems and the rest 341 (98.8%) had no a history this problem. Out of the total respondents, 300(89.6%) of the respondents have ever attended ANC services utilization prior to the current while the rest 35 (10.4%) not have past ANC experiences. Out of 301 respondents who responded to the timing of first visit for pregnancy preceding the current pregnancy, 240 (79.7%)had their previous first visit initiation with the WHO recommended time (≤ 12 weeks of gestation) but the rest of respondents 61 (20.3%) had their last pregnancy first visit starting lately (>12 weeks of gestation) (Table32).

Table 33 Respondents past experience on Antenatal care service utilization in Addis Ababa, Ethiopia, January, 2017.

Variables	Category	Late starting(> 12 weeks of gestation)	Timely initiating (≤12 weeks of gestation)	Total number (%)
Abortion n = 597	no	296(57.0%)	223(43.0%)	519 (86.9%)
	Yes	48(61.5%)	30(38.5%)	78 (13.1%)
abortion Type	Spontaneous	43(58.9%)	30(41.1%)	73 (87.8%)
	induced abortion	6(54.5%)	5(45.5%)	11 (12.2%)
History still birth	Yes	6(54.5%)	5(45.5%)	11 (1.8%)
	no	338(57.7%)	248(42.3%)	586 (98.2%)
pregnancy related problem	Yes	2(50.0%)	2(50.0%)	4 (1.2%)
	no	200(58.7%)	141(41.3%)	341 (98.8%)
caesarean delivery	Yes	17(60.7%)	11(39.3%)	28 (8.5%)
	no	176(58.1%)	127(41.9%)	303 (91.5%)
Have you ever attended ANC?	Yes	173(57.7%)	127(42.3%)	300 (89.6%)
	no	22(62.9%)	13(37.1%)	35 (10.4%)
time started last pregnancy	≤(12weeks	98(40.8%)	142(59.2%)	240(79.7%)
	>12 weeks	28(45.9%)	33(54.1%)	61(20.3%)

History of current pregnancy and timing of first ANC visit

414 (69.3%) of the respondents reported that they confirm their pregnancy by missed period others 188 (31.8%) physiological change and 514 (86.1%) recognize by doing laboratory, urine pregnancy test (HCG) .Among those who confirmed their pregnancy by urine test 287(55.8%) of them initiated timely according to the recommended time for the current pregnancy but 227 (44.2%) of them lately. Similarly, among those who recognize their pregnancy by missed menses, 245(59.3%) respondents started their first ANC visit timely. Of all respondents, 585 (98%) of the respondents were first informed their pregnancy to their husbands and 250(42.7%) of them started their first ANC visit on the recommended time. 255 (42.9%) to their mothers, 455 (76%) of respondents reported that their pregnancies were planned. Among those who had a planned pregnancy 253(55.7%) of started first ANC timely on the other hand 201(44.3%) of pregnant mothers initiated their first ANC lately. Of 455 pregnant women who had a planned pregnancy, 455(76%) of them included their husband in the plan and among which 253(55.7%) started their first ANC visit timely. Out of the 142(24%) unplanned pregnancies, 141(99.3%) were wanted by the women after conception and similarly 140(99.3%) cases were wanted by their husbands. Out of 231 pregnant women who responded that the pregnancy were unplanned, 104 (45%) were

reported as the pregnancy was unwanted and 88 (89.4%) of the respondents who have responded as the pregnancy was unwanted were consider abortion and 45(89.4%) not. 506 (84.8%) of respondents reported that they have faced any pregnancy related problem in the current pregnancy. Out of 231 pregnant women who responded that they faced pregnancy related problem, 87(80.5%) of them minor pregnancy disorder.

Table 34: History of current pregnancy and timing of first ANC, Addis Ababa, Ethiopia, 2017.

Variables	Category	Late starting(> 12 weeks of gestation)	Timely initiating(≤12 weeks of gestation)	Total number (%)
menses missed	Yes	245(59.3%)	168(40.7%)	414(69.3%)
	No	98(53.6%)	85(46.4%)	183(30.7%)
Physiological change	Yes	111 (59.0%)	77 (41.0%)	188(31.5%)
	No	233 (57.0%)	176 (43.0%)	409(68.5%)
Urine test	Yes	287(55.8%)	227 (44.2%)	514(86.1%)
	No	57(68.7%)	26(31.3%)	83(13.9%)
pregnancy planned	Yes	253(55.7%)	201(44.3%)	454(76%)
	No	91 (63.6%)	32(36.4%)	143(24%)
plan include your husband	Yes	254(55.8%)	201(44.2%)	455(76.2%)
	No	90(63.4%)	52(36.6%)	142(23.8%)
Unplanned, you wanted	Yes	91(64.5%)	50(35.5%)	141(99.3%)
	No	0(0.0%)	1(100.0%)	1(0.7%)
Unplanned, wanted your husband	No	50(35.7%)	90(64.3%)	1(0.7%)
	Yes	0(0.0%)	1(100.0%)	140(99.3%)
unplanned, consider to abort	Yes	18(58.1%)	13(41.9%)	31(23%)
	No	68(65.4%)	36(34.6%)	104(77%)
Your Husband	Yes	250(42.7%)	335(57.3%)	585(98%)
	No	3(25.0%)	9(75.0%)	12(2%)
Your Mother	Yes	99(38.8%)	156(61.2%)	255(22.9%)
	No	154(45.2%)	187(54.8%)	341(57.1%)
Your Sister	Yes	53(38.7%)	84(61.3%)	137(42.9%)
	No	220(43.5%)	260(56.5%)	460(77.1%)
Your Friend	Yes	33(39.8%)	50(60.2%)	83(13.9%)
	No	200(42.8%)	294(57.2%)	514(86.1%)
problem in the current pregnancy	yes	38(44.7%)	47(55.3%)	506(84.8%)
	no	214(42.0%)	296(58.0%)	91(15.2%)
minor pregnancy disorder	yes	47(55.3%)	85(44.7%)	87(80.5%)
	no	296(58.0%)	214(42.0%)	510(80.5%)
danger signs related problem	yes	0(0%)	0(0%)	0(80.5%)
	no	344(57.6%)	253(42.4%)	597(80.5%)

hyperemesis gravidrum	yes	344(57.6%)	252(42.3%)	1(80.5%)
	no	0(0%)	1(100%)	596(80.5%)

History of current ANC& Service related Variables and timing of fist ANC visit

Majority of the respondents 405 (67.8%) of them reported that they received advise on ANC use. out of those who had informed about ANC initiating, 119 (19.9%) respondents were received advice from urban health extension workers, 136(22.8%) from husbands, and the rest 202(66.2%) from friends. With regard to The reason why they preferred for deciding in initiation of first ANC was reported as follow; 389 (65.3%) respondents reported that they perceived it is the right time to initiate first ANC follow . 218 (36.6%) From their previous experience .Majority reported 544 (91.1%), they perceived to know maternal and fetus health status. Among the respondents who perceived as it is appropriate time 199(51.2%) of them started their first ANC visit according WHO first visit recommended time (initiating ($\leq$ 12 weeks of gestation) whereas 190(48.8%) started late (initiating ($>$ 12 weeks of gestation). Majority of respondents 481(80.6%) who attended ANC for the current pregnancy reported that they spent less than 2 hours, 110(18.4%) spent 2-4 hours for first visit and also 252(58.1%) less than 30 minute, 137(31.6%) spent 30-40 minute and for repeat or routine visit. Payment for the ANC service in current pregnancy was found as 595 (99.7%) paid for the service .The reason for maximum payment ever paid during the service was reported that 305(51.1%) for laboratory investigations, 592(99.2%) for ultrasound, 148(24.8%) for drug, 148(24.8%) for card. 280 (89.2%) paid 200.00 to 400.00ETB. From the total respondents, almost all pregnant 591 (99%) women were replied on good approach of health care providers (Client – health care providers Interaction, Privacy, respect of culture) during ANC follow up of previous and current pregnancy (Table34).

Table 35: History of current ANC visit and timing first ANC initiation, Addis Ababa city Administration, 2017.

Variables	Category	Late starting(> 12 weeks of gestation)	Timely initiating(≤12 weeks of gestation)	Total number (%)
Number of visits in current pregnancy	First visit	72(42.9%)	96(57.1%)	168(28.1%)
	2 nd visit	61(39.9%)	92(60.1%)	153(25.3%)
	3 rd visit	74(43.0%)	98(57.0%)	172(28.8%)
	4 th and above visit	45(44.1%)	57(55.9%)	104(17.4%)
Received advise on ANC: n =597	Yes	175(43.2%)	230(56.8%)	405(67.8%)
	No	78(40.6%)	114(59.4%)	192(32.2%)
get advice From Extension worker	Yes	70(58.8%)	49(41.2%)	119(19.9%)
	No	274(57.3%)	204(42.7%)	478(80.1%)
get advice From Husband	Yes	92(67.6%)	44(32.4%)	136(22.8%)
	No	252(54.7%)	209(45.3%)	461(77.2%)
get advice From Media	Yes	33(60.0%)	22(40.0%)	55(9.2%)
	No	311(57.4%)	231(42.6%)	542(90.8%)
get advice From Mother	Yes	51(58.6%)	36(41.4%)	87(14.6%)
	No	292(57.4%)	217(42.6%)	509(85.3%)
get advice From Sister/brother	Yes	31(54.4%)	26(45.6%)	57(9.5%)
	No	313 (58.0%)	227(42.0%)	540(90.5%)
get advice From Friend	Yes	99(49.0%)	103(51.0%)	202(33.8%)
	No	245(62.0%)	150(38.0%)	395(66.2%)
Advice when start	Yes	9(40.9%)	13(59.1%)	22(3.7%)
	No	244(42.4%)	3310(57.6%)	575(96.3%)
Waiting time for first Visit n= 597	Less than 2 hrs	207(43.0%)	274(57.0%)	481(80.6%)
	2-4 hrs	45(40.9%)	65(59.1%)	110(18.4%)
	> 4 hrs	1(16.7%)	5(83.3%)	6(1%)
Waiting time for routine visit	Less than 30	106(42.1%)	146(57.9%)	252(58.1%)
	30-40 minute	63(46.0%)	74(54.0%)	137(31.6%)
	> 40 minute	14(31.1%)	31(68.9%)	45(10.4%)
Payment for ANC Visit: n=597	Yes	252(42.4%)	343(57.6%)	595(99.7%)
	No	1(50%)	1(50%)	2(0.3%)
payment for Laboratory	Yes	119(39.0%)	186(61.0%)	305(51.1%)
	No	134(45.9%)	158(54.1%)	292(48.9%)
payment for ultrasound	Yes	250(42.2%)	342(57.8%)	592(99.2%)
	No	3(60.0%)	2(40.0%)	5(0.8%)
payment for Drug	Yes	53(35.8%)	95(64.2%)	148(24.8%)
	No	200(44.5%)	249(55.5%)	449(75.2%)
payment for card	Yes	250(42.2%)	342(57.8%)	592(99.2%)

