Addis Ababa University

College of Health Science, School of Public Health

Ethiopia Field Epidemiology Training Program

(EFETP)

Compile Body of Works in Field Epidemiology

By:

Gebremedhin Gebreslassie

Submitted to the school of Graduate Studies of Addis Ababa University in partial Fulfillment for the Degree of Master of Public Health in Field Epidemiology

June, 2019

Addis Ababa, Ethiopia

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ACKNOWLEDGEMENTS

I am very much indebted to many individuals and organizations and/or institutions for their priceless support and encouragement during my study. Next to God, my utmost gratitude goes to my dear Mentor Abdunnasir Abagaro, My Advisors Prof. Hagos Ashenafi, Dr. Negussie Deyessa and field Advisor Gidey Gebrelibanos for their invaluable, persistent and unlimited encouragement and support given for me from the commencement of each output writing till the development of this Compile body of work as this Compile body of work report could not have been synthesized without their all rounded support.

My special thanks also extend to my Family: Leulseged H., Kahsu B., Mehary F. and Kiflom G. for their support while attending this program.

At last but not least, I am very much indebted to my dearest family, especially my wife Ms. Mulu Kiross, for the remarkable moral support they nourished me till my dream come true.

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LIST OF ACRONYMS / ABBREVIATIONS

ANC	Anti-Natal Care
AOR	Adjusted Odds ratio
ART	Anti-Retroviral Therapy
AUIBAR	African Union Inter African Bureau OF Animal Resource
AWD	Acute Watery Diarrhea
BCG	Bacillus Chalmette Guerilla
B. bovis	Brucella Bovis (cattle)
B. ovis	Brucella ovis (sheep)
B. Melitensis	Brucella melitensis (goat and sheep)
CBN	Community Based Nutrition
CBR	Crude Birth Rate
CDC	Communicable Disease Control
CDR	Crude Death Rate
CBH	Community Health Insurance
CFR	Case Fatality Rate
CI	Confident interval
CSA	Central Statistics Agency
CTC	Case Treatment Center
CTU	Case Treatment Unit
DHIS	Demographic Health Information System
EDHS	Ethiopian Demographic Health System

EFY	Ethiopian physical year
EF	Edema Factor
ET	Edema Toxin
EMR	Emergency Medical report
EPHI	Ethiopian Public Health Institute
FDRE	Federal Democratic Republic of Ethiopia
HC	Health Center
HCF	Health Care Financing
HEWS	Health Extension Workers
HIT	Health Information Technician
HMIS	Health Information Management System
HSDP	Health Center Development Plan
IDSR	Integrated Disease Surveillance
IR	Incident Rate
LF	Lethal Factor
LT	Lethal toxin
KAP	Knowledge Attitude and Practice
KM^2	Kilo Meter Square
MDG	Millennium Development Goals
MIS	Malaria Indicator Survey
MNCH	Maternal, Neonatal and Child health
MS	Member states
NMR	Neonatal Mortality Rate
ODR	Odds ratio

COR	Crude odds ratio
OIE	Office of International Epizootics
OPD	Out Patient Department
ORP	Oral Rehydration Point
OTP	Outpatient Therapeutic Program
PA	Protective Antigen
PAB	Protected at Birth
PF	Plasmodium Falciparum
PHEM	Public Health Emergency Management
PICT	Provider Initiated Counseling Testing
PLWHIV	People Living with Human Immune Virus
PMTCT	Prevention Mather to Child Transmission
PNC	Post Natal Care
PNMR	Post Natal Mortality Rate
PV	Plasmodium Vivax
RDT	Rapid Diagnostic Test
RRT	Rapid Response Team
SAM	Sever Acute Malnutrition
SARS	Syndromic Upper Respiratory Syndromes
SHI	Social Health Insurance
TB	Tuberculosis
TFU	Therapeutic Feeding Unit
TSF	Targeted Supplementary Feeding
TRHB	Tigray Regional Health Bureau
WASH	Water Access sanitary

EXECUTIVE SUMMARY

Residents are expected to produce and summit Compile Body of Works as a partial fulfillment for their Masters of public health degree in field epidemiology to school of graduate studies of Addis Ababa University. This Compile Body of Works has six chapters and four annexes.

Chapter I: Presents two outbreaks; Cholera and brucellosis investigations. We investigated cholera outbreak in Kafta Humera District Wester Zone of Tigray region. Since August 28, to September 16, 2018 there were139 cases of daily workers those come from different camps to the district. We use them for descriptive analysis without control. Open defecation of farm areas and drinking untreated river water, contact tracing, crowding in one camp room among the identified risk factors. More over weak early contact tracing seasonal flood and distance of farms to health facility furnishes the way to aggravate for long time in controlling. The incidence rate was only male daily workers and new comers that live in camps.

We recommended to mobilize ORP sites near to the farms, distribution of water chemicals and should have early contact tracing. We have also an investigation brucellosis outbreak Degua Temben district. We use 50 cases and 150 unmatched controls. From the cases 26(52%) of were males.

Here we investigated the abortion case in animals and associated materials was the source of human brucellosis. Human 4(100%), and animal 18(38%) samples taken were confirmed seropositive by RBPT. The odds ratio of having aborted animal and assisting abortions have significant association from risk factors identified. No death at all. We recommended public health education to reduce contact, not to use raw animal products and keeping environmental hygiene.

Chapter II: Describes surveillance data analysis on suspected anthrax in Tigray region. We described four year reported data of suspected anthrax cases in human and animals. 404 suspected cases and 6 deaths were recorded (3015-2018) and 1.46 % mortality rate at region level. 55.8% of the cases were recorded in 2016 and 44% case fatality rate was seen in animals (2018). All sex and age groups were affected. Central zone was the highest recorded cases by the two Sectors. We stressed surveillance activities should give attention in general and specially to central zone together.

Chapter III: Surveillance system evaluation on suspected anthrax cases in Abi-Adi and Kola Temben districts of Tigray region. We use purposive selection method based the data analysis result we describe in chapter two.

Suspected anthrax was under the immediate reportable diseases in human and animals. We showed 83.3% case definition of anthrax in all health facilities, reporting format and daily listed cases by simple chart in two health offices. Surveillance focal persons have a problem data analysis. They couldn't take training. Applying the Attributes, core activities in suspected anthrax were well practiced however, as sensitivity of the system, the focal person complains they had additional work load. Ours recommendation training and some logistics such as computers, stationary should be needed to complete by the district and region.

Chapter IV: Public health surveillance system in Kola temben. We assessing the public health status of 8 health centers and 28 health posts at district level, Education, water resources supply of power and road access. In representativeness health facility and educational facility were at good level. However, Coverage of water supply (55%), one health center and one separate technical school needs prioritizing and environmental hygiene at woreda level needs attention and so the prioritize diseases.

Chapter V. Epidemic research project proposal here we proposed an assessment of brucellosis in southeast zone of Tigray in three districts. Brucellosis is a miss diagnosed and chronic nature; it was not common in our region to see a case of brucellosis in human. The incidence of outbreak in Degua Temben points as, to see the status of knowledge attitude and practice of the community to assess. We will have tried to build community based definitions and mobilizing the professional in diagnosing and the public contact with brucellosis.

Chapter VI: Manuscripts prepared for scientific peer received journals for publication from data analysis of suspected anthrax

Chapter VII: Additional works and activities: Abstract of Anthrax for scientific writing

Chapter VIII: Training on capacity building on brucellosis case definition in human and animals, Bulletin's week 12 and Consent f

CHAPTER 1: OUTBREAK INVESTIGATION

1.1 Cholera Outbreak Investigation in Kafta Humera District Tigray region, Ethiopia: 2019

ABSTRACT

Introduction: Cholera is one form of acute watery Diarrhoea, a symptom that can be caused by any number of bacteria, viruses and parasites. Which offerings as profuse watery diarrhea triggered by Vibrio cholerae sero groups O1 or O139(1). According to the definitions given, cholera affects to those have poor access of dinking pure water (WHO, 2018)(2). Cholera outbreaks have been repeatedly reported far from the seashores: from 2009 - 2011, 75% of all cholera cases in Africa occurred in domestic regions(1). Cholera remains to be major public health issue in Ethiopia: since January 2017, 48,592 acute watery diarrhea cases were reported across the country, according to Gov't records (2). In Tigray region since 2016 -2018 a total of 8919 cases and 148 deaths were reported by acute diarrhea. Lack pure drinking water, and inadequate access of latrine were from the main risk factors identified. The objective of the study was investigating risk factors and intervening in control of cholera outbreak in Kafta Humera District in 2018.

Methodology: A cross sectional study was used to investigate the possible risk factors of the line list record and active cases in four CTC; when, how and where they were infected.

Result: From August 28, 2018 to September 16, 2018; 139 cases was recorded at district level. Cholera cases were admitted at five CTC sites and 7 cases confirmed by RDT, one pipe water and one hand pump were bacteriological culture confirmed for the agent O139. 100 %(139) cases were males and epidemiologically linked to the confirmed cases. 11(7.9%) of the patients had a contact history with in last seven days, 136(97.8%) were replied drinking contaminated water is source of infection; 79(57 %) of the cases were severe dehydration. In knowledge, attitude and practice assessment on cholera patient, 57.8% replied taking to health facility and 25.8% to take to holy water. 75(98.7%) of the cases were inpatients.

Conclusion and recommendation: From total cases, 45.4% of them were in the age category of 15-24 years old. The big challenge to intervene was due to high rainy season the road access blocked by mud and tributary floods. So we took the cases to describe the hypothesis. Cholera follows seasonal forms, so timely preparedness is the best opportunity before occurrence.

Key words; cholera, outbreak, cases, daily workers, investment camps, water chemicals.

1.1.1. **Introduction**

Cholera is usually a symptom of an infection in the intestinal tract caused by a variety of bacteria, viral and parasitic organisms, though it can also be associated with other non-infectious conditions. Infection is spread through the ingestion of contaminated food or water or from person-to-person.

And cholera outbreak is a public health emergency, which calls for an immediate response and requires the rapid mobilization of Public Health and Water and Sanitation resources(1).

It is an infection which offerings as profuse watery diarrhea triggered by Vibrio cholerae sero groups O1 or O139. Humans are the main reservoir of vibrio cholera but water, mollusc, fish and aquatic plants are potential reservoirs. Vibrio cholerae causes rapidly advanced outbreaks and can cause pandemics. Sporadic cases and small outbreaks may also occur in endemic area(1).

According to the definitions given, cholera affects to those have poor access of dinking pure water. Acute Watery Diarrhea occurs both as a short outbreak (i.e. several hours or days) and expanded epidemic/pandemic, and includes cholera (WHO, 2018)(2).

In general cholera is an acute enteric disease characterized by the sudden onset of profuse painless watery diarrhea or rice-water like diarrhea, often accompanied by vomiting, which can rapidly lead to severe dehydration and cardiovascular collapse.

- Approximately 75% of people infected with *Vibrio cholerae* have no symptoms at all.
- Another 20% develop a diarrheal illness that is indistinguishable from diarrhea caused by other organisms.
- Small proportions (2% - 5%) of infected people develop severe watery diarrhea, vomiting, and dehydration without fever or abdominal cramps (4).

Acute diarrheal infection is a leading cause of outpatient visits, hospitalizations, and lost quality of life occurring in both domes- tic settings and among those traveling abroad. The Centers for Disease Control and Prevention has estimated 47.8 million cases occurring annually in the United States, at an estimated cost upwards of US$150 million to the health-care economy(5).

Cholera remains an important public health issue. Yet there are few reliable population-based estimates of laboratory-confirmed cholera incidence in endemic areas around the world.(6).
Cholera is on the rise with an estimated 1.4 billion people at risk in endemic countries and an estimated 3 million to 5 million cases and 100,000-120,000 deaths per year worldwide.[1](7).

Profuse watery diarrhea and vomiting can lead to dehydration and shock. If there was no immediate support, death can occur within hours. Oral and intravenous rehydration therapy has markedly decreased case fatality rates [2, 3] but cholera remains a be worried about illness because of its rapid onset, severity, and potential to cause outbreaks that easily overcome public health systems in impoverished settings. Seasonal disease occurs in many less developed countries that cannot afford to establish or to maintain essential infrastructure for safe water supply and sanitation. Outbreaks may arise during natural disasters and complex emergencies(8–12).

In addition to this if there was a high movement of people from infected to non-infected area the infection continuous everywhere. The short incubation period of cholera disease of two hours to five days facilitates the potentially fast spreading pattern of outbreaks resulting in hypovolemic shock and death if rehydration of the affected persons is delayed(13).
Cholera disease caused by Vibrio cholera continues to be a global threat to public health and a key indicator of inadequate social development. Cholera 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. In endemic areas, outbreaks usually occur when war or civil unrest disrupts public sanitation services. Natural disasters like earthquakes, tsunami, volcanic eruptions, landslides and floods also contribute to outbreaks by disrupting the normal balance of nature. Cholera epidemics continue to cause major morbidity and mortality globally, and recent large outbreaks in Haiti, Zimbabwe, and Sierra Leone show the urgent need for improved control measures to save lives and reduce human suffering(13).
According to WHO estimates, 115,106 cases and 3397 deaths of cholera were reported from Africa in 2010 representing 36.3% of the global incidence of the disease for that year (3).(14) Meanwhile, in Africa, accessible studies are limited, and the relevance of this disease hypothesis is questionable. Cholera outbreaks have been repeatedly reported far from the seashores: from

2009 through 2011, three-quarters of all cholera cases in Africa occurred in domestic regions. Such outbreaks are either influenced by rainfall and subsequent floods or by drought- and water-induced stress.

In Ethiopia only 55 percent of the general population has access to safe water and that percentage drops to 35 percent for those in rural areas. This lack of access to safe water and adequate sanitation increases the morbidity and mortality from diarrhoeal diseases. Health service records and community based surveys indicate that diarrhoeal diseases are major causes of morbidity and mortality in Ethiopia(15).

In Ethiopia it was indicated that, there was acute watery diarrhea (AWD) epidemic in 1990 which proceeded with revival of cases until 1998 (Scrascia et al., 2008). Moreover, from July 2016 to June 2017 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. Afar region took the country's highest share of cases [2,988(31.5%)] and deaths [99(51.25%)] of AWD with a case fatality rate of 3.3% (FDRE-MOH, 2009).(3) (CFR–2.4%)

AWD continues to be major public health concern in Ethiopia: since January 2017, 48,592 AWD cases were reported across the country, according to Government records. Although the AWD outbreak is showing a downward trend, risk factors are still prevalent, including chronic water shortages forcing communities to use water from unprotected sources; seasonal labour migration; Holy Water sites[4]; and congested internal displacement sites with limited WASH facilities. Absence or inadequate access to safe water in health posts and schools is also a challenge (2).

In Tigray region since 2016 -2018 a total of 8919 cases and 148 deaths were recorded by acute watery diarrhea. A holy water, lack pure drinking water, poor personal and social sanitation and hygiene and inadequate access of latrine in daily working areas were from the main risk factors identified. Meanwhile Kafta Humera district had also one of the districts which had high movements of daily workers and lived in camps of many farms in the region. This is why the epidemic occurred faced a problem to control easily.

The objective of the study was to describe risk factors, intervene and control the course of acute watery diarrhea outbreak the spreading seasonal occurred in Kafta Humera District Tigray Region. Ethiopia 2018.

1.1.2. **Objectives**

1.1.2.1. **General objective**

- To describe the magnitude of cholera outbreak investigation in Kafta Humera woreda

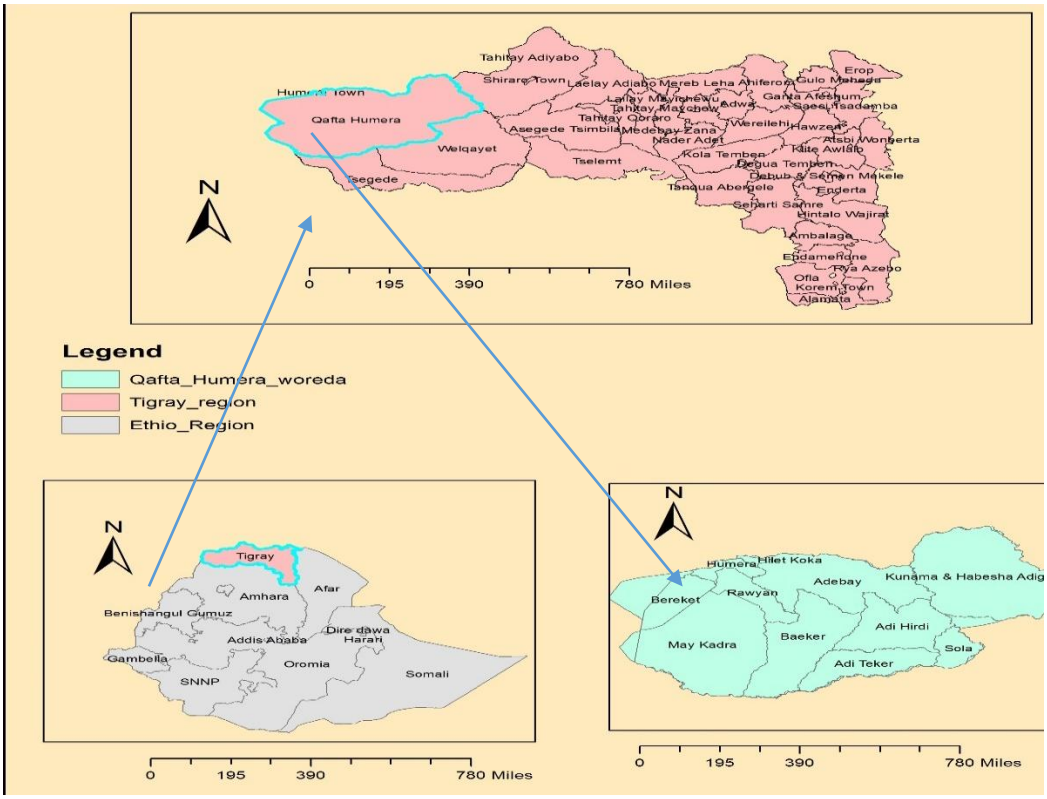
1.1.2.2. Specific objective

- To describe the magnitude of cholera outbreak in terms of place, person and time
- To describe and identify possible contaminated sources
- To intervene control and preventive measures

1.1.3. Method and materials

1.1.3.1. Study Area and period

Kafta Humera District is found in the western zone of Tigray Region. It has a total population of 121,841 and a total area of 4542.33 Km2 with a density of 23.6 persons per square Kilometer. It has nine administrative kebelles. It is bordered by Eritrea to north, Welqait and Tsegedie to the south and Tahtay Adiabo to the East. The study was conducted from August 28 t0 September 16/2018.



Map 1: Description Map of the study area /Kafta Humera District/ in Tigray region Ethiopia 2018

1.1.3.2. Study population

The total population of Kafta Humera district 121, 481(63,967 males and 57,874 female). We defined a person age of 5 years or above living in Kafta Humera and inhabitants living in Kafta Humera investment farms during the course of outbreak.

Cholera Case definition

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 five years or more develops severe dehydration or dies from acute watery Diarrhoea.
- In an area where cholera epidemic, a patient aged five or more develops acute watery Diarrhoea with or without vomiting.

Confirmed case: A suspected case in which vibrio cholerae O1 or O139 has been isolated from their stool.

1.1.3.4. Study design

We conducted a cross-sectional study design to describe the magnitude of cases of cholera from line list record in four-health center's CTC of Kafta Humera District.

1.1.3.5. Data Collection tools and Methods

The World health organization tool (checklist) questionnaire for cholera, which is based the guideline (WHO, 2004), was used to collect data from case treatment centers in health centers.

The questionnaire contains information of socio-demographic characteristics, clinical signs, feeding habits, latrine usage, travelling and contact history, and sanitation practices 5 days before the onset.

1.1.3.6. Sample size

We identify 139 cholera cases during the outbreak. We included all the cases of cholera in the outbreak investigation and response plan in the study area from all sites.

1.1.3.7. Study variables

Dependent variable: cholera illness

Independent Variables are socio-demographic characteristics, Food and drinking water habits, hygiene and sanitation, contact and travel history within previous seven days.

1.1.3.8. Data quality and Analysis

A secondary data was collected from the line list and district health office through structured questionnaire and cleaned in Microsoft excel 13 and transferred to SPSS version 21 for analysis.

1.1.3.9. **Disseminations of findings**

The investigation findings were reported to Regional Health Bureau, District health office of Kafta Humera and presented to Addis Ababa University, College of Health Science, School of Public Health, and Field Epidemiology Department.

1.1.3.10. Ethical consideration

An official letter was given from Ethiopian Public Health Institute to investigate cholera outbreak in Tigray region Kafta Humera District. Regional Health Bureau also accepted and inform to the district health office to collaborate in investigating the outbreak ethically and timely. Verbal consent was obtained from participants after informed consent.

1.1.4. RESULT

1.1.4.1. Socio-demographic characteristics of cases

Majority (80.6%) of cases were daily laborers and 56.8% of them were single with 98.6% illiterate.

Table 1. Description of demographic characteristics of patients in Kafta Humera district Tigray region, Ethiopia: 2018

S.no	Variables	Number of cases	Proportion (%)
1	**Occupation**		
	Farmer	21	15.1
	Daily worker	113	80.6
	Students	2	1.4
	Gold miners	2	1.4
2	**Marital status**		
	Single	79	56.8
	Married	48	34.5
	Divorced	12	8.6
3	**Educational status**		
	Illiterate	137	98.6
	Primary	2	1.4

1.1.4.2. Distribution of cases by person

In the course of the outbreak occurred from June 18 /2018 to September 16 /2018 in Kafta Humera, district 139 cases and 3 community deaths were reported. 55.4% of the cases were in the age category (25-59) years old and 40.3% were from (15-24) years old age category. All cases were Orthodox religion followers.

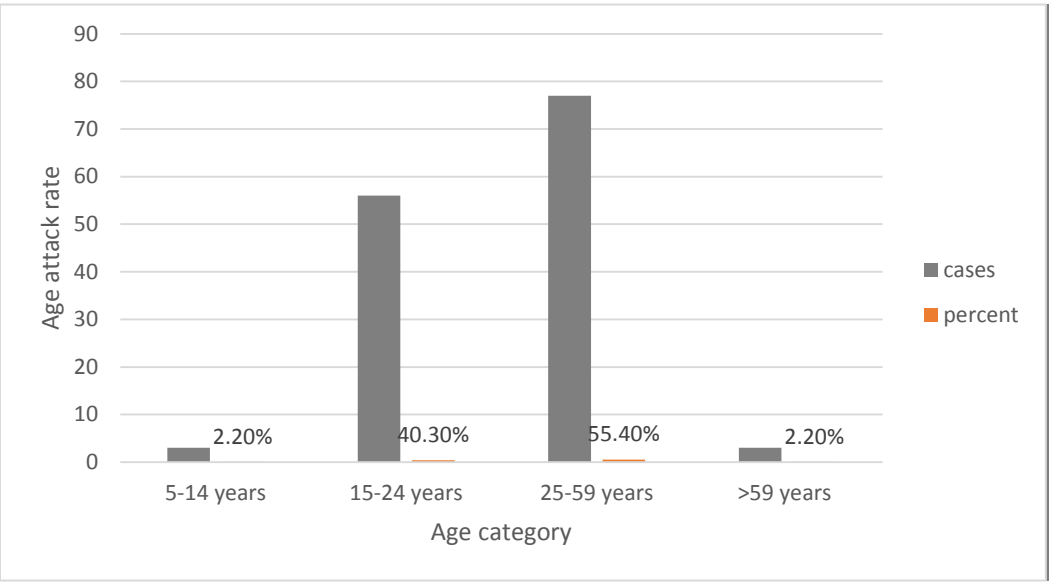


Figure 2. Age specific Attack rate of cholera in Kafta Humera, western zone of Tigray Ethiopia, August 2018

Table 2. Description of Attack rate by age category of Cholera cases in Kafta Humera Tigray region, Ethiopia: 2018

Age category	Total population	Total cases	Attack rate/10000
5-14	18029	3	1.7
15-24	12329	56	45.4
25-59	29590	77	26.0
>59	8019	3	3.7
CAR		139	19.2

The highest attack rate was in the age category of 15-24 years old; the productive age category of daily laborer followed by 25-59 years old. The overall attack rate of the outbreak was 19.2/10000 population. There were 3/63967(0.005%) community deaths reported by the health centers in the catchment area.

1.1.4.3. Distribution of cases by place

The first index case was seen in Adebay kebelle. Most (30.2%) of cases were reported from Tirkan health center where the confirmed sources of the cholera outbreak was mainly occurred followed by Adebay health center.

Table 3. Description of cases by health center clusters in Kafta Humera Tigray region, Ethiopia 2018

Health center cluster	Frequency	Percent (%)
Adebay health center	37	26.6
Baeker health center	32	23.0
Maycadra health center	15	10.8
Rawuyan health center	08	5.6
Tirkan health center	42	30.2
Shiglil	05	3.6

1.1.4.4. Distribution of cases by time:

The outbreak was occurred before one moth of our intervention. Due to high rain season, it was difficult to control the outbreak in which flood contaminated water sources. The tributaries, roads and farms were full of floods, road access to implement logistics and help emergencies. Flood was one of the facilitating factors to distribute easily from the infected area to non - infected area.

A 33 years old, male index case of cholera was reported from Kafta Humera, who came from a huge outbreak occurred in Ahferom woreda, the so-called local name Sero where cholera cases were distributed to all regions of Ethiopia.

The epi curve below indicates the outbreak was propagated epidemiologically linked cases to the index case in the district. Days on 08/30/2018 and 09/05/2018 were peak periods in course of the outbreak.

In other words, the figure below indicates that, week 35 was the high epidemic week compared to others. All recorded cases were out patients and males. This indicates that, the time was a high movement of daily workers came for weeding to those farms.

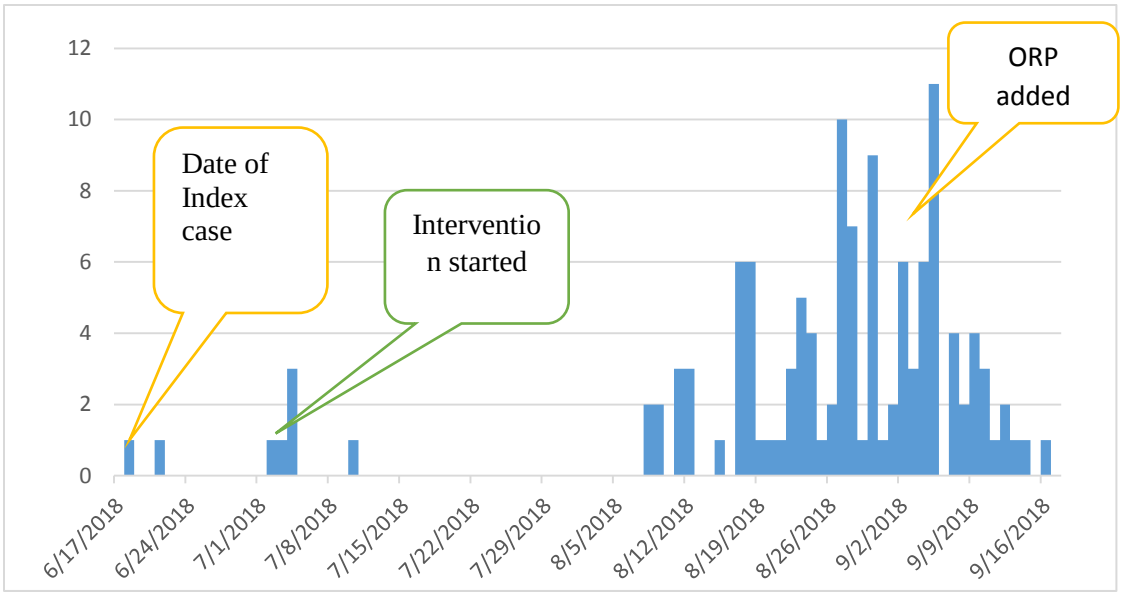


Figure 3. Description of cholera cases in Kafta Humrea woreda, Tigray region Ethiopia:2018

The high epidemic week seen in WHO week 35 in which many cases were reported.

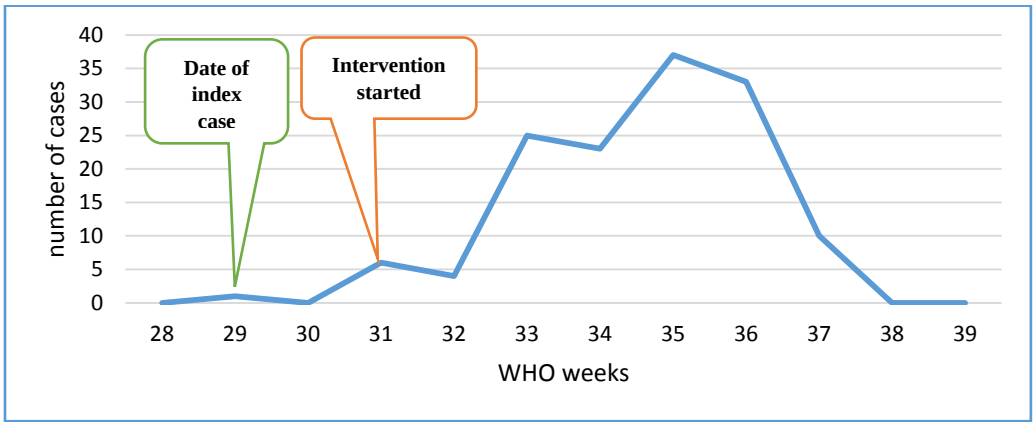


Figure 4. WHO week cholera outbreak in Kafta Humrea woreda Tigray region Ethiopia:2018

1.1.4.5. Possible risk factors identified

Table 4. Description of risk factors identified to cholera outbreak in Kafta Humera district Tigray, Ethiopia; 2018

Variables	Cases	Proportion (%)
Contact history with cholera patient	11	7.9
River Source of water drink	136	97.8
Low Hand wash practice	95	68.3
Not used treated water chemicals	134	96.4

1.1.4.6. Environmental Investigation

In the farm investment area, the latrines were not enough to all the daily workers and not constructed in standard way. We observed open defecation around the residential camp of the daily laborers. Water containers like the roto and tankers could easily be contaminated. No health care service was given in the camp around the farm area.

Table 5. Description of proportion of of cases by village (village) in kafta Humera Tigray region Ethiopia;2018

Got /Block/camp	Frequency	Percent
Azaf Rugoe	3	3.9
Baeker	2	2.6
Bewal camp	2	2.6
Bomiya camp	3	3.9
Goblel camp	4	5.3
Mahar camp	11	14.5
Maygaba	2	2.6
Mehar (Wofro Zemet Private Farmer(WZPF)	4	5.3
Myharish camp	2	2.6
Mysegen camp	9	11.8
Nugaw camp	2	2.6
Shelela camp	5	6.6
Sherafit camp	2	2.6
Others	28	36.64

1.1.4.7. Laboratory confirmation

A stool sample was taken from three patients (Adebay, Baeker and Tirkan health centers) in week 31. Three of them were positive to agent O139 by rapid diagnostic test. Before our intervention, water samples from the suspected pipe and hand pump water from six sites were taken to microbiological culture test and became positive result to cholera from two sites (Tirkan hand pump and Ruwasa pipe water source)

1.1.4.8. Public Heath Intervention

Cholera cases were treated at short distance by establishing temporary oral rehydration site before they reach the CTC site.

Health education was given to the community about hand washing practices and use of water treatment chemical. Water chemicals for consumption treated the infected water sources identified

Early contact tracing and information communication was strengthened Active surveillance was strengthened on daily bases. Water chemicals and water access for drinking was distributed for the farm camps.

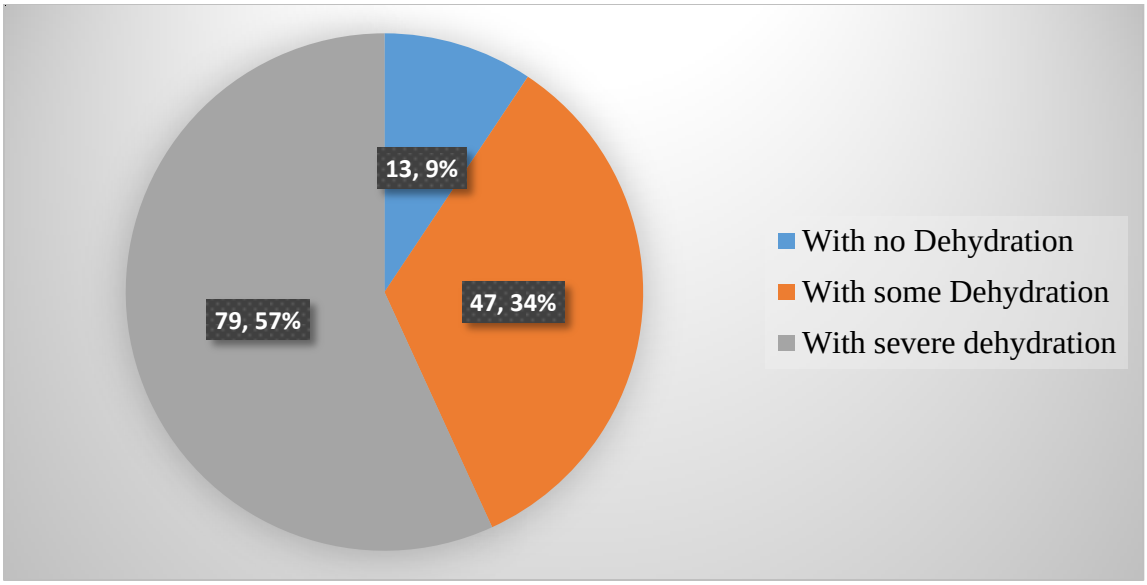


Figure 5. Description of severity status of dehydration by cholera outbreak in Kafta Humera District in 2018

From the above figure, about 57% % of the cases were severe dehydrated, and 34 % were with some dehydration. All the farm investment area had not latrine. Their daily workers use open defecations, and they drink river water from nearby tributaries. The Knowledge attitude and practice of the interviewed on the question what do they did if they get AWD patient on their area 57.8% answered taking to health facility, 26.3% to stay at home and 25.8% to take to holy water. This indicates a more effort needs on education on risk factors of acute watery diarrhea the community and commercial farms.