	No	3(60.0%)	2(40.0%)	5(0.8%)
Maximum Payment	< 100ETB	2(22.2%)	7(77.8%)	9(2.9%)
	100 – 400 ETB	154(55.0%)	125(45.0%)	280(89.2%)
	>400 ETB	174(55.4%)	140(44.6%)	25(8%)
Number of visits	<4 visits	10(76.9%)	3(23.1%)	13(2.2%)
	≥4 visits	334(57.2%)	250(42.8%)	584(97.8%)
Health Providers approach good	Yes	248(42.0%)	343(58.0%)	591(99%)
	No	5(83.3%)	1(16.7%)	6(1%)

Husband involvement on decision making of timing of first ANC booking

Among the respondents 589 (98.7%) of them reported that they received permission from their husband on ANC initiation but 8 (1.3%) of them not get permission. 63% of the respondents had decision power on current ANC use. Regarding the decision making for ANC visit, almost all respondents 596 (99.8%) were made decision for initiating with their partners (Husbands) while 1 (0.2%) were made decision with herself (fig4). 340 (57%) of the respondents partners comes to health facility for HIV testing while or during this pregnancy and 257 (43%) did not come. reasons those who did not come ANC clinic for partner HIV testing, 231 (93.5%) respondents were due to busy.

Table 36: Husbands involvement by timing of first Antenatal care initiation in Addis Ababa city administration, Ethiopia, 2017.

Variables	Category	Late starting(> 12 weeks of gestation)	Timely initiating(≤12 weeks of gestation)	Total number (%)
Get permission ANC	Yes	248(42.1%)	341(57.9%)	589(98.7%)
	No	5(62.5%)	3(37.5%)	8(1.2%)
With whom Decide initiate ANC	myself	0(0.0%)	1(100.0%)	1(0.2%)
	With partner	253(42.4%)	343(57.6%)	(99.8%)
Partner HIV test	Yes	148(43.5%)	192(56.5%)	340(57%)
	No	105(40.9%)	152(59.1%)	257(43%)
the reason	B/c he is busy	96(41.6%)	135(58.4%)	231(93.5%)
	He is now abroad	2(50.0%)	2 (50.0%)	4(1.6%)
	He is no volunteer	3(25.0%)	9(75.0%)	12(4.9%)

Association of factors associated with timing of first ANC initiation

Bivariate analysis showed that pregnant women whose education status diploma and above (COR=3.383, 95% CI (1.509, 7.585)), secondary school education (COR=2.343, 95% CI (1.187, 4.625)) were found 3.4 times and 2.3 times more likely to initiate first ANC early within 12 weeks of gestation when compared to women whose education status primary and below respectively. mother monthly income 1425 ETB (COR=1.781, 95% CI (1.193, 2.658)) were found to be 1.78 times more likely to initiate first ANC within recommended time (12 weeks of gestation) compared to those have monthly income 712.5. Respondents whose family size was ≤ 3 (COR=1.697, 95% CI (1.12, 2.57)) were found to initiate first ANC visit ANC within recommended time than those have family size > 3 . The detail variables are described in the table below (Table 9). Bivariate analyses result showed that respondents who confirm their pregnancy by using urine test laboratory were 1.7 times more to initiate their first ANC within recommended as compared respondents with not confirmed by urine test (COR= 1.734, 95%CI, 1.057, 2.846)) . Proportion of respondents those who confirm their pregnancy by missed of period were less likely to initiate first ANC within recommended time as compared not (COR= .787, 95% CI,.55,1.12) . Bivariate analysis of this study revealed that pregnant women who attend their visits greater than four times (COR=2.495, 95% CI (.680, 9.16)) were 2.5 times more likely to initiate first ANC early within 12 weeks of gestation when compared to women attend less than four visits . Respondents whose decision to initiate current first ANC due to previous experience (COR=1.504, 95% CI (1.074, 2.106)) were 1.5 times more likely to initiate first ANC visit ANC within recommended time as compared to those not have previous experience. binary logistic regression showed that respondents decide to initiate their first ANC to know maternal and fetal health condition were 4.6 times more likely to book timely as compared to the referents (OR= 4.609,95% CI, 2.132, 9.962). Regarding get information, those who had get advice from their friends about ANC initiation were 1.67 times more likely initiate first ANC early as compared to those mothers who had not get advice. (OR= 1.672, 95% CI, 1.206, 2.394).

Table 37: bivariate Logistic Regression analysis on association of factors by timing of first ANC visit among pregnant women attending public Health Centers in Addis Ababa, Ethiopia, 2017.

Variables	Category	late(<12 weeks of gestation)	Timely(≤12 weeks of gestation)	Total	COR(95%CI)	P-value
Age in years n=597	15-19	19(70.4%)	8(29.6%)	27(4.5%)	1	.008
	20-24	107(54.6%)	89(45.4%)	196(32.8%)	.243(.086, .689)	.038
	25-29	157(62.3%)	95(37.7%)	252(42.2%)	.480(.240, .961)	.003
	30-34	46(56.8%)	35(43.2%)	81(13.3%)	.349(.176, .692)	.037
	>35	15(36.6%)	26(63.4%)	41(6.9%)	0.439(.203, .951)	Ref
Educational status of husband	≤Primary(1-8)	153(65.3%)	87(34.8%)	250(41.9%)	1	Ref
	Secondary	126(55%)	103(45%)	229(38.4%)	1.532(1.060, 2.213)	.023
	Diploma and above	55(46.6%)	63(53.4%)	118(17.8%)	2.146(1.374, 3.351)	.001
	Others	15(60%)	10(40%)	25(4.2%)	1	Ref
Educational status of mother	≤Primary	163(65.2%)	87(34.8%)	250(41.9%)	1	Ref
	Secondary	126(55.0%)	103(45%)	229(38.4%)	1.532(1.060, 2.213)	.023
	≥Diploma	55(46.6%)	63(53.4%)	118(19.6%)	2.146(1.374, 3.354)	.001
Maternal monthly income	< 712.5 ETH birr	240(60.8%)	155(39.2%)	395(66.2%)	1	Ref
	712.5 - 1425ETH	44(60.3%)	29(39.7%)	73(12.2%)	1.021(.613, 1.700)	.938
	>1425 ETH birr	60(46.5%)	69(53.5%)	129(21.6%)	1.781(1.193, 2.658)	.005
Family size	≤ 3	259(55.0%)	212(45.0%)	126(21.1%)	1.697(1.121, 2.569)	.012
	>3	85(67.5%)	41(32.5%)	471(78.9%)	1	Ref
Pregnancy planned	Yes	253(55.7%)	201(44.3%)	454(76%)	1.390(.943, 2.049)	.096
	No	91 (63.6%)	32(36.4%)	143(24%)	1	Ref
Urine test	Yes	287(55.8%)	227 (44.2%)	514(86.1%)	1.734(1.057, 2.846)	.029

Get advice from husband	No	57(68.7%)	26(31.3%)	83(13.9%)	1	Ref
	Yes	92(67.6%)	44(32.4%)	136(22.8%)	.577(.385, .863)	.007
Get advice from Friend	No	252(54.7%)	209(45.3%)	461(77.2%)	1	Ref
	Yes	99(49.0%)	103(51.0%)	202(33.8%)	1.672(1.206,2.394)	.032
From my previous experience	No	245(62.0%)	150(38.0%)	395(66.2%)	1	Ref
	yes	106(48.6%)	112(54.4%)	218(36.5%)	1.504(1.074,2.106)	.018
Influenced by others	no	146(38.6%)	232(61.4%)	378(63.3%)	1	Ref
	yes	17(7.2%)	90(92.8%)	107(16.2%)	1	Ref
	no	246(49.2%)	254(50.8%)	500(83.8%)	12.45(5.658,27.40)	0.000
Waiting time for the routine visit	< 30 minute	106(42.1%)	146(57.9%)	252(58.1%)	1.608(.815,3.1)	.170
	30-40 minute	63(46.0%)	74(54.0%)	137(31.6%)	1.885(.922,3.8)	.082
	>40minute	14(31.1%)	31(68.9%)	45(10.4%)	1	Ref

In the final multivariable model the association remained statistically significant even after controlling for possible confounders were; mothers get information from their friends about ANC timing (AOR=1.81, 95%CI (1.16, 2.83)), decide to initiate their first ANC visit without others influence (AOR=9.84, 95%CI (4.04, 23.98)), family size less than three in their family (AOR=1.88, 95%CI (1.01, 3.49)) and age of mother in the range of 20-24 years (AOR=0.196, 95%CI (0.046,.847)) , 25-29 years (AOR=0.224, 95%CI (0.080,.621)) , 30-34 years (AOR=0.142, 95%CI (0.053,0.379)) , greater than35 years (AOR=0.268, 95%CI(0.092,0.780)) were found to be statistical significant factors for timely initiation of first ANC visit. The study finding reveals that respondents who have family size of less three were 1.88 times more likely to initiate timely as compared those who greater than three ((AOR=1.88, 95%CI (1.01, 3.49)) , p=0.046) . Analysis this study showed that, The odds of respondents who get advise (information) from their friends before to attend ANC were 1.8 times more to initiate first ANC within recommended time compared to those who did not get advice (AOR=1.81, 95%CI (1.16, 2.83, p=0.009)) . the likelihood of respondents who initiate their ANC visit without other influence were 9.84 times more likely initiate first Antenatal care timely as compared respondents those who had exposure of other influence (AOR=9.84, 95%CI (4.04, 23.98, p=0.000) . The result of this study finding showed that, the odds of age of mother in the range of 30-34 years (AOR=0.142, 95%CI (.053,.379, p=0.000)) and greater than35 years (AOR=0.268, 95%CI (0.092,0.780, p=0.016)) were less likely to initiate timely as compared those whose age group 15-19years.

Table 38: **Bi-variate Vs multivariable analysis of associated factors with timing of first antenatal care initiation in Addis Ababa city administration, Ethiopia, 2017.**

Factors(variable)	late 1 st ANC	Timely 1 st ANC	COR(95% CI)	AOR(95% CI)	P-value
Get advice (information) from their friend					
Yes	99(49.0%)	103(51.0%)	1.699(1.206,2.394)	1.81(1.16, 2.83)	0.009
No	245(62.0%)	150(38.0%)	1	1	Ref
influenced by others to initiate first ANC					
No	17(7.2%)	107(92.8%)	12.45(5.658,27.40)	9.84(4.04, 23.98)	0.000
Yes	246(49.2%)	254(50.8%)	1	1	Ref
Family size of respondents					
Less than 3	259(55.0%)	212(45.0%)	1.697(1.121, 2.569)	1.88(1.01, 3.49)	0.046
Greater than 3	85(67.5%)	41(32.5%)	1	1	Ref
Age of pregnant women in years					
15-19	19(70.4%)	8(29.6%)	1	1	Ref
20-24	107(54.6%)	89(45.4%)	.243(.086, .689)	.196(.046,.847)	0.029
25-29	157(62.3%)	95(37.7%)	.480(.240, .961)	.224(.080,.621)	0.004
30-34	46(56.8%)	35(43.2%)	.349(.176, .692)	.142(.053,.379)	0.000
>35	15(36.6%)	26(63.4%)	0.439(.203, .951)	0.268(.092,.780)	0.016

Discussion

Maternal age in this study was highest in the age group of 25–29 years old which accounts about 157(62.3 %). A study conducted in Nigeria which is in line with this study findings (73). This might be due to the two studies use different age categorization. This result is inconsistent with the study done in ambo town. (74). The median Age of respondents in this study was 25 (IQR 23-29) with the ranges of 17 years to 39 years. This findings is in line with previous conducted study in Addis Ababa which stated as follows; the median age of respondents was 25 years, and the age ranges from 17 to 40 years (27). The median Gestational age at which pregnant mothers initiated the first ANC in this study was 12 weeks (IQR 12-16). This is nearly comparable with findings from Gondar (70) and Addis Ababa (48). The possible justification for this comparable finding might be current implementation of new focused ANC approach that is being implemented throughout the country enforcing commencement of first ANC within recommended time period. but another study conducted in New South Wales (Australia) show that , the mean pregnancy duration at entry to ANC was 12.8 weeks (31). This may be attributed due to sociodemographic differences between Ethiopia and New South Wales. The difference in time of initiation of ANC might also be attributed by difference in policy. According to 2011 EDHS report the median duration of pregnancy at the first visit was 5.2 months (29). According to this study, it is about 8 weeks earlier than that of 2011 EDHS report (5.2 months). This difference happen in this study finding might be as result of difference in study population since this study was conducted on urban population but the report of EDHS includes urban and rural population where majority of the population in Ethiopia were residents of rural parts of the country.

According to recommendation of World Health Organization (WHO), Even if it is recommended that every pregnant mother should start ANC initiating in the first trimester of pregnancy (≤ 12 weeks) .However, high Proportion of women from developing countries do not start ANC according to the recommendation (22). The result of this study showed that 42.4% pregnant women were attended first ANC timely (according to WHO recommended ANC, ≤ 12 weeks of pregnancy) while the rest of 57.6% were initiated lately (> 12 weeks of pregnancy). This is higher with a study conducted in Addis Ababa (27). This might be due to the current national emphasis given to the focused ANC service, time gap might also be the other reason. According to this study finding, initiating first ANC timely is lower when compared to study shown in Nigeria (67) And also, finding of this study is higher when compared study done in Tanzania (40) and only 17% of women initiated first Antennal care with first trimester in Uganda(38). This finding is higher when compared to EDHS 2016, which only 20% women booked timely(10). This inconsistency could be attributed to the fact that EDHS covered more remote areas. The result of this study higher than the study conducted in Gondar town, North West part of Ethiopia, which revealed that 35% of

pregnant mother initiate first ANC visit timely (70). In another study conducted in Mekelle city the proportion of pregnant women initiate first ANC visit was around 32.7%, which is lower than this study (4). And Also finding of this study is higher when compared study done in Copper belt (Zambia) on women who attended ANC shown(28%) of women initiated before the recommended time of pregnancy, which might be due to that the study conducted in Zambia included both urban and rural area, but this study conducted in health institution found in urban area (58). Also, the proportion of pregnant women in this study was higher than the study conducted in Kembata Temba zone (southern Ethiopia), in which the proportion of pregnant women made their first ANC visit was 31.4% (30). This could be due to the socio-demographic variation between the study areas. Other studies shows that, the proportion of pregnant mothers who initiated within the recommended time was 26.2% of pregnant women were initiated their first ANC in debre birhane town (26) , 39% of them in wolayita sodo town(71) ,27.1% Halaba ,south part of Ethiopia (75) . this difference could be due to the fact that, Addis Ababa is the capital city of the Ethiopia and the community of Addis Ababa might have better health awareness than other parts of the country side. In contrast this, this study finding was lower than the study in University of Gondar teaching referral hospital, where 47.4% of respondents initiate timely (59), this also might be explained by the fact that the two areas are different in socio demographic characteristics and study setting from our study ,study setting is health center but that is referral hospital. Study which was conduct in Pakistan showed 51.6% of the expected pregnancies first time reported for the ANC which is higher in this study(65). And also this result is low compared to the recommendation of WHO which states that each and every pregnant woman should start the first ANC within the first trimester of pregnancy (22). This study result showed that pregnant women who have got advice (information) from their friends about initiation of first ANC visit were 1.8 times more likely to be initiated timely for their first ANC as compared mothers who did not get any advice from their friends(AOR=1.81, 95%CI (1.16, 2.83, p=0.009)) . Which in line with studies conducted in Addis Ababa and Uganda, in which women were more likely to visit earlier when they were advised up on their pregnancies(27) (39). Analysis this study showed that respondents who initiate their ANC visit without other influence were 9.84 times more likely initiate first Antenatal care timely as compared respondents those who had exposure of other influence to initiate their first ANC visit (AOR=9.84, 95%CI (4.04, 23.98, p=0.000)) (Table10). In this study, one of the important factor that associated with timely initiation of first ANC visit was family size, multivariable analysis of this study showed that respondents whose family size less than or equal to three were 1.88 times more likely initiate first Antenatal visit timely as compared respondents those whose family size were greater than three (AOR=1.88, 95%CI (1.01, 3.49), p=0.046))this study finding is in line with a study conducted in Kenya (76). Multivariable analysis of this study revealed there is statistically significant association in between maternal age and timing of first ANC initiation within recommended time. The result of this study finding showed that respondents of age of mother in the range of 20-24 years (AOR=0.196, 95%CI (.046,.847)) , 25-29 years (AOR=0.224, 95%CI (0.080,0.621)) , 30-34 years (AOR=0.142, 95%CI (0.053,0.379)) , greater than35 years (AOR=0.268, 95%CI (0.092,0.780)) were less likely to initiate timely as compared those whose age group 15-19 years. This finding is similar with Literature shown maternal age was found as factor of first ANC visit (45). This might be due to young women at their first pregnancy are more careful about their pregnancy and therefore require institutional care more

than older women. But in contrast, EDHS 2011, that indicated as maternal age and ANC utilization has no significant association (29). This inconsistency of findings might be due to difference socio-demographic characteristics of the study population and time gap of studies. This finding was contrast to those of studies done in Kenya ,Nigeria (23,76).

Strength of the study

- Questionnaire was pre-tested and necessary modification was made, the principal Investigator and Supervisors were supervising the daily data collection activities.
- The interviewers were nurses, who were different from the respective health centers to minimize bias and the response rate was 97.8%.
- The questioner was pretested on similar setting and a necessary modification was made to minimize the difficulty during the data collection.

Limitation of the study

- As this is a cross-sectional study, the associations observed may not be causal enough and since this study is institution based, it may suffer from lack generalizability.
- The study has considered only pregnant women attending ANC at the governmental Health institutions. However other pregnant women who visit private clinics, hospitals who focus on maternity care are not included in this study. There could be Socio-demographic differences to those pregnant mothers visiting other health institutions could have been reported.

Conclusions

- ✓ In this study the proportion of pregnant mothers who practiced timely initiation of first ANC is low. That means, more than half of the mothers did not practice timely initiating of first ANC.
- ✓ In the study, family size less than three, mothers get advice (information) from their friend, and decide to initiate first ANC without others influence were significantly associated with the early ANC visit.
- ✓ Out total respondents 42.4 percent made their first ANC initiated within and before three month's pregnancy where as 57.6 percent were initiated after three month of pregnancy.

Recommendations

1. As per the findings of this study, awareness creation and strengthening on improving number ANC visit should be stressed at facility and community education programs.
2. Addis Ababa region and each sub city family health department should empower mothers through education so as to maintain appropriate family size through strengthen family planning program.
3. The FMOH and/or Addis Ababa City Administration Health Bureau should develop harmonized with WHO and clear updated guideline.
4. Addis Ababa City Administration Health bureau, other stakeholders and NGOs working on maternal and child health services should struggle on promoting timely first visit initiation.
5. Addis Ababa City Administrative Health Bureau, each Sub City, Empower health care workers; by designing on job training, regular supportive supervision & monitoring.
5. There must be give emphasis for older mothers for improvement in the timely initiation of first ANC visit.
6. Pregnant women should be prefer appropriate source of information rather than influence by any individual information
7. There should be further qualitative studies focusing on quality of ANC service to see health care system practices and to make possible more pregnant women to receive early and continuous ANC.