1.1.4.9.. Limitation of the Study

Challenge to reach the farm due to high flood and mud to cross the way to investigate the area in time.

5. Discussion

In the course of cholera outbreak in Kafta Humera from June 18, to September 2018, we found 139 peoples affected. The outbreak was occurred after the suspected case who came from cholera outbreak area of the region. Tirkan and Adebay health centers were registered more cases, 2(30.2%) and 37 %.3(26.6) respectively. Four case management care centers were established to control the outbreak. Kafta Humera is an investment area and more daily laborers came to the district in weeding and harvesting times. This leads to infection to the daily workers in the investment area or camps. 55.4% of the recorded cases were from the productive age category of (15-25). 100% of the cases were males who came for daily work.

This is similar to afar (2009), most of the cases were males and daily laborers employed in the farm companies(3). This may be due to the crowdedness of farm camps.

The hand pump confirmed possible risk factor was cited in the border of Tirkan River. Shiglil, my segen, my kadra rawian areas where use this river.

August week 35 was peak when the time of weeding crops of commercial farms and movement of working people from place to place and from farm to farm increases. There was no health facility mortality rate.

The World Health Organization (WHO) recommends that cholera CFRs should not exceed 1%(12) Even though, studies in indicated the CFR of 4.5% in 2004 Zambian outbreaks [10], Afar 1.9% (2009), 1.9 % Lusaka, CFR of 2.1% 2010-11 and Somalia, (CFR–2.4%); 2017(16).

But ours finding is less than the studies mentioned above. This may be due to time and place of occurrence. Because currently the surveillance system, case management and contact tracing are experienced practically at community level or at the site of occurrence.

The course of the outbreak revealed that an advanced epidemiological transmission and person to person, this could be due to the overcrowding camps absence of health infrastructure in the investor farms, distance to nearby health facilities and weak response activity of the districts epidemic task force. Risk factors like hand washing after latrine usage, drinking untreated water, no access of latrine (unsanitary latrines) and contact tracing to a case and carrying someone with similar illness had shown statistically significant association with AWD in univariate analysis(3).

In terms of place or CTC line list, at the intervention time Tirkan health center was leading a problem of controlling. The main problem we identified there were a seasonal flood blocking roads, distance of farms from the health center, movement of unknown farmers /Wofro zemet far away from the commercial farms and boarders of the district. A man power to follow up contact tracing was another problem. Meanwhile the team discussed with the task force of the district to select additional ORP sites center to those far farms and organize man power from another less burden HCs and allow them based on their profession supporting the gap and the district with the stalk holders budgeted the logistics needed on the field minimum to one week. This decision plays an important role to control the outbreak in the district.

From the interviewed cases, river water was identified the leading risk factor in the district which accounts 136(97.8%) and 2(2.63%) pipe water an attack rate from the total cases interviewed or 9.6 % from 10000 populations. The lack of access to latrines has been identified as risk factor for cholera in informal settlement areas in previous studies [16](17). Our study also agree with the study; In land Africa seasonal and climatic determinants (15) were the main risk factors for the outbreak to occur.

6. Conclusion and Recommendations

During the course of outbreak, seasonal rain water, flood, and mud distance of farm areas were more challenging barriers in control the outbreak.

The additional established oral rehydration sites were the best strategic in minimizing the burden. Movement of daily workers from place to place were also increases the course of the outbreak. The course of the outbreak was terminated after more efforts were implemented. This reveals that the community as well as the district task forces had no given attention on the emergency preparedness plan to solve such challenge before and on time of occurrence.

Drinking river water, open area defecations, seasonal flood and distance of the farms to health centers, contact tracing, were some of the identified risk factors in the district. Mahar and Mysegen camps were the leading in case record in Tirkan health center cluster.

Drinking of river water were the risk factors to distribute epidemiologically and person to person easily. Except daily workers came from other areas no one was acquired the disease from the neighboring villages/Kebelles. On the time of visit, farms had no health facility, latrine and

enough sanitation areas in the camps. Most of them use water from unsecured barrel or tank came from river.

7. Recommendations

The District had a high movement of seasonal daily workers ever year, therefore;

- The district health office with the investment office should force to incorporate the hygienic and sanitation packages in the farms.
- Investment farms should have private health facility or fist aid care centers.
- District emergency preparedness and response should learn from this treaty of outbreak to be ready for future occurrences.
- Public awareness and implementation of sanitation and hygienic practice at farm areas.
- The District task forces and RRT should exert their force in the health education especially on the risk of open defecations, drinking unhygienic water and feeding uncooked food in the farms and constructing hygiene and sanitation packages at households.

Government and stalk holders at all levels have a responsibility to work cholera and other diagnostic disease prevention and control activities. Such as strict monitoring of hygiene and availability of safe water for daily workers in the investor companies and in the local community.

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1.2 Investigation of Brucellosis outbreak in Degua Temben District Tigray Region, Ethiopia, 2019

ABSTRACT

Brucellosis is one of the major zoonotic diseases of the worldwide, and it is responsible for massive economic losses as well as significant human morbidity in endemic areas. Brucellosis infects bovine, ovine, caprine swine and camelids. Humans become infected by direct and indirect contacts with infected animals and consumption of their products. Brucellosis occurs worldwide and it is rare in industrialized countries because of routine screening of domestic animals as well as animal vaccinations. The disease is common in the Middle East, Asia, and Africa, south and Central America and the Mediterranean basin. As compared to study of animal brucellosis, study of human brucellosis in Ethiopia is sparse with even less information on risk factors for human infection. A cross sectional study conducted from October 2007–April 2008 western Tigray, indicated that the overall prevalence in female cattle was 6.1% and 1.2% prevalence among human risk groups, all of which were herdsmen.

Objective: The objective of the investigation to control the outbreak, prevent farther occurrences and to implement health education

Methodology: A cross-sectional study design will be carried on from January to March 2019; and a standard questionnaire will be used based on the epidemiological risk factors of brucellosis.

Conclusion and recommendation: Both human and animals screening tests checked positive to Rose Bengal test. The contact practice with abortion and materials was a significant association with the contamination of brucellosis. Collaborative implementations should invest by bureaus of regional health and agriculture, the district with the community on the solution of this case. Because there is no specific treatment for brucellosis.

Key Words: Risk factors, Epidemiology, Brucellosis, abortus, melitensis, caprine, Bovine, ovine, investigation

2.1.1. Introduction

Background

About half a million cases of human brucellosis occur around the world each year.1 The principal causing organism worldwide is Brucella melitensis, a species of Brucella found in sheep and goats. It is the most pathogenic and invasive species followed by B. suis, B. abortus, and B. canis. Brucella is a non-motile, non-encapsulated, facultative intracellular, Gram-negative coccobacillus(1).

It is a zoonosis, caused by several species of Brucella bacteria that have their natural reservoir in domestic animals. Brucella melitensis is the most pathogenic and invasive species of Brucella and more commonly it occurs in the overall human population than in the other known species [1]. Human brucellosis is a multisystem disease, expressed by non-specific symptoms and affects mainly the muscosceletal system evidenced by generalized aches and pains [2](2).It is a highly infectious for humans causing a disease often called undulant fever or Malta fever, since it was first recognized in Malta during the 1850s. Brucellosis is typically spread when the animal aborts or gives birth. High levels of bacteria are found in the birth fluids of an infected animal and can survive outside the animal in the environment for several months, particularly in cool moist conditions. They remain infectious to other animals which become infected by ingesting the bacteria. It also inhabits the udder and contaminate the milk. The disease can also infect animals and humans through cuts in the skin, or through mucous membranes. The reservoir of disease in wildlife complicates eradication efforts(2).

Signs in humans include intermittent or irregular fever, headache, weakness, profuse sweating, chills, weight loss and general aching. Infections of organs including the liver and spleen may also occur. Veterinarians, farmers, and abattoir workers are vulnerable to infection as they handle infected animals and aborted fetuses or placentae. Brucellosis is one of the neglected zoonotic diseases with major outcomes of reproductive wastage in livestock and debilitating illnesses in humans (3).

It can also manifest as a localized disease, affecting the central and peripheral nervous system, and the gastrointestinal, and hepatobiliary, genitourinary, musculoskeletal, cardiovascular, and integumentary systems. Osteoarticular manifestations, specifically peripheral arthritis, sacroiliitis, and spondylitis, are the most common problems, occurring in up to 40% of cases in

some series. Although Brucella endocarditis is rare, it is the most serious complication, accounting for most of the 5% total mortality rate seen in human brucellosis(5). About half a million cases of human brucellosis occur around the world each year. The principal causing organism worldwide is Brucella melitensis, a species of Brucella found in sheep and goats. Human brucellosis is commonly found in countries with rural communities that live in close association with animals, and its prevalence in a region depends on factors such as methods of processing milk and milk products, food habits, socioeconomic status, hygiene, and climate(5).

Consumption of contaminated foods and occupational contact remain the major sources of infec tion. Examples of human-to-human transmission by tissue transplantation or sexual contact are occasionally reported but are insignificant. The true incidence of human brucellosis is unknown. Reported incidence in endemic-disease areas varies widely, from <0.01 to >200 per 100,00 populations (3). While some areas, such as Peru, Kuwait, and parts of Saudi Arabia, have a very high incidence of acute infections, the low incidence reported in other known brucellosis-endemic areas may reflect low levels of surveillance and reporting, although other factors such as methods of food preparation, heat treatment of dairy products, and direct contact with animals also influence risk to the population(6).

Brucellosis is one of the most important zoonosis in the world [1]. The disease is endemic in many regions of the world, including Latin America, the Middle East, Africa, Asia and the Mediterranean basin [2](7).

The Brucellosis 2003 International Research Conference estimated that 500,000 human infections occur per year worldwide, with incidences ranging from less than one case per 100,000 population in UK, USA and Australia, through 20 to 30 cases per 100,000 in southern European countries such as Greece and Spain, to more than 70 cases per 100,000 in Middle Eastern States such as Kuwait and Saudi Arabia (Cutler and What more, 2003; Pappas et al., 2006)(8). The annual incidence ranges from 0.3 cases per million in some developed countries to >1000 cases per million in endemic areas [1](9).

Although accurate estimates of human incidence are lacking, largely because of under-reporting and misdiagnosis. Infected livestock are the source of most human cases; therefore, prevention of human brucellosis is dependent on the control of the disease in livestock. This has been achieved

with vary in degrees of success using a combination of vaccination, test and slaughter of positive animals and quarantine/animal movement controls(10).

It affects people in many parts of the world. Mediterranean countries of Europe, North and East Africa, the Middle East, South and Central Asia and Central and South America [1, 2]. The importance of brucellosis for public health is associated with expanded trade in animals and animal products [3, 4]. The reduced control of hygienic measures poses a risk of spreading the disease and return into Brucella-free regions(11).

Sub-Saharan Africa fakes a series of challenges that consist of required valuation of the incidence brucellosis in humans and animals, and the impact of the different regional epidemiological characteristic diseases [30]. In East African, brucellosis is reported in most of member countries and endemic with high economic loss and zoonosis [8, 12]. Brucellosis in human is common in rural areas because farmers or pastoralists live in close contact with their animals and often consume raw and unpasteurized dairy products [8, 31](12).

In Ethiopia as compared to the study of animal brucellosis, study of human brucellosis is scarce with even less information on risk factors for human infection. A study conducted in traditional pastoral communities by Ragassa et al. (2009) using B. abortus antigen revealed that 34.1% patients with febrile illness from Borena, 29.4% patients from Hammer and 3% patients from Metema areas were tested positive using Brucella IgM/IgG Lateral Flow Assay(8).

A cross sectional study conducted from October 2007–April 2008 western Tigray carried on assessing the effect of Brucella infection on reproductive conditions of females breeding bovine and to explore the presence of Brucella seroreactors in vulnerable humans. The result indicated that the overall prevalence in female cattle was 6.1% and 1.2% prevalence among human risk groups, all of which were herdsmen (13).

2.1.2. Statement of the problem

At the first week of January,2019 regional health bureau received a report from Degua temben health office there was uncommon disease in human which causes sick for a number of weeks or months in Ade-Azmera kebelle Tukul health center. And they need intervention from the region to investigate the cause of the disease. Moreover, at the same time there was also rumor in caprine unusual frequency of abortion cases in caprine in the specific village (Grasaguh) from

August to December, 2018. The situation of the abortion was in the populated flock and abort at the time of third trimester. About three hundred heads were encountered throughout the course of the suspected case. Slowly but surely it affects the owner and epidemiologically linked households. Though the case in humans have progressively increases in number especially in those high flocks and more family sizes at household level. This was the main reason to our investigation. The aim of our investigation was to describe the cause of the unknown disease and characterize the epidemiological risk factors in one health approach in Degua Temben district.

2.1. Objective

2.1.2. General objective

To investigate brucellosis outbreak in Degua temben district Tigray region, Ethiopia.

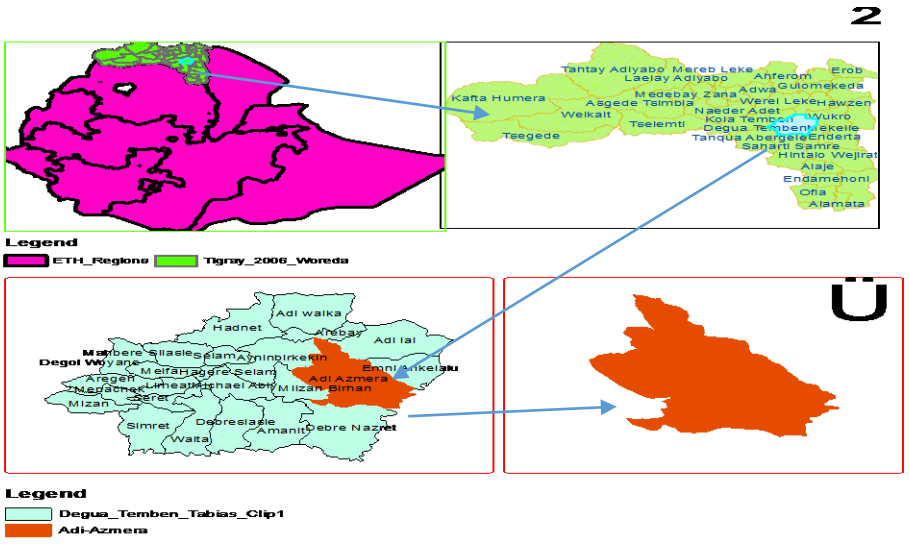
2.1.2.1. Specific objectives

- To describe the magnitude of brucellosis outbreak in terms of person, place and time
- To investigate the epidemiological risk factors in human and animals as one health
- To forward ways of prevention and control measures as one health in the community.

2.1.3. Methodology

2.1.3.1. Study area

The study was conducted from January 4, to March 14, 2019 in Degua Temben is one of the four districts of south east zone, located 50 km west of Mekelle, capital city of Tigray region northern Ethiopia and 883km from Addis Ababa. Geographically, it is located at $13^0$16'23"-$13^0$47'44" latitude and $39^0$3'17"-$39^0$24'48" longitude. It has an altitude range of 2300-2750 meter above sea level. The area has typically rugged topographically. The elevation and morphology are typical for the northern Ethiopia Highlands. It has a population of 133,025(F= 5737 & M= 66,237) and 30,233 households at district level and 24 administrative kebelles. There are 24 health posts and 6 health centers and one primary hospital. Tabia Adi-Azmera; village Sesemat/Grasaguh/ is one of the 24 Kebelles in the district which have 25 km from the district and Mekelle. Public rumors of unusual disease were reported from District Degua Temben; Kebelle Adi-Azmera village Sesemat to the Regional Health Bureau Public Health Emergency Management on the day; January 14, 2019. Regional health; immediately decided to investigate the rumor and send rapid response team to the area. The team including the investigator visited four cases admitted in Tkul health center and have another suspected cases epidemiologically linked to them in the community.



Map of the study area

Source Tigray shape file Arc GIS: 2006.

Map **2: Map of the study area Degua Temben district in Tigray region, Ethiopia: 2019**

2.1.3.2. Study period and source population

The study was carried on from January 4, 2019 –March 14, 2019 and the study population was the total population 133,025; of Degua Temben district.

2.1.3.3. Study design

We conducted case control study and we interviewed using a case and control based questionnaire. We used unmatched case control with sample size 50 cases and 150 controls. The demographic information of the cases and controls were in the same village.

2.1.3.4. Inclusion criteria:

All residents of the Adi-Azmera kebelle agree to the interview information about the outbreak in their community.

2.1. 3.5. Exclusion criteria

Residents of Adi Azmera kebelle, who have refused and residents those who were out of the kebelle during the outbreak time.

2.1.3.6. Data source*:*

Because brucellosis is ignored or uncommon disease in diagnosing in our country; cases based in the community and a line list record was used as source of the data.

Case Definition. (CDC, 2016)

An illness characterized by acute or insidious onset, continued, intermittent or irregular fever of variable duration, profuse sweating, particularly at night, fatigue, anorexia, weight loss, headache, arthralgia, and generalized aching.

Suspected: A case, that is compatible with the clinical description and is epidemiologically linked to suspected or confirmed animal cases or contaminated foods of animal origin.

Probable: A suspected case that has symptoms compatible with disease and is positive in the Rose Bengal test, but negative in blood culture and showing low titers in the confirmatory tests.

Confirmed: A suspected or probable case that is laboratory confirmed. (By RBPT, ELISA, CFT and Culture)

2.1.3.8. Data Collection Methods and tools

A structured questionnaire was developed and translated to local language prior to the field development. Demographic information of the controls and clinical symptoms for each case was interviewed by face to face to investigate the outbreak.

2.1.3.9. Sampling Method

We used non probability sampling method of case and controls to investigate the source and risk factors of the outbreak.

2.1.4.10. Ethical considerations

A formal letter was written from Tigray regional health bureau to the district health office. The purpose of the investigation was briefed to the study participants, kebelle administrative and health professionals. Consent letter was taken from each study participants prior to data collection**.**

2.1.4. Result

2.1.4.1. Descriptive Epidemiology

A total of 50 cases from which 48% females and 52% males recorded from January 4 to March 14, 2019. The index case was a man 54, and his 7 families encountered the same disease in different times. He has goats, which had been abortion cases before his illness. From admitted cases, 2(50%) of them are females, two (50%) from one family a father, aged 56 and son, 22. Another six, of his families were encountered by this problem currently seems healthy after treating privately and using Holy water they believed they said. The third woman aged 40 and fourth man 54, cases were from neighboring household's allied relatives. 48 %(24) of the cases and 21.1 %(53) of controls were females. Intermittent fever and night sweating, joint pain, poor appetite and headache was from the observed clinical symptoms. They said this case started after their goats were experienced unusual abortion since August 2018. 100% of the cases were Orthodox follower.

Table 1. Description of attack rate by age category of Degua Temben District by age category, 2019.

Age Category	Total population	Number of cases	AR/10000 Populations
0-4	19421	0	0
5-14	38711	13	3.4
15-24	26472	6	2.3
25-59	37114	26	7.0
>59	11307	5	4.4

The attack rate was high in the age category of (25-59) which have 7.0 %(37114) from the total population. Even though, it affects all age and sexes; the age category of 256-59 were high infected by brucellosis. (Table.1). the mean age is 37 with standard deviations 18.65. The overall attack rate was 17.1%/10000 populations and none mortality rate.

Farmers who have aborted animal was COR 4.141(2.006, 8.549), (p-value=0.000) in bivariate and ACR 2.917(.1.106, 7694) multivariate regression models. This indicates not having an aborted animal was less infected by brucellosis. Or having aborted animal was significantly associated risks to brucellosis infection in the course of outbreak.

Assisting or contact with aborted animal had also AOR of 2.961, (1.255, 6.98) 95% CI: and (P-value=0.005) Assisting or direct contact with abortion was 2.961 times infected than no contact. Or no contact with abortion was 2.961 times less infected than those have contacts with abortion cases by brucellosis. However, in the knowledge of brucellosis has COR of 1.967 with 95%CI :(0.043, 1.022) in bivariate regression models. But no significant in multivariate regression model. In addition, using raw milk as part of food, having sick animal or person in the house hold, using

raw milk as part of food were significantly associated with the transmission of brucellosis. In animals there was 0.0112% proportional rate of the population of the district.

Table 2. Socio demographic characteristics of brucellosis cases and controls in Degua Temben district in Tigray region, Ethiopia 2019

Variables	**Cases (N =50)**	**Controls (N=150)**
Gender	**N (%)**	**N (%)**
Male	26(68.8)	97(78.9)
Female	24(31.2)	53(21.1)
Education	**N (%)**	**N (%)**
No education	9(19.6)	37(80.7)
Red and write	9(13.8)	56(86.2)
Primary	22(55.8)	49(69.0)
Secondary	10(31.)	8(44.4)
Occupation	**N (%)**	**N (%)**
Housewife	7(16.3)	36(83.7)
Farmer	20(15.5)	105(84.5)
Student	23(82.1)	5(17.9)
Family Size category	**N (%)**	**N (%)**
1-3	2(7.7)	24(92.3)
4.6	18(16.8)	89(83.2)
7-10	30(44.8)	37(55.2)

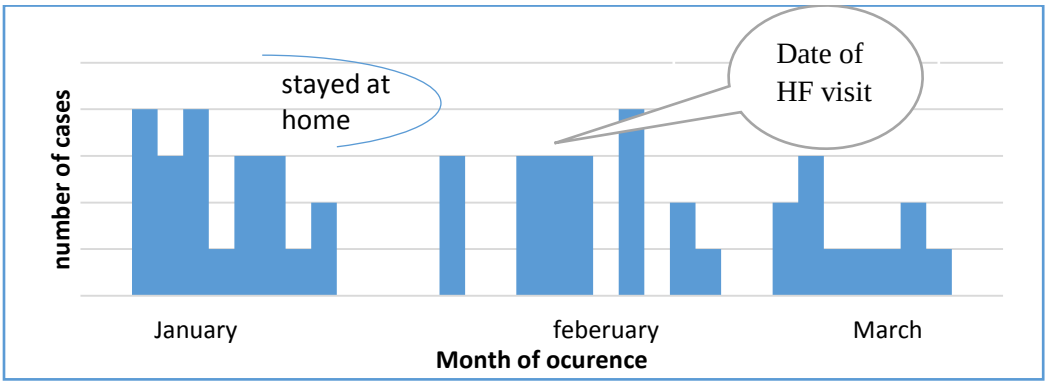


Figure2. Epidemic curve of brucellosis outbreak in Degua Temben District Tigray region, Ethiopia: 2019

The epi-curve indicates the chronic nature of brucellosis. Cases stayed sick at home, using holy water and some of them also tried treatment privately. But they assumed as it has come by super. It was raised as political issue after cases increase. That was the reason for delaying of index case. The course of the outbreak was propagated or intermittent for long periods. Even though, it

agrees with the incubation period of brucellosis infection is between 1-3 weeks but can take several months before clinical disease appearance(13).

Laboratory investigation

A serum sample was collected from four human cases using the standard operating procedure and sent to the national laboratory. Four of them (100%) were positive to Rose Bengal plate Test screening. More over the samples were on process to culture for identification of the specific agent. 46(92%) of the cases were propagated and epidemiologically linked cases. Further screening will be proposed to screen the households of the specific village who didn't come to hospitals in collaborating with the different sectors involved in the investigation. Samples taken from who have ill in the household 7(87.5%) and no ill 5(27.7%) of the aborted goats were positive. The screening reveals that there was a circulating brucellosis among human and the animal that had direct and indirect contacts. After confirmation of the diseases reveals the rumor, 13(26%) cases waited at home, come out to Mekelle hospital and admitted for two weeks each. (Table 8.)

Table 3. Description of serum samples screened by Rose Bengal Plate Test positive in human brucellosis

Species	Specimen taken	Sample number taken	RBPT Seropositive	RBPT Seronegative
Human	Whole blood (serum)	N=4	N=4	N=0
Male		2	2	0
Female		2	2	0
Caprine	(serum)			
Male		5	0	0
Female		42	18	24

2.1.4.2 Environmental Epidemiology

We visited the village during interviewing and cases follow up. We also identify the incidence was in specific household allied family or neighboring household and have more goats. They use common source of water from hand pump, spring and pond if there is shortage of water. The Pen of animals was close to the house of the household. The hygiene and sanitation of the area is not implemented enough. Geographical situation of the village is lowland from the district and highly dense bushes suitable for browsing animals than grazing. The village is in the range of

13’593400 -39^0, 335600 North West southwest of Mekelle Abi-Adi main road. Have rural public road access. Every household have goats as commercial cashes to the family.

They share common water sources and browsing areas, river Gereb giba, hura spring water, ponds are the common source of water. More over the season of occurrence in goats was rainy season so there should be a highly close contact of the flock. This makes easy to aggravate from each other. There was a small but specific animal market in the kebelle which could be as a source of introducing infected animals or persons. They had direct or indirect contact with the aborted parts and some died goats in the pen or farm areas. Hundred percent of the cases were who lived in Sesemat village specific area Grasaguh. The contact with animals, consumption of animal and their products, environmental hygiene and sanitation were played a role to increase risks factors.

2.1.4.3. Data analysis

Cases and controls are analyzed using Microsoft excel window 13 and SPSS version 21. Demographic characterization and Brucella related variables were assessed. Incidence rate, frequencies and multivariate identified risk factors were displayed by percent, figures and tables.

Table 1. Description identified risk factors to brucellosis outbreak in Degua Temben district Tigray region, Ethiopia: 2019

Variables	Patient status		COR	P/Value	95% CI	**AOR**	95%CI
	case	control					
Do you have any aborted animal?]							
No[1]	12	65	4.14	.000	2.006	**2.917**	1.106
Yes	38	85			8.549		7.694
Have you contact with abortion?							
No[1]	34	67	2.632	0.005	1.339	**2.961**	1.255
Yes	16	83			5.174		6.981
Have you heard brucellosis							
No	19	68	1.967	0.043	1.022	0.877	0.384
Yes[1]	31	82			3.789		2.002
Is a brucellosis transmittable diseases?							
No	22	55	2.198	0.017	1.148	1.435	.626
Yes	28	95			4.210		3.292
Is raw milk part of your food							
No	8	70	6.00	0.000	2.639	**7.031**	2.615
Yes	42	80			13.641		18.91
Do you have a sick person/animal?							
Yes	33	37	5.928	0.000	2.965	**5.564**	2.267
No	17	113			11.855		13.65

2.1.5. Public health intervention

Public mobilization on health education and awareness creation had given parallel to active case surveillance by the investigator, surveillance focal person health extension workers and community leaders.

In addition, mobilization of patients those not volunteer for treatment was visited, discussed. After the four patients screened RBPT positive and showed result of treatment 13(26%) of patients started to come out and admitted in Mekelle hospital.

Doxycycline 1000mg, Gentamycin 80gm, Dexamethasone 4mg and RH was given to admitted patients for 2-3 weeks, depending the progress of the patient and outpatient under follow up in their home. Even though, there was a relapse rate in 2(11.75) patients. 34% of the patients were treated in Mekelle hospital under follow up.

Case definition of brucellosis prepared and explained as capacity building to the southeast zone neighboring districts including Mekelle special zone. 47 collaborative expertise were trained from the human and animal health by regional human health, regional animal health and Mekelle University for two days.

The situation of the abortion was in the populated flock. They aborted at the time of third trimester. About three hundred heads were encountered by this case. Slowly but surely it affects the owner, and epidemiologically linked households. In addition, the case in humans have progressively increases in number especially in those have high flocks and more family sizes at household level (Table.1) 48(96%) the cases interviewed have goats and (2(4%) have not goats.

After this the health bureau and investigator communicates to regional agricultural bureau to investigate in animals based on the result of brucellosis confirmed in human. Mekelle regional animal laboratory immediately assigned one serology expert for collecting serum sample (serology). On January 27, 2019 the serologist and the investigator collect whole blood sample by non-heparin zed plain vacationer and non-traumatic needle with cold chain. We took from 47 goats from those have aborted and not aborted heads of at the course of the disease. Serum was collected after 24 hours stay at 37^0 c. We screened by using 25 Brucella antigen and 75 µl serum antibody by Rose Bengal plate Test in doted white plate for dilution and agitate. After stay of 3-5 minutes we read the result.

2.1.6. Discussion

Our study showed that the outbreak was associated with abortion case of goats observed in the household. It reveals that 96% of the patients have goats and all had usual contacts of goat's abortion and associated materials.

Based on this history; we asked if they had aborted animal; 38(72%) cases, 85(56.7%) responded yes, and contact with abortion, 16(32%) cases, 83(55.3%) controls responded yes. concerning the abortion asked what do you do the aborted parts or fetus (76%) of cases, 92.3% of controls responded we throw it somewhere.

There was no sex and age group difference. It relates with previous study; humans infected direct or indirect contact with animals and their products. It affects all age group and sexes(14).

We also proved that brucellosis has a miss diagnosed diseases. The patients claimed that several times visited to health facilities but they didn't treat their problems. Simply they take medicals for another suspected disease. The investigator also found the introduction of new animal or materials to the house hold and a travelling history to see the significance status. Introducing new animal and contaminated materials to the household have a association risk factors.

We also tried to see the variables occupation and family size in the analysis, but we didn't see the significant factors. However, we see the proportion of households based family size. 30(60%) of cases have 7 to 10 family size at household level and list 1 to 3, 2(7.7%).

Concerning education, the proportion of those red and write was affected 38 %(57), no education 24 %(36) and primary 49 (32.7%). Therefore, education have not been significant in infection of brucellosis based our investigation. Meanwhile, when we see in occupation three of the category had a slightly similar. Our finding is less related with the variable farmer infection in humans occurs through broken of skin, rarely by consumption of infected products and conjunctiva. Most occupational risks are farmers or herdsmen, veterinarians, inseminators and zoo technicians(15).

But, agree with another study, farmers and shepherds have a usual contact with livestock that may have brucellosis and therefore indicate advance risk infection(16).

We found introduction of new animal or material to the household during the course of outbreak have significantly associated risk of contamination. This strongly agree with the indications of high level introduction of infected animals to herds trans humans, and high level of mixing of herds such as grazing in communal pasture and livestock markets(17).

Prevalence of brucellosis in man is largely influenced by the prevalence of the disease among domestic animals [19]. Brucellosis in human is acquired from infected animals through direct contact or indirectly by ingestion of animal products product [22](18).

Our investigation agrees with the study showed having contacts with aborted animal and assisting the abortion were a risk factors in bivariate and multivariate regression model analysis. Households and herd seroprevalence ranges from5%-73% and 6%-68%, respectively. It is similar with our study in animals but less sero prevalence in human from our findings 100% positivity in human and 38% in goats in RBPT. Similar findings were reported in a study in Kyrgyzstan (8). Brucellosis is a function of herd prevalence and depends on both human-livestock contacts.

This investigation was less than the study existence of another case of brucellosis in the home was COR 15.33(6.91, 34.09), (p-value=0.000) and ACR .117(. 044,315) in bivariate. Existence

of another case of brucellosis in the home (OR,7.5,97%CI 3.9-14.6), and greater than the same study on direct contact with goats(OR,3.2,95%CI:1.2-8.7)(10). The contact practice with abortion and materials was COR 17.48 (7.68, 38.8)95% CI, (P-value=0.000) and AOR, 19.33(6.54, 57.1)95%CI. Those who have contact with abortion had 19.33 times high risk than non-contacts or non-contacts were 19.33times less risk than had contacts. The COR of travel history was 4.14(2.006, 8.54)95%CI ;(p-value=0.000) and AOR, 7.69(2.66, 22.24). And having new animal or material to the household was COR, 144(0.045, 0.50); (p-value=0.002) and AOR, 13.88(1.89, 101.8). Travelling history was 4.14times high risk to be infected than non-traveling history and introducing new animal or material to the household had13.88 time's high risk to be infected than not introducing new animal or material.

Concerning knowledge of cases on brucellosis 31(62%) of cases and 61(40.7%) of controls heard brucellosis as a disease. And 23(46%) of cases and 73(48.3) controls knew brucellosis was a disease; and they call it locally 'Mibray'.it means abortion. Concerning practice on the use of raw milk as part food diet, it associates to risk compared the proportion of the case; this agrees with the study farmers or pastoralists live in close contact with their animals and often consume raw and unpasteurized dairy products [8, 31](12).