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Annex 1: introduction information (English version)

Title of the research project: Assessment of timing of first antenatal care visit and associated factors among pregnant women attending antenatal care in Addis Ababa, Ethiopia.

Name of principal investigator: Simegnew Asrie

Name of the organization (College): Saint Paul Hospital Millennium Medical College

Name of the sponsor: Saint Paul Hospital Millennium Medical College

Introduction: this information sheet is prepared for Addis Ababa city administration, of which three sub cities and health institution which found under these; Addis ketema sub city (for Addis ketema health center, Quas meda health center) administration health office, koleffe sub city (for koleffe health center, Lomi meda health center and woredas 9 health center) administration health office and gulelle sub city (for selam health center, Addisu gebia health center) administration health office. The aim of the form is to make the above concerned offices clear about the purpose of the research work, data collection procedure and get permission to undertake research.

Purpose of the research project: To assess timing of first antenatal care visit and associated factors among pregnant women attending antenatal care in Addis Ababa city, Ethiopia.

Procedures: In order to achieve the above objective all pregnant mother attending ANC service in Addis Ababa city administration that come to the selected health institution at the time of data collection period will be included in the study.

Risk and discomfort: By participating in this research project, there is no risk that come to one who is interviewed whereas the interview is of great important to the research project which is in turn important for overall planning of program.

Benefit: The research have no direct benefit to those who have participated in this project .But the indirect benefit of the research for the participant and all other clients in the program is clear. This is because if program planners are aware of cause of delaines of first ANC visit, it will be easy to take appropriate intervention and to make targeted programs to client will be benefited.

Confidentiality: To keep the confidentiality the name of client will not be mentioned rather code number will be used.

Person to contact: This research project will be reviewed and approved by review board of Saint Paul Hospital Millennium Medical College. If in any case you want to know more information about the research and its undertakings, you can contact the following persons through the address of advisor and /or principal investigator.

1. Simegnew Asrie (BSc), SPHMMC, EFETP resident, principal investigator), e-mail simegnewasriesw@gmail.com, Tel:251-0918336157 .

2. Tsedeke woleda (BSc, MPH), SPHMMC, department of public health instructor, Advisor) e-mail: tswmh2006@gmail.com, Tel: +251-0940841894

3. Dr. Elias senbeto (MPH, MPH), SPHMMC, department of public health instructor, Advisor e-mail: eliasenbeto@yahoo.com Tel: +251-0911121426

Permission: lastly but not least you are kindly requested to permit and forward your permission to concerned body in your organization so that the researchers can get cooperation from responsible body in the study area.

Annex 2: information sheet and Consent form (English version)

Information sheet:

Greeting.

My name is _____ I am member of research team conducted by Simegnew Asrie (Ethiopian Field Epidemiology Training Program resident) in Saint Paul Hospital Millennium Medical College, department of public health. I am here to gather information about ANC use of mothers. So, I want to ask some questions. Would you mind if I take some time with you? Your name will not be included in the information. I promise to keep the confidentiality of your response. It takes us about 30 minute. The study will help to improve the Antenatal care service for all pregnant women. Are you willing to participate in the study? Yes_____ No_____

Consent form:

I have been briefly informed about the study and I clearly understood the objective, risks, benefit, and the right to participate and withdraw at any time. Since it doesn't affect my personal life, I agreed to take part in the study. I have been informed that there is no direct financial benefit for my participation. Consequently, I here approve my consent to take part in the study as an Interviewee with my signature.

Signature_____ Date_____

Name and Signature of interviewer

Questionnaire Number: _____Name of health facility _____

Name of data collector _____ Signature _____

Name of supervisor_____ Start time _____

Annex 4: Questionnaire for thesis (English version)

No.	Questions	Response	Skip
Section I:Socio-demographic variables			
Q01	Current your Age	_____ years	
Q02	Marital status	1.Married 2.Single(Never married) 3.Separated(Divorced,Widowed) 4.Others_____	if no married skip to Q06
Q03	Your Age during marriage(if marriage Q02)	_____ years	
Q04	Occupational status of your husband	1.gov,t employed 2. self/private Employed 3.my own work 4. Other (specify) -----	
Q05	Educational status of your husband(Grade completed)	1.illiterate 2. Primary(1-8) 3. Secondary 4. Diploma and above	
Q06	Religion	1.Orthodox Christian 2.Muslim 3.Protestant 4.Others (specify) __	
Q07	Ethnicity	1. Amhara 2. Oromo 3. Gurage 4. Seltie 5.Others [Specify]__	
Q08	Mother educational status (Grade completed)	1.illiterate 2. primary(1-8) 3. secondary(9-12) 4. Diploma and above	
Q09	Your monthly income in birr?	_____ EBirr/Month	
Q10	Family income per month?	_____ EBirr/Month	
Q11	Your occupational status	1. Gov,t employed 2. Self/private Employed 3. House wife 4.Other (specify) -----	
Q12	Family size in your home	_____	
Q13	What are the means to reach health center related to transportation?	1. on foot 2. by taxi or related	
Q14	If Q13 by taxi, Transportation cost that you paid for coming & back to this health service	_____ ETB	
Q15	How far your home from health center?	_____ in Km	
Section II:knowledge of mother on antenatal care			
Q16	Is ANC service important for mother?	1. Yes. 2.No	

Q17	Is ANC service important for fetus?	1.Yes 2.No	
Q18	If yes, Q 15, When do you think it is appropriate time to begin ANC?	_____ weeks	
Q19	How many times do you think women need to go for ANC in health facility during pregnancy?	1.One Visit 2. Two to Three Visits 3. Four to Six Visits 4. More than Six Visits 5.Others[Specify]:__	
Q20	Do you think timely or early initiation of ANC important	1.Yes 2.No	
Q21	All pregnant women are at risk of pregnancy complication.	1.Yes 2.No	
Q22	Is there any difference in time of visiting of first ANC (between premi & multi para women)?	1.Yes 2.No	
Q23	Do you think waiting time is one of the problems that hinder ANC service utilization?	1. Yes 2. No	
Section III: Obstetric history			
Q24	Current Gestational age of fetus	_____	
Q25	Number of gravida including this pregnancy	_____	
Q26	Number of parity (all previous birth experience)	_____	If no birth skip Q 30
Q27	Number of children alive now	_____	
Section IV: past Experience of ANC service utilization			
Q28	If have any birth experience for Q 23, is there any still birth?	1.Yes 2.No	
Q29	Is there any abortion?	1.Yes 2.No	
Q30	If there is, type of abortion	1.Spontaneous_____ 2.Induced_____	
Q31	From previous , have you faced any pregnancy related complication or health problems (admission for eclampsia, previous surgery)	1.Yes 2.No	
Q32	Have you previous history of caesarean delivery	1.Yes 2.No	
Q33	Have you ever attended ANC?	1.Yes 2.No	
Q34	If yes, for Q 30, for which pregnancy you attended?	1st pregnancy 1. Yes 2. No 2 nd pregnancy 1. Yes 2. No 3rd pregnancy 1. Yes 2. No 4th pregnancy 1. Yes 2. No 5th pregnancy 1. Yes 2. No	

Q35	If you attended ANC before this pregnancy, At what months you started the service for the recent pregnancy?	After_____ months	
Q36	What is the maximum waiting time you spend to complete checkup?	1.For first Visit ___hrs/minute 2. For the repeat Visits _____hrs	
Q37	Is there any payment you were asked for checkup or service?	1. Yes 2. No	
Q38	If yes for Q 20, for what services you paid?	1.card 2. For laboratory 3. For ultrasound 4. For drugs 5. Other [specify]_	
Q39	If you paid for any service charge, what is the maximum money you paid for a visit	_____Birr	
Q40	Is there any missed investigation in previous, due to shortage [inadequacy] of money?	1. Yes 2. No	
Q41	Which service you missed due to lack of money	1. Laboratory 2. Ultrasound 3. Drugs 4. Other [specify]_____	
Section V: History of current pregnancy			
Q42	How do you know (confirm) your pregnancy?	1. While menses missed 2. Physiological change 3. Urine test 4. Other [specify] _____	
Q43	Is this pregnancy planned?	1Yes 2.No	Ifno goQ36
Q44	If yes for Q34, is the plan include your husband?	1.Yes 2.No	
Q45	If this pregnancy is not planned, was it wanted by you after conception?	1.Yes 2.No	
Q46	If this pregnancy is not planned was it wanted by your husband after conception?	1.Yes 2.No	
Q47	If this pregnancy is unplanned, do you consider to abort	1.Yes 2.No	
Q48	To whom did you tell you become pregnant for the first time?	1. Your Husband 2. Your Mother 3. Your Sister 4. Your Friend 5.Other (specify)_____	
Q49	Have you faced any pregnancy related medical complication?	1.Yes 2.No	If no skip to Q 41

Q50 If yes, what are the problems that you faced

1. minor pregnancy disorder
2. danger signs related problem
3. hyperemesis gravidum
4. Other (specify)_____

Q51 If yes, is this complication makes you start ANC visit?

1. Yes 2. No

Section VI: History of current ANC& Service related Variables

Q52 In the present pregnancy, when did you start the 1st ANC follow up?

1. After_____weeks

Q53 How many times did you receive ANC during this pregnancy (including this one)

_____ visits

Q54 Before your first attendance of the ANC, was there any one who advised you to come in to health institution?

1. Yes 2. No

Q55 If yes Q43, from whom you get advice?

1. Health extension worker
2. Husband 3. Media 4. Family
5. Friend 6. Other[specify]_____

Q56 If you were advised to attend ANC by someone, Did he/she informed you when to start?

1. Yes 2. No

Q57 If you are advised on the time to start ANC, When does he/she advise you to start?

_____months after Amenorrhea

Q58 Why did you decide to initiate the ANC follow up now

1. I perceived it is appropriated time
2. From my previous experience
3. Because, I get Sick now
4. for my and fetus health
5. Economic factor [money constraints]
6. others influence
7. Others [specify]_____

Q59 When you being appointed after 1st visit for second visit

after_____ month/weeks

Q60 Is health providers approach good

1. Yes 2. No

Section VII: Women Decision making and Husband involvement

Q61 Did you get permission from your husband to initiate ANC visit

1. Yes 2. No

Q62 With whom did you decide to initiate antenatal care visit for Current pregnancy?