2.1.7. Conclusion

The overall investigation we found brucellosis affects both sex and age groups. It develops with the high level contaminations of animals specially abortion cases.

We also observe that, family size and flock crowding in the households were additional facilitators.

Introduction of new animal or related material, travelling history, having aborted goats in the household and assisting or contaminating with abortion cases are the most risk factors.

The common water resources, grazing areas also the mediators of the transmission from one to another. So the rumor of unusual abortion in goats before humans are affected; is revealed by the findings. Both human and animals screening tests checked positive to Rose Bengal test.

2.1.8. Recommendations

The area specially the specific village needs a series follow up and Surveillance of new cases.

And mobilization of those didn't want to visit health facilities who slept at home.

Public awareness should be exercised on the hygiene and sanitation of their environment

Grazing areas, pasture and water resources should need attention on contamination of animals

Education should be exerted on the contact of human with animals especially with abortion cases, consumptions of raw milk and meat.

Collaborative implementations should invest by bureaus of regional health and agriculture, the district with the community on the solution of this case. Because there is no specific treatment for brucellosis.

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CHAPTER II: SURVEILLANCE DATA ANALYSIS

2.1. Surveillance Data Analysis on suspected Anthrax in Tigray region, Ethiopia (2015-2018)

ABSTRACT

Introduction

Anthrax is caused by Bacillus *anthracis,* a gram-positive, encapsulated, spore-forming, non-motile rod. The anthrax spores of *B. anthracis* are the infectious agent. Anthrax is primarily a disease of herbivorous; humans are accidental hosts; the remarkable stability of these spores makes them an ideal bioweapon, and their destruction in decontamination activities can be a challenge. Anthrax has significant economic and public health impact around the world, especially in developing countries in Africa. As MS of AU-IBAR, the highest number of deaths recorded in Ethiopia (1102), Zimbabwe (119), Guinea Bissau (109) and Cote d'Ivoire (103) respectively (10).

Objective: To describe the prevalence of suspected anthrax cases in terms of person, place and time in Tigray region

Methodology: A retrospective record review was used for data collection and analysis

Result: In this study 404 suspected cases and 6 deaths were recorded in the last four years (2015-2018) in the region. 46.3% of the cases were females. (Figure1). The case fatality rate of suspected anthrax in Tigray region is 1.46% in humans. It affects all sex and adult age. The highest cases 228 (55%) were recorded in 2016 and list in 2015 30 (7.3%). The case fatality rate in animals were high in 2018 44 %(11/25) and low in 2017, 9.2 %(436/47259). The occurrence of the disease was high in the central zone in both human and animals. This describes that the awareness of the people on anthrax is feeble or practicing of disposals of the carcass and contaminants. Have cultural or consuming food from infected animal and animal products.

Conclusion: The vaccine coverage in animal's increases from time to time but the prevalence of suspected anthrax case in human and animals have no implication in minimizing; This indicates the health extension education have no modification on the way of control and preventing of the

disease disposals of animal, animal product and consumptions. There was inconsistency on surveillance and data recording system. The one health approach between the two disciplines' needs cooperative health education intervention on the early suspected case detection.

Key words: Anthrax, Animals, Bacillus, human, suspected, prevalence, Tigray

2.1.1. **Introduction**

Background and Justification

Anthrax is caused by B. *anthracis*, a gram-positive, non-motile, spore-forming rod that is found in soil and predominantly causes disease in herbivores such as cattle, goats, and sheep. Anthrax spores can survive for extended periods in the environment. The remarkable stability of these spores makes them an ideal bio weapon, and their destruction in decontamination activities can be a challenge(1).

Herbivorous animals are usually exposed to spores via grazing on vegetation or by drinking water contaminated with anthrax originating from the blood and body fluids of previously polluted and deceased animals. When exposed to air, anthrax bacteria in these fluids sporulate producing the highly robust form that remains viable for many years, awaiting ingestion or contact with another animal host or human to initiate another life-cycle. Human Anthrax case is also included in the immediately reportable surveillance disease in Ethiopia and one case of anthrax is an outbreak, which calls for notification within 24 hrs. and quick response to control the outbreak(2).

Humans can acquire anthrax contamination by handling animal products from infected animals or by inhaling anthrax spores from contaminated animal products. It can also be spread by eating raw meat from infected animals. Direct human to human transmission is unidentified. In developed countries, it is declining but in developing countries, it is still a great public health burden, especially in low-income group people(3).

Human anthrax is mainly of two types, agriculture related anthrax that occurs in a seasonal pattern, and occupation related that can occur at any time. Naturally occurring human infection is generally the result of contact with anthrax-infected animals or animal products such as goat hair in textile mills or animal skins used in making drums. Human anthrax is more common where infection occurs among livestock, e.g. in Africa, Central and Southern Asia. Reported animal: human case ratios in a country or region reflect the economic conditions, quality of surveillance, social traditions, dietary behavior, etc. in that country or region. In contrast to animals, age- or sex-related bias is generally not apparent in humans, though males generally have higher occupational risk rates in many countries(4).

Anthrax can be transmitted to humans by direct contact with infected animals or their products (e.g. wool, hides, animal-hair products), by inhalation of aerosolized spores from infected animal products, or by ingestion of undercooked anthrax-contaminated meat. In anthrax-endemic areas, sporadic animal cases and occasional outbreaks (epizootics) occur; sustaining the persistence of the organism in the environment. The three major clinical forms of anthrax are cutaneous, gastrointestinal and inhalational. Cutaneous anthrax is the most common form accounting for >95% of infections, occurs when the bacterium enters a cut or abrasion on the skin – typically on \the hands, arms or face. Disease begins as small pruritic papule (papular skin lesion) resembling an insect bite, which within 1-2 days develops a central vesicle, which leaves a painless ulcer(5).

The lesion of cutaneous anthrax typically begins as a papule following the introduction of spores through an opening in the skin disease begins as a small ulcer. The ulcer is characterized by the presence of a black necrotic centre (scar), and is typically associated with extensive local oedema(6).

There may be regional lymphadenopathy. Swelling on the face or neck may occlude the airways. Lesions on the face or neck can also develop into meningitis. Fever, pus and pain are seen only if secondary infections occur. Cutaneous lesions often resolve spontaneously but disseminated, with timely diagnosis and appropriate antimicrobial therapy, the case fatality rate (CFR) is <1%; however, in untreated cases the CFR can approach 20%. In developed countries, it is declining but in developing countries, it is still a great public health burden, especially in low-income group people(7).

Cases of cutaneous and inhalation anthrax have been reported in persons who made or handled animal-hide drums or participated in drumming events where animal-hide drums contaminated with Bacillus anthracis spores were used. This report describes an anthrax case related to animal-hide drum exposures, involving the gastrointestinal form of the disease(8).

Animal Anthrax is a fortifiable disease in most countries and annual notifications are forwarded by many countries to the Office International des Epizooties [OIE] in Paris where they are recorded as a multiple species listed disease. Disease reports are also submitted by Member States (MS) monthly to the African Union - Inter-African Bureau for Animal Resources. Anthrax, a disease of great historical interest, is once again making headlines as an agent of biological warfare. Bacillus anthracis, a rod-shaped, spore-forming

bacterium, primarily infects herbivores. Humans can acquire anthrax by agricultural or industrial(9).

In 2011, 21 MS reported anthrax outbreaks to AU-IBAR recording a total of 629 outbreaks, 5655 cases and 1735 deaths. The upper most numbers of outbreaks were (452), (44) and (25) reported by Ethiopia followed by Somalia and South Africa respectively. The highest number of deaths in addition, recorded by Ethiopia (1102), Zimbabwe (119), Guinea Bissau (109) and Cote d'Ivoire. Current anthrax outbreaks in South Africa Northern Cape Province during March 2014 there were reports of an unusual increase(10).

Anthrax is still enzootic in most developing countries and it occurs sporadically in many other countries. West Africa is the most affected area of the world.(11) Because anthrax remains a problem in developing countries, animal products imported from these areas continue to pose a risk. Human cases occur infrequently in economically advanced countries, where animal anthrax is under control(11).

2.1.1.1 Statement of the problem

Anthrax is caused by bacillus *anthracis* a gram positive bacterial zoonotic disease of animal and human beings. Anthrax has cutaneous, intestinal, inhalation and injection forms. In one health approach anthrax is one of the zoonotic importances of public health reportable disease. Even though the disease is easily preventable and treatable; it has severed health and economic problem, and fragile surveillance data analysis system in developing countries like Ethiopia as well as in the study region Tigray. This is why the study on surveillance of secondary data analysis on suspected anthrax case was carried out.

2.1.1.2 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 program and policies. This information is also needed to determine the most appropriate and efficient allocation of public health resources and personnel. Currently the diseases anthrax, beside its human and animal infectivity, it also plays an important role in biological weapons worldwide. It is also one of the endemic diseases in Ethiopia; as well as in the study region. This is why I interested to highlight the surveillance of secondary data analysis.

2.1.2. Objective

2.1.2.1 General objective

- To describe and analyze suspected anthrax cases in terms of person, place and time in human and animals

2.1.2.2 Specific objective

- To describe trends of suspected anthrax cases interns of person,
- To describe suspected anthrax cases in terms of place and
- To describe the trend interns of time in the two disciplines' (TRHB and BOARD)

2.1.3. Literature Review

Anthrax is a serious infectious disease caused by gram-positive, rod-shaped bacteria known as Bacillus anthracis. Anthrax can be originating naturally in soil and commonly affects domestic and wild animals around the World. Anthrax is not contagious, which means you can't catch it like the cold or flu. Anthrax is a primary zoonotic disease which is cuased by Bacillus *anthracis* (*B. anthracis*) and for human it has both, public health as well as biodefence importance. Humans are accidental hosts. Anthrax has been known since ancient times; however, it acquired attention as biological warfare disease after 2001 incidence in United States(12).

2.1.3.1. Epidemiology

B. anthracis bacteria are very fragile and susceptible to disinfectant or exposure to moderate temperature. However, *B. anthracis* vegetative cells convert into spores on exposure to air. These spores are highly resistant to heat and to most of the disinfectants(13). Therefore, post-mortem of anthrax infected animals is never recommended to avoid the exposure of bacteria to oxygen. A peculiar feature of anthrax infection in animals is that blood does not clot and drains from the natural orifices like nose, mouth and bowl. This results in contamination of soil and water with bacteria which ultimately transform into spores.

Even the processed parts and products like leather, hides, wool, *etc*., of an anthrax infected animal can carry spores for years. The spores can remain viable for an extended period in the soil, especially when deposited 15 cm below the upper soil levels. Environmental and climatic factors have a great influence on the ecology of anthrax(13).

Human anthrax is endemic in the agricultural regions of the world, such as sub-Saharan Africa and Asia, south and central America, and southern and eastern Europe. Livestock are at risk of infection from animal feed containing contaminated bone meal(14).

2.1.3.2. Virulence

Anthrax, being a disease of mainly herbivorous is generally prevalent in those areas where animals like cattle, horse, sheep, goat, *etc*., graze. Several animal species like pigs, dogs, cats, rats and chicken are fairly resistant to anthrax. Many scavenging birds like vultures which feed on dead animals have a natural resistance to anthrax. However, such birds may disseminate the anthrax spores from infected animals through claws, beaks or feathers(6).

The spores of *B. anthracis* that can remain in the environment for a prolonged time become the infectious form of anthrax. For causing anthrax, spores first germinate, that is losing their dormancy and resistance properties, regain metabolism and start vegetative growth. After getting favorable environmental and nutritional growth condition, spores convert into vegetative bacteria and result in further multiplication. Human skin generally does not permit spores to invade; however, spores find access through small cuts or abrasion in skin to cause cutaneous anthrax. After entry into host, *B. anthracis* remains in the capillaries of invaded organs and produce lethal and edema toxins which cause the local and fatal effects of infection(6).

B. anthracis has three major virulence factors: an antiphagocytic capsule and two exotoxins, edema toxin (ET) and lethal toxin (LT). Much of the morbidity and mortality observed with anthrax is attributed to the enzymatic effects of these toxins. Protective antigen (PA) combines with edema factor (EF) and lethal factor (LF) to form binary combinations of ET and LT(15).

2.1.3.3. Pathogenesis

Anthrax is a zoonotic illness caused by the spore-forming gram-positive rod *Bacillus anthracis* (12). Human anthrax is mainly of two types, agriculture related anthrax that occurs in a seasonal pattern, and occupation related that can occur at any time. On the basis of route of infection, there are three clinical… forms of anthrax, cutaneous (skin), gastrointestinal (ingestion) and Pulmonary through inhalation of spores. Recently, another type of anthrax has been identified among the heroin injecting drug users Europe(2).

There are two basic stages in the systemic anthrax infection, a prodromal and fulminant. The prodromal stage is mainly asymptomatic and generally lasts 2-4 days. In this stage, macrophages engulf the spores and release to lymph nodes near the port of entry. In the fulminant stage, bacteria multiply and are distributed to different organs through bloodstream. In human inhalation anthrax, treatment is started after the onset of fulminant stage because prodromal stage is largely asymptomatic(4).

3.4. Types of anthrax

Anthrax infection in humans can occur mainly in three forms: cutaneous (skin), inhalation (pulmonary) and gastrointestinal (oral route) based on exposed areas of the body (head, neck, forearm, hands, legs) and route of entry(3). Anthrax gets into the body through the

skin, lungs, or gastrointestinal system. All types of anthrax can eventually spread throughout the body and cause death if they are not treated with antibiotics.

3.4.1 Cutaneous anthrax

When anthrax spores get into the skin, usually through a cut or scrape, a person can develop cutaneous anthrax. This can happen when a person handles infected animals or contaminated animal products like wool, hides, or hair. Cutaneous anthrax is most common on the head, neck, forearms, and hands. It affects the skin and tissue around the site of infection(3).

Cutaneous anthrax is the most common form of anthrax infection, and it is also considered to be the least dangerous. Infection usually develops from 1 to 7 days after exposure. Without treatment, up to 20% of people with cutaneous anthrax may die. However, with proper treatment, almost all patients with cutaneous anthrax survive(1).

Untreated infections can also spread to regional lymph nodes and bloodstream resulting in septicemia and possible meninges involvement. Case-fatality rate is estimated between 5% and 20%(14).

3.4.2 Inhalation anthrax

When a person breathes in anthrax spores, they can develop inhalation anthrax. People who work in places such as wool mills, slaughterhouses, and tanneries may breathe in the spores when working with infected animals or contaminated animal products from infected animals. Inhalation anthrax starts primarily in the lymph nodes in the chest before spreading throughout the rest of the body, ultimately causing severe breathing problems and shock(3).

Inhalation anthrax is considered to be the deadliest form of anthrax. Infection usually develops within a week after exposure, but it can take up to 2 months. Without treatment, only about 10 - 15% of patients with inhalation anthrax survive. However, with aggressive treatment, about 55% of patients survive(11).

3.4.3 Gastrointestinal anthrax

The gastrointestinal form is rare and is most frequent in the developing world. (16) When a person eats raw or undercooked meat from an animal infected with anthrax, they can

develop gastrointestinal anthrax. Once ingested, anthrax spores can affect the upper gastrointestinal tract stomach, and intestines.

Rate of sepsis following internal organ anthrax infections is extremely high. Gastrointestinal anthrax frequently causes multiple and superficial ulcers all along gastrointestinal tract starting from oral cavity to caecum; in some cases, ulcers may also be seen in the colon. Massive and fatal bleeding is seen in serious cases of ulcerative lesions(8).

Infected uncooked or insufficiently cooked meats cause oropharyngeal and gastrointestinal system anthrax. When these infected materials swallowed anthrax spores may cause lesions from the oral cavity to the caecum. The diagnosis of gastrointestinal system anthrax is difficult due to insidious clinical progression of the disease and difficulty in the isolation of agent pathogen. Related symptoms of GIS anthrax are sore throat, neck swelling, difficulty swallowing, stomach pain, anorexia, bloody diarrhea, nausea, bloody vomiting and fever(17).

Infection usually develops from 1 to 7 days after exposure. Without treatment, more than half of patients with gastrointestinal anthrax die. However, with proper treatment, 60% of patients survive(4).

3.4.4 Injection anthrax

Recently, another type of anthrax infection has been identified in heroin-injecting drug users in northern Europe. Symptoms may be similar to those of cutaneous anthrax, but there may be infection deep under the skin or in the muscle where the drug was injected. Injection anthrax can spread throughout the body faster and be harder to recognize and treat. Lots of other more common bacteria can cause skin and injection site infections, so a skin or injection site infection in a drug user does not necessarily mean the person has anthrax(12).

3.4.5. Diagnosis of anthrax

As various outbreaks are reported time to time from different areas, there is a great need of an early diagnosis of the disease to save human and animal life(12).

Besides, requirement of rapid and reliable detection, identification and diagnosis systems for anthrax has been emphasized by recent bioterrorism events. The early monitoring of the

disease requires the detection of anthrax spores and infection both at environmental and clinical levels. (12).

Rapid diagnosis of anthrax at an early stage of infection *i.e*., before the appearance of symptoms can be very useful for proper medical treatment to stop the further spread of infection and accumulation of toxins. The route by which infectious spores enter the body determines the location of germination and the type of anthrax that manifests (15).

3.4.6. Controls and Prevention

The main objectives of any anthrax surveillance systems are to prevent or reduce livestock losses and to prevent human disease.(4) Effective surveillance is essential to prevention and control programmes for anthrax and encompasses mechanisms for disease detection, confirmation of diagnosis, reporting, collation of data and feedback of the data to the source(6).

The cardinal actions to achieve this are education of both those who will be involved in the surveillance and all who own or handle livestock, meat, hides and other animal products, correct diagnosis, implementation of control measures and reporting(4).

Immediate diagnosis of anthrax at an early stage of infection *i.e*., before the appearance of symptoms can be very useful for proper medical treatment to stop the further spread of infection and accumulation of toxins. The basis of control and, in the case of livestock, eradication of anthrax is breaking the cycle of infection. If a potential infectious source is known to exist, this should be eliminated without delay. Recalling that natural anthrax is primarily a disease of herbivorous mammals, control largely centers on control in livestock(4).

Control of anthrax among humans depends on the integration of veterinary and human health surveillance and control programs. Constant cross-notification between the veterinary and human health surveillance systems should be part of any zoonotic disease prevention and control program, and close partnership between the two health sectors is particularly important during epidemiological and outbreak investigations(18).

Behavior change through building greater awareness of anthrax is also needed at the farmer level for control and eradication of anthrax in animals as well as human. The incidence of naturally acquired anthrax is extremely low. A handful of naturally occurring Cases have been reported from the united states in the last decade: Inhalational and gastrointestinal

Cases related to drum-making from contaminated animal hides or exposures to animal products and dust(19).

People most at risk of cutaneous anthrax are butchers, farmers, veterinarians or people working in the animal hide industry. Anthrax can be treated with antibiotics. Inhalational anthrax requires respiratory support in an intensive care unit(13).

2.1.4. Material and Methods

2.1.4.1. Study Area

Tigray region is found in the northern part of Ethiopia a distance of 783 km far away from Addis Ababa, capital city of Ethiopia. According to CSA 2007 EFY, it has a total population of 5247005. Tigray is one of the nine national regional states of Ethiopia. It is bordered in the north by Eritrea, in the south by Amhara, in the east by Afar and in the west by Sudan. The region is administratively divided into 7 zones, 52 Woreda and 814 kebelles. Tigray has an amazing landscape with the Tekeze Gorge at 550 meters above sea level and the mountains like Tsibet peaking at 3935 meters. Public health care services in Tigray are delivered through 1 specialized hospital, 15general hospitals, 20 primary hospitals, 204 health centers and 712 health posts.

The population of animals in Tigray region is 4,201,501 cattle, 4, 506, 64 sheep and goats and 155,434 chickens. CSA; 2014/2015

2.1.4.2 Study Population

The study was carried out in the suspected human anthrax populations of the region which previously collected weekly, monthly surveillance report data of HMIS and PHEM of regional health bureau and passive surveillance reported case in animal population from BOARD. Anthrax guidelines and different literatures concerning the case were used.

2.1.4.3. Study Design

A surveillance report based on retrospective record review for the period of 2015 to 2018 was carried out at TRHB and BOARD. A descriptive statistic was performed to generate rates, frequencies and percentages. Estimated data of animal population, immunization status and the magnitude of the disease among animals from BOAD were reviewed. And also health management information system (HMIS) reports were tried to compare and contrast with reports in the public health emergency management (PHEM) department from 2017 to 2018 in both disciplines

2.1.4.4. Case definition

Suspected case

Cutaneous anthrax: An acute illness with a painless skin lesion developing over 2 to 6 days from a papular through a vesicular stage into a depressed black eschar with surrounding

edema, and has history of exposure to anthrax suspected animals or/and their products. Fever, malaise and lymphadenopathy may be seen(3).

Any case of sudden death of animals accompanied by bleeding (unclotted dark tarry blood) from natural orifices, absence of rigor mortis, and rapid bloating of carcasses will be considered as suspected case of anthrax(3).

Probable: A case that meets the clinical criteria and has reasonable laboratory test results, OR

A case that meets the clinical criteria and has epidemiologic evidence relating it to anthrax.(WHO)

Confirmed A case that meets the clinical criteria and has confirmatory laboratory

2.1.4.5. Data dissemination and reporting

From the beginning of the study, and after completed the collected data analysis and interpretation of findings of the document was not reported. The information about the data analysis was a roll play between advisor and mentors for commitment. Finally, its softcopy was sent to mentors and advisor.

2.1.4.6. Ethical Considerations

All the process was started after permissions obtained from Tigray regional health bureau before the data collection. During the data collection all precautions was taken to confidentially maintain records and information of the document.

2.1.4.7. Exclusion

The data did not include the type of anthrax, clinical and laboratory findings. The data of 2005-2006 EFY simply presented in graph or table are out of the plan and the data had no complete variables to analyze. But it incorporates to views the trend of long time activity done. The line list that had no complete information of variables was not included.

2.1.4.8. Inclusion

Secondary data of regional public health emergency management and HMIS, and passive surveillance of outbreak reports from 2007-2010 EFY regional agriculture of animal health and fishery.

2.1.4.9. Data Analysis

A secondary data was collected and cleaned from HMIS and PHEM of Tigray Regional Health Bureau, Directorate of Livestock, Health and Fishery core process; and entered to Microsoft excel window 10. For descriptive data analysis of the variables and inferential statistics and data was presented using frequency table, bar graph and pie chart.

2.1.5. RESULT

2.1.5.1. Distribution of suspected anthrax cases by person, time and year

Out of 410 cases was recorded since 2015-2018 four consecutive years, the highest cases and area coverage were recorded in 2016, which was 228 (55%) and the list was in 2015, 30 (7.3%). The attack rate of suspected anthrax case in all ages and sexes. The incidence rate over 100000 populations was 0.8%, 5.3%, 1.9% and 1.2% since 2015-2018 respectively. (Table 13). From the total cases, 375 (91.4%) were out patients. From the total cases of anthrax 404 (98.5%) and 6(1.5%) of them were alive and deceased respectively and the case fatality rate was 1.46%.

The animal's passive surveillance data record describes that a total of 9337cases and 1293 death were recorded in the last six years. The case fatality rate in animals were high in 2018 44% (11/25) and low in 2017, 9.2 %(436/4725). Even though the occurrence was high in central zone, the overall trend describes decline in the discussed four years. The reason for the declining was believed that the status of the cultural consumption of sick animal and animal products may reduce due to improvements of the health education from time to time. (Figure13). Moreover, the vaccination coverage in animals also indicates progress from time to time.

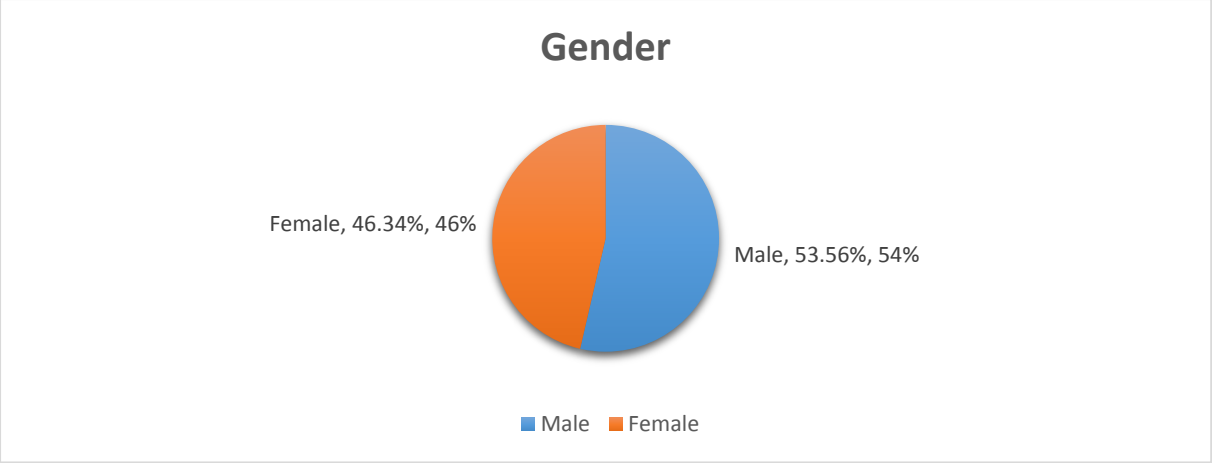


Figure 1. Description of gender on the total suspected anthrax cases in Tigray region Ethiopia. (2007-2010) EFY

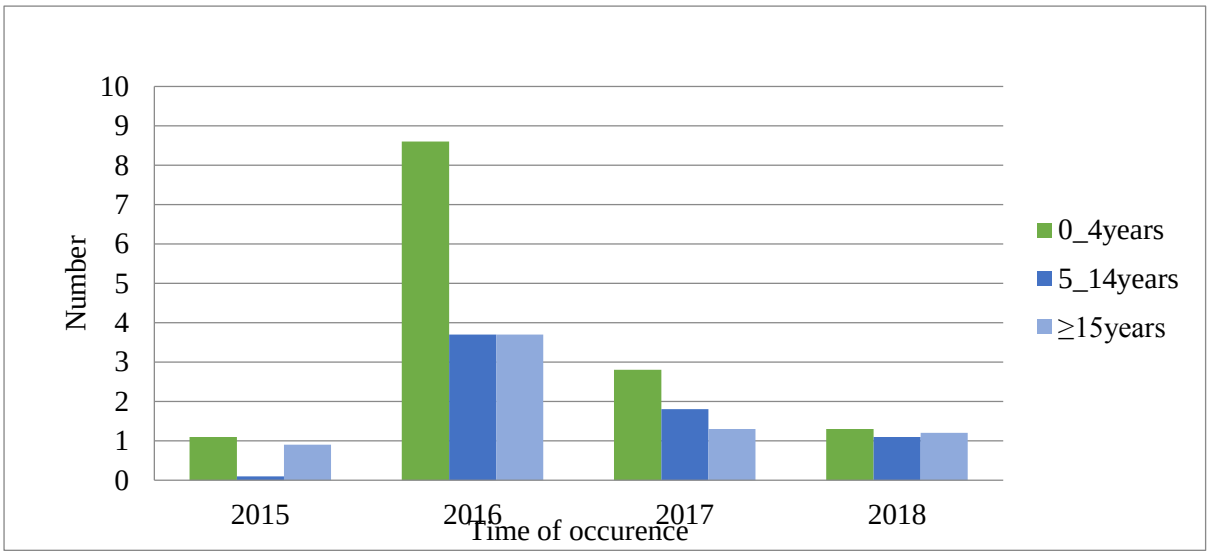


Figure 2: Incidence rate of suspected anthrax case by time and person from 2015-2018 in Tigray region Ethiopia.

Table 1. Description of incidence rate of suspected anthrax case in Tigray region (2015-2018)

Age category	2015			2016			2017			2018			AR/ 100000
	Total Popl.	Cases	AR/ 100000	Total popl.	Cases	AR/ 100000	Total Popl.	Cases	AR/ 100000	Total Popl.	Cases	AR/ 100000	
0-4	737569	8	1.1	751722	65	8.6	765584	22	2.8	785214	10	1.3	3.45
5-14	1471434	4	0.1	1499668	56	3.7	1527324	29	1.8	1565051	17	1.1	1.67
>15	2845997	28	0.9	2900608	107	3.7	2954097	39	1.3	3027915	35	1.2	1.77
CAR			0.8			5.3			1.9			1.2	2.3

Table 2: Stratified suspected anthrax cases by place, time and person, from 2015-2018

	Zone	Wereda number.	M	F	Cases	death	<5	5_14	≥15	Ip	Op
2007											
	Centeral	6	19	9	28	0	8	4	16	2	28
	East	1	0	2	2	0	0	0	2	0	2
	Total	**7**	**19**	**11**	**30**	**0**	**8**	**4**	**18**	**2**	**30**
2008											
	Centeral	14	77	86	163	4	48	35	80	6	157
	East	2	1	2	3	0	2	0	1	0	3
	North west	4	21	24	45	2	12	20	13	5	40
	South east	3	8	5	13	0	2	2	9	4	9
	West	3	4	0	4	0	2	0	2	0	4
	Total	**26**	**111**	**117**	**228**	**6**	**66**	**57**	**105**	**15**	**213**
2009											
	Centeral	6	15	25	40	0	14	14	12	1	39
	East	3	15	6	21	0	4	9	8	0	21
	Northwet	2	5	2	7		3	0	4	0	7
	South	1	2	0	2	0	0	0	2	0	2
	Southeast	2	8	5	13	0	1	4	8	5	8
	Wrest	3	5	2	7	0	0	2	5	4	3
	Total	**17**	**50**	**40**	**90**	**0**	**22**	**29**	**39**	**10**	**80**
2010											
	Centeral	5	24	13	37	0	8	12	17	4	33
	East	2	2	0	2	0	1	0	1	1	1
	North west	1	2	3	5	0	1	1	3	3	2
	South	1	0	1	1	0	0	0	1	0	1
	South east	2	12	5	17	0	0	4	13	0	17
	Total	**11**	**40**	**22**	**62**	**0**	**10**	**17**	**35**	**8**	**54**

Figure 3, below describes that the suspected anthrax cases prevalence in central zone woredas of the region which accounts 268(65.4%) from the total reported cases of the region. The graph indicates that Abi Adi woreda was high incidence and Ahferom low incidence in the four years.

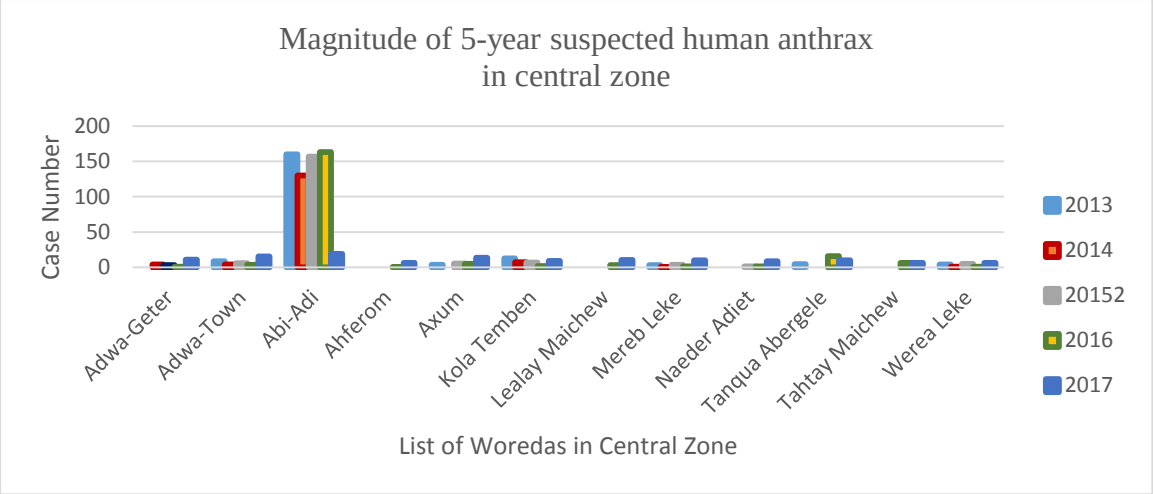


Figure 3: The incidence rate of suspected anthrax cases by Woreda in central zone of Tigray, region Ethiopia: (2015-2018)

Table 14 below, describes that the prevalence of suspected anthrax in Abi- Adi was the highest incidence rate reported woreda from Central zone of the region comparing to the others. Abi Adi have the general Hospital which serves as referral hospital to neighboring woredas and region three.

Table 3. Tabular description of prevalence of suspected anthrax cases by zone.

S/n	Zones	2015	2016	2017	2018	Total	%
1	Central	28	163	40	37	268	65
2	East	2	3	21	2	28	6.8
3	N/west	0	45	7	5	57	14
4	South	0	0	2	1	3	0.7
5	Southeast	0	13	13	17	43	11
6	West	0	4	7	0	11	2.7
	Morbidity. Rate	30(0.001)	268(0.004)	90(0.002)	62(0.001)		

Table 4: Description of suspected human anthrax cases by Zone number and frequency of occurrence at woreda label.