1. mine only
2. Mine & my husband
3. My husband only 4. Other (specify) --

This is all what I want to ask you. Thank you for spending your time and Valuable information you gave me. Do you have any question that I can address for you? _____

Ending time-----

Q63	If no in Q56,Why do you think your husband did not participated ANC visit	1 B/c pregnancy is normal 2 No good service at HC 3 Financial problem 4 I don't know the reason 5 no one tell me to come with him 6. Other (specify) -----	
Q64	Did your husband come for partner HIV test in this pregnancy	1. Yes 2. No	
Q65	If no in Q57,what is the reason	1 B/c he is busy 2. He is now abroad 3. He is no volunteer 4. I don't know the reason 5. Others (specify)	
Name of data collectors -----		signatures-----	Name of supervisors-----
----- signature-----			
Date of data collection -----			

የመረጃና የፈቃደኝነት መግለጫ

የጥናቱ መረጃ

ሰላምታ

እኔ ስሜ _____ እባላለሁ። የቅዱስ ጳውሎስ ሆስፒታል ሚሊኒየም ህክምና ኮሌጅ የህብረተሰብ ጤና አጠባበቅ ት/ቤት የፊልድ አፒዲሞሎጂ የሁለተኛ ድግሪ ተማሪ የሆኑት አቶ ስሙኘው አስሬ በሚያካሂዱት የነፍሱ-ጡር ህክምና ክትትል እና ተዛማጅ ምክንያቶች ጥናት መረጃ ሰብሳቢዎች አባል ነኝ። እዚህ የመጣሁት ስለ ነፍሱ-ጡር እናቶች የክትትል ጊዜ መረጃ ለመሰብሰብ ነው። ጥናቱም ነፍሱ-ጡር ሴቶች የመጀመሪያ የቅድመ ወሊድ የጤና ክትትልን መቸ እንደሚጀምሩ፤ እንዲሁም የእናቶችና የጨቅላ ህፃናት ህመምና ሞትን በመቀነስ ረገድ ከፍተኛ አስተዋፅኦ ያበረክታል ተብሎ ይገመታል፡፡ በዚህ ጥናት በመሳተፍዎ የሚያገኙት ቀጥተኛ የሆነ ጥቅም የለሌ ሲሆን ነገር ግን ከዚህ ጥናት የሚገኘው ዉጤት በቀጥታ ማህበረሰቡን የሚጠቅም ሲሆን ለእርስዎ ደግሞ እርካታን እንደሚሰጥ ተስፋ አደርጋለሁ። ቃለ መጠይቁ ወደ 30 ደቂቃ የሚያክል ጊዜ ይፈጃል።ስምዎን በመረጃዉ ላይ አይገለፅም።ሚስጢራዊነቱም ይጠበቃል።ጥናቱ የነፍሱ-ጡር እናቶችን የህክምና አገልግሎት በማሻሻል የጎላ ሚና ይኖረዋል። ይህ ጊዜዎትን የሚይዝ ቢሆንም መላውን ሴቶች ሊጠቅም የሚችል የአገልግሎት ጥራት ማሻሻያ ለማድረግ የሚያግዝ በመሆኑ እንዲተባበሩኝ እጠይቅዎታለሁ። በጥናቱ መሳተፍዎ ሙሉ በሙሉ በፍቃደኝነት ላይ የተመሰረተ ሲሆን ከጥናቱ ማቋረጥ በፈለጉበት ወቅት የማቋረጥ መብትዎ ሙሉ በሙሉ የተጠበቀ ነው። በጥናቱ መሳተፍዎም ሆነ አለ መሳተፍዎ ከዚህ ጤና ጣቢያ የሚያገኙትን አገልግሎት በምንም መልኩ የሚቀይር ወይም የሚጎዳ አይደለም።በዚሁ መሰረት ትክክለኛ መረጃን በመስጠት በቃለመጠየቁ እንዲሳተፉ በአክብሮት እጠይቃለሁ።

በቃለ መጠይቁ ለመሳተፍ ፈቃደኛ ነዎት?

ፈቃደኛ ነኝ _____ ፈቃደኛ አይደለሁም _____

የፈቃደኝነት ማረጋገጫ

የምርምር ጥናቱ ክፍል የሆኑት መረጃዎችና ሂደቶች ተብራርተዉልኛል።እኔም በተቢራራልኝ መሰረት ተረድቻለሁ።ጥናቱ ወይም ምርምሩ ምንም ዓይነት ጉዳት የማያስከትል በመሆኑ ለማድረገዉ ተሳትፎ የካሳ ክፍያ አይኖረዉም።

በጥናቱ ላይ ለመሳተፍ ፈቃደኛ መሆኔን በፊርማዬ አረጋግጣለሁ።

ፊርማ _____ ቀን _____

ቃለ መጠይቁን ያደረገዉ ሰዉ ስምና ፊርማ

ስም _____ ፊርማ _____ የጤና ጣቢያው ስም _____

ቀን _____ የተቆጣጠረው ስም _____ ፊርማ _____ የተጀመረበት ሰአት _____

የመረጃና የስምምነት ውል ቅፅ

የምርምሩ/ጥናቱ ርዕስ

በአዲስ ከተማ ክፍለ ከተማ በሚገኙ ጤና ጣቢያዎች የነፍሱ-ጡር ህክምና ክትትል በሚያደርጉ እናቶች ላይ የመጀመሪያ የነፍሱ-ጡር ክትትል ማድረግ የጀመሩበትን ጊዜ እና ተዛማጅ ምክንያቶችን በተመለከተ፡፡

የዋና ተመራማሪው ስም፡ ስመኘው አስፊ

የድርጅቱ ስም፡ በቅዱስ ጳውሎስ ሆስፒታል ሚሊኒየም ህክምና ኮሌጅ የህብረተሰብ ጤና አጠባበቅ ት/ቤት

ወጪውን የሚሸፍነው አካል፡ የቅዱስ ጳውሎስ ሆስፒታል ሚሊኒየም ህክምና ኮሌጅ የህብረተሰብ ጤና አጠባበቅ ት/ቤት

መግቢያ፡ ይህ የመረጃና የስምምነት ውል ቅጽ የተዘጋጀው በአዲስ አበባ ከተማ አስተዳደር በሚገኙ ሶስት ክፍለ ከተማዎች ስር በሚገኙ ጤና ጽህፍት ቤት እና በስሩ ለሚገኙት ጤና አጠባበቅ ጣቢያዎች ጉለሌ ክፍለ ከተማ (ሰላምጤና ጣቢያ ተጠሪ፣ አዲሱ ገቢያ ጤና ጣቢያ ተጠሪ) አዲስ ከተማ ክፍለ ከተማ (ለአዲስ ከተማ ጤና ጣቢያ ተጠሪ ፣ ለኳስ ሜዳ ጤና ጣቢያ ተጠሪ) እና ኩልፌ ቀራንዮ ክፍለ ከተማ (ኩልፌጤና ጣቢያ ተጠሪ፣ ሎሚ ሜዳ ጤና ጣቢያ ተጠሪ፣ ወረዳ 9 ጤና ጣቢያ ተጠሪ) ነው። ዋና ዓላማውም ስለምርምሩ ዓላማ፣ ስለ መረጃ አሰባሰቡ እንዲሁም ጥናቱን ለማካሄድ ፈቃድ ለማግኘት ከላይ የተገለፁትን አካላት ግልፅ እንዲሆንላቸው ለማድረግ ነው።

የጥናት ፕሮጀክቱ የሚካሄድበት ምክንያት፡

የጥናቱ ዓላማ በአዲስ አበባ ከተማ አስተዳደር በሚገኙ ሶስት ክፍለ ከተማዎች ስር በሚገኙ ጤና ጣቢያዎች የነፍሱ-ጡር ህክምና ክትትል በሚያደርጉ እናቶች ላይ የመጀመሪያ የነፍሱ-ጡር ክትትል ማድረግ የጀመሩበትን ጊዜ እና ተዛማጅ ምክንያቶችን ለማጥናት ታቅዶ የተዘጋጀ ነው። የጥናቱ ግኝት ችግሩን ለመፍታት በተለይም ደግሞ ጥናቱ በሚካሄድበት ቦታ ትክክለኛ የሆነ የመፍትሄ አቅጣጫ ለመቅረፅ እንደመነሻ መሰረት ያገለግላል።

አተገባበር ፡

የጥናቱን ዓላማ ለማሳካት በአዲስ አበባ ከተማ አስተዳደር የነፍሱ-ጡር ክትትል የሚያደርጉ እናቶች መረጃ በሚሰበሰብበት ጊዜ ወደ ጤና ተቆሙ የነፍሱ-ጡር ክትትል ሊያደርጉ የሚመጡትን በሙሉ ያካትታል።

ሊገትም የሚችል ችግር/አለመመችት በዚህ ጥናት ላይ ቃለ መጠይቅ የሚደረግላቸው እናቶች ምንም የሚደርስባቸው ጉዳት የለም።ነገር ግን መረጃው ለጥናቱ በጣም አስፈላጊ ነው።

ጥቅሞች በዚህ ጥናት ተሳታፊ የሚሆኑት እናቶች በቀጥታ ሊያገኙት የሚችሉት ጥቅም ባይኖርም መረጃው ግን ነፍሰ-ጡር እናቶች የነፍሰ-ጡር ህክምና ክትትል የሚጀምሩበትን ጊዜ እንዲሁም ተዛማጅ ምክንያቶችን ለማወቅ ይጠቅማል። ቀጥተኛ ባልሆነ መልኩ ም ቢሆን እናቶቹ ተተቃሚ ይሆናሉ።

ምስጢራዊነት

ለዚህ ጥናት የሚሰበሰበውን መረጃ ሚስጢር ለመጠበቅ የእናቶች ስም በመረጃ መሰብሰቢያው ቅጽ ላይ አይፃፍም።ሚስጥራዊ በሆነ መልኩ የመረጃ ሰጪዎቹን ማንነት የማይገልፅ ቁጥር መረጃ መሰብሰቢያው ላይ ይፃፋል።