	Zone	Wereda Frequency	M	F	Cases	death	0_4yrs	5_14yrs	≥15yrs	Inpat.	Outpat.
2015	2	7	19	11	30	0	8	4	18	2	28
2016	5	26	111	117	228	6	66	57	105	15	213
2017	6	17	50	40	90	0	22	29	39	10	80
2018	5	11	40	22	62	0	10	17	35	8	54
		61	220	190	410	6	106	107	197	35	375

The above table describes that, suspected anthrax cases was high in year 2016 at 26 woredas and list in year 2015 at 7 woredas frequently occurred. Correspondingly in terms of suspected cases also had similar as the frequency increases the suspected case also increase.

Table 5: Occupational risk factors to suspected anthrax incidences observed in adult ages

People who take care animals and breeds animals in endemic areas
Local butchers
Leather gift makers
Cultural shoe makers
Drum makers
Traditional raw meat consumers etc…

The trend of the suspected anthrax cases was almost distributed throughout the year due to the endemic nature of the disease. But more common reported seasons or months were Jun, July, August, December, February, March and April since 2015-2018.

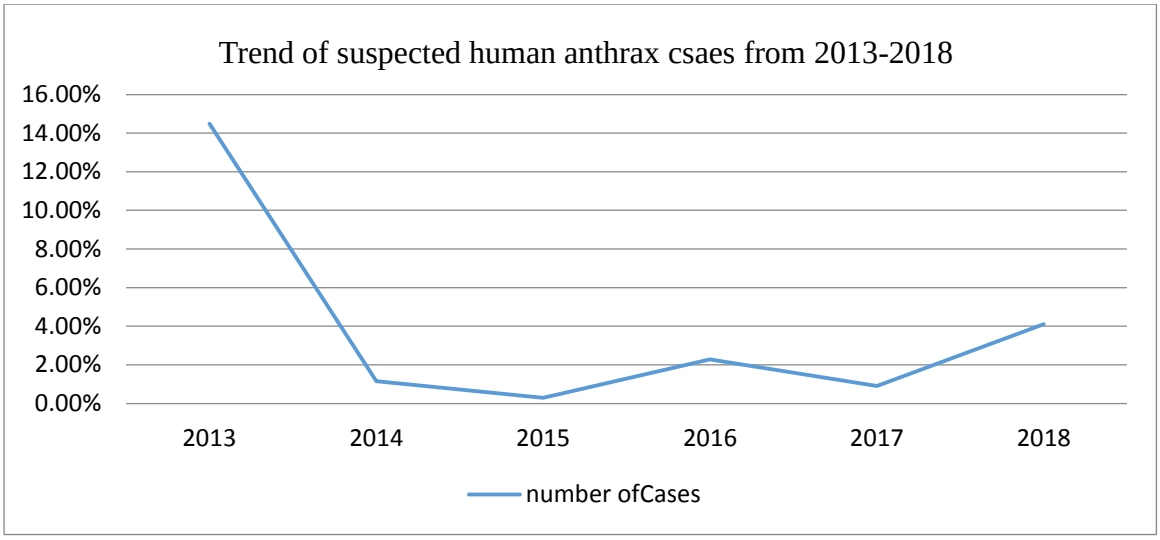


Figure 4. Descriptive of gross prevalence of suspected anthrax human case in Tigray region by year of 2015-2018

2.1.5.2. Distribution of suspected anthrax cases in animals by time and place in Tigray region

The gross data in the regional bureau of agriculture and rural development reveals that, though the disease is endemic, a progressive prevention program was carried out every year. The figure below describes the coverage of vaccination on the past six consecutive years. It indicates that progress from 1094.2% in 2013, 2991.4% in 2017 and 2866.6% in 2018. Even though the vaccine coverage rises, suspected cases also occurs persistently.

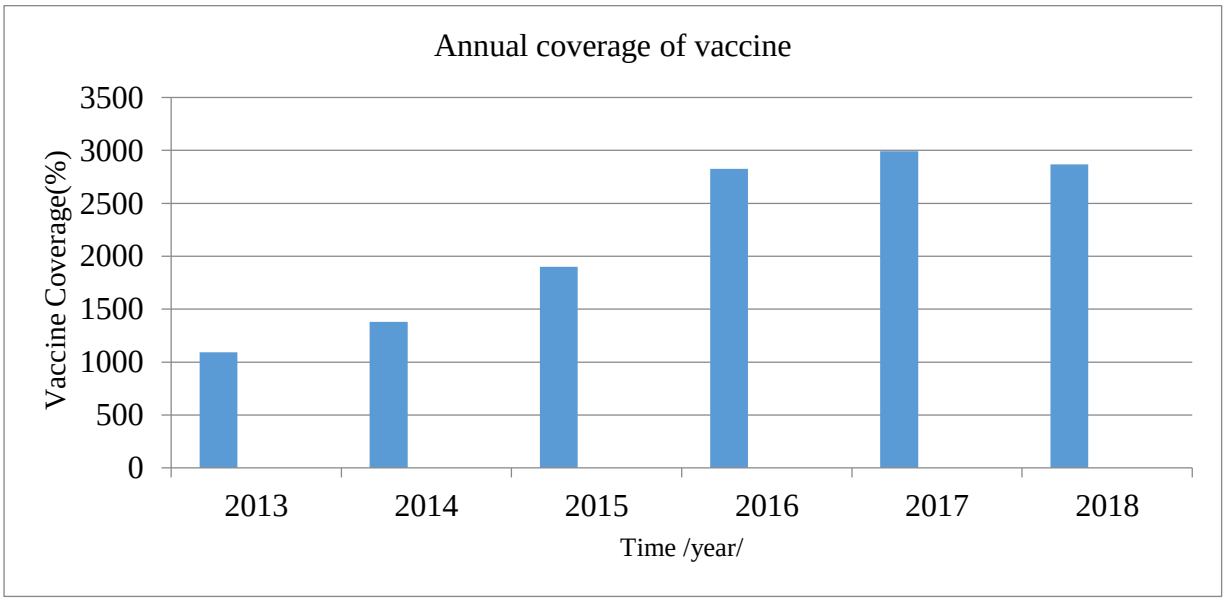


Figure 5: Description of animal annual vaccine coverage of in Tigray region Ethiopia from 2013- 2018

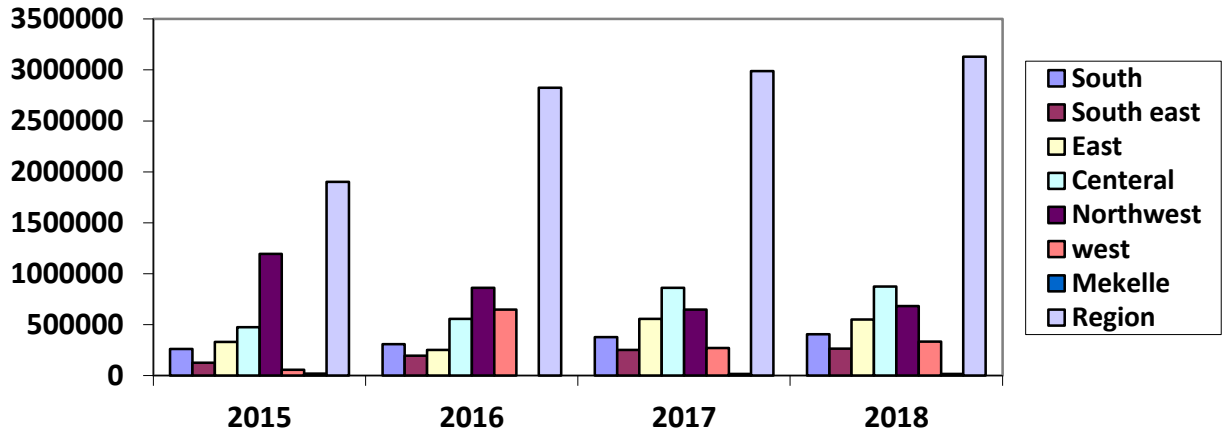
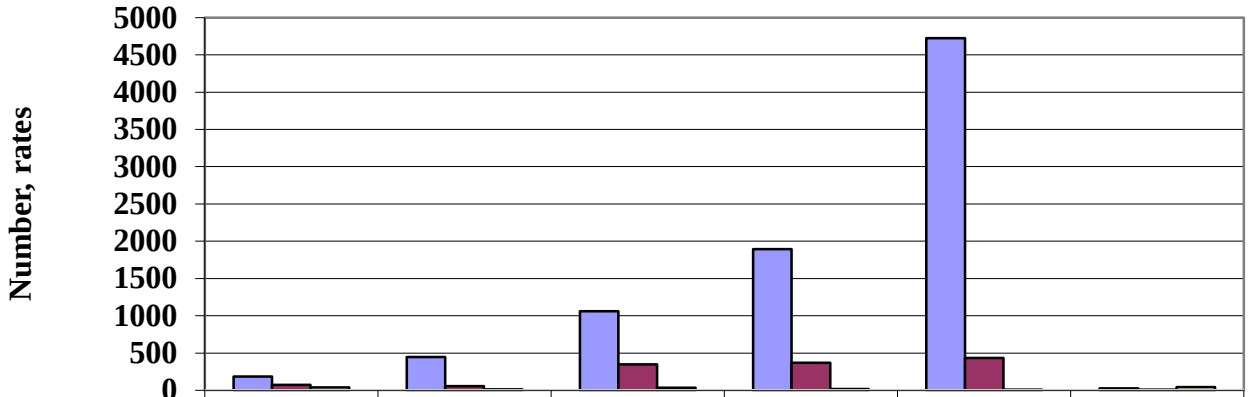


Figure 6: Annual plan and vaccine coverage by zones 2015-2018 of Tigray region Ethiopia

The above Figure12, describes that the regional annual vaccine coverage was increased from time to time within four years. It was high in North West, Central and East zones respectively and list in Mekelle.



	2013	2014	2015	2016	2017	2018
Morbidity	185	446	1061	1895	4725	25
Mortality	73	54	348	369	436	11
CFR	39.5	12.1	32.8	19.5	9.2	44

Figure 7: Passive surveillance data of suspected anthrax cases in animals reported by time from 2013-2018 in Tigray Ethiopia

The above figure 13, describes that the case fatality rate in animals were high in 2018, 44(11/25) and low in 2017, 9.2(436/4725). It was the universe of morbidity which was 4725 cases in 2017 and 25 in 2018.

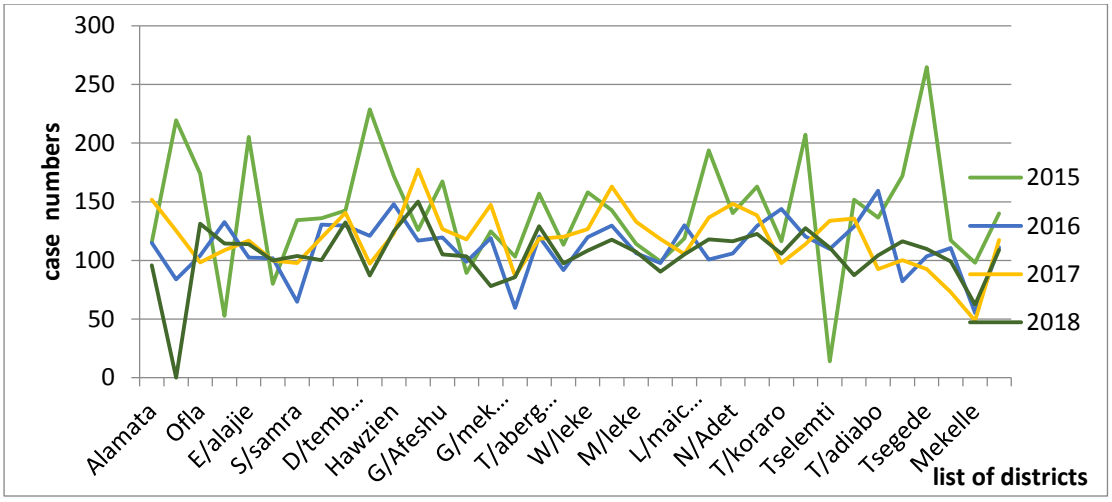


Figure 8: Annual vaccine coverage by district 2015-2018 of Tigray region Ethiopia

In Figure 14 above describes that the vaccine coverage by District had almost the same progress except 2015 has a significant difference in achievement between the districts.

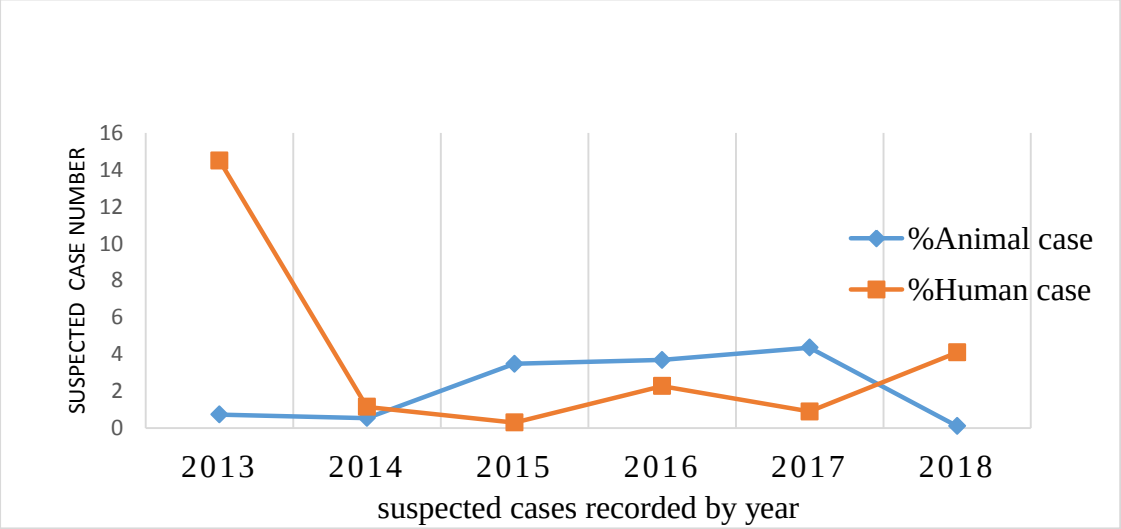


Figure 9: Trend of gross suspected anthrax case in human and animals' 2013-20118 Tigray region Ethiopia

The above figure 22, describes the trend of gross report of human and animal cases in the past six years and the endemic nature of the disease. In 2018 both cases were decline. Increase in animals from 2015-2017 and decrease in 2018. But in humans it was undulant type for last four years.

2.1.5.3. Limitation of the Study

Clinical and laboratory findings were not included on this study. Unclear data which didn't have consistency or incomplete line list information in terms of time, place and person couldn't include here. (2013-2016 in human and 2013- 2015 in animals).

2.1.6. Discussion

Since 2015-2018 a total of 410 cases were recorded; the highest cases, 228 (55%) were in year 2016 and list was 30 (7.3%) in year 2015. From the total cases, 375 (91.4%) were out patients. The attack rate of suspected anthrax case was high in year 2016 and low in 2015 in the past four consecutive years. The incidence rate over 100000 populations was AOR 0.8%, 5.3%, 1.9% and 1.2% since 2015-2018 respectively (Table 1) there was no age and sex difference.46.3% of the cases were females. The case fatality was 1.46%.

The animal's passive surveillance record describes that a total of 9337cases and 1293 death were recorded in the last six years. The case fatality rate in animals were high in 2018, 44 %(11/25) and low in 2017, 9.2 %(436/4725). It was the universe of morbidity which was 4725 cases in 2017 and 25 in 2018 (Figure 9).

Central and northwest zones are the most affected area in human and animals. Southern zone is the list. The overall trend describes fragmented in the discussed last four years. The reason for this was believed that the status of the cultural consumption of Sick animal and animal products may not improve on the health extension education. (Figure2).

On the other hand, the vaccination coverage in animals also indicates progress from time to time. Even though the anthrax is endemic in the region it is from the list of reportable diseases. Based on the current study, the nature of the occurrence of suspected anthrax in terms of person place and time it is still undulate.

The trend of the disease in these four years describes there is no sex difference; but the overall incidence rate indicates that more in adults that are age category of 15 and above years than others. This studies strengthen to the study of; the major sources of naturally acquired human anthrax infection are direct or indirect contact with infected animals, or occupational exposure to infected or contaminated animal products(20). And to the study of the incidence of the natural disease in humans is dependent on the level of exposure to affected animals and, for any one country, national incidence data for non-industrial cases reflect the national livestock situation. It implies the activity or occupations of the productive ages were more relation to exposed environment. (Contacts on farming, slaughtering, feeding and direct contact with exposed animals)(21).

This study indicates the case fatality rate of suspected anthrax in Tigray region in humans is 1.46% but other /studies indicates that, the case-fatality rate is estimated between 5% and 20%.which is higher than this study(22).

In terms of temporal frequency, 59 cases (53.15%) occurred in the month of September followed by 20 in August (18.01%), 13 in April (11.71%), 6 in June (5.4%) and 6 in July (5.4%), 2 in February (1.80%) and 2 in March (1.80%). Only a single case was identified in the month of January, October and November and no cases were identified in the month of May and December. In 2010 G.c. there were 219 reported cases of human cutaneous anthrax(21).

In this study the most frequent recorded occurrence of suspected anthrax cases was recorded on June (22 times), December (44times), August (32times), February(28times), and 22times in July and September. In other studies, also reveals beside the severity of the disease the case mortality is not more than 20%. But agree with the present study the case fatality rate (CFR) is <1%; however, in untreated cases the CFR can approach 20%(5).

Data on the presentation of anthrax in children are limited, and the ability to diagnose anthrax might be more difficult because clinical symptoms and signs might not be as apparent. Younger children (i.e., those aged <12 years) can have difficulty communicating symptoms (e.g., fatigue, chest pain, headache, myalgia, and confusion) and might not present with classic signs associated(15).

As people were not aware on the hazards of improper disposals of carcass of dead animals by anthrax, they were concealed rarely. Usually an animal carcass is either thrown in to flood or in the open field, which results in contamination of the grazing land with anthrax bacilli(18).

On the other hand, the annual vaccination coverage in animals increases from time to time (1900% (2015) to 2866% (2018)). But also this study on outbreak report describes increase from 0.3 % to 4.1% suspected anthrax cases in humans and decreases from 3.48% to 0.11% suspected anthrax cases in animals 2015-2018. This study agrees with the study carried on: A few Upazilas (sub-districts), Shahajatpur, Belkuchi had more outbreaks and they also had the highest vaccination coverage, although it was below 70-80% of the population at risk(11).

But on the present study the descriptions of the reason were; the residence activities on the food consumption from infected animals, and management of animal products and ways of disposing contaminated materials are cultural. More over the animal vaccination was carried on ring vaccination after the outbreak is occurred for control. National

programmes have resulted in a global reduction of anthrax, although this is counteracted by the failure of more recent generations of veterinarians, farmers, etc., through lack of experience, to recognize and report the disease, and the abandonment of vaccination

Overall, the evidence underscores the importance of One Health recommendations to activate anthrax awareness campaigns, supervise the destruction of known anthrax carcasses, record global position system coordinates of sites and disinfect infected soils and introduce a participatory health education tool on anthrax.

2.1.7. Conclusion

The surveillance system of anthrax in human and animals indicates there were annual endemic cases of suspected anthrax.

Disease surveillance was increased from time to time. Especially in human anthrax was listed in the immediately reportable diseases.

In was the same in animals but less in sensitivity in time lines and completeness. It mostly reported monthly as passive surveillance.

More suspected case reports were recorded in the central zone of the region. And the season of the occurrence is undulating throughout the year.

Even the vaccine coverage in animal's increases the occurrences of outbreak in humans have no indication in reducing suspected anthrax cases.

Place of occurrence indicates the same area in humans and animals high in the central Zone.

In surveillance system of zoonosis diseases between the two disciplines have no indication on the situation of anthrax beside on time of outbreak.

The recording systems of the HMIS and PHEM have no complete information as required. The limitation of this recording makes difficult to draw the onset of the disease occurrence and more than this record may happen in the ground.

2.1.8. Recommendation

Therefore, Regional Health Bureau;

- Proper listing of zoonosis diseases variable should need attention in case recording.
- Performing active surveillance of anthrax case during the outbreak to identify unreported cases and evaluate the surveillance system in multimodal approach.
- The community and health workers should be need sensitizing periodically.

The Regional bureau of Agriculture and Rural Development

- A lot works should need on the surveillance of outbreaks, control and prevention
- Prevention plans should be agreeing with our target population.
- Verification of the previous location, of the source of infection

In general, the two disciplines should have work hard on the integration zoonotic diseases. They plan a clear and easy to follow up from the top to the bottom of health facilities on public awareness, surveillance and data analysis applying the one health approach.

2.1.8. References

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Chapter III: Surveillance evaluation system

3.1. Surveillance Evaluation System in Abi-Adi and Kola Temben Tigray region Ethiopia: (2019)

ABSTRACT

Introduction:

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 (5--7.(1).Routine collection and analysis of indicators to measure how well the system is achieving its objectives(2).

World Health Organization (WHO) in 2012 defined Public health surveillance as the continuous, systematic collection, analysis and interpretation of health-related data needed for the planning, implementation, and evaluation of public health practice[3](3).

Anthrax is an important economic importance in the glob and endemic diseases in Ethiopia as well as in the selected districts in Tigray region; this is the objective why selected for the system evaluation.

Objective: To evaluate the performance of existing surveillance system of anthrax on Kola temben and Abi-Adi districts in Tigray region Ethiopia.

Methodology: Abi Adi and Kola temben districts was purposively selected based on the occurrence and public importances of the disease; Anthrax an immediate reportable endemic disease was considered on the surveillance system evaluation. HC and HP were selected by simple random sampling and in Hospital.

Result: Hundred percent of the districts and health facilities have standard case definitions national guidelines and manuals.100% of the health posts use RDT to malaria patients based on the case definition and had a thresh hold for malaria at each health facility. Emergency preparedness plan had ready in 100% of the Health office, health center and all timely reporting. Based on the feedback of reports health posts Begasheka, G/mlesiley, Simret and Zelakme (n=3, 57.1%) and D/Ataklity (n=4, 14.3%) and Denbela (n=2, 28.6%) received from higher levels. Feedback from district and health center was dominant on giving timely. Health centers Work Amba (n=3), Zelakme (n=2) received a feedback from the higher level. The system of the surveillance and feedback mostly practiced by phone and supervision (face to face contact). All the system attributes completeness, timelines,

acceptability, and usefulness were similar in all health facilities. All the visited laboratories had a capacity to collect, examine, handle and send samples to higher diagnostic laboratories. Guya, Workamba and Abi Adi health centers perform internal quality control and supervised by Abi Adi hospital for external quality control.

Discussion: A focal person of surveillance was present in all assessed health facilities; a surveillance report was simply accepting and sent without any interpretation and analysis to the higher levels. They lack the capacity to analyze and interpret data by chart and graph descriptions. But all facilities had a malaria thresh hold by flip chart and recording of cases by person, time and place. The flow of report from lower to higher level was appreciated by the two sectors. In spite of reporting anthrax, in veterinary service delivery was reported monthly as passive surveillance. The integration between the two sectors was almost none, they tried only when an outbreak of suspected cutaneous anthrax, rabies and other zoonosis diseases was occurred in humans and they exchange the idea of control and prevention methods at every level of the two sectors with the community based on RRT and outbreak committee.
Key Words: Anthrax, Anthracis, Endemic, Health facility, Outbreak, surveillance, community.

3.1.1. Introduction

3.1.1.1. Back Ground

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 (5-7)(1).

Routine collection and analysis of indicators to measure how well the system is achieving its objectives(2)A surveillance system is usually established as an integral part of a health care system in order to monitor priority health events. This protocol should be used as a first step towards strengthening and improving surveillance of diseases and other health events within a public health Programme.

The modern concept of surveillance has urbanized over the centuries. World Health Organization (WHO) in 2012 defined Public health surveillance as the continuous, systematic collection, analysis and interpretation of health-related data needed for the planning, implementation, and evaluation of public health practice(3).

Naturally acquired human anthrax infection generally results from contact with infected animals, or occupational exposure to infected or contaminated animal products. The incidence of the natural disease depends on the level of exposure to affected animals. Reported animal: human case ratios in a country or region reflect the economic conditions, quality of surveillance, social traditions, dietary behavior, etc. in that country or region(4).

Surveillance is the collection, collation and analysis of health data that enables the prompt dissemination of the information to take appropriate action. Routine information sharing and notification between the veterinary and human health sectors should be established for prompt decision making(5).

A public health surveillance system is useful if it contributes to the prevention and control of adverse health-related events, including an improved understanding of the public health implications of such events. A public health surveillance system can also be useful if it helps to determine that an adverse health-related event previously thought to be extraneous is, actually important. In addition, data from a surveillance system can be useful in contributing to

performance measures, including health indicators that are used in needs assessments and accountability systems [5](6). Anthrax is caused by Bacillus *anthracis*, a gram-positive, encapsulated, spore-forming, non-motile rod(7). The purpose of evaluation is to improve the information provided and thereby help to improve service provision and delivery. It is necessary to evaluate the relevance of the events selected, how the system can detect and report these events, and how the system can respond to them.

Cutaneous anthrax: 95% of the worldwide human anthrax cases are due to the cutaneous form. This form is initiated when spores of B. anthracis are introduced into the skin through cuts or abrasions or by biting flies. The signs and symptoms become apparent within 5 days after exposure. The initial cutaneous manifestation is a small erythematous painless macule, which develops into a papula approximately 48-72 h later. Within the following 24-48 h multiple vesicles and oedema surround the lesion(8).

Infection in humans traditionally has been much rarer than infection in animals. Anthrax occurred in people who come in contact with infected animals or animal products. It was frequently reported as an occupational disease, affecting veterinarians, people who raised livestock and people who prepared products from wool, hide and hair of animals mainly in the underdeveloped countries [1, 6]. (9)Anthrax is among the diseases identified in immediately reportable priority disease in the glob including Ethiopia.

The Surveillance System of reporting reportable diseases in the Veterinary Service

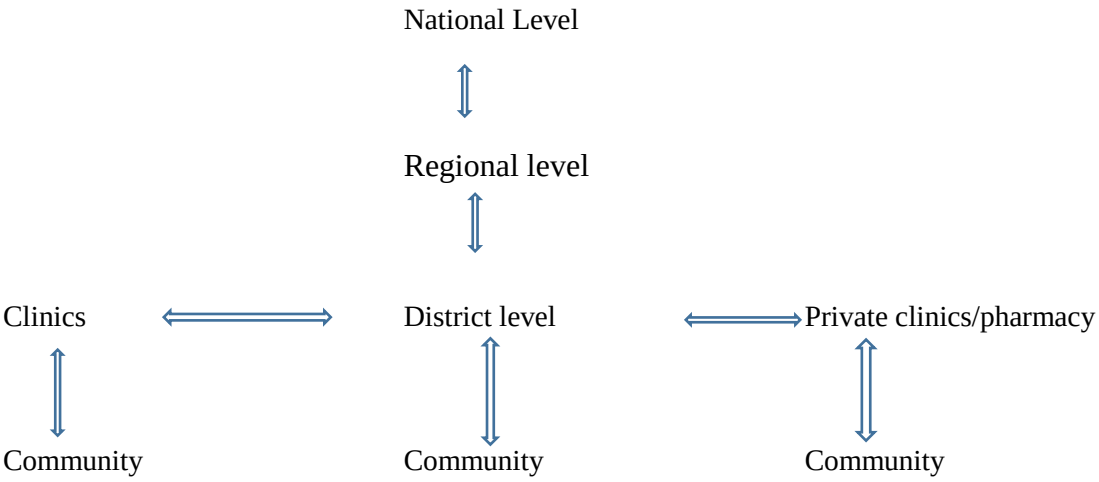


Figure 10: A hierarchy of veterinary service in surveillance system of immediately and monthly reportable diseases.

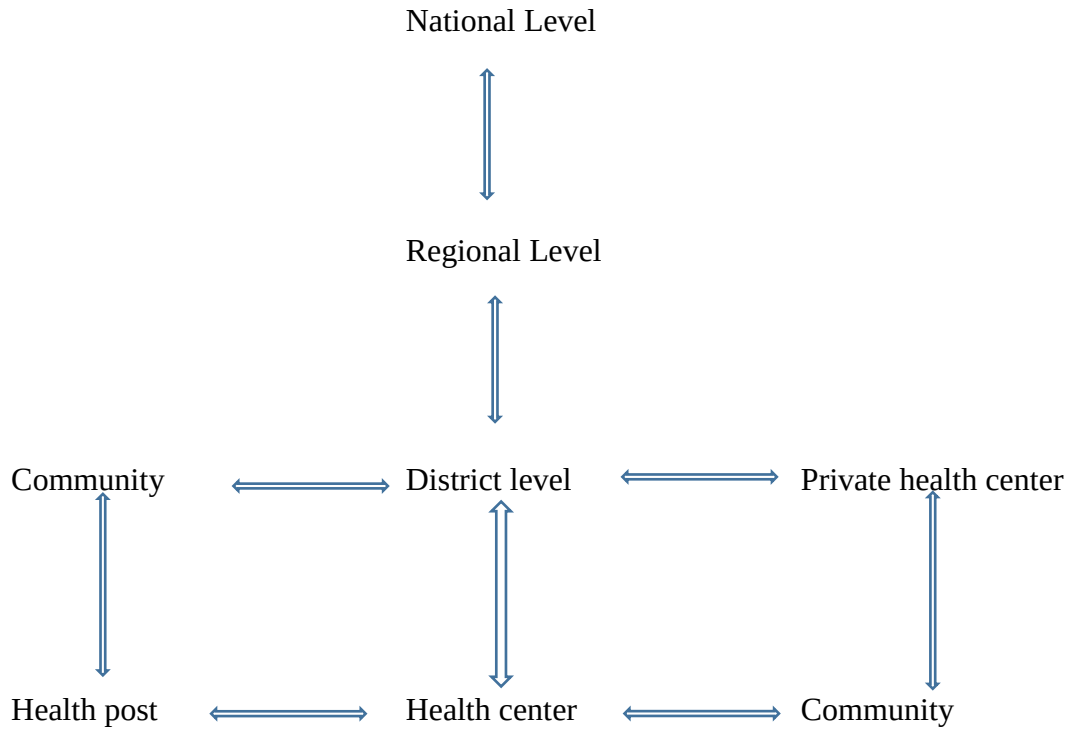


Figure 11: A hierarchy of human surveillance system of immediately and weekly reportable diseases.

3.1.1.2. Diseases under surveillance

In Animals: the surveillance system in veterinary service was carried on by categorized prioritizing as list A and list B in national level; immediate and monthly passive surveillance reportable diseases. Anthrax is from the list B endemic reportable diseases and currently it is under the immediate reportable zoonosis diseases in one health. Most of the list A reportable disease is transboundary and economic importance in trades as well as zoonotic importances.

In Humans: The surveillance system has lists of immediate and weekly reportable diseases based on the national guide lines. (Table1.). Anthrax is from the immediate reportable zoonotic diseases or list 'A' diseases. Health centers and hospitals are conscious on treatments of subcutaneous suspected anthrax cases in 5 visited health facilities (1 hospital and 4 health centers). Specially Abi Adi hospital has a series attention on referral cases of suspected anthrax from the different health centers and health posts.

Table 6: List of Immediately and weekly reportable diseases of the two districts in Tigray region Ethiopia 2018.

Immediately Reportable diseases	Weekly reportable diseases
Acute febrile polio	Malaria cases (confirmed & Clinical)
Anthrax	Meningitis
AWD	Dysentery
Guinea wart	Typhoid fever
Measles	Relapsing fever
Neonatal tetanus	Epidemic fever
Pandemic influenza	SAM (MUAC)
Rabies	Hepatic VOD
SARS	Maternal death
Small pox	Prenatal death
Viral hemorrhagic fever	
Yellow fever	
Human avian influenza	

3.1.1.3. Statement of the problem

Anthrax is caused by Bacillus *anthracis,* a gram-positive, encapsulated, spore-forming, non-motile rod.(7) It is one of the zoonotic and economic importance diseases of human and animals. Currently it includes under the immediate reportable diseases in national surveillance system. The last five years' data of the region indicates central zone of the region was more prevalence suspected anthrax cases. Abi-Adi hospital and kola temben districts also have the top in reporting the suspected anthrax cases from the zone. It was assessed by the surveillance data analysis (2018). This is the purpose of selecting the two districts. More over to see the system attributes core activities; what makes it has more cases than others; or the system evaluation is better than others in follow up.

The purpose of the evaluating public health surveillance is to ensure that problems of public health importance are being monitored efficiently and effectively. Public health surveillance systems should be evaluated periodically, to assess the quality, efficiency, usefulness, and gap of the existing system accordingly to improve the surveillance system.

3.1.2. Objective

3.1.2.1. General objective

To describe the attribute and the existing surveillance system of anthrax on Abi-Adi and Kolatemben districts

3.1.2.2. Specific objective

To describe the core activities of notifiable diseases reporting system in respect to case detection, registration, confirmation, reporting, epidemic preparedness and response.

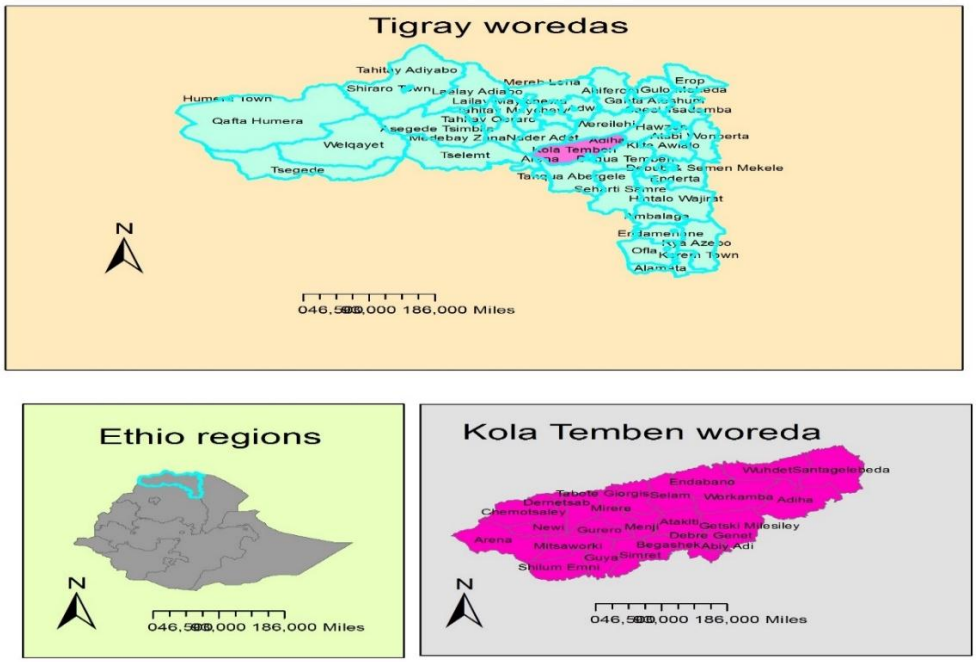
To describe the status of surveillance system attributes like sensitivity, simplicity, positive predictive value, flexibility, completeness, acceptability, representativeness and specificity.

To determine constraints and challenges of implementation

3. Method and Materials

3.1. Study area

The study was carried on Abi-Adi and Kola temben districts. Abi Adi is a town site of the two district offices.



Map 3: **Description of study area (Abi Adi and kola temben districts) in Tigray region Ethiopia (2018)**

3.1.3.2. Study period

The study was conducted from December 17-30/2018 in Abi-Adi and Kola Temben districts of central zone of Tigray region.

3.1.3.3. Study population

All the catchment populations on the assessed 2 district health offices, 1 general hospital, 4 health centers and 6 health posts were studied. The total population of Abi-Adi (N=27,474) and Kola Temben (N=174,797).

3.1.3.4. Study unit

The surveillance system evaluation included two district offices, one general hospital, four health centers, six health posts a total of 13 study units. All are governmental health facilities.

3.1.3.5. Data collection methods

Selection of districts was purposely based on public health importances and existence of the diseases on the study area and by approval of the regional public health and emergency management office. The health center and health post were selected by simple random sampling. Regional data was considered on the surveillance system evaluation based on the immediate reportable diseases of the region. A standard questionnaire was used when collecting the data. 7/9(77.7%) of the surveillance focal persons or representatives have a national guideline: 2 (100%) in two health offices, 4/9 (44.4%) from four health centers, 1/1(100%) hospital and 3/9(33.3%) laboratory technicians and 6/54(11.1%) (Health extension workers were interviewed. The data collection was performed by the researcher in collaborating with the focal persons and one supervisors. Data of immediate reportable diseases were used as basic source in all assessed health facilities.

3.1.3. RESULTS

3.1.3.1. Suspected Anthrax surveillance system

The existing surveillance system in suspected anthrax was based on the data reported cases of past five years of the two districts and the population of the districts.

Table 7: Description of the study population in Abi Adi and Kola Temben districts in Tigray region Ethiopia 2018.

Visited Areas	Rural Areas	Urban Areas	Health post	Health center	General Hospital	Total
Abi-Addi	0	27,474	1	1	1	27,744
Kola Temben	169464	5333	(6/28)	(3/8)	0	174,797

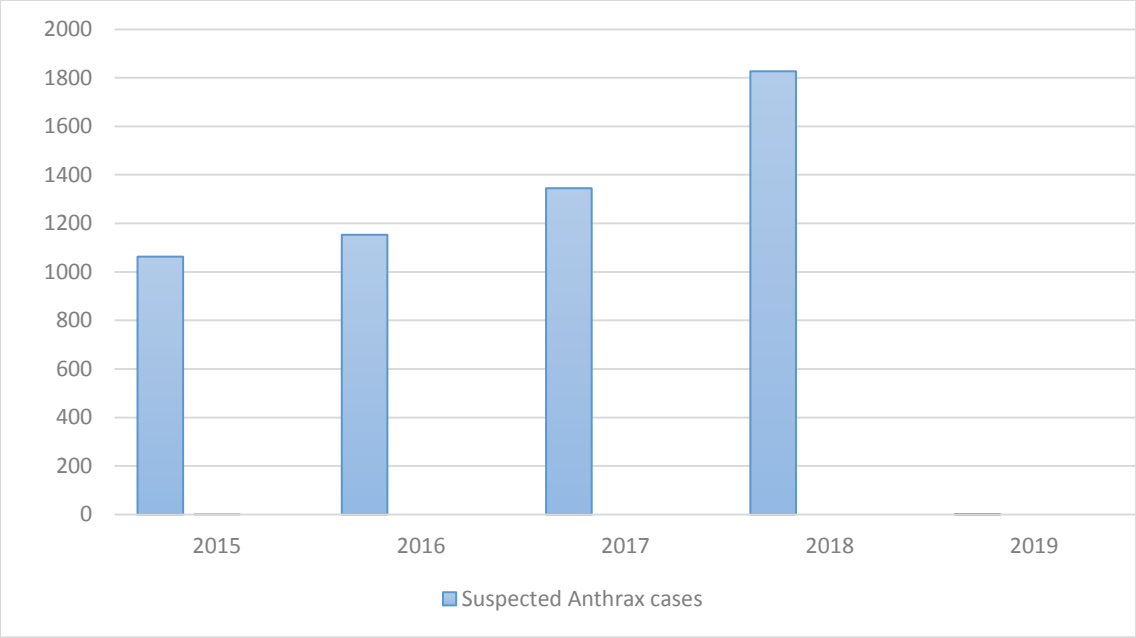


Figure 12: Description of reported suspected anthrax cases under surveillance of Abi-Adi district in Tigray region Ethiopia (2015-2018).

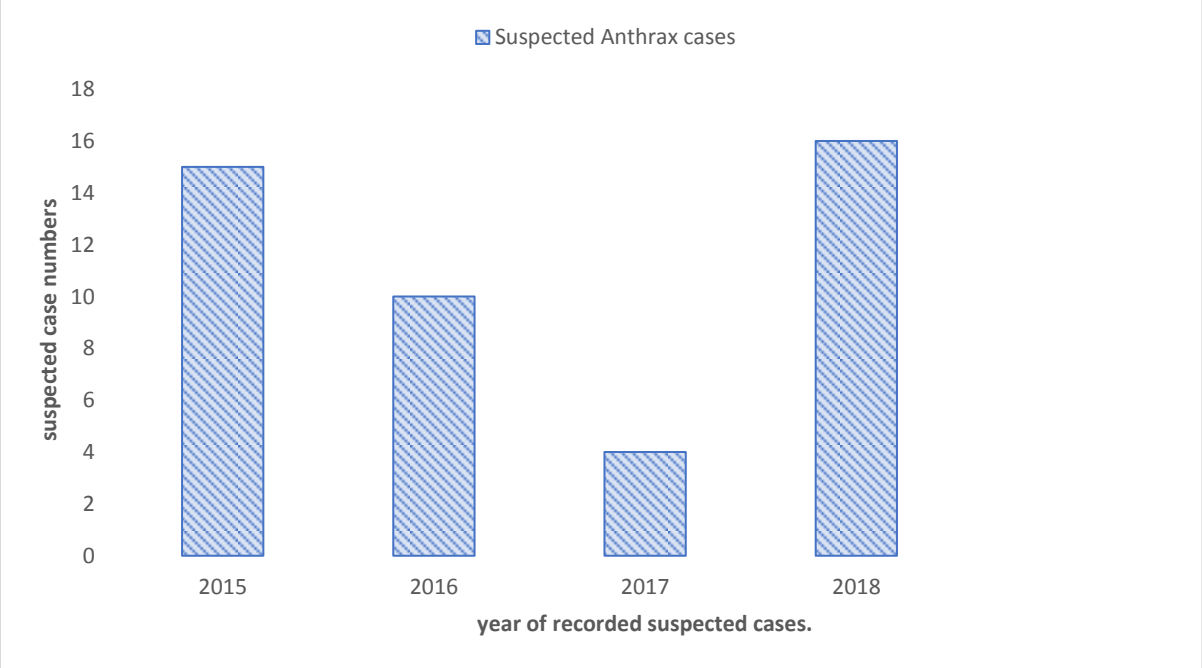


Figure 13. Description of reported suspected anthrax cases under surveillance of Kola Temben district in Tigray region Ethiopia (2015-2018).

3.**1.3.2. Core activities**

3.1.3.2.1. Availability of surveillance manual:

In all the assessed health facilities and health offices, the national guideline manuals of measles, cholera, malaria, Acute flaccid paralysis, meningitis, PHEM guideline and immediate and weekly reportable diseases case definitions and reporting formats was present and checked in place.

3.1.3.2.2. Case detection and registration:

The case definitions of anthrax were found in 83%(5/6) health posts, 100% (4/4) four health centers, in 1 Hospital and 100%(2/2) health offices; In one health post it didn't allowed at appropriate place but had it.

3.1.3.2.3. Case definition:

Suspected case

Cutaneous anthrax: An acute illness with a painless skin lesion developing over 2 to 6 days from a papular through a vesicular stage into a depressed black eschar with surrounding edema, and has history of exposure to anthrax suspected animals or/and their products. Fever, malaise and lymphadenopathy may be seen.(5)

Any case of sudden death of animals accompanied by bleeding (unclotted dark tarry blood) from natural orifices, absence of rigor mortis, and rapid bloating of carcasses will be considered as suspected case of anthrax.(5)

Probable

A case that meets the clinical criteria and has reasonable laboratory test results, OR

A case that meets the clinical criteria and has epidemiologic evidence relating it to anthrax.(5)

Confirmed

A case that meets the clinical criteria and has confirmatory laboratory test results.

Community case definition

Anthrax: a painful febrile cutaneous swell around soft bodies of all age and sex.

3.1.3.2.4. Data reporting:

The reporting system was mostly by personal phone and hard copy in all health posts and catchment areas. The report begins from the catchments to health post, to health center and

health center to district health office and then to regional health office HMIS/PHEM office. Here they report in time if network is available by them and the PHEM office of the district collects daily report from the health centers. In five of the health centers the HMIS software not active and DHIS replaced but it is difficult to manipulate as HMIS. Based on this to get recorded data of line list was difficult at the time of assessment. The turnover of expertise also a big challenge we faced. In addition, stationary materials had sometimes challenges in health posts (Begasheka, Simret, and Getski mlesiley). But 100% of the health facilities report on time in the last 6 months. Anthrax were clearly registered and checked with the monthly report.

3.1.3.2.5. Data analysis:

Except documented list of the diseases in register book, there was no epidemiological description of anthrax by graph and table; but a thresh hold by chart were found in the health offices and health centers.

3.1.3.2.6. Epidemic preparedness and response:

In the health offices and in all the health facilities had an epidemic preparedness and response plans. However, in most of the health posts were not active as much as needed in the preparedness time; it stimulates by the district RRT when only after the existence of events. RRT and EPR committees more activate at the occurrence of outbreaks or hazards. Anthrax was not registered at the health post level but at health center and most at the general hospital Abi-Adi.

3.1.4. Supportive Functions

3.1.5.1. Feedback and supervisions

Based on the feedback of reports health posts Begasheka, G/mlesiley, Simret and Zelakme (n=3, 57.1%) and D/Ataklity (n=4, 14.3%) and Denbel (n=2, 28.6%) received from higher levels. Feedback from district and health center was dominant on giving timely. Health centers Work Amba (n=3), Zelakme (n=2) received a feedback from the higher level. However, Guya and Abi-Addi health centers had no evident except posters to explain, because the expertise are new comers.

In hospital there was one report feedback received from the higher level. The system of the surveillance and feedback mostly, practiced by phone and supervision (face to face contact). The community also got feedback orally at health education time and other social and political

organizations. Especially if any new event was happened, it was alerted from community to the surveillance system route.

3.1.5.2. Training

Eighty percent of the health center and the hospital, the focal persons trained 3-5 days short training only by zone, region in collaborating different stalk holdes.50% of the health posts also had the same problem. The PHEM office at district level was trained 2 days – months at different times and places. In Abi-Adi health center the trained person was upgrade to health office and the health center temporary represented another focal person.

3.1.5.3. Material resources available for surveillance

Logistics, for communication and data management were available in the region and district health office; health center and health posts had lack of complete resource. This was to make ease of management and preparedness at alert time. Health posts used cluster ambulance of the health center. Health centers have one cluster ambulance and motor vehicles for surveillance and one health center from the assessed had bicycle but hadn't in use.

Laboratories in the health center had materials for detecting outbreaks of malaria and parasitic diseases. The challenge there was turnover of the technicians and interruptions of power supply. Abi Addi hospital had appropriate logistics and perform investigating outbreaks reported from lower level of the two districts and common endemic diseases of the clustered six woreda including cases from region three neighboring kebelles.

Computers are only available at health office level. 4 visited HCs, focal person use common computer from the officer/HMIS. HMIS services were active in Abi-Adi hospital, Kolatemben health office, Zelakme health centers. But the HMIS software were updated by DHIS and had a challenge in manipulating as HMIS. All IT technicians raised it. Zelakme HC had no laboratory technician and Abi- Adi HC had no IT technician at the time of visiting.

Most of surveillance report was by personal phone. This helped to report in time of immediate and weekly reportable diseases except the personal account. All the challenges mentioned in the above had access in the regional PHEM office. It is ready for emergency problems in vehicle and logistics.

3.1.6. System Attributes

3.1.6.1. Usefulness of surveillance data:

Collection of surveillance data was useful to investigate and analyze the situation of diseases under surveillance. To plan for the current status and for future preventive measures or directions. Meanwhile, still data collected by surveillance system were not analyzed and interpreted at all health posts and health centers as needed; they only tried to map of the place of occurrences. A malaria thresh hold was mapped in 6 health posts and 4 health centers. And anthrax in two health offices. List of immediate and weekly reportable diseases were presented in the flipchart of 100% Health posts, health center and district health office. Data analysis and interpretation was not done in all except the top ten priority diseases at health center and district level by the HMIS software.

3.1.6.2. Simplicity*:*

In the reporting format, there was no problem on reporting.100% of the HP, HC and health office replied, it lasts 5-15 minutes to complete the report form. Even though, access of updated basic materials like computer, internet and stationaries should be in place to complete in time.

3.1.6.3. Flexibility:

The flexibility of the format was supported 33% of the respondents, 33% of the respondent replied no flexibility it was already filled once, and lastly 33% of them also in doubt in flexibility. because the form is too specific; there is no place to add if new unknown case occurs. 100% of the health facility have HMIS service which also updated by DHIS.

3.1.6.4. Acceptability:

The system was accepted as an effective tool to investigate outbreaks and regular surveillance and to follow up the community health status replied by7 focal persons. However, in spite of the work load, the current structure is not appropriate to done by one person replied by 4 health centers especially, in one health center; they involve also on other cases as clinical examiner in the health center and not trained enough in data analysis. The surveillance report communication carried on by personal phone, no specific vehicle, no specific computer at the health center and health post level. In addition, it doesn't have motivation in air time or allowance based on the distant geographic area coverage's.

3.1.6.5. Representativeness:

Accurately describing the health event with respect of a health event with respect to its distribution in the population in place and time.

The general health seeking behavior of the districts was better in addressing to the community. Especially kola temben tried to address more than 95% of the community. The community needs to upgrade the capacity and service of the health posts in delivering additional cases to reduce additional cost of transport and time on seeking the higher level. On the other hand, there were not private clinics in the districts to minimize the loads of health facilities. Health posts follow up the immediate and weekly reportable diseases based on the standard case definition and diagnosing malaria in RDT effectively. Most of their service is to mobilize and facilitate cases to be diagnosed early in the cluster health centers. More over the vaccination and health education service activities carried by them.

3.1.6.7. Time lines and completeness:

The reporting system was strengthening by phone contact, the health facilities reported complete reports in time; Abi Adi from expected 2 health facilities reported 100% and Kola temben from expected 35 health facilities reported 100% in time and complete in the last 6 months including the region.

3.1.6.8. Stability:

83.3% of the health posts replied it was stable and 16.7% of the health posts no stability in reporting by hard copy; most of their report was by phone and collecting by supervisors visit due to the interrupted network, reports may be delayed to address in time if the report would have been by hard copy. Supervisors would have taken the responsibility to collect on time and stability of the system.

3.1.6.9. Positive value predictive:

As the interviewee replied all the reported cases of malaria was actual cases; but anthrax cases were suspected cases from the lower to the higher level.

3.1.6.10. Sensitivity

In cases detection: All health posts use RDT to malaria patients based on the case definition. Anthrax cases and other reportable diseases were diagnosed clinical. And they give refer to their

cluster health center. They don't have access of diagnostic materials and capacity of the health posts have limited to perform on their level. The community also seeks to examine in higher levels. But the health center can perform different public impotence diseases.

In outbreaks detection:

A regular data analysis of reportable diseases and health pursuing of the community, including the necessary reagents based on the case definitions, thresh holds, timelines and completeness of the society were the basic tools of detecting outbreaks. We visited one health facility had some ready basic materials to control AWD cases; which was alarmed to be ready by the region before four months. This indicates the sensitivity of the health facility in searching outbreaks based the bulletin or information given from the higher level was in place.

3.1.7. Laboratory Results

All the visited laboratories had a capacity to collect, examine, handle and send samples to higher diagnostic laboratories. The only problem was an interrupted power and they didn't participate in the surveillances of different diseases as they need. They had a load on the cases came to the health facility; except the referral hospital Abi-Addi which diagnose all the referral cases come from the different health facilities and cases registered with in the hospital. Except Zelakme health center no laboratory technician, the rest three health centers (75%) can make confirmation malaria using different tests. All the health centers have the capacity to transport serum samples of suspected measles cases for IgM antibody confirmation to central laboratory. Guya, Workamba and Abi Adi health centers perform internal quality control and supervised by Abi Adi hospital for external quality control.

3.1.8. Limitations

We were faced to observe acceptability and stability of reported cases described in place and time in HMIS reports to cross check the usefulness of the surveillance. The HMIS soft copy was updated by DHIS software and; have a problem in manipulating. Therefore, our evaluation was specified by the focal person interviewing only. Abi-Adi health center have no IT technician for the time being. Expertise had in evaluation of Health insurance and general service of public health problems at the time of assessing; so we challenged to get the right person on the right time and place.

3.1.9. Discussion

Our evaluation system adresses in two districts which sited together in one town(Abi Adi). We showed the core activities. The availalble of manual and case definition of anthrax were found in visited health facilities including other immediate and weekly reportable disease case definitions.

The problem we obseve is there was no a trained focal person by the sytsem. They simply report to the higher level without any analysis. This was cosidered as limted to prform the core activities. This agrees with a stduy on western zone of Tigray region (2012) .

In our visit, we found that the current evaluation system was easy to practic at a stable time and work place. Specially its usefullness and sensitivity of suspected anthrax cases. Bcause anthrax was a common problem of human and animals in the districts. Simplicity of a public health surveillance system refers the structure of the system and sensitivity of each cases. surveillance system ought to be as simple as while they meeting their operating objectives. The flow of report from lower to higher level was appreciated by the two sectors.

In spite of reporting suspected anthrax, in veterinary service was reported monthly as passive surveillance. The integration between the two sectors was almost none; they tried only when an outbreak of suspected anthrax, rabies and other zoonosis diseases was occurred in humans and unusual sudden death in animals. They exchange the idea of control and prevention methods at every level of the two sectors with the community based on RRT and outbreak committee. Private health facilities are not engaged in the two sectors.

All services are covered by governmental health facilities. There were contests in measuring the health seeking of the community, because they only come to health facility at time of illness, so the health seeking of the community is still low; to fulfill the WHO standard, everyone should visit 2.5 times per year.

Limited capacity of health facility, basic reagents, interrupted power, lack of computers, internet access and interrupted reporting formats have an influence in completeness and stability of the service. The districts timelines and completes is 100% above the standard of the national level (>80%) and the evaluation carried on 2016 on malaria of the two district indicated 100%. The two year (2017-2018) regional health bureau annual report indicates Abi-Adi and kola temben

2(100%), 35(100%) of completeness and timelines respectively. this helps to address suspected anthrax cases reach in time to treatment.

Health facilities should assure that suspected anthrax cases exposed individuals are contacted within 24 hours and refer them for post exposure prophylaxis (PEP)(10)

The budget of health facility, procurement of supplies, need to solve by informing the problem in time before happened. (Ex. Workamba Health center) Turnover of professional, lack of a basic training of the stuff, timely technical support and incentives to telephone and transport; has influence in performance of the surveillance system.

Epidemic committee is present in the sectors to follow outbreaks in their areas based on the governmental designed hierarchy from higher to the lower level and so for emergency preparedness. But mostly they try to look for if the epidemic was highly effect and raised issue by the community. Most health posts evaluate their status monthly with the stream committee of their cluster.

3.1.10. Conclusion

The flow chart of the surveillance system by the two sectors is well designed and practiced. We observe the real recorded data of 5 years reported suspected anthrax.

The surveillance focal persons had not the capacity to describe the epidemiological information of the districts. This will have been influence in performing the qualitative and quantitative attributes as required.

The evaluation system of the health post stream committee in community should appreciated. Usefulness, emergency preparedness and representativeness were evaluated with their community leaders and publics.

Daily Surveillance information is relayed by the HMIS/DHIS of the health centers and focal person to health office and then to region.

The two sectors had lost integration in cooperating in the zoonotic disease surveillance as one health in practical.

The RRT team and epidemic committee of the two sectors had gaps of looking timely epidemiological information of their area.

There was complain on logistics to address in time to the health facility because of the budget and procurement steps and in capacity buildings.

3.1.11. Recommendation

The surveillance system should be strong in relation with the community on the implementation of core activities and attributes at ground level.

The status of surveillance system attributes like sensitivity, simplicity, flexibility, completeness, acceptability, and representativeness would be experienced and practiced carefully.

The capacity of the professionals should be updated with the current reporting software and trained enough to describe epidemiological information's,

Materials that are basic for the reporting system should be ready in time; at each facility

There should be a strong plan of RRT and integration between the two sectors especially in zoonosis diseases,

Finally, the challenges which had seen in using personal phone account, complains supply to health facility in time should be solved in time by the districts and regions together.

3.1.12. Reference

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Chapter IV: Health Profile Description Report

4.1. Public Health Profile Assessment of Kola Temben District Tigray Region Ethiopia ; (2018)

Executive Summary

Introduction

Globally, community health profile (CHP) is a common set of measures for the community to prioritize the health issues that will be addressed through strategic planning and action, to allocate and align resources, and to monitor population-based health status improvement over time.

Health Profile is a community based collected, analyzed and interpreted data about the health of people and about the conditions in which they live. It is basic tool for change and thus must be an integral part of local decision-making and strategic planning processes.

The preparation of profiles provides a dynamic, scientifically and evidence based account of health in the district; it can stimulate public interest and political commitment; and it can identify targets for the future and monitor progress towards them. Since 2004, the government of Ethiopia has made a bold decision to strengthen and expand its primary health care system by launching the Health Extension Program (HEP). While the scaling up of the HEP is necessary to achieve the aim of universal access to primary health care, close attention should be paid to the performance of the program. Kola temben district also tried to scaling up to the standards PHCU access, elementary schools, in number of provider and services.

METHODOLOGY

The assessment was conducted on kola temben district from February to March 2010 EFY. TRHB gave me an official letter to introduce, the purpose and for their corporation to all district organization to make easy of doing. Based on this, data was collected using semi-structured questionnaire, observing, interviewing the respective bodies and from HMIS documents, magazines of the district and additionally unavailable data on time was collected through phone contacts. Finally, data was analyzed and interpreted in MS- excel 2007.

RESULT

The district has 27 kebelles rural (2009) and currently (28) 1 kebelle is added as urban. Population of the district is 174797 from which (49.4%) males and (50.6%) are females.99.89 % of the people is Orthodox Christianity follower and the remaining Muslims. Both have common language Tigrigna, the national language of the region. From the total population (32.5%) 48061 are youth which have 24289 (50.5%) females. Sex ratio of the district is 1:1 and the fertile age is 23 % from the total population. A total of 34,038 students were enrolled in elementary and secondary schools; which have 48% of them female students. Out of them 4042 students were enrolled in secondary school in which 44.65% were females. The health coverage is above 90% both health centers and health posts according the standard. Health professional to population ratio is; HO18 (1:8211), Bsc.Nurse3 (1:49266), Nurse 58 (1:2548), Midwifery 25(1:25951) and HEW 68 (1:2174) respectively. HC 1:18474 and HP 1:5473 which is at good label of the health center coverage standard. Fully immunization coverage, Measles and PAB was 4439, 4448 and 4873 respectively.

Conclusion

Diarrhea with and without blood, subcutaneous skin disease, pneumonia and acute febrile diseases are among the causes of morbidity and prioritized on the district. The Education and health coverage at district label is at medium standards of the millennium goals. In spite of this, the quality of, infrastructure, standardized activities, documentation and public services should be needed update with comprehensive standard and technologies. As the assessment describes prevention or vaccine achievements were more than planned. But it doesn't mean; they free of all, it needs series attention on planning. The Education and health coverage at district label is at medium standards of the millennium goals. There should be separate technical school at district label from secondary school. The analysis shows still health center, health post, high school, technical schools were less than the average needed. Primary hospital and physicians should be needed at least at District label. The supply of pure water also needs improvement in number of resources and short in distance.

Recommendation

The current top causes of morbidity of the district indicates that more efforts were to reportable or communicable diseases; but on the other hand, non-communicable like nutritional and parasitic diseases have also needs attention parallel to communicable diseases.

- A series attention should have been given to the causes of still birth in mothers.
- The health service documentation should need to be update and clear in all activities of the sector.
- Data of today is data for tomorrow; there for the data should not fallacy depending on personal performances. Line list data is a permanent source document of the district.
- As the district standard in constructing HC, HP, and Elementary school has progress;
- Secondary and technical schools should be need additional and the public services should improve practically.
- Still the result indicates the service of the health center and health post, as well as providers were less than the average need of population.
- Physician and primary hospital should be essential at least at District label.
- As the 53 villages make home delivery free, it should be publicizing to the remaining villages.
- Safe and pipe water coverage of the district also need improvement in access and purity.

4.1.1. Introduction

4.1.1. Background

Global community health profile (CHP) is a common set of measures for the community to prioritize the health issues that will be addressed through strategic planning and action, to allocate and align resources, and to monitor population-based health status improvement over time. The CHP includes broad-based surveillance data and measures related to health status and health risk at individual and community levels including: demographic and socioeconomic characteristics; health resource availability; quality of life; behavioural risk factors; environmental health indicators; social and mental health; maternal and child health; death, illness, and injury; communicable disease; and sentinel events. Hhealth is the health of populations in the global context; it has been defined as "the area of study, research and practice that places a priority on improving health and achieving equity in health for all people worldwide"(55).

Health Profiles are about the health of people and about the conditions in which they live. It is basic tool for change and thus must be an integral part of local decision-making and strategic planning processes. The preparation of profiles provides a dynamic, scientifically and evidence based account of health in the district; it can stimulate public interest and political commitment; and it can identify targets for the future and monitor progress towards them. Data and information are displayed in multiple formats for diverse audiences, such as the media and community-based organizations. Data included in the community health profile are accurate, reliable, and consistently interpreted according to the science and evidence-base for public health practice(55)(56).

In order to progress the health status of the population, identifying the determinants of health, are essential which includes social, cultural, environment as well as economic factors. Health profile assessment aims to identify the major determinants of health through evidence based information which helps for planning, priority setting, resources allocation and implementation of intervention strategies(57).

Health profiles endeavour to: make available a regular, concise, comparable and balanced overview of the population’s health, to inform local needs assessment, policy, planning, performance management, surveillance and practice, to be primarily of use to joint efforts

between local government and the health care service to improve health and reduce health inequalities and finally empower the wider community(58).

Generally, health profile addresses access to and the quality of health care, both of which can affect population health. The most frequently recommended demographics and social environment components are age, income, race/ethnicity, educational attainment, employment status, gender, and poverty level. On the other hand physical environment includes safe and affordable housing, air quality, and water quality, transportation, and access to nutritious & affordable food (58).

A health care organization's decision to adopt and sustain a scalable innovation depends on several factors. Commitment to change from leaders (both administrative and clinical leaders) is critically important.(59)based on the centers for disease control and prevention morbidity and mortality represent the major health outcomes that point out disease burden in the community. The presentation of overall and cause-specific death rates by sex, age, and race/ethnicity can demonstrate health disparities and provide readily understandable information on health status to policy-makers and community members(60).

District health data are essential for advocacy, program planning, implementation and evaluation of health care including, most notably, at the district level, districts are the basic units of planning, decision making, and political administration. Health care supervisions are relevant for scaling innovation, because they can yield the type of information that leads to the adoption of innovations. Disease registries a type of surveillance designed to collect information about people with certain diagnoses or conditions have the potential to transform the way chronic diseases are managed, by prompting the adoption of improved approaches to treatment and management(61).

As the Ethiopian ministry of Health, Health sector Transformation Plan (HSTP), the average size of a household at national level is 4.7. The pyramidal age structure of the population has remained predominately young with 44.9% under the age of 15 years, and over half (52%) of the population in the age group of 15 and 65 years. The population in the age group of over 65 years' accounts for only 3% of the total population. While the sex ratio between males and females is almost equal, women of reproductive age constitute 23.4% of the population. The Health Sector Development Plan (HSDP) is prepared in cycles of five years; the first cycle began in 1997. The

development of the fourth one (HSDP 4 -2010/11-2014/15) has been an all-inclusive process which extensively utilized the Joint Assessment of National Strategies tool to monitor with agreed upon priorities and implementation modalities.(58)(62).

Egypt in the period 2005-2008, the crude birth rate (CBR) was 27 births/1000 populations, and the general fertility rate (GFR) was 106 births/1000 women. The lowest CBRs were found in the Urban Governorates, where the CBR was 22 births/1000 populations and the GFR was 87 births/1000 women(63).

Based on Mini-EDHS 2014 report, the total fertility rate (TFR), crude birth rate (CBR), and general fertility rate (GFR) was 4.1, 28 and 138 respectively. It also shows 39%, 57.2%, and 31.6% of contraceptive prevalence rate (CPR), 1st ANC and 4th ANC follow-up respectively. Trends in fertility since the early 2000s can be examined by observing a time series of estimates produced from demographic surveys conducted in Ethiopia over the last 16 years, beginning with the 2000 EDHS. The TFR has declined from 5.5 children per woman in 2000, to 5.4 children per woman in 2005, to 4.8 children per woman in 2011, and to 4.6 children per woman in 2016.(64)Fertility is notably higher among rural women than urban women. On average, rural women will give birth to nearly three more children during their reproductive years than urban women (5.2 and 2.3 children per woman) (64).

As EDHS 2016 report description, the coverage of 1st ANC, 4th ANC, skill delivery and CPR were 62%, 32%, 28% and 36% respectively. The report also points out BCG 69%, penta1 73%, penta353%, and measles 54%. The maternal mortality ratio was 412 per 100,000 live births. But the coverage in Tigray region was ANC190%, ANC456.5%, Skill delivery59.3%, BCG88%, penta192%, penta3 81.4%, and 80.1% measles. Regular antenatal checkups from trained health providers are necessary to monitor the progress of a pregnancy and identify early on if a woman shows signs of complications. It is commonly recommended that a woman see a trained health provider at least four times during her pregnancy(65).

Maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.(66)

Studies indicate that, use of any contraceptive method varies notably by region, ranging from 64 percent in Addis Ababa to 3 percent in the Somali region. Similarly use of any modern contraceptive method is highest in Addis Ababa (57 percent) and lowest in the Somali region (2 percent). Current contraceptive use increases with women's education. Thirty-five percent of women with no education report current use of any method, compared with 70 percent of women with more than secondary education. Similarly, nowadays use of any contraceptive method increases with wealth. At the present time married women in the wealthiest household are twice as likely as women in the poorest household to use any contraceptive method (57 and 28 percent, respectively)(67).