Annex 5: የአማርኛ መጠይቅ

የመጠይቅ ቁጥር_____

ተ.ቁ፣ ጥያቄ

መልስ

ወደ ..እለፍ

ክፍል አንድ፤ አጠቃላይ መረጃ (ስነ ህዝብና ማህበራዊ ጉዳዮች መረጃ)

ጥ01 አሁን ዕድሜሽ

_____ዓመት

ጥ02	የጋብቻ ሁኔታ	1. ያገባች 2. ያላገባች 3. አግብታ የፈታች 4. የሞተባት 5. ሌላ [ይገለጽ___
ጥ03	ስታገቢ ዕድሜሽ(ጥ2 መልስሽ ያገባ ከሆነ)	___ ዓመት
ጥ04	ሀይማኖት	1. ኦርቶዶክስ ክርስቲያ 2. ሙስሊም 3. ፕሮቴስታንት 4. ሌላ (ይገለጹ)
ጥ05	ብሔር	1. አማራ 2. አሮሞ 3. ጉራጌ 4. ስልጤ 5. ሌላ [ይገለጽ___
ጥ06	የትምህርት ደረጃ	1. ያልተማረች 2. ከ1-8 3. ከ9-12 4. ዲፕሎማና በላይ
ጥ07	ያንች የወር ገቢዎ በገንዘብ ምን ያህል ይሆናል	----- የኢትዮጵያ ብር
ጥ08	የቤት የወር ገቢዎ በገንዘብ ምን ያህል ይሆናል	----- የኢትዮጵያ ብር
ጥ09	የስራ ሁኔታ	1. የመንግስት 2. በግል 3. የቤት እመቤት 4. ሌላ (ይገለጹ)
ጥ10	የባለቤትዎ የስራ ሁኔታ (ባለትዳር ከሆነች)	1. ደመወዝተኛ (የመንግስት) 2. የግል ተቀጣሪ 3. የራሱ የግሉ 4. ሌላ (ይገለጹ) -----
ጥ11	የባለቤትዎ የትምህርት ሁኔታ (ባለትዳር ከሆነች)	1. ያልተማረ 2. እስከ 1ኛ ደረጃ ድረስ (1-8) 3. ሁለተኛ ደረጃ (9-12) 4. ዲፕሎማ እና ከዚያ በላይ
ጥ12	የቤተሰብዎ ብዛት	_____
ጥ13	ወደዚህ ጤና ጣቢያ ለመድረስ በምን አይነት የማዳዳዝ ዘዴ የተጠቀምሽው?	1. በእግር 2. በታክሲ/በመኪና
ጥ14	ለጥ13 መልስሽ በታክሲ ከሆነ ለመድረስና ለመመለስ የከፈሉት የገንዘብ መጠን	_____ ብር
ጥ15	ይህንን አገልግሎት ለማግኘት በአማካኝ ምን ያህል ርቀት ተጉዘሽ ነው የመጣሽው	_____ ኪሎ ሜትር
ክፍል ሁለት፤ የነፍሱ-ጡር ምርመራ ክትትል እውቀትን የሚመለከት		
ጥ16	የነፍሱ-ጡር ህክምና ክትትል ማድረግ ለእናትዎ የሚጠቅማት ነገር አለ	1. አዎ 2. የሚጠቅማት ነገር የለም
ጥ17	የነፍሱ-ጡር /ቅድመ ወሉድ/ ምርመራ የወር አበባዎ ቀርቶ መቼ ቢጀመር ጥሩ ነው ብላው ያስባለ?	_____ ሳምንት

ጥ18	የነፍሰጡር (የቅድመ ወላጅ) ምርመራ ለሽሉ /በማህፀን ውስጥ ላለው ልጅ አስፈላጊ ነው ብለሽ ታስቢያለሽ/ያስባሉ?	1.አዎ 2. አይደለም
ጥ19	አንዲት ነፍሰ-ጡር እናት በእርግዝና ጊዜዋ ስንት ጊዜ የነፍሰ-ጡር ክትትል ብታደርግ በቂ ነው ብለው ያስባሉ?	1. አንድ ጊዜ 2.ሁለት ጊዜ 3.ሶስት ጊዜ 4.አራት እና ከዚያ በላይ
ጥ20	ሁሉም ነፍሰ-ጡር እናቶች ከርግዝና ጋር በተያያዘ የጤንነት ችግር የማጋጠም እድል አላቸው?	1.አዎ 2.የላቸውም
ጥ21	በጊዜው የነፍሰ-ጡር ክትትል መጀመር ጠቃሚ ነው ብለሽ ታስቢያለሽ	1.አዎ 2. አላስብም
ጥ22	በካር በሆኑ እናቶች እና ከዚህ በፊት በወለዱት መካከል የነፍሰ-ጡር ክትትል ቀድሞ በመጀመር የጊዜ ልዩነት አለ ብለው ያስባሉ?	1.አዎ 2.ልዩነት የለም
ጥ23	የቅድመ ወላጅ ምርመራ መጥተሽ የምቆይው ጊዜ አገልግሎቱን እንዳታገኝ እንቅፋት ይሆናል ብለሽ ታስቢያለሽ	1.አዎ 2. የለም አላስብም
ክፍል ሶስት፤ አጠቃላይ የጽንሰ ታሪክ መረጃ		
ጥ24	አሁን ጽንሱ/ሽሉ ምን ያህል ጊዜ ይሆነዋል	_____ ወር
ጥ25	ስንት ጊዜ አርግዘዋል/ሻል (የአሁኑን ጨምሮ)	_____
ጥ26	ስንት ልጆች ወልደዋል/ሻል	_____ ካልወለዱ 36 ይሂዱ
ጥ27	አሁን ያሉዎት/ሽ ልጆች ብዛት ስንት ነው?	_____
ክፍል አራት፡ የአገልግሎት አጠቃቀም መረጃዎች (ከዚህ ቀደም ለነበረው እርግዝና መረጃዎች		
ጥ28	ከዚህ በፊት እርግዝና እና ወላጅ ካጋጠመዎት፣ ሞቶ ተወለደ አጋጥመዎታል?	1.አዎ 2.አላጋጠመኝም
ጥ29	ዉርጃ አጋትሞዎት/ሽ ያዉቃል;	1.አዎ 2.አላጋጠመኝም
ጥ30	ዉርጃ ካጋጠመዎት	1. በራሱ ጊዜ የወጣ ብዛት __ 2. እርስዎ ያስወረዱት ብዛት __
ጥ31	ከአሁኑ አርግዝና በፊት ማንኛውም ዓይነት በርግዝና ምክንያት ያጋጠመዎት የጤና ችግር አለ (የደም ግፊት በመጨመሩ ምክንያት አልጋ ይዘዉ መታከም ወ.ዘ.ተ.)	1. አዎ 2. አይደለም
ጥ32	በባለፉት የወላጅ ጊዜያት በቀዶ ጥገና ተገላግለው ያዉቃሉ?	1. አዎ 2. አይደለም
ጥ33	የቅድመ ወላጅ [የነፍሰጡር ምርመራ] ተከታትለው ያዉቃሉ?	1. አዎ 2. አላውቅም
ጥ34	የነፍሰጡር ምርመራ ተከታትለው የሚያውቁ ከሆነ የትኛውን እርግዝና ነው?	1ኛ 1. አዎ 2. አይደለም እርግዝና

		2ተኛ እርግዝና	1. አዎ 2. አይደለም	
		3ተኛ እርግዝና	1. አዎ 2. አይደለም	
		4ተኛ እርግዝና	1. አዎ 2. አይደለም	
		5ተኛ እርግዝና	1. አዎ 2. አይደለም	
ጥ35	ከዚህ እርግዝና በፊት የነበረውን እርግዝና የቅድመ ወሊድ ተከታትለው ከሆነ ክትትሉን የጀመሩት ወር አበባዎ ቀርቶ በስንት ግዜ ነው?	_____ ወር		
ጥ36	ለቅድመ ወሊድ ምርመራ ሲመጡ ምርመራውን ለማድረግ የሚፈጅብዎት ጊዜ ምን ያህል ነበር?	_____ ሰዓት		
ጥ37	የእርግዝና ክትውትል ሲያደርጉ ለሚያገኙአቸው አገልግሎቶች ሂሳብ እንዲከፍሉ ይጠየቃሉ?	1.አዎ 2. ክፍያ አልተጠየቅሁም		
ጥ38	ክፍያ ተጠይቀዉ ከሆነ ለምን ለምን ነው	1.ለላብራቶሪ 2. አልትራሳውንድ 3. ለመድሀኒት 4.ሌላ ካለ/ይገለጽ-		
ጥ39	ገንዘብ ከፍለው ከሆነ፣ የነፍሰጡር /ቅድመ ወሊድ/ ምርመራ የከፈሉትከፍተኛው ገንዘብ ምን ያህል ነው?	_____ ብር		
ጥ40	ክፍያ ተጠይቀዉ ከሆነ ፡ለመክፍል ባለመቻልዎ የቀረብዎት የህክምና አገልግሎት አለ	1.የለም 2.አለ		
ጥ41	በገንዘብ እጥረት ምክንያት ያላደረጉት ምርመራ ካለ የትኛውን ነው ያላደረጉት	1.ለላብራቶሪ 2.አልትራሳውንድ 3.ለመድኃኒት 4.ሌላ [ይገለጽ] _		
ክፍል አምስት፡ ስለ አሁኑ እርግዝና መረጃዎች				
ጥ42	ማርገዝዎትን በምንድን ነው ያወቁት?	1. የወር አበባ መቅረቱ 2. የሰውነት ለውጥ 3. የሽንት ምርመራ በማድረግ 4.ሌላመንገድካለ/ይገለጽ/_		
ጥ43	ይህ እርግዝናዎ በዕቅድዎ መሰረት ነዉ ያረገዙት	1. አዎ 2. አይደለም		2ካሉወደጥ4 6ይሂዱ
ጥ44	በእቅድዎ መሰረት ከሆነ ያረገዙትእቅዱ ባለቤትዎን ወይም የወንድ ጉአደኛዎትን ያካትታል?	1. አዎ 2. አይደለም		
ጥ45	ይህ እርግዝናዎ ያለእቅድ ከሆነ ከተረገዘ በኋላ በእርስዎ ይፈለግ ነበር?	1. አዎ 2. አይደለም		
ጥ46	ይህ እርግዝናዎ ያለእቅድ ከሆነ ከተረገዘ በኋላ በባለቤትዎ ይፈለግ ነበር?	1. አዎ 2. አይደለም		
ጥ47	ይህ እርግዝናዎ ያለእቅድ እና ያለፍላጎት ከሆነ ለማስወረድ አስበው ነበር	1. አዎ 2. አይደለም		