The 2016 EDHS study results show that 62 percent of women who gave birth in the five years preceding the survey received antenatal care from a skilled provider at least once for their last birth. Three in 10 women (32 percent) had four or more ANC visits for their most recent live birth. Urban women were more likely than rural women to have received ANC from a skilled provider (90 percent and 58 percent, respectively) and to have had four or more ANC visits (63 percent and 27 percent, respectively). The percentage of women who used a skilled provider for ANC services and who had four or more ANC visits for their most recent birth in the five years preceding the survey increases greatly with women's education. Among women with no education, 53 percent obtained ANC services from a skilled provider and 24 percent received four or more ANC visits compared with 98 percent and 73 percent, respectively, of women with more than a secondary education. The use of ANC services by a skilled provider and proper number of ANC visits also increases steadily with household wealth(68).

Ethiopia is a Federal Democratic Republic with a centralized governance system. Health sector policies originate from the Federal Government via "directives" (a legal instrument) and then are implemented by regional and Woreda (district) governments. To extend financial protection to large segments of the population, the Government of Ethiopia is implementing two risk-pooling schemes: CBHI and SHI. CBHI schemes are established by Woreda governments and managed by community members. CBHI schemes collect premiums from households in the Woreda, pool funds including subsidies, and then pay public health facilities to deliver services to enrolled members. The SHI scheme, which is in a final planning phase, will collect premiums from

formal sector employees and employers through payroll taxes and then pay participating public and private health providers for delivering covered services to enrollees(69).

Based on the Health Sector Transformation Plan of MoH 2015/16-2019/20; health systems consist of all organizations, product, people and actions whose primary intent is to promote, restore or maintain health. The health care delivery system in Ethiopia is structured in three-tier. The primary level health care delivery system includes Health Posts (per 3,000 – 5,000 population), Health Centers (15,000 – 25,000 Population) and primary hospitals (60,000 – 100,000 population); secondary level health care delivery system includes general hospital which serves about 1-1.5 million people and Tertiary level health care delivery system includes tertiary hospital which serves 3.5 to 5 million people(70).

The present assessment of Kola temben health profile shows 95% of the population were engaged in farming, animal husbandry, poultry and cultivation of gardens and the remaining 5% depends on Merchandise, hotel and catering and government employee. There are 2305 registered governmental and NGO employee assigned in different sector offices in 2009-2010 EFY; out of them 70 workers are employed in the recent year 2010EFY.

The district has 71 elementary and 6 secondary schools; a total of 34,038 students were enrolled in elementary (98% coverage) and secondary schools (<50% coverage). Out of the total students 48% of them were females. Out of them 4042 students were enrolled in secondary school in which 44.65% were females.

Based on EDHS 2014 at national label the ratio of girls to boys in primary education 1.1, secondary education 1.4, and in tertiary education 1.0.

The health coverage shows 90% both health centers and health posts; health center 1:187475 and health post 1:5474 to total population. Health professional to population ratio is; HO 18 (1:8211), BSC Nurse3 (1:49266), Nurse 58 (1:2548), Midwifery 25(1:25951) and HEW 68 (1:2174) respectively which is at the good label from the regional standard. A total of 5957 clients received HIV test (at PITC) 8(0.13%)/and 1651 clients test for HIV at (VCT) 3(0.18%) were positive results. From the total population age groups 0-4yrs, 5-14yrs, 15-44yrs, 15-64yrs,>65yrs is 15%,30%,50% and 4.3% respectively. Sex ratio of the district is 1:1 and the fertile age is 23 % from the total population. (DHMIS)

The purpose of this assessment is to assess and describe the health profile of kola temben district, central province of Tigray region. It will be to help to considerate the current health profile and use it to address the current gaps for program planning, priority setting and intervention and appreciate the improved experiences.

41.1.2. Statements of the problem

The profit of under taking a health profile assessment from the recognition that health, defined as a state of physical, mental and social well-being, is influenced by a range of factors. A wider influence on an individual's health is constituted by the living and working conditions, including access to essential services and facilities

At regional level there is annual health profile available which could contribute for decision makers, policy makers, planners, and other stake holders as valuable base line information or resource for further studies, and priority problem identification, resource allocation and mobilization for strategic planning. Besides this importance's the districts are not well known with comprehensive and compiled evidence based health profile studies.

Kola temben district is a pilot district for many historical places of truism and health activities as well as for agricultural activities. However, the district is not a model in compiled evidence based written health profile studies which strengthened its model and motivate for further well development of its bests and visualize where the weaknesses for further search of solutions.

So the main purpose of this health profile assessment is to indicate and recommend major health problem and health status of the district and then to be addressed by the responsible bodies in each level.

4.1.1.3. Rationale of the Study

Health profile assessment of district will help as to understand the determinants of health in terms of socio demographic characteristics, availability of infrastructure, human resources, health services coverage, performance and budget allocated to the district health office. After the health profile data is collected it will help for planning, resources allocation priority setting and in general for decision making to improve the health status of Kola temben.

4.1.2. Objective

4.1.2.1. General objective

- To assess and sketch the current situation of health profile of Kola temben district, and forward the well done and limitation of the district

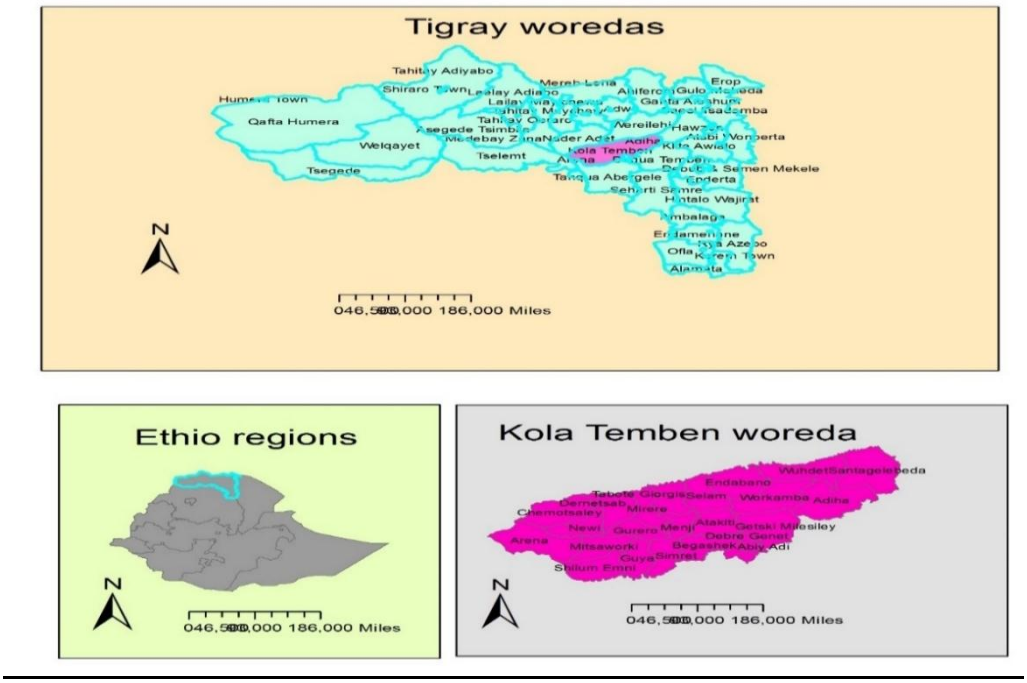
4.1.2.2. Specific objective

- To identify the major health problems of the District
- To review secondary HMIS data on selected health problem
- To assess risk factors those, have an effect on health in the District
- to explore applicable recommendations based on the findings

4.1.3. Methodology

4.1.3.1. Study area

The study was conducted from February to March 2010 EFY on Kola temben at district level. All the district governmental and non-governmental sectors were assessed based the information forwarded to answer by each sector.



Map 4: Administrative map of Kola Temben District February 2010 EFY

4.1.3.2. Study period

The assessment of health profile was conducted from February 20 to March5, 2018G.C.

4.1.3.3. Study design

Descriptive cross sectional record review and interview using checklist (questionnaire) was applied to develop this profile description.

4.1.3.4. Source and study population

Study and source population is all population lives and gets service in all health facility of Kola-Temben District.

Variables: Kola Temben, Demographic information, Geographic and climatic, Administrative organization, Health status, MCH and EPI coverage, Economic condition, Education status, Health sector expenditure.

4.1.3.5. Data collection tools and techniques

The data was collected by a semi-structured questionnaire through face to face interview to responsible persons, experts and heads, by reviewing records, observing the annual reports.

4.1.3.6. Data processing and analysis

The collected data was cross checked, cleaned and entered in to computer and analyzed using MS- excel, 2007 and finally written by MS-word, 2007.

4.1.3.7. Data quality and control

An ongoing cross-check was done between yearly report and HMIS data in every data in order to keep the accuracy and completeness.

4.1.3.8. Dissemination of result

The final analysis of this report will be presented to Addis Ababa University, College of health science school of Public Health Department of Epidemiology and will be submitted and copy to kola temben health office.

4.1.3.9. Ethical consideration

Support letter was given by Tigray regional PHEM coordinator to Kola Temben district health office for getting permission for the health profile data collection. The health profile data was collected from different sectors of the district such as district Health office, district planning office, Education office, agricultural office, and Regional health bureau annual reports.

4.1.4. RESULT

4.1.4.1. Historical view of the District

Kola temben is one of the Districts found in Tigray regional state. It is located between 13°0’41’’to 13^0 0’43’’ latitude and 38°0’57’to $39^0$0’00’’ longitude. It is named in part after the former province of central zone. Have an area of 147000 ha; of which 31021ha cultivated 47925.57ha for grazing land, 25058.23ha forest, 10.070ha catchment and 29502 out use. The district is 876Kms far to Addis Ababa and 93 kms to Mekelle respectively. It has an area of low land mid-land and high land 58%, 41%, 1% respectively

Notable landmarks in this Woreda include the monastery of Abba Yohanni and the Monolitic church of Gebriel Wukien from the total 162 churches found in the district, both of which are north of Abi Addi; Worsege area of grave to Italian army, and Awurisi dance are the most typical cultural and historical resource of tourism to the district, the region and to the nation. In addition to this; the District has areas sources of high value elements like gold and marble. (District kola temben public media and communication office; no 18, January 2010EFY)

4.1.4.2. Geography and Climate

Kola temben is one of the Districts found in Tigray regional state. It is located between13°0'41''to 13^0 0'43'' latitude and 38°0'57'to $39^0$0'00'' longitude. It has an area of low land mid-land and high land58%, 41%, 1% respectively. It has an average of 25-30-degree Celsius temperature and 500-800mm annual rain fall.

4.1.4.3. Demographic information

The district has 27 kebelles rural (2009) and currently (28) 1 kebelle is added as urban. Population of the district is 174797 from which 72981 males and 4816 are females.99.89 % of the people is Orthodox Christianity follower and the remaining Muslims. Both have common language Tigrigna, the national language of the region. From the total population 48061 are youth which have 24289 (50.5%) females. From the total population age groups 0-4yrs, 5-14yrs, 15-44yrs, 15-64yrs,>65yrs is 15%,30%,50% and 4.3% respectively. Sex ratio of the district is 1:1 and the fertile age is 23 % from the total population.

4.1.4.4. Administrative set up

Kola temben is bordered northern; Wereleke, southern; Naederadiet and Tselemti, Southern; Tanquaabergele, Eastern Deguatemben and North east by Hawzen Woreda. Its name had got since 1997EFY. It was formed from two crease districts surrounding to Abi Adi town based on the geographical standards of the area and to make ease of political administration on 1997 EFY. Before 1997 EFY the district had Amberameteka, Workamba and Abi Adi three independent districts. Its administration offices are seated in Abi Adi town which at this time is its own administrative district. The district has 27 kebelles rural (2009) and currently (28) 1 kebelle is added as urban.

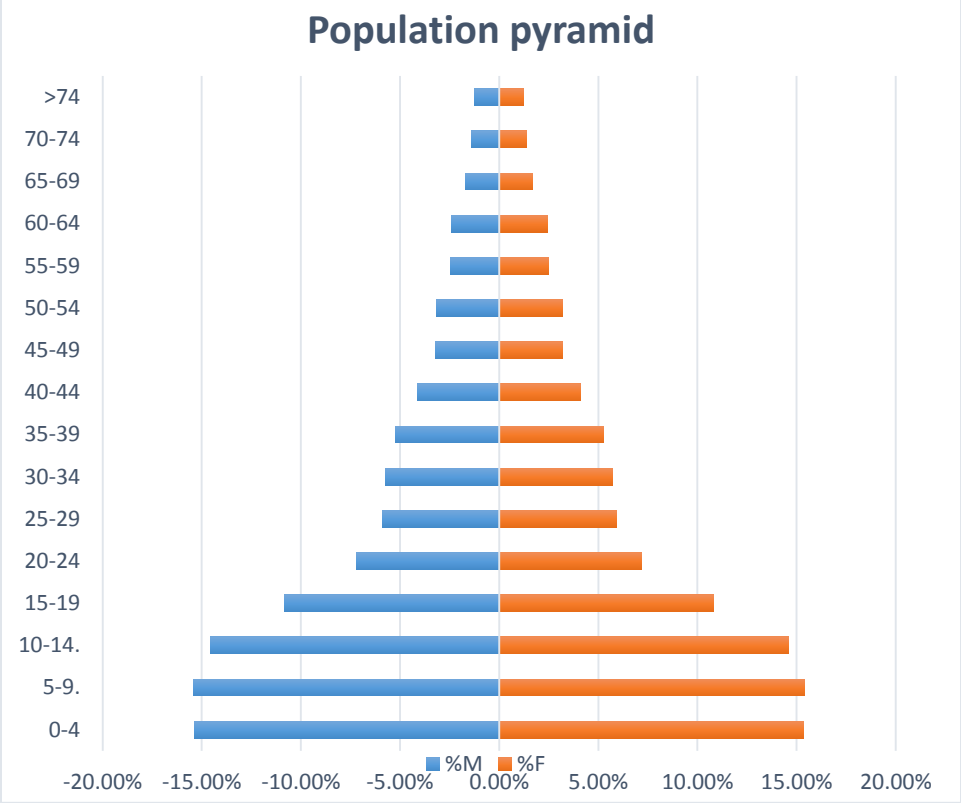


Figure 14: Population of Kola Temben District by age category 2009 EFY Tigray region Ethiopia

4.1.5. Economic Status

Over 95% from the total population of the district depends on mixed farming and the remaining 5% depends on Merchandise, hotel and catering and government employee. The main crop produced is sorghum and maize in the lowlands, teff in the mid and highland areas. The annual crop productivity of the land was 22.68 quintal per hectare. 199.227Cattle, 228623 goats, 62700 sheep, 30862 donkeys, 127 mule 4 horse 15329 local and 4375 improved bee hive and 278339 local and 87762 improved poultry are reared respectively. Annual production from irrigation was 60000 quintals at district label; practicing parallel to the crop production and throughout the year.

4.1.6. Education and Health

Kola temben district has 71 elementary and 6 secondary schools. A total of 34,038 students enrolled and 16256 were females; which is 47.8%. The total coverage is 98% elementary and less than 50% (6/14) of secondary and has no separate technical school at woreda level.

Table 8: Description of students and teachers enrolled at school in 2009-2010EFY in Kola temben district Tigray region Ethiopia

Type of School	2009 EFY			2010 EFY			With functional latrine	with water supply	with power supply	With road access
	No School	Students	Teachers	No School	students	Teachers				
O' Class	71	3105	69	71	3560	69	48	18	18	43
Elementary	71	29996	1011	71	38270	1024	48	18	14	43
Secondary	6	4042	163	6	4851	132	5	2	6	6
Total	77	34038	1174	77	43121	1156	53	20	20	49

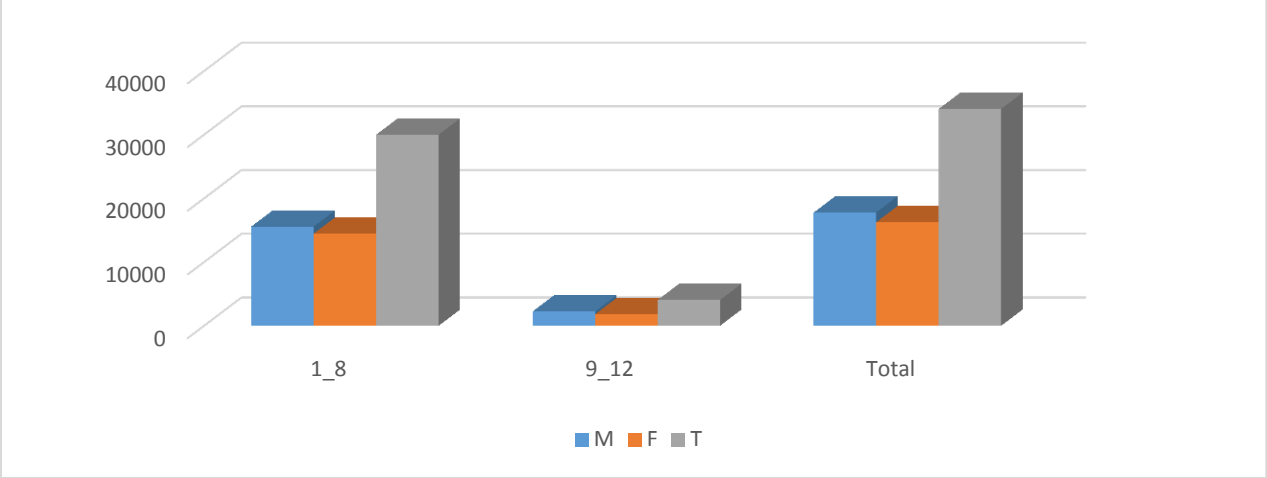


Figure 15: Description of students enrolled in school by grade and sex in 2009EFY in kola temben district Tigray region Ethiopia

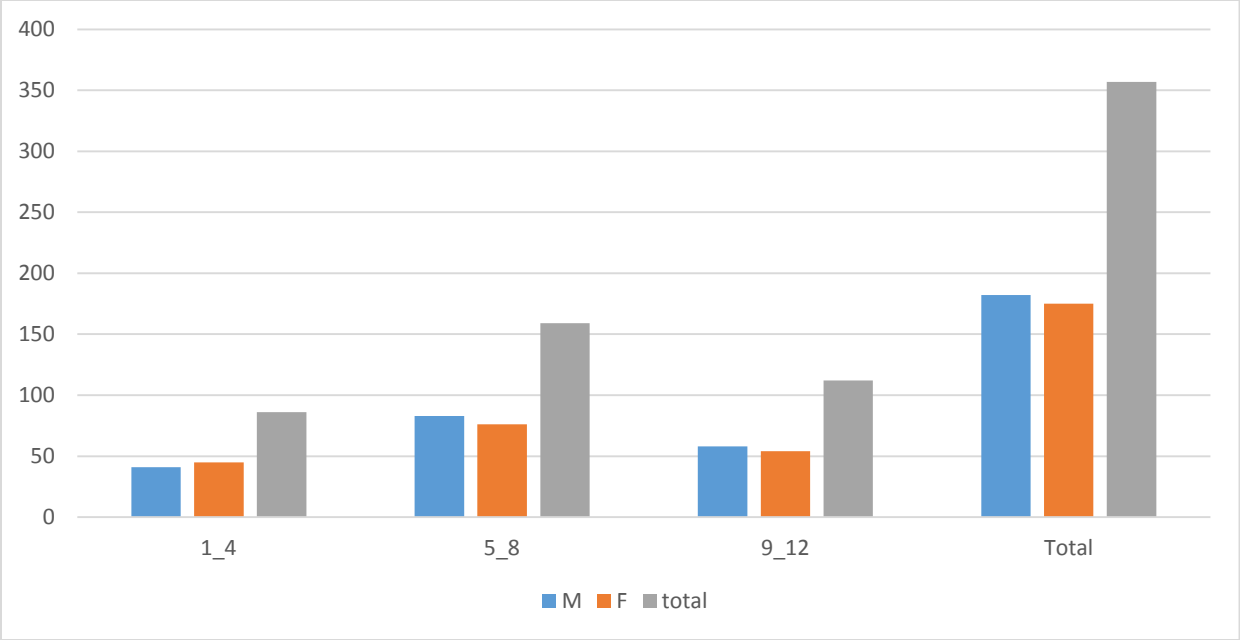


Figure 16: Description student drop out in 2009 EFY of Kola temben Tigray region Ethiopia

4.1.7. Water Supply

The source of water of the district is ground and surface water. There have been 301 shallow walls, 145 hand dag well and 27 spring development at district level. From 27 Kebelles of the district 3 kebelles have pipe water. The frequency of chlorination is every three months. The total coverage of water supply at Woreda level is 57%. There should be need more efforts to accomplish the supply of pure water to the community

8. Transport, Telecommunication, Power Supply and Road Facilities

Out of the 27 kebelles 13 have power supply and 25 Kebelles an accessed solar telecommunication but currently all are out of service except the mobile phones. Almost all kebelle have a rural road access. The road constructed for trade and networking kebelle to kebelle, district to district and region to region from Hawzen district to Tselemti and then to region 3 was crossed by the district from north eastern to west of the district.

4.1.9. Health Facilities

Table 9: Descriptions of health facilities from2008-2010 EFY of district kola temben in Tigray region Ethiopia

Type of health facilities	2008 EFY	2009 EFY	2010 EFY
	No. of Health facilities	No. of Health facilities	No. of Health facilities
Primary hospital	0	0	0
Health center	07	08	08
Health post	27	27	28

Table 10: Description of health facilities and their infrastructures of Kola Temben District 2010EFY Tigray region Ethiopia

Type of Health facility	No	Ratio/ Population	Have pipe water	Have no pipe water	power with 24hrs	Power <than 24hrs	Electronic media record	Have road access	Have no road access
Health Center	8	1:18474	1	7	7	1	7	7	1
Health post	28	1:5278	0	0	8	19	0	19	2
Pharmacy	8	1:18474	0	0	0	0	0	0	0
Diagnostic laboratory	3	1:49266	0	0	0	0	0	0	0

9.1. Coverage of PHCU

Table 11: Description of health facilities, ratio to catchment population of Kola Temben District in Tigray Region Ethiopia

S/n	Name of PHCU	Catchment population	Ratio of HC to population	Cluster of Health post per HC	Standard
1	Adiha HC	9694	1:96943	1	5
2	Arena HC	7237	1:7237	1	5
3	Dedere HC	13923	1:13923	2	5
4	Gelebeda HC	12851	1:12851	2	5
5	Guroro HC	19097	1:19097	3	5
6	Guya HC	27400	1:27400	5	5
7	Tsetsera HC	35637	1:35637	3	5
8	Workamba HC	22963	1:22963	5	5
	Around Abi Adi	6316	No HC	5	5

Table 12: Description of human resource to population ratio in Kola temben District in Tigray Ethiopia 2017-2018

S/n	Job title	Male	Female	Total	District actual ratio/popul.	Regional standard,2009	WHO Standard
1	Physician	0	0	0	0	1:44,880	/1:10,000
2	Health officer	14	4	18	1:8211	1:24,111	
3	B.Sc. nurse	3	0	3	1:49266		1:5000
4	Laboratory	0	3	3	1:49266		
5	Pharmacy techni	3	8	11	1:13456		
6	Nurse	16	42	58	1:2548	1:1,944	1:5000
7	Midwifery	6	19	25	1:5951	1:24,502	1:435
8	HEWs	0	68	68	1:2174	1:3,163	1;2500
9	HIT	2	5	7	1:4,21114		
10	Envir. Profession	1	1	2	1:73899		
11	IESO	1	0	1	1:147797		
12	Anesthesia	0	0	0	0		
	Total	46	150	196			

9.2. MNCH and EPI coverage of the district 2009 EFY (2016/17)

Table 13: Describes vaccine coverage of district Kola temben in Tigray region Ethiopia

S/n	Description	Performance(2009 EFY)			Performance(2010EFY)	
		Plan	Achievement	%	Plan	Achievement
1	ANC1 coverage	5025	7636	147.9	-	4363
2	ANC4 coverage	5025	5265	114.2	-	3333
3	Skill delivery	4581	3234	93.8	-	1928
4	PNC	4581	4096	95.2	-	2598
5	Maternal death	0	2		-	1
6	Live births	4581	3213	70	-	1930
7	Still birth	0	21	0	-	10
8	BCG coverage	4581	4798	103.4	-	2689
9	Measles vaccine	4286	4448	98.4	-	2445
10	Penta1	4286	5065	114.1	-	2812
11	Penta3	4286	4810	109	-	2688
12	PAB	4286	5065	106.8	-	2`807
13	Fully vaccinated	4286	4439	98.4	-	2445
14	Contraceptive preva	29707	21148	70.5	-	-
15	LAFP	7422	2426	32.68	-	-
16	TT2 coverage	34584	5300	106.8	-	-

[1]Source HMIS of kola Temben health office

4.1.9.3. Top ten diseases cause of morbidity on pediatrics and adults of Kola temben district in Tigray region Ethiopia in 2009-2010 EFY

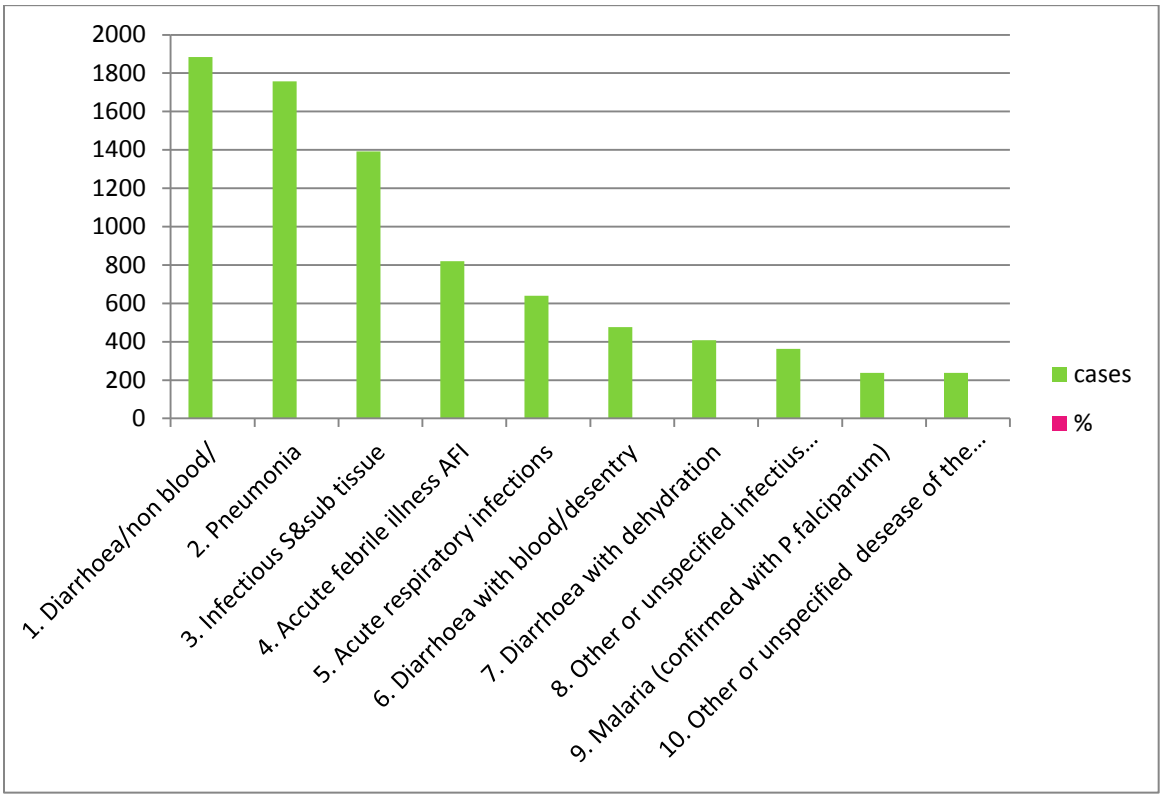


Figure 17: Top ten causes of morbidity under 5years age category of Kola temben district in Tigray 2009-2010EFY.

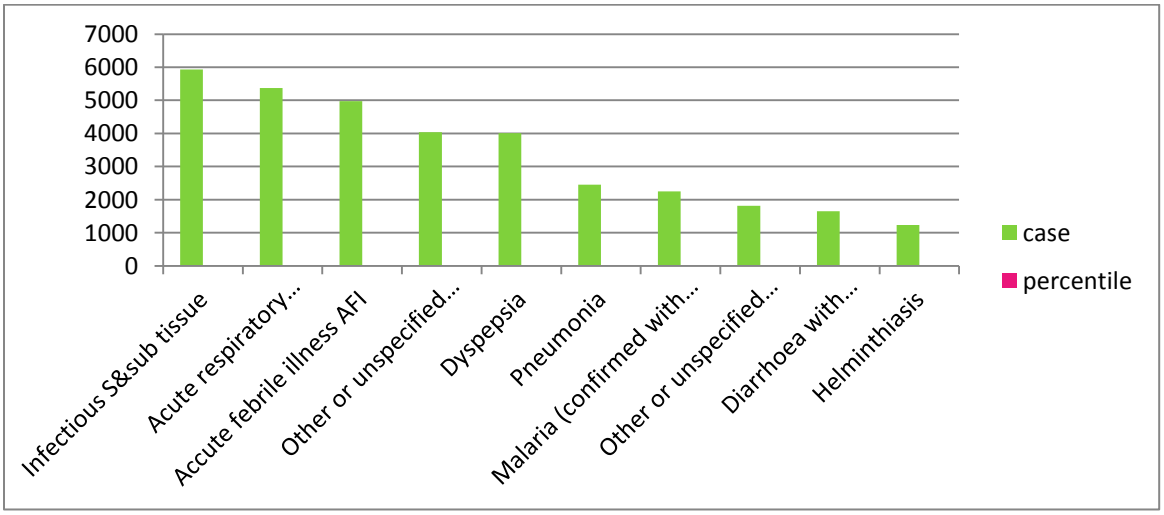


Figure 18: Top ten causes of morbidity above 5 years age group of Kola temben district in Tigray region Ethiopia.

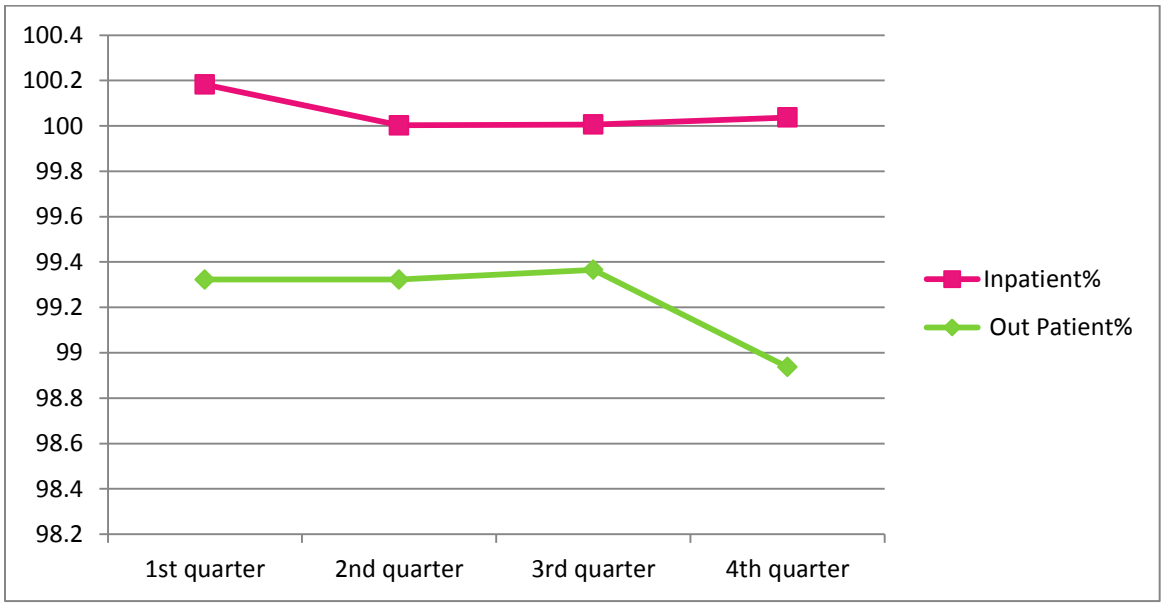


Figure 19: Description of in and out patients of district kola temben in Tigray region Ethiopia 2009EFY

9.4. Anti Natal Health Care

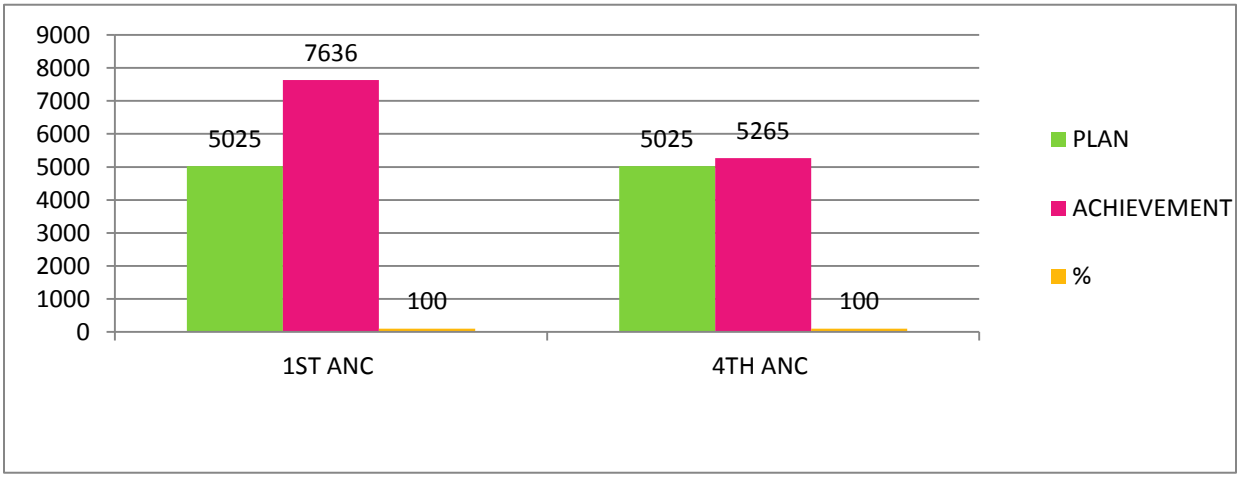


Figure 20: Describes 1st and 4th antenatal care coverage of kola Temben district in Tigray region 2009EFY Ethiopia

4.1.10. Disaster situation

Even though there has been disaster situation in eight villages there was no clear justified documents of the status in the total population except the dropout of students from school (Figure.4 above) and the nutritional coverage. (Figure 9 below)

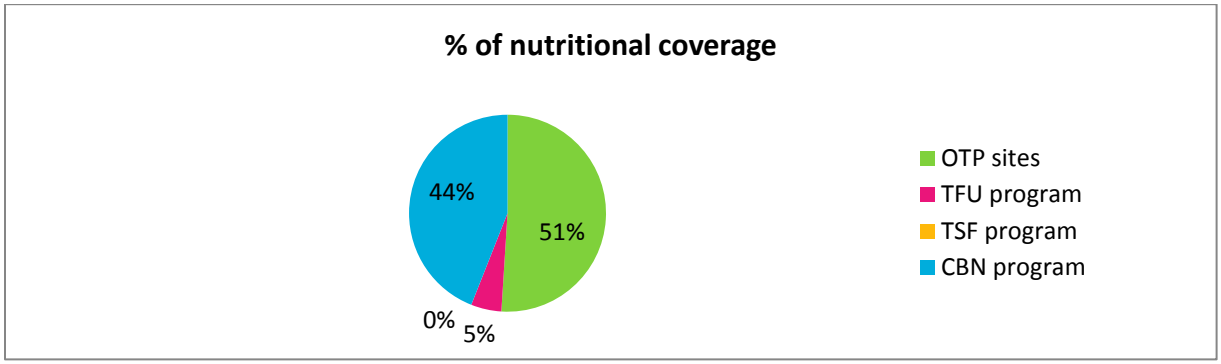


Figure 21: Description of nutritional coverage of Kola temben in Tigray region Ethiopia 2009EFY

4.1.11. Epidemic Disease

4.1.11.1. Malaria

Even though malaria is one of the high risk diseases of the district, the result of health profile assessment describes, currently the status of the case situation decreases from the top to the middle of top diseases of morbidity of the district on all age in 2009-2010 EFY. From the total cases 28167 on RDT 9302 slides were malaria positive confirmed. 2063(7.3%) positive to PF, 5560(19.7%) to PV and the rest were mixed results. The age group of equal or greater than15 years was more affected 4410(15.67%) male and 1507(5.35%) females from the recorded cases.