ጥ48	መጀመሪያ ማርገዝዎትን ያበሰሩት [የነገሩት] ለማን ነው?	1. ለባለቤትዎ 2. ለቤተሰብዎ 3. ለጎረቤትዎ 4. ለጓደኛዎ 5. ለሌላ [ይገለጽ] _____
ጥ49	በአሁኑ እርግዝናዎ፡ እርግዝናን ምክንያት በማድረግ ያጋጠመዎት ጤና ችግር አለ?	1. አዎ 2. ያጋጠመኝ ችግር የለም፤
ጥ50	አዎ ከሆነ፡ ምን ምን ናቸው	1. ቀለል ያሉ ከርግዝናው ጋር የተያያዙ 2. አደገኛ ምልክቶች 3. ከፍተኛ ማስታወክ 4. ለሌላ [ይገለጽ] _____
ጥ51	የጤና ችግር አጋጥመዎት ከሆነ፡ ይህ ችግር ነፍሰ-ጡር ክትትሉን እንዲጀምሩ ምክንያት ሆኖዎታል/ሻል?	1. አዎ 2. ክትትሉን ለመጀመር ምክንያት አልሆነኝም፤
ክፍል ስድስት፡ የአሁኑ የቅድመ ወሊድ ክትትል መረጃዎች		
ጥ52	የአሁኑን የነፍሰ-ጡር ምርመራ ክትትል ወር አበባዎ ቀርቶ ከስንት ወር በኋላ ነው የጀመሩት?	ከ _____ ወር በኋላ
ጥ53	የአሁኑ ክትትል ስንተኛ ጊዜ ሽ ነው	_____ ጊዜ
ጥ54	የቅድመ ወሊድ /ነፍሰ-ጡር/ ምርመራ አስፈላጊነት ለዚህ ምርመራ ወደ ጤና ድርጅት ከመምጣትዎ በፊት ስለ ጥቅሙ ምክር የሰጠዎት ነበር?	1. አዎ 2. አይደለም
ጥ55	የቅድመ ወሊድ /ነፍሰ ጡር/ ምርመራ አስፈላጊነት ተመክረው ከሆነ ምክሩን የሰጠዎት ማነው?	1. የጤና አክስቴንሽን ባለሙያ 2. ባለቤቴ 3. ሚዲያ 4. ቤተሰብ 5. ጓደኛ 6. ሌላ/ይገለጽ/ _____
ጥ56	ምክር የሰጠዎት ሰው መቼ ምርመራ ማድረግ [መጀመር] እንዳለብዎት ነግሮዎታል?	1. አዎ 2. አይደለም
ጥ57	ምክር ወይም መረጃ አግኝተሽ ከሆነ፡ መቼ እንድትጀምሩ ተነገረሽ?	_____ ወር
ጥ58	በዚህን ጊዜ ምርመራ ለማድረግ ለምን ፈለጉ?	1. ትክክለኛ የምርመራ ጊዜ በመሆኑ 2. ከበፊቱ በዚህ ጊዜ ምርመራ ስለማድረግ 3. ጤንነቱ ጡሩ ስላልሆነ 4. ለኔና ለልጄ ጤና 5. የገንዘብ ችግር 6. የሌሎች ግፊት 6. ሌላ/ይገለጽ/ _____
ጥ59	ለመጀመሪያ ጊዜ ለምርመራ ከመጡ በኋላ 2ኛውን ክትትል ከስንት ወር በኋላ እንዲመጡ የተነገርዎት	ከ _____ ወር በኋላ
ጥ60	የባለሙያዎች አቀራረብ ምቹ ነበር	1. አዎ 2. አይደለም

ክፍል ሰባት፡ውሳኔ ሰጭነት እና

- ጥ61 ለቅድመወሊድ ምርመራ ከባለቤትዎ ፈቃድ 1. አዎ 2. አይደለም አግኝተሻል
- ጥ62 የእርግዝና ክትትል ለማድረግ ከማን ጋር 1. በራሴ
ተማከርሽ/ወሰንሽ 2. እኔና ባለቤቴ
3. ባለቤቴ ብቻ
4. ሌላ [ይገለጽ] _____
- ጥ63 ለጥ58 ባለቤትሽ ፈቃደኛ አይደለም ከሆነ 1. እርግዝናው ችግር ስለሌለው
ያልሆነበት ምክንያት ምንድን ነው? 2. በህክምና ተቋም ጥሩ
አገልግሎት ስለማይስጥ
3. ገንዘብ ችግር ስላለብኝ
4. አላውቅም
5. ሌላ [ይገለጽ] _____
- ጥ64 ባለቤትሽ ለ HIV ምርመራ መጥቷል 1. አዎ 2. አይደለም
- ጥ65 ለጥ61 ባለቤትሽ አልመጣም ከሆነ ያልመጣበት 1. ስራ ስለሚበዛበት
ምክንያት ምንድን ነው? 2. አሁን ያለው ውጭ ሀገር ስለሆነ
3. ከኔ ጋር መጥቶ አንዲመረመር
የነገረኝ የለም
4. ለመምጣት ፈቃደኛ ባለመሆኑ
5. ምክንያቱን አላውቅም
6. ሌላ/ይገለጽ/ _____

ጥያቄዬን ጨረሻለሁ ጊዜዎትን መስዋዕት አድርገዋል ለቃለ መጠይቁ በመተባበር ጠቃሚ መረጃ ስለሰጡኝ ከልብ አመሰግናለሁ። ሌላ አስተያየት ካለዎት ሊነግሩኝ ይችላሉ።

የመረጃ ሰብሳቢው ስም _____ ፊርማ የጤና ድርጅቱ ስም _____

ቀን _____

የተቆጣጣሪው ስም _____ ፊርማ _____

መጠይቁ ያለቀበት ሰዓት _____

Chapter VI- Other out puts

6.1- Abstracts for scientific conference

Abstract

Outbreak Investigation of Acute Watery Disease in Addis Ketema Sub City, Addis Ababa, Ethiopia –August 2016

Name of FETP: Ethiopia FETP

Authors: Simegnew A.Adugna¹, T.Menna².

Introduction: Globally, Acute watery diarrhea (AWD) is threat to public health. It becomes the major public health challenge in Sub-Saharan Africa including Ethiopia due to inadequate or unprotected water supplies, poor sanitation and hygiene, overcrowding. We conducted investigation to confirm the outbreak, identify risk factors and implement control measures in the Abaya district, Ethiopia. In 2016, 2000 cases and 12deaths reported in Addis Ababa respectively.862 cases and 2death in Addis Ketema sub city and accordingly suspected outbreak reported from Addis Ketema sub city(population=319,318) on June18,2016. We investigated the distribution and associated factors of AWD outbreak.

Methods: We defined suspected cases as individual residence in Addis ketema and developed >3 loose of watery diarrhea and vomiting for 24 hours between June12 to August20, 2016, Controls were without disease. We conducted a 1:2 unmatched case control study by using structured questionnaire to identify risk factors. We recruited controls in the community and cases admitted from treatment center by random sampling technique. We entered Variables with p-value ≤ 0.2 to multivariable logistic regression to see effect on the outcome variable and to control confounders.

Results: the case fatality rate were 23/10000 and attack rate 27/10000.We recruited 120 controls and 60 cases, of which 91 (50.6%) cases were males. The mean age for cases was 42.72 ± 19.482 SD and for controls 33.81 ± 14.08 SD. multivariable analysis revealed, ate food out of home(AOR=2.72,95%CI:1.26,5.76,p=0.010),drank unprotected holy water(AOR=3.17,95%CI:1.13,8.89,p=0.028))were statistically significant .

Conclusion: There was AWD outbreak in Addis Ketema sub city associated with eaten food out of home, drank unprotected holy water. We recommend chlorination of water, keep tidy holy water utility and environment and aware Individuals who ate out home should protect themselves

Key Words: AWD, outbreak, Addis Ketema, Ethiopia, 2016.

Abstract

Surveillance data analysis of typhoid fever in Addis Ketema sub city, Addis Ababa, Ethiopia –August 2016.

Name of FETP: Ethiopia FETP

Authors: Simegnew A.Adugna¹, T.Menna².

Introduction: Typhoid fever is a severe, life-threatening systemic illness caused by *Salmonella enterica* Typhi (S. Typhi, and characterized by fever and, abdominal symptoms). Typhoid fever causes an estimated 22 million illnesses and 216,000 deaths annually worldwide, that more than 90% of this morbidity and mortality occurred in Asia and sub-Saharan Africa. We aimed to describe Typhoid fever distribution by person, place, time and 3 years trends

Methods: Descriptive retrospective cross-sectional study was used by review of registrations, reporting and other secondary data of typhoid from PHEM and HMIS departments from Addis Ketema Sub City those who have suspected or clearly confirmation of widal positive for typhoid fever for three years period of time or annual report of three consecutive years from June 2013 up to 2015. Data was checked and analyzed using excel.

Results: from 2013 -2015, a total of 18,901 typhoid fever cases were reported .with an average of 6,300 cases per year. The mean ages were 18 years. Age 5-14 year were most affected (84.15%). More than half of the cases, 12703 (67.2%), were reported from Health Center and from these high number of cases reported from millennium health center 1576 (12.4%) followed by clinics 28.8%. Of the three years report, the highest cases were reported in 2015, 9547 (50.5%) with the incidence rate of 4554 cases per 100,000 residents per year and the lowest report was in 2013, 4656 (24.63%) with the incidence rate of 1605/100,000.