Prevention and control measures had been taken at 15 Kebelles and 45 villages selected more risk areas to malaria and 100% of ITN distribution was performed. But prevention and control measures had been taken in nine Kebelles. At that time 68270 houses sprayed by anti-mosquito insecticide and 78794 residents were protected from infection in 2009 EFY. Public awareness of malaria was given to the people during and after the distribution of nets concerning preventing methods, control, and management of net and sprayed houses.

4.1.12. Tb/Leprosy Prevalence

A total of 129 had been detected for TB case. And 46(35.6%) of them tested for HIV, from the tested ones 1 (male) was positive. A contraceptive user of those with HIV was 28.

4.1.13. Budget Allocation to Health Sector

Table 14: Descriptions of health sector annual allocated budget at district label of Kola temben Tigray region Ethiopia

S/n	Activities	2007EFY	2008EFY	2009EFY	2010EFY
1	Cost operatives	871568	987786	1092184	-
2	Salary	820025	343416	460415	-
3	Total	1,691,593	1,331202	12,280,246.92	12,990,240.00

14. Organography

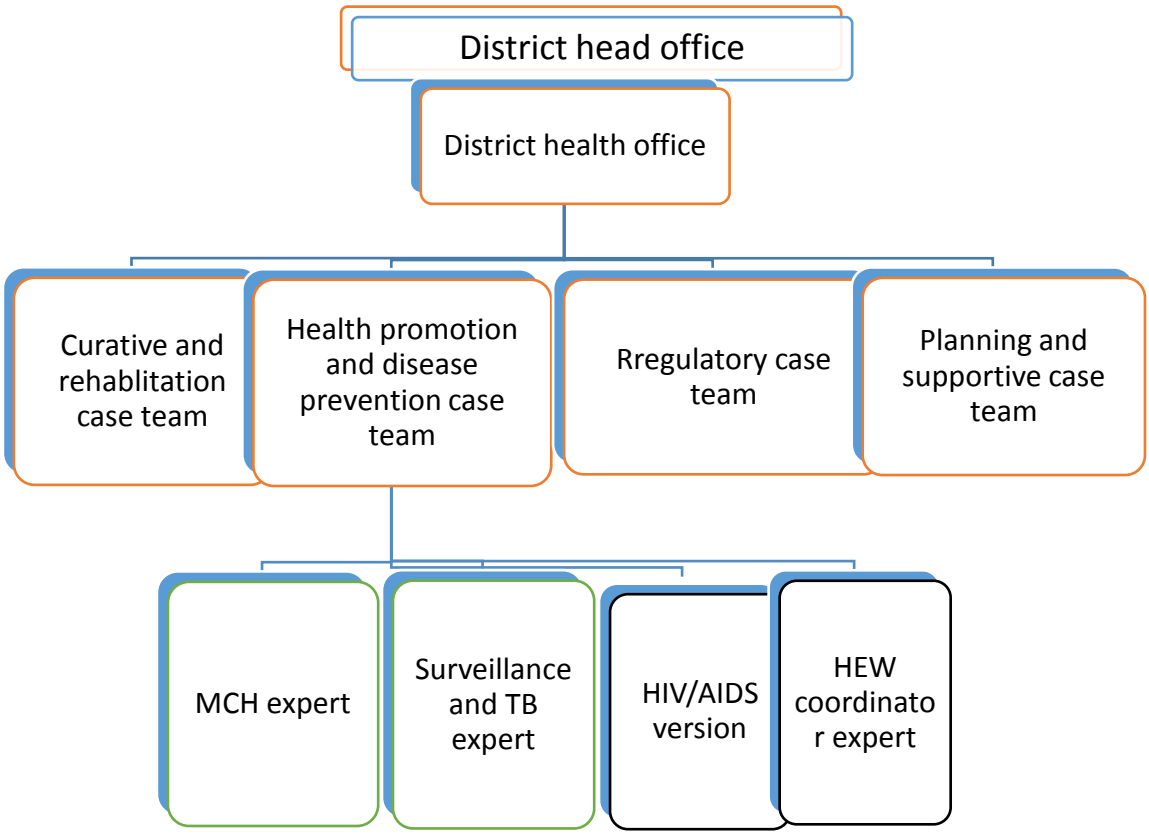


Figure 22: Organographies' of Health office

The graph in figure 38 describes the hierarchy of the organographies' of health office in the district.

4.1.15. Discussions

The current assessment reveals that, the HH family size was 4.6 and the reproductive age 15-49 years(23%) from the total population. Which had a significant difference from national 4.7(2016 EFY) and 4.4 regional standard (2008EFY) HH family size. The age group categories were <5(15%), < 15(30%), 15-64 (50.3%) >65 years (4.34) according the plan and finance office of the district. There were (N=21) still births and (N= 3213) live births (N=3234) total delivery by skilled personnel recorded.

There was a coverage of PNC 4096 (95.2%) and skill delivery of live birth 3213 (71%). BCG and measles coverage of the district 4798 (103.4%), 4448 (98.4%) and Penta1, Penta3, PAB and fully vaccinated were 5065 (114), 4810 (109), 5065(106.8), and 4439 (98.4) respectively. From 179109 children screened 448 were Sever acute malnutrition, 53 exit, 37 recovered and 15 were transferred. From the total 29707 expected to use contraceptive, 71.2% (21148) were contraceptive users. Concerning environmental hygiene there is 6175 HHs uses improved and 4474 unimproved latrines. In 53 villages did home delivery free. Testesra and Guya health centers service to population still above the standards and Arena health center also minimum population to service provider. This was because of settlements of the residence makes them a service difference. Based on the Health Sector Transformation Plan of MoH 2015/16-2019/20 the health institution to population ratio is Health Post 1:3,000-5,000 people, Health Center 1: 15,000-25,000 people. In the current health profile assessment result shows, health center1:18475 and health post 1:5474 -1:5274 (2010 EFY) to total population. But two of the services were below the average needed population (health center1:20000) and (health post 1:4000). It implies additional (2 HC, 2HP) will be needed for the time being.

Overall, 20 percent of households in Ethiopia have water on their premises, 77 percent in urban areas versus only 6 percent in rural areas. Forty-five percent of households spend 30 minutes or longer to obtain their drinking water, 53 percent in rural areas, as compared with only 13 percent in urban households.(68)

4.1.16. Conclusion

Even though the district was high risk in malaria currently, diarrhea with and without blood, subcutaneous skin disease, pneumonia and acute febrile diseases are among the top causes of morbidity and prioritized on the district. It implies more efforts were implemented on prevention and control measures of malaria. As the assessment describes prevention or vaccine achievements were more than planned. But it doesn't mean they free of all, it needs series attention on planning. The Education and health coverage at district label is at medium standards of the millennium goals. In spite of this, the quality of, infrastructure, standardized activities, line list, documentation and general public services productivity should be need update with global standard of science and technologies. There should be separate technical school at district label from secondary school. The analysis shows still health center and health post, high school, technical schools were less than the average needed.

4.1.17. Recommendation

The current top causes of morbidity of the district indicates that more efforts were to reportable or communicable diseases; but on the other hand, non-communicable like nutritional and parasitic diseases have also needs attention not less than communicable diseases.

- A series attention should have been given to the causes of still birth in mothers.
- The health service documentation should need to be update and clear in all activities of the sector.
- Data of today is data for tomorrow; there for the data should not fallacy depending on personal performances. Line list data is a permanent source document of the district.
- The district standard in constructing HC, HP, and Elementary school has progress; Secondary and technical schools should be need additional
- And the public services should improve practically. Still the result indicates the service of the health center and health post, as well as providers were less than the average need of population.
- Home delivery should be free at each household label. Villages that make home delivery free, should be publicizing to the remaining villages.
- Resource and coverage of pure water supply should have been given prioritizing of the district.

CHAPTER 5: SCIENTIFIC MANUSCRIPTS FOR PEER REVIEWED JOURNALS

5.1. Surveillance Data Analysis on Prevalence of Suspected Anthrax cases in Tigray Region (Since 2015-2018)

ABSTRACT

Anthrax is primarily a zoonotic disease caused by the spore forming bacterium Bacillus anthracis. The remarkable stability of these spores makes them an ideal bio weapon, and their destruction in decontamination activities can be a challenge.

Anthrax has significant economic and public health impact around the world, especially in developing countries in Africa.

In Ethiopia, suspected cases of anthrax are reported from several districts, few of these are officially confirmed. Anthrax is an endemic causing disease both in humans and animals. This is the need to describe the prevalence of suspected anthrax in human and animals.

Methodology: A retrospective recorded data was used to collect and review line list and passive surveillance of outbreaks in animals from January to March 2018. The data since 2015 to 2018 were collected from Tigray Regional Health Bureau and Bureau of Agriculture and Rural Development based the ethical considerations of these bureaus. All data were cleaned electronically using Microsoft excel worksheet**.**

Result: A total of 410 suspected cases and 6 deaths were recorded since 2015-2018 in the region. It also affects all age group and sex. Males are more affected. In terms of time; the highest suspected cases also recorded in 2016. In terms of place 65% of the total suspected cases were reported from central zone.

The description's in data of annual vaccination coverage in domestic animals increases regionally. The descriptions of passive surveillance data in suspected anthrax case report in animals,' morbidity is high in 2016, 2017 and 2015 and mortality in 2017 2016 and 202015.

Conclusions: The risks are identified based on the case definition of the study on suspected anthrax; therefore, the veterinary service delivery system, surveillance system and should improve. The community should know the risk of anthrax disease and its prevention methods.

Key words: Anthrax, Bacillus, Animal, human, prevalence, Tigray

5.1.1. Introduction

5.1.1.1. Background

Anthrax is primarily a zoonotic disease caused by the spore forming bacterium Bacillus anthracis. B. *anthracis*, a gram-positive, non-motile, spore-forming rod that is found in soil and commonly causes disease in herbivores. Anthrax spores can survive for extended periods in the environment. The remarkable stability of these spores makes them an ideal bio weapon, and their destruction in decontamination activities can be a challenge(27). Human anthrax is mainly of two types, agriculture related anthrax that occurs in a seasonal pattern, and occupation related that can occur at any time. Based on the route of infection, clinical forms of anthrax are; cutaneous (skin), gastrointestinal (ingestion) and Pulmonary through inhalation of spores. Recently, another type of anthrax has been identified among the heroin injecting drug users Europe(28).Humans can get anthrax infection by handling animal products from infected animals or by inhaling anthrax spores from contaminated animal products. It can also be spread by eating undercooked meat from infected animals. Direct human to human transmission is unknown. In developed countries, it is on the way out but in developing countries, it is still a great public health burden, especially in low-income group people(29).

Anthrax has significant economic and public health impact around the world, especially in developing countries in Africa. In 2011, 21 Member States reported anthrax outbreaks to AU-IBAR recording a total of 629 outbreaks, 5655 cases and 1735 deaths. The upper most numbers of outbreaks were (452), (44) and (25) reported by Ethiopia followed Somalia and South Africa respectively. As MS of AU-IBAR, the highest number of deaths was also recorded in Ethiopia (1102), followed by Zimbabwe (119), Guinea Bissau (109) and Cote d'Ivoire (103) (5)(31).

In Ethiopia, suspected cases of anthrax are reported from several districts, few of these are officially confirmed. Anthrax is an endemic disease which occurs in May and June every year (‘anthrax season’) in several farming localities of the country, causing disease both in humans and livestock(71). This is **the need to describe** the prevalence of suspected anthrax in human and animals, in terms of person, place and time in Tigray region**.**

5.1.2. Methodology

Tigray region is found in the northern part of Ethiopia a distance of 783 km far away from Addis Ababa, capital city of Ethiopia. According to CSA 2007 EFY, it has a total population of 5247005. It is bordered in the north by Eritrea, in the south by Amhara, in the east by Afar and in the west by Sudan. The region is administratively divided into 7 zones, 52 Woreda and 814 kebelles. It has an amazing landscape with the Tekeze Gorge at 550 meters above sea level and the mountains like Tsibet peaking at 3935 meters. Public health care services in Tigray are delivered through 1 specialized hospital, 15 general hospitals, 20 primary hospitals, 204 health centers and 712 health posts. The population of animals in Tigray region is 4,201,501 cattle, 4, 506, 64 sheep and goats and 155,434 chickens. CSA; 2014/2015. There had been also 172 veterinary service clinics.

Data was collected from January to March 2018 from line list of public health emergency management, health management information system of (TRHB) and passive surveillance outbreak report of suspected anthrax cases in animals from Bureau of Agriculture and Rural Development. During data collection and analysis, the ethical commitment of the Regional Health Office and Bureau of Agriculture and Rural Development were followed. All the process was started after permissions obtained from Tigray regional health bureau

The study was carried out in the suspected human anthrax populations of the region which previously recorded and collected by surveillance report data of human management information system (HMIS) and public health emergency management (PHEM) of regional health bureau and passive surveillance reported cases in animal population from bureau of agriculture and rural development (BOARD).

A retrospective record data review of Line list, passive surveillance of outbreaks, immunization status in animals since 2015 to 2018 were collected in Tigray regional health bureau (HMIS and PHEM) and Bureau of Agriculture and Rural Development veterinary service. And cleaned electronically using Microsoft excel worksheet. A descriptive statistic was performed to generate rates, frequencies and percentages. The results are presented in narrative, tabular and also in graphical presentation**.** All suspected anthrax case records from secondary data of regional public health emergency management and line list of HMIS, and passive surveillance of outbreak

reports from 2015-2018 regional bureaus of agriculture and rural development (animal health and fishery core process). Moreover, a raw data since 2013-2014 were presented in graph to explain about the trend of six years in both sectors.

The data do not have the type of anthrax, clinical and laboratory findings. The data of 2013-2014 presented in graph or table are not defining the case definition. But views the trend of the disease. The line list that had no complete information of variables was not included in the analysis. (2013-2014).

Case definition

Human anthrax

Suspected: A case that is compatible with the clinical signs.

Probable: A person that have contact with a suspected and consumed from infected animal.

Human exposure to anthrax

Possible exposure: A person who had contact to anthrax susceptible animal and outbreak area

Probable exposure: A person who had close contact with susceptible animal displaying clinical signs consistent with anthrax at time of the exposure.

Exposed: A person who had contact with infected animals occupationally or consuming of meat infected animal

5.1. 3. Result

6.1.3.1. Distribution of suspected anthrax cases by person, time and place in human

In terms of person; the result of the data collection and analysis describes that, 410 suspected cases and 6 deaths of anthrax in human are recorded since 2015-2018. It also affects all age category but more to the adult age who have exposures to animals and animal products. There is also a slight difference in gender issue. Males are more infected. In terms of time; the highest suspected cases also recorded in 2016 and list in 2015 (Figure.2).

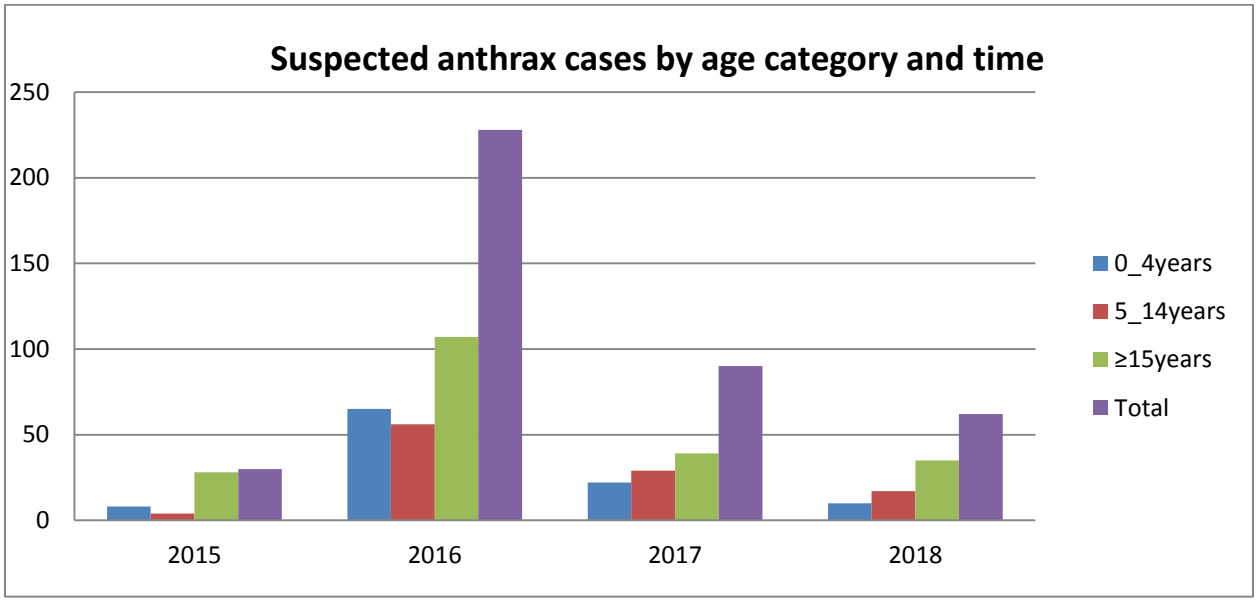


Figure23. Description of suspected anthrax case by Time and Person in Tigray region Ethiopia (since 2015-2018)

In terms of place 65% of the total suspected case reported from central zoon in the four consecutive years. (Table22.).

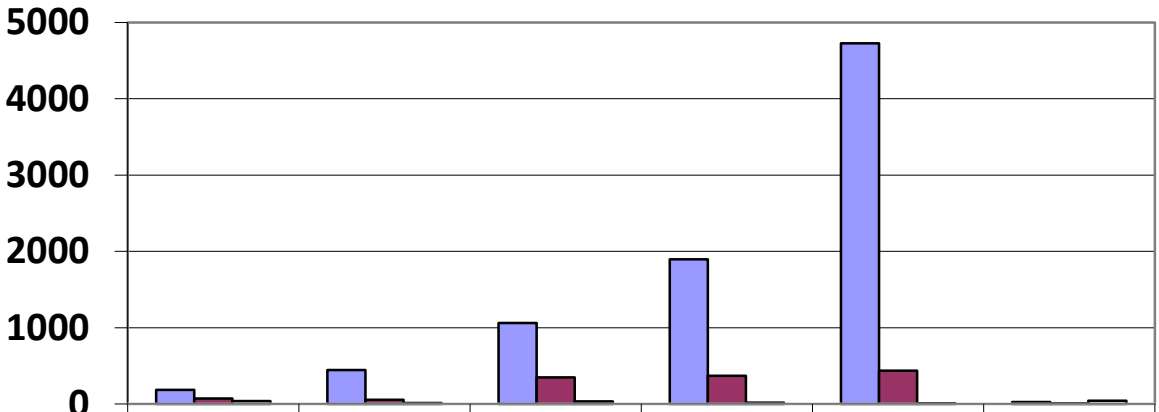
Table 15 Tabular description of morbidity rate on the suspected anthrax cases by zone

S/n	Zones	2015	2016	2017	2018	%
1	Central	28	163	40	37	65
2	East	2	3	21	2	6.8
3	N/west	0	45	7	5	14
4	South	0	0	2	1	0.7
5	Southeast	0	13	13	17	11
6	West	0	4	7	0	2.7
	Morbidity rate	30 (0.001)	268(0.004)	90(0.002)	62 (0.001)	

Description of the disease in animal

Descriptions data of annual vaccination coverage in domestic animals increases every year regionally. When it stratified by zones; when central zone increases, northwest zone decreases every year in coverage. (Figure.3.)

The descriptions of passive surveillance data in suspected anthrax case report in animals' morbidity is high in 2017, 2008 and 2007 and case fatality in 2018, 2013 and 2014 (Figure .2)



	2013	2014	2015	2016	2017	2018
Morbidity	185	446	1061	1895	4725	25
Mortality	73	54	348	369	436	11
CFR	39.5	12.1	32.8	19.5	9.2	44

Figure 24: Passive surveillance of suspected anthrax cases in animals by time from 2013-2018 in Tigray Ethiopia

The annual districts vaccination coverage of animals describes almost the same label in increasing but also unexpected changes are happening up and down (Tsegedie and Thelemti) (Figure 34 bellow)

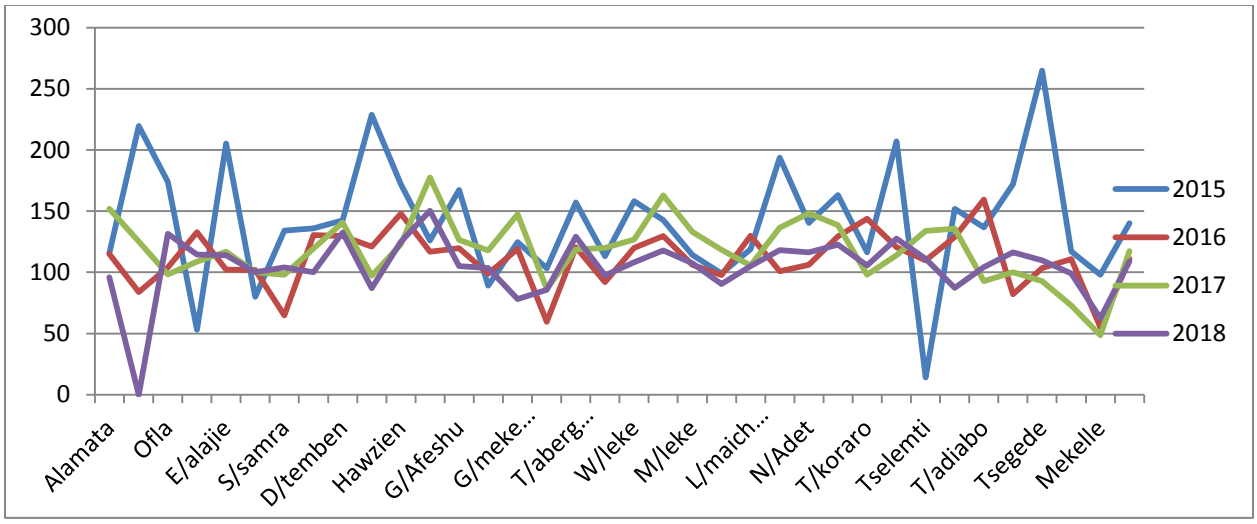


Figure 25: Annual animal vaccine coverage by district 2015-2018 of Tigray region Ethiopia

Trend of human and animal anthrax in terms of time.

In both human and animal's data describes the same language in terms of place in central zone, and more suspected cases recorded in 2016. It implies the endemic and zoonotic importance of anthrax.

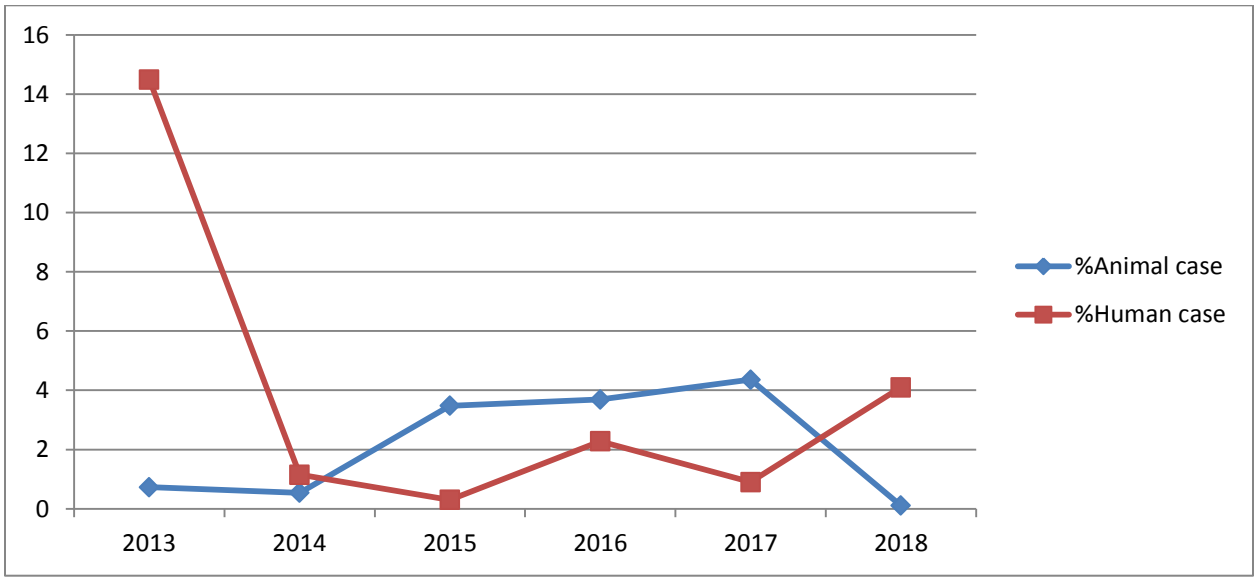


Figure 26: Trend of raw data of suspected anthrax case in human and animals' 2013-2018 in Tigray region Ethiopia

Figure 35, above describes that the trend of suspected anthrax case in human and animals have no indication in progress of reducing the burden. But it implies the gap between the two sectors in working together.

5.1.4. Discussion

The suspected anthrax case is endemic in the region based on the findings. In terms of person a total of 410 cases were recorded since 2015-2018 The highest cases 228 (55%) were recorded in 2016. From the total suspected cases, 375 (91.4%) were out patients. 46.3% of the suspected cases were females. The attack rate of suspected anthrax case by age category was 48.1% (≥15), 26.1% (5_14), and 25.9% (0_4) respectively. The incidence rate over 10000 populations is 0.059, 0.4, 0.17 and 0.12 2015-2018 respectively (Table 22)

In terms of place, the occurrence of suspected anthrax case is mostly occurred in central zone (65%/410) of the region. Even when the data is stratified it leads to specific districts. The case fatality rate of suspected anthrax in Tigray region in humans' accounts 1.46% but other studies states that, Gastro intestinal anthrax is very dangerous and its mortality rates rages from 25% - 60%(34). More over untreated cutaneous anthrax can be also as high as 25%. If untreated, all forms of anthrax can lead to septicemia and deaths (37). Two of the study have a significant difference from the current study; this may be happed due to the study time difference. The present knowledge of the community on the health aspect may have not the same or improvements were seen at this time than the time they study. In addition to this, the current study is suspect case but their study was confirmed by type. In other studies indicates that, the case-fatality rate is estimated between 5% and 20%.which was different than this study(47).

The animal's passive surveillance record describes that a total of 9337 cases and 1293 death were recorded in the last six years. The case fatality rate in animals were high in 2018, 44 %(11/25) and low in 2017 9.2 %(436/4725). It was the universe of morbidity which was 4725 cases in 2017 and 25 in 20180. (Figure 2). On the other hand, the vaccination coverage in animals also indicates progress every year as well as the management of animals.

Anthrax is endemic and reportable diseases in the region. Based on the current study, the occurrence of suspected anthrax in terms of person, place and time it is still rise and fall. The trend of the disease in these four years describes there is no sex difference; but the incidence rate indicates more in adults (15 and above years) than others. This studies strengthen to the study on; the major sources of naturally acquired human anthrax infection are direct or indirect contact with infected animals or occupational exposure to infected or contaminated animal products(45).

Central and northwest zones are the most affected area in human and animals. The overall trend describes there was no system implemented to work together as one health strategy in the discussed four years. (Figure 40).

5.1.5. Conclusions

The present study indicated that the most endemic area of the region was identified in both species had the same area. Which accounts 65% of the recorded with in the discussed period of time. The suspected cases had not age and sex difference but implied the high risk age and sex. Those have close contact with animals and animal products and occupational risks were viewed.

The following actions are recommended as control approach for anthrax:

- Improving the animal health service delivery system
- A series attention should be given to the risk areas identified in one health approach.
- The communities should know the risks of suspected anthrax.
- The surveillance system data recording should use updated electronic and laboratory system

CHAPTER 6: Abstract Writing

6.1. Abstracts for Scientific Presentation

ABSTRACT

Background: Epidemiologic surveillance system evaluation is the ongoing and systematic collection, analysis, and interpretation of health data in the process of describing and monitoring a health event(48). A surveillance system is usually established as an integral part of a health care system in order to monitor priority health events(49).

World Health Organization (WHO) in 2012 defined Public health surveillance as the continuous, systematic collection, analysis and interpretation of health-related data needed for the planning, implementation, and evaluation of public health practice[3].(50)Anthrax is an important economic importance in the glob and endemic diseases in Ethiopia as well as in the selected districts in Tigray region; this is the objective why selected for the system evaluation.

Objective: To evaluate the performance of existing surveillance system of anthrax on Kola temben and Abi-Adi districts in Tigray region Ethiopia.

Methodology: Abi Adi and Kola temben districts was purposively selected based on the occurrence and public importances of the disease; Anthrax an immediate reportable endemic disease was considered on the surveillance system evaluation. HC and HP were selected by simple random sampling and in Hospital.

Result: In all of the districts and health facilities standard case definitions and national guidelines manual were available. All health posts use RDT to malaria patients based on the case definition and had a thresh hold for malaria at each health facility. Emergency preparedness plan had ready in 100% the Health and all timely reporting. Based on the feedback of reports health posts Begasheka, G/mlesiley, Simret and Zelakme (n=3, 57.1%) and D/Ataklity (n=4, 14.3%) and Denbela (n=2, 28.6%) received from higher levels. Feedback from district and health center was dominant on giving timely. Health centers Work Amba (n=3), Zelakme (n=2) received a feedback from the higher level. The system of the surveillance and feedback mostly practiced by phone and supervision (face to face contact). All the system attributes completeness, timelines, acceptability, and usefulness were similar in all health facilities. All the visited laboratories had a

capacity to collect, examine, handle and send samples to higher diagnostic laboratories. Guya, Workamba and Abi Adi health centers perform internal quality control and supervised by Abi Adi hospital for external quality control.