Conclusions: 5-14 years were the most affected. Most of the cases were from Health Center. Strengthened typhoid fever surveillance, routine and Supplementary Immunization Strategy should be designed to address targeted age group is highly recommended with especially emphasis to Community based activities

Keywords: Trend, Typhoid fever, surveillance, Addis ketema sub city, Ethiopia, 2017

Epidemiologic bulletin week 14(25/07-1/08/09 E.C)

- Addis ketema subcity surveillance report completeness rates in week 14 for health facilities under all woredas were 87%.
- Completeness and Timeliness for woredas were 100% and 80% respectively.
- 7 new SAM case and 6 MAM cases were reported in week 14 of 2017.
- From 11 malaria suspected cases 4 were confirmed in week 14.
- 3 relapsing fever cases were reported in week 14, number of cases were same as the previous week.
- Number of typhoid cases were 382 in week 14.
- Number of epidemic typhus cases were 282 in week 14.
- No measles case was reported in week 14.
- No AWD cases were reported in this week.

1. Introduction

This weekly epidemiological bulletin serves to provide key information on public health emergency management activities, and summarizes surveillance data and performance on epidemic prone diseases and other public health emergencies. The bulletin mainly includes surveillance data of week 14 of 2017 received from woredas through SMS and telephone call. It highlights the surveillance completeness and timeliness across all woredas, trends of diseases under surveillance, cluster of cases and events , ongoing outbreak and responses undertaken at all levels in the sub city.

2. Surveillance report completeness and timeliness.

Completeness.

In week 14 the aggregated surveillance result of completeness and timeliness rate for health facilities under each woreda were 87%. It shows some decrement as compared to week 13. The completeness in all woredas were above the standard value except woreda 9 and 7. (see figure 1) Timeliness for woredas was 80%.

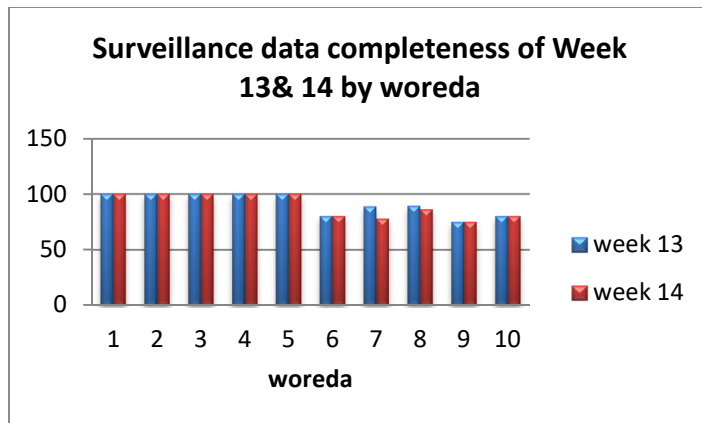


Figure 1. Week 13 and 14 completeness by woreda, Addis Ketema Sub city.

3. Diseases and conditions

A. Malaria

From 11 suspected malaria cases a total of four malaria confirmed cases were reported in week 14. Two were *P.falciparum* and the other two were *P.Vivax*. The number of cases in this week was decreased by 3 cases as compared to previous week. Woreda 4 reported 2 cases, woreda 5 and woreda 8 each of them reported 1 case.

B. Meningitis

No Meningococcal Meningitis case was reported in week 14.

C. Typhoid fever

A total of 382 typhoid fever cases with no death were reported in week 14. The number of cases were increased as compared to the previous week by 17 cases. When we try to see the distribution of these cases higher number of cases were reported from woreda 1(122 cases), followed by woreda 8(61 cases), woreda 9,3 and 7(36,34 and 31 cases respectively). These woredas have high number of cases for the last 10 consecutive weeks.(see figure 2)

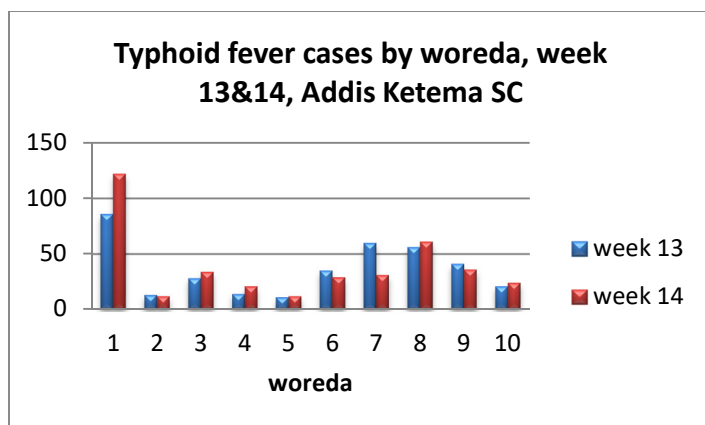


Figure 2- Trends of Typhoid fever cases by woreda, Addis ketema sub city, week 13 and 14, 2017.

D. Dysentery

A total of 51 dysentery cases were reported during week 14. Of which 22 cases were reported from woreda 1. For the last 13 weeks woreda 1 contributes high number of dysentery cases. Woreda 10 has no cases for 10 consecutive weeks and woreda 3,5 and 9 has no cases for this week also. Number of cases decreased by 12 as compared to the previous week. (see figure 3)

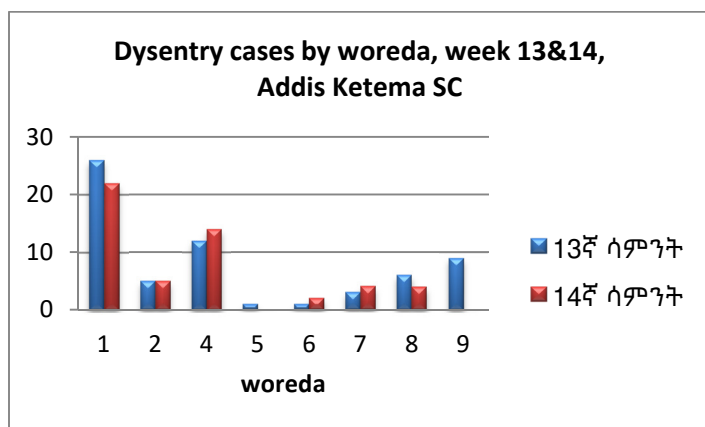


Figure 3-Trends of Dysentery cases in Addis Ketema sub city, week 13 and 14, 2017

E. Relapsing Fever

3 relapsing fever cases were reported in this week. The number of cases were same as the previous week.(see figure 4)

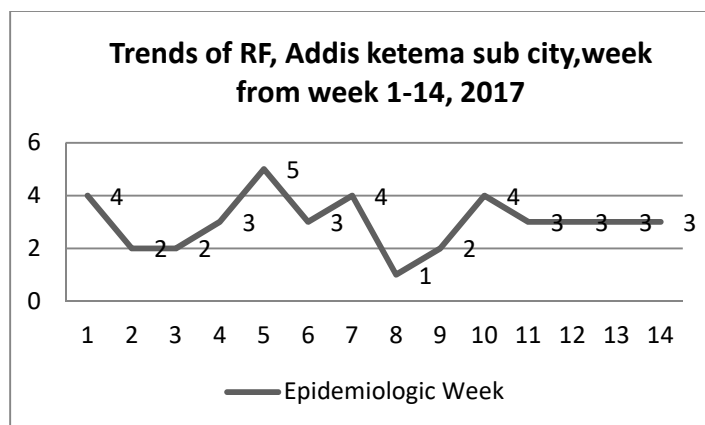


Figure 4-Trends of Relapsing fever cases in Addis Ketema sub city, from week 1 to 14, 2017.

F. Epidemic Typhus

A total of 282 Epidemic Typhus cases were reported during week 14. The number of cases increased by 81 cases as compared to the previous week. Higher number of cases were reported from woreda 1, followed by woreda 9 and 3. (see figure 5)

Figure 5-Trends of Epidemic Typhus Cases by woreda, Addis Ketema sub city, week 13 and 14, 2017.

G. Malnutrition

7 SAM and 6 MAM cases were reported in this week.

H. Maternal Death

No maternal death was reported in week 14 of 2017.

I. AWD

No AWD cases were reported for 21 consecutive weeks.

J. Measles

No measles case was reported in this week.

K. Acute Flaccid Paralysis

One Acute flaccid paralysis case was reported from Ethio Tebib hospital.

In week 14 NNT, SARS, Anthrax, rabies, Guinea worm, VHF, Yellow fever and other immediately reportable diseases were reported 0.

4. Recommendations

- The completeness of report in woreda 9 is still below the WHO standard of 80% for 15 consecutive weeks. In order to increase the quality of the surveillance system non reporting sites should be identified and continuous monitoring should be done in these woredas.
- In other regions of Ethiopia AWD epidemic is aroused, Addis ketema is in a continuous risk since it contains a large bus station where large number of population of the country travel to and from the city daily, also serves as transit for many regions of the country. Therefore the surveillance system should be sensitive and be prepared for epidemic response.
- Some Woredas like woreda 1 and 3 have large number of diarrheal and other weekly reportable epidemic prone diseases therefore these woredas should see their trends and respond accordingly.
- In order to strengthen and extend the surveillance system to the community WDA should be involved and awareness creation on what to report should be done.
- Active search should be strengthened.
- A due attention should be given to MDSR and Rabies surveillance.
- Every dog bite should be reported and vaccinated.

Biography

My name is Simegnew Asrie, I was born on July, 1985 E.C in North Gondar zone, South west Ethiopia, Amhara region. I attended my primary education and secondary school at Mestawot terara Elementary School and Aykel high & preparatory School. Then I joined Hawassa University College of health Science (referral campus) and graduated with BSc, in Midwifery in 2012 G.C.

After graduation I worked in Efoyta health center in Addis ketema sub city and surveillance officer in the sub city health office (as the same time I worked in the member of committee in prevention & control of Ebola in Addis ketema sub city) until I join Saint Paulo's Hospital Millennium Medical College class, 2015. Then I joined Saint Paulo's Hospital Millennium Medical College in 2015/16 for a postgraduate studies in FETP urban track.

My hobbies: primarily reading books especially professional related day and night and others