Conclusion and Recommendation: A focal person of surveillance was present in all assessed health facilities; a surveillance report was simply accepting and sent without any interpretation and analysis to the higher levels. They lack the capacity to analyze and interpret data by chart and graph descriptions. But all facilities had a malaria thresh hold by flip chart and recording of cases by person, time and place. The flow of report from lower to higher level was appreciated by the two sectors. In spite of reporting anthrax, in veterinary service delivery was reported monthly as passive surveillance. The integration between the two sectors was almost none, they tried only when an outbreak of suspected cutaneous anthrax, rabies and other zoonosis diseases was occurred in humans and they exchange the idea of control and prevention methods at every level of the two sectors with the community based on RRT and outbreak committee.

Key Words: Anthrax surveillance, Tigray 2018

Chapter 7: Epidemiology Project Proposal

7.1. An Assessment of Knowledge Attitude and Practice on Brucellosis in Southeast Zone of Tigray Region, Ethiopia: (2019)

ABSTRACT

Introduction

Brucellosis is caused by the small, non-motile, non-encapsulated, facultative intracellular gram-negative coccobacillus. Several Brucella species infect humans; usually B. abortus , B. m, B. ovis and B. suis rarely B. canis(16).

Brucella melitensis is the most pathogenic and invasive species of Brucella and more frequently it occurs in the general human population than in the other known species.

Signs in humans include intermittent or irregular fever, headache, weakness, profuse sweating, chills, weight loss and general aching (18).

Although accurate estimates of human incidence are lacking, largely because of under-reporting and misdiagnosis [5], brucellosis is considered one of the most common bacterial zoonosis worldwide [6].(15) It affects people in many parts of the world. Mediterranean countries of Europe, North and East Africa, the Middle East, South and Central Asia and Central and South America [1, 2]. The importance of brucellosis for public health is associated with expanded trade in animals and animal products [3, 4].

The global burden of human brucellosis remains enormous [2, 4]. Though eradicated in many developed countries after years of effort, the disease is still a major neglected zoonosis of developing countries, including Nigeria [1] (26).

As compared to study of animal brucellosis, study of human brucellosis in Ethiopia is sparse with even less information on risk factors for human infection. For instance, out of 56 cases with fever of unknown origin, two (3.6%) were reported to be positive for B. abortus antibodies by RBPT and CFT (Tolosa et al., 2007).(15) A cross sectional study conducted from October 2007–April 2008 western Tigray carried on assessing the effect of Brucella infection on reproductive conditions of females breeding bovine and to explore the presence of Brucella seroreactors in vulnerable humans. The result indicated that the overall prevalence in female cattle was 6.1% and 1.2% prevalence among human risk groups, all of which were herdsmen.

Objective: To know the KAP of the community and describe epidemiological risk factors of Brucellosis in terms of person, place and time in Tigray region.

Methodology

A cross-sectional study design will be carried on from March to August 2019; and a standard questionnaire will be used based on the epidemiological risk factors of brucellosis.

5. 1.1. Introduction

5.1.1.1. Background

Brucellosis is caused by the small, non-motile, non-encapsulated, facultative intracellular gram-negative coccobacillus. Several Brucella species infect humans; usually B. abortus , B. melitensis, B. ovis and B. suis rarely B. canis.(16)

It is a zoonosis, caused by several species of Brucella bacteria that have their natural reservoir in domestic animals. Brucella melitensis is the most pathogenic and invasive species of Brucella and more commonly it occurs in the overall human population than in the other known species [1]. Human brucellosis is a multisystem disease, expressed by non-specific symptoms and affects mainly the muscosceletal system evidenced by generalized aches and pains [2](17).

It is a highly infectious for humans causing a disease often called undulant fever or Malta fever, since it was first recognized in Malta during the 1850s. Brucellosis is typically spread when the animal aborts or gives birth. High levels of bacteria are found in the birth fluids of an infected animal and can survive outside the animal in the environment for several months, particularly in cool moist conditions. They remain infectious to other animals which become infected by ingesting the bacteria. It also inhabits the udder and contaminate the milk. The disease can also infect animals and humans through cuts in the skin, or through mucous membranes. The reservoir of disease in wildlife complicates eradication efforts (17).

Signs in humans include intermittent or irregular fever, headache, weakness, profuse sweating, chills, weight loss and general aching. Infections of organs including the liver and spleen may also occur. Veterinarians, farmers, and abattoir workers are vulnerable to infection as they handle infected animals and aborted fetuses or placentae(18).

It can also manifest as a localized disease, affecting the central and peripheral nervous system, and the gastrointestinal, and hepatobiliary, genitourinary, musculoskeletal, cardiovascular, and integumentary systems. Osteoarticular manifestations, specifically peripheral arthritis, sacroiliitis, and spondylitis, are the most common problems, occurring in up to 40% of cases in

some series. Although Brucella endocarditis is rare, it is the most serious complication, accounting for most of the 5% total mortality rate seen in human brucellosis(19).

About half a million cases of human brucellosis occur around the world each year. The principal causing organism worldwide is Brucella melitensis, a species of Brucella found in sheep and goats. Human brucellosis is commonly found in countries with rural communities that live in close association with animals, and its prevalence in a region depends on factors such as methods of processing milk and milk products, food habits, socioeconomic status, hygiene, and climate(19).

Consumption of contaminated foods and occupational contact remain the major sources of infec tion. Examples of human-to-human transmission by tissue transplantation or sexual contact are occasionally reported but are insignificant. The true incidence of human brucellosis is unknown. Reported incidence in endemic-disease areas varies widely, from <0.01 to >200 per 100,000 populations (3). While some areas, such as Peru, Kuwait, and parts of Saudi Arabia, have a very high incidence of acute infections, the low incidence reported in other known brucellosis-endemic areas may reflect low levels of surveillance and reporting, although other factors such as methods of food preparation, heat treatment of dairy products, and direct contact with animals also influence risk to the population(20).

Brucellosis is accepted as a significant public health challenge, with major economic and financial burdens in countries where the disease remains endemic. In livestock, the disease typically manifests as reproductive failure, often through abortion or the birth of weak, infected off-spring(21).The World Health Organization (WHO), Food and Agriculture Organization (FAO), and World Organization for Animal Health (OIE) reflect brucellosis to be one of the most wide-ranging zoonosis causing considerable morbidity in both livestock and human populations globally. Brucella is also a potential agent for bioterrorism because of its propensity for airborne transmission and induction of a chronic debilitating disease that requires combined and lengthy antibiotic therapies(22).

The Brucellosis 2003 International Research Conference estimated that 500,000 human infections occur per year worldwide, with incidences ranging from less than one case per 100,000 population in UK, USA and Australia, through 20 to 30 cases per 100,000 in southern European countries such as Greece and Spain, to more than 70 cases per 100,000 in Middle

Eastern States such as Kuwait and Saudi Arabia (Cutler and What more, 2003; Pappas et al., 2006)(23).

The annual incidence ranges from 0.3 cases per million in some developed countries to >1000 cases per million in endemic areas [1](24).

Although accurate estimates of human incidence are lacking, largely because of under-reporting and misdiagnosis. Infected livestock are the source of most human cases; therefore, prevention of human brucellosis is dependent on the control of the disease in livestock. This has been achieved with vary in degrees of success using a combination of vaccination, test and slaughter of positive animals and quarantine/animal movement controls(15).

It affects people in many parts of the world. Mediterranean countries of Europe, North and East Africa, the Middle East, South and Central Asia and Central and South America [1, 2]. The importance of brucellosis for public health is associated with expanded trade in animals and animal products [3, 4]. The reduced control of hygienic measures poses a risk of spreading the disease and return into Brucella-free regions(25).

The global burden of human brucellosis remains vast [2, 4]. Though eradicated in many developed countries after years of effort, the disease is still a major neglected zoonosis of developing countries, including Nigeria [1]. The incidence is directly related to the prevalence of the disease in animals, eating habits, poor hygiene and practices that expose humans to infected animals or their products [9](26).

In Ethiopia as compared to the study of animal brucellosis, study of human brucellosis is scarce with even less information on risk factors for human infection. For instance, out of 56 cases with fever of unknown origin, two (3.6%) were reported to be positive for B. abortus antibodies by RBPT and CFT (Tolosa et al., 2007). A study conducted in traditional pastoral communities by Ragassa et al. (2009) using B. abortus antigen revealed that 34.1% patients with febrile illness from Borena, 29.4% patients from Hammer and 3% patients from Metema areas were tested positive using Brucella IgM/IgG Lateral Flow Assay(23).

A cross sectional study conducted from October 2007–April 2008 western Tigray carried on assessing the effect of Brucella infection on reproductive conditions of females breeding bovine and to explore the presence of Brucella seroreactors in vulnerable humans. The result indicated

that the overall prevalence in female cattle was 6.1% and 1.2% prevalence among human risk groups, all of which were herdsmen(13).

5.1.1.2. Statement of the problem

Brucellosis is caused by the small, non-motile, non-encapsulated, facultative intracellular gram-negative coccobacillus. Several Brucella species infect humans; usually B. abortus , B. m, B. ovis and B. suis rarely B. canis(16).

Brucella melitensis is the most pathogenic and invasive species of Brucella and more frequently it occurs in the general human population than in the other known species. Signs in humans include intermittent or irregular fever, headache, weakness, profuse sweating, chills, weight loss and general aching. (18)Brucellosis in humans is acquired from infected animals through direct contact or indirectly by ingestion of animal products [22]

In Ethiopia as compared to the study of animal brucellosis, study of human brucellosis is uncommon with even less information on risk factors for human infection. For instance, studies revealed that, out of 56 cases with fever of unknown origin, two (3.6%) were reported to be positive for *B. abortus* antibodies by RBPT and CFT (Tolosa et al., 2007), in traditional pastoral communities by Ragassa et al. (2009) using *B. abortus* antigen revealed that 34.1% patients with febrile illness from Borena, 29.4% patients from Hammer and 3% patients from Metema areas were tested positive using *Brucella* IgM/IgG Lateral Flow Assay.

And in high risk group such as farmers, veterinary professionals, meat inspectors and artificial insemination technicians in Amhara Regional State (Mussie et al., 2007b), Sidama Zone of Southern People Nations and Nationalities Sate (Kasahun et al., 2007) and Addis Ababa (Kassahun et al., 2006) found a seroprevalence of 5.30%, 3.78% and 4.8% by screening sera from 238, 38 and 336 individuals respectively. The discrepancy between Regassa et al. (2009) and others might be due to difference in milk consumption habits and sensitivity of test methods used. Furthermore, Abebe et al. (2009) assessed the prevalence of major causative agents of acute febrile illness in 653 outpatients of four health centers in Northern Ethiopia. Among these febrile patients, *B. abortus* was detected in 6.3%, 3% and none of the patients in Finoteselam, Quirt, and both Dembecha and Jiga, respectively. In northern Tigray a study indicated that there was 1.3% (n = 225) prevalence of brucellosis among the examined herdsmen. The objective of the project is to describe the KAP in the zoonotic importance of brucellosis on the community.

5.1.2. General objective

- To describe the KAP in the epidemiological risk factors of brucellosis in terms of person, place and time.

5.1.2.1. Specific objectives

- To describe the outcomes of the KAP assessment in terms of person. place and time
- To investigate the epidemiological risk factors in human and animals as one health
- To implement screening test as one health approach in the community for confirmation
- To implement the prevention and control measures as one health in the community.

5.1.3. Methodology

5.1.3.*1. Study area and population*

The study area will be carried on Southeast Zone of Tigray which are cited around the capital city of the region. Southeast zone has four districts. Naming; Enderta, Degua Temben, Hintalo Wejerat and Saharti Samre. The zone has a population of 560,693(278,987 male). Southeast zone mostly affects drought. Mixed farming, irrigation, and daily work is the income sources. The districts cited between 30and 60 km from the capital.

The study will be carried on the total population 560,693, (Male 278,827and Female 280,896 of the selected districts which will have represented by randomly selected people.

5.1.3.2. Sampling

5.1.3.2.1. Sampling Technique

A proportional sampling technique will be used to allocate the number of Kebeles for the assessment for each district. Districts will purposively select kebelles and villages (considering accessibility, representativeness & feasibility for implementation) for the assessment among the selected areas. From selected woreda one health center with at least 3 catchment Kebeles will be selected purposively by woreda health office. The catchment Kebeles of the health center will be included in the base line assessment. Herdsmen/farmers, butchers, HEW, veterinarians, and cattle attendants, will be targeted for interview.

5.1.3.2.2. Sample size

A simple random sampling techniques will be used to select the three woreda from one zone and two kebelles from each: six kebelles are included in the assessment. A total of 384 interviewees from the selected district will be interviewed. In each woreda and health center two key staff will be interviewed

We calculate the sample size using the single population proportion formula supposing a 50% proportion of diagnostic knowledge level, 0.05marigional errors and 95% confidence level.

$$n = \frac{(z_{/2})2 * p (1-p)}{d^2} = \frac{(1.96)2(0.5)(0.5)}{(0.05)2} = 384 \text{ participants}$$

Where:

n = sample size

p = 0.5(knowledge level proportion of practioners)

z = x/2=1.96(Z-score corresponds to 95% confidence interval)

d = 0.05(margin of error) considering a 10% non-response rate, we increase the sample size to 422. Therefore, we will sample 50% livestock owners, 25% no livestock and 15% professional (human and animal health) and 10% non-professional.

5.1.3.4. Data collection materials and procedure

Materials

The assessment data collection will be conducted using prepared semi structured questioner for key informants and for interview. The data collection questioner will be prepared in English and translated to local language for data collection. A paper-based print our questioner will be used for data collection.

Procedures

A cross-sectional study design will be carried on to the potential risk groups for brucellosis from March to August 2019. Occupational workers, notably cattle attendants, local butchers, veterinarians, should identified first and then fully informed by the health posts or health centers. The proposal will have approved by institutional ethical review board of Addis Ababa University

of School of Public Health and by the Regional Health Bureau. Information will be collected using a pretested questionnaire about the possible risk factors associated with human *Brucella* infections such as assisting removal of retained fetal membranes and drinking raw milk. A pretested questionnaire translated to their local language (Tigrigna) will be prepared to the interviewee

5.1.3.5 Data management

Data collections

Paper based semi structured questionnaire will be used for data collection. Data will be collected at woreda, health center, and kebelle and community levels

Data collectors

Data collectors will be enrolled and used for data collection from the staff of the health centers on the selected woreda. Two data collectors will be needed for selected woreda and kebelles in the woreda. A total of about 12 data collectors are needed for the assessment. The data collection will be finalized in 15 days.

Data quality

Training will be given to r data collectors. A two days training on overview and rationale of community base surveillance, data collection tools familiarization, data quality and management will be organized. A total of 12 data collectors 3 supervisors (one representative from woreda, two from health centers each and 2 trainer and facilitators will be assigned to ensure data quality and data entry. Data collectors will submit questionaries' to supervisor on daily basis. Supervisors will collect completed data and review for data quality. Supervisors will also enter data to a template prepared for data entry on daily basis.

Data processing and analysis

A standard data entry template will be prepared by the researcher. Data collectors will submit completed questioner to supervisors on daily basis. Paper based data collection will be reviewed for data quality and enter data to the designed template and process data cleaning by supervisors. The researcher need to collect from each supervisors and compiled the data entry template. In addition to data analysis it will be carried out at regional level to generate regional summary reports.

Report writing

A summary report of the assessment will be generated by the researcher for his respective regional assessment. A compiled report for the region and Addis Ababa University will be produced by the researcher.

5.1.3.6. Report disseminating and utilization

The print and softcopy compiled report of the assessment result will be made available for stakeholders and implementers. The compiled reports will be shared with the region and uploaded web site. A workshop will be organized by researcher to present the assessment result and to build consensus on the community-based surveillance implementation standards. The report will also be used to develop the guideline and operating procedure for community-based surveillance program on brucellosis and other zoonosis diseases.

5.1.3.7. Action plan for assessment

The schedule of the program expected from March-August 2019.The nature of the disease is experiencing clinical sings stays from days to 6 months. Moreover, contact person with animals will be experienced mostly at this season. Because it is time of ploughing and rain most of the animals shade together with the owner at any time.

Table 16: Description of project operational calendar

Activity	March	April	May	June	July	August	Remark
Questionnaire preparation	**X**						
Questionnaire pretest	**X**	**X**					
Consent letter preparation and introducing to selected woreda		**X**					
Interviewing & data Collection			**X**				
Entering and cleaning data				X			
Analyzing and interpreting data					X		
Disseminating data						**X**	

5.1.3.8. Resource Required

When the budget was allocated, it is based on time of the community and investigating the risk factors of the diseases. In addition, professionals on the spot including additional supporters from different sectors will be deployed on screening.

Table Budget allocation of the project

S/n	Item / participants	Allowance	Total price	Remark
1	Professionals Starting workshop Data collectors & supervisors Researchers Diver Fuel Stationary Pencils and Pen	 1* 450*1days 12*450*1days 1*450*40days 1*450*15days 400lt*18.00 2pkc4A paper* 15pcs*2.00 17pcs*5.00	 450.00 5400.00 18,000.00 6750.00 7200.00 500.00 30.00 85.00	
	Sub total		**38,415**	
2	Workshop Participants stimulants 15 participants Tea Coffee xxx	 5 p*5.00 and 5 bread 5p*15.00 &bread*2.00	 35.00 112.00 53.00	
	Sub total		**200.00**	
	Total cost		**38,615**	

CHAPTER 8: Additional Works

8.1: Manual of Brucellosis in Human and Animals, Control and Preventive Measures

Introduction

Brucellosis is a zoonotic infection transmitted to humans by contact with fluids from infected animals (sheep, cattle, goats, pigs, or other animals) or derived food products such as unpasteurized milk and cheese.

- It is one of the most widespread zoonosis worldwide.
- Brucellosis has high morbidity both for humans and animals.
- It is an important cause of economic loss and a public health problem in many developing countries.
- Human as accidental host
- Brucellosis is caused by Aerobic gram negative un encapsulated non spore coccobacilli
- Reservoirs –domestic livestock

1. Brucella abortus – cattle, buffalo
2. Brucella Suis – pigs
3. Brucella canis – dogs
4. Brucella melitensis – goats

- Brucella organisms can survive up to

-Two days in milk at 8°C,

-Three weeks in frozen meat, and

-Three months in goat cheese.

- Brucella shed in animal excretions may remain viable for >40 days if the soil is damp.
- The organisms are sensitive to heat, ionizing radiation, most commonly used disinfectants, and pasteurization.

8.1.1. Epidemiology

- Human brucellosis due to B. melitensis infection is the most common zoonosis worldwide.

- B. melitensis infection is emerging as an increasingly serious public health problem in some countries like South American countries.

It is estimated that the number of Brucella infected individuals may be up to 26 times higher than the 500,000 cases reported annually

8.1.2. Animal Infection

- Abortion or premature births are characteristic signs of brucellosis in animal hosts.
- Infected animals excrete Brucella in urine, milk, placenta, and the products of miscarriages.
- The bacteria are disseminated and infect other animals and humans
- Brucellosis is almost invariably transmitted to humans from infected domestic animals and their contaminated products.

8.1.3. Human Infection

- All age groups and both sexes are affected.
- Humans acquire the infection through the consumption of animal products like

  -Unpasteurized (Unboiled/ insufficiently boiled) milk, Cheese

  -Insufficiently cooked or raw meat.
- Route of entry of the bacteria from infected animals or their secretions through

-Cut, abrasion in the skin, Conjunctiva, Inhalation of contaminated dust or aerosols.

Pathogenesis

- Brucella are readily ingested by polymorph nuclear cells and macrophages, which then pass to local lymph nodes.
- Organisms replicate intracellular and bacteria from lysed cells can infect other cells or disseminate systemically.
- Facultative intracellular parasite localizes in the RES and causes septicemia
- Granulomatous response with central necrosis

Clinical Manifestations

- Brucellosis is a systemic infection with a broad clinical spectrum, ranging from asymptomatic disease to severe and/or fatal illness.
- Incubation Period; 1 week to several months

- The main presentations is like febrile illness, with or without signs of localization.
- Fever, night sweats (with a strong, peculiar, moldy odor), arthralgia, myalgia, low back pain, and weight loss as well as weakness, fatigue, malaise, headache, dizziness, depression, and anorexia.

Three common forms:

1. **Brucellosis (undulant fever)** – acute septicemia with high grade fever often in the evening.
    - Undulant pattern
    - Influenza like symptoms – arthralgia, anorexia, myalgia, back pain, profuse sweating.
    - hepatomegaly

2. **Fever and acute monoarthritis.**

-Hip or knee joint in children and young patients.

-Lumbar, lower thoracic or sacroiliac joint involvement in adults.

-Shoulder and sternoclavicular joints (mono or poly arthritis).

3. Chronic form

- Disease for more than one year
- Usually B. melitensis
- Usually in older people (veterinarians)
- Cyclic bouts of depression and sweating
- Fever is rare
- Uveitis in 5-10%
- Chronic fatigue

Other manifestations:

- Dry cough, pneumonia, empyema, intrathoracic lap, lung abscess,
- Acute epididymoorchitis, prostatitis, pyelonephritis.
- Increased rate of abortion, depression, lethargy and lymphocytic meningoencephalitis.
- Endocarditis in few patients
- Rarely skin manifestation

Diagnosis

- Cultures on biphasic media may take 7-21 days for growth (even up to 35 days) – hazardous, and need special setup.
- Serology – early IgM, followed by rise of IgG and IgA, with decline in IgM.
- Titers of 1:160 with compatible history or a change of titer by 4 fold in 4-12 weeks (1-3 months).
- False results and less availability.

PCR-Can be performed on blood or on any body tissue and can yield positive results as early as 10 days after inoculation.

- LFT normal or slight elevation of enzymes
- CBC – thrombocytopenia, mild anemia.
- CSF – lymphocytosis

Treatment

ADULTS

- **First line;** Doxycycline 100 mg PO BID for six weeks plus Gentamicin 5mg/kg/day Iv/IM daily for the first 14 to 21 days.

  -Streptomycin 1mg/kg/day can be used in place of gentamycin.

- **Second option;** Doxycycline 100 mg PO twice daily plus Rifampin 600 to 900 mg PO (15 mg/kg) once daily for six weeks.
- Fluoroquinolones' also have effect against Brucella.
- Combination therapy prevents relapse and development of resistance.

Pregnant women

- Management of brucellosis in pregnant women is a challenging because of limited data.

- Regimens include rifampin (900 mg once daily), with or without TMP-SMX (one double-strength tablet twice a day) for six weeks.
- Rifampin with ceftriaxone is also a reasonable regimen.
- Use of TMP-SMX during the last week prior to delivery is associated with kernicterus and should be avoided if possible.

Children

- ≥8 years of age –doxycycline 2-4 mg/kg/day, max of 200mg/day for six weeks, and gentamicin 3-5mg/kg/day for the first 14 days of therapy
- <8 years of age – Oral TMP-SMX 60mg/kg/day(max 2.8gm) for six weeks plus gentamicin 3-5mg/kg/day for the first 14 days of therapy
- Rifampin 15-20 mg/kg/day (max. 600-900mg/day) may be used in place of gentamicin.

Follow up

- Some patients may have persistent symptoms (attributable to persistent infection or another cause) after completing treatment.
- Assessing disease activity following completion of treatment can be difficult.
- It is not always possible to distinguish serologically between persistent (active) and past (inactive) infection.
- Elevated levels of IgG antibodies may persist for years in fully treated individuals with no clinical signs of infection.

Complications

- Relapses
- Therapeutic failures

  -Are usually as a result of failure to eradicate intracellular bacteria.

- Development of resistance is (rare)

Relapse

- High relapse rate, 10-15%.
- Relapse of symptoms should prompt assessment for a focal lesion.
- Most relapses can be treated successfully with a repeat course of a standard regimen.
- Occurrence of second or third relapse should prompt selection of an alternative regimen (better to consult an expert in the field)
- Therapeutic failures are usually associated with Brucella spondylitis and have been reported in up to 15 percent of cases.
- Moderate to severe sequelae occur in the setting of spondylitis and neuro brucellosis.
- The prognosis of neuro brucellosis is variable; with appropriate antimicrobial treatment, the mortality rate of brucellosis is <1 percent.

Patient approach/ History

- Patient complaints

  -Fever, Joint pain/swelling, profuse sweating, appetite and weight Loss….

- Risk assessment

  -Contact with sick animal.

  -Exposure to animal product

  -Similar illness in the Family or in the vicinity.

- Family history of brucellosis in endemic regions varies from 9 to 51 percent.
- Screening household index.

Physical Examination

- Fever, tachycardia…
- Pale Conj. & Icteric sclera
- Lymph node enlargement

- Hepatosplenomegaly
- Joint tenderness and swelling.
- Mental status change and prostration.

Prevention

- Animal vaccination
- Pasteurization/proper boiling of milk
- Avoiding use of row meat.
- Avoiding unprotected contact with diseased animals.
- Protection of slaughterhouse workers.

8.2. Case Definition

An illness characterized by acute or insidious onset, continued, intermittent or irregular fever of variable duration, profuse sweating, particularly at night, fatigue, anorexia, weight loss, headache, arthralgia, and generalized aching. (WHO)

Suspected. A case that is compatible with the clinical description and is epidemiologically linked to suspected or confirmed animal cases or contaminated foods of animal origin.

Probable. A suspected case that has symptoms compatible with disease and is positive in the Rose Bengal test, but negative in blood culture and showing low titers in the confirmatory tests.

Confirmed. A suspected or probable case that is laboratory confirmed. (By RBPT, ELISA, CFT and Culture)

Tigray Regional Health Bureau, Health Promotion and Diseases Prevention Core Process
Public Health Emergency Management (PHEM) Case Team
Weekly Bulletin, WHO week 12 /2019 (15-21 /05/2011 E.C

8.3. WHO Week 12 Bulleting (2019)

1. INTRODUCTION

Early warning is the identification of a public health threat by closely and frequently monitoring identified indicators and predicting the risk it poses on the health of the public and the health system.

As a part of an indicator based surveillance system our country closely following 21 cases and conditions in daily and weekly based.

Table 17: Summary of Daily reportable Diseases week 12/2019

S.N	***Disease type***	***Case***	***Death***
1	*AFP*	*0*	*0*
2	*Anthrax*	*1*	*0*
3	*Avian Human Influenza*	*0*	*0*
4	*AWD*	*0*	*0*
5	*Dracunculiasis (Guinea) Worm)*	*0*	*0*
6	*Measles*	*6*	*0*
7	*Neonatal Tetanus*	*0*	*0*
8	*Pandemic Influenza*	*0*	*0*
9	*Rabies/Dog Bite*	*82*	*0*
10	*SARS*	*0*	*0*
11	*Smallpox*	*0*	*0*
12	*VHF*	*0*	*0*
13	*Yellow fever*	*0*	*0*
14	*Maternal Death*		*2*
15	*NND*		*4*

1. Vaccine Preventable Diseases

In this week no AFP and NNT cases was reported but 6 case of measles were reported from Mekelle, south and south east Zone.

2. Dog bite

A total of 82 Rabies suspected cases were reported from different zones out of those south zone reports 28(34.1%), followed by Mekelle 17(20.7%) and the other zones 37(45.1%).

3. Maternal and Neonatal Death

Only four neonatal deaths (Mekelle =4) and two maternal deaths was reported from Mekelle zone this week.

Table 18: Summarized of weekly reportable Disease week 12/2019

S.N	***Disease type***	***Case***	***Death***
1	*Malaria*	*14,861*	*0*
2	*Dysentery*	*823*	*0*
3	*Meningitis*	*0*	*0*
4	*Relapsing fever*	*0*	*0*
5	*Typhoid fever*	*427*	*0*
6	*Typhus*	*24*	*0*
7	*Malnutrition(Severe)*	*114*	*0*
8	*Hepatic Veno- occlusive disease*	*0*	*0*
9	Scabies	*100*	*0*

4. Malaria

A total of 14,861 patients tested for Blood film or RDT out of those malaria confirmed cases of 2071 of those P.F=1411(68.1%), P.V= 660 (31.8%) and no death reported.

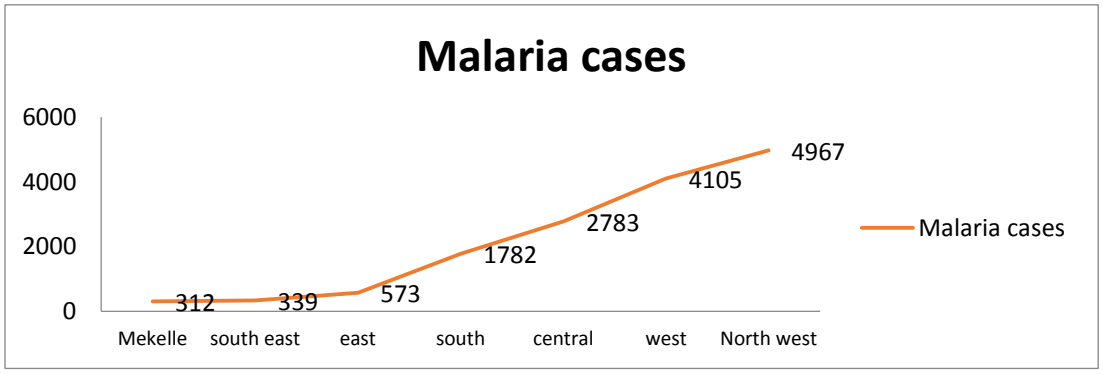


Figure 27: Summary of sum of malaria cases on WHO week 12/2019 by zone

North West zone is still the leading with cases of 4967 (33.4%) from the region followed by West zone 4105(27.6%), central 2783(18.7%), south 1782 (12%) and the rest 1224(8.2%).

5. **Dysentery**

A total of 823 cases of Dysentery were reported from the region, North west zone is the leading one with the number of cases 215(26%) followed by West 208(25%), Central 143(17.3%) and the rest four Zone 257(31. 2%).this might be show that low in WASH activity especially in North West and central Zone.

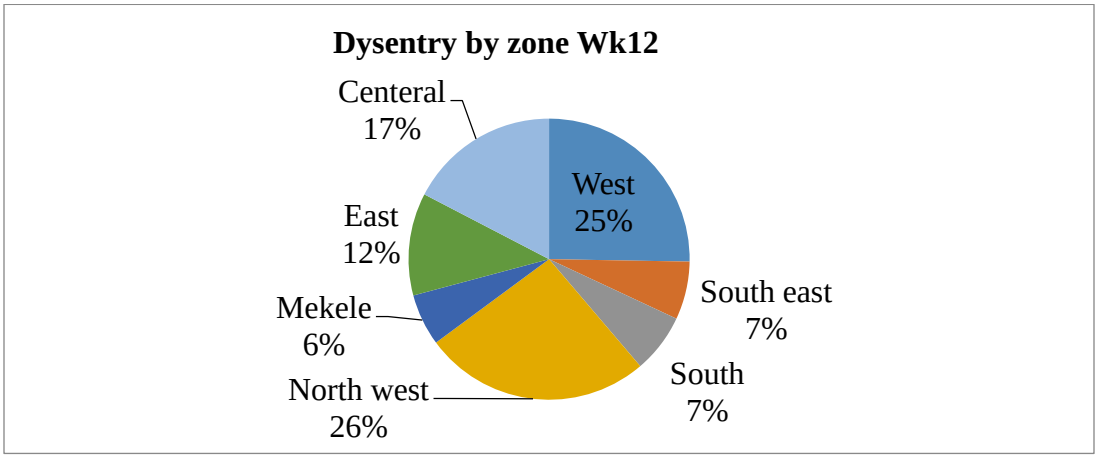


Figure 28: Summary of sum of Dysentery cases on WHO week 12/2019 by zone

6. **Scabies**

A total of 100 cases were reported in this week out of these 44(44%) from East zone and 24(24%) were from central, more over both South east and North West Zones equally report 15(15%) while South 2(2%).

Focus issues for next week

- Increase preparedness on rabies & Malaria
- Measles active case searches should be in place
- Follow up should be in place for dysentery and typhoid fever.
- Attention should be strengthening in NND and maternal death.

Tigray Regional Health Bureau

HPDP, PHEM case team

Telephone: 0348409786/0344408675

Fax: 0344408830

Annex 1: Acute watery Diarrhea Outbreak Investigation Questionnaire

Date --------- **Health facility--------**

Respondent Status: ☐ **Case** **control** ☐

A. Demography Information

1. Name of respondent ……ID……

2. Gender ☐ Male ☐ Female

3. Age ……Address/ Zone ……District……Kebelle…… .Got……

5. Resident Urban☐ Rural ☐

6. Occupation ☐ Farmer ☐Student ☐ House wife☐ Trader☐ Other specify ……

7. Religious ☐ Orthodo☐ Muslim ☐ other…….....

8. Ethnicity ☐ Tigray☐ Amhara ☐ Oromo☐

Other/specify……

9. Education ☐ primary education☐ Secondary Education ☐ Collage and above ☐Illiterate☐read and write

10. Marital ☐ single ☐ married ☐ Divorced/separated w ☐ widowed

B. **Clinical Information**

2. Do you have the following Sign and ☐ Diarrhea ☐Vomiting ☐ Nausea☐ Abdominal Cramp

Other specify ……. If no skip to q. 10

3. If Diarrhea is present Duration of diarrhea --- days. Stool frequency per days……...

4. Which did you Experience First ☐Vomiting ☐ Diarrhea ☐ other specify ----------

5. Date seen at health facility -----/-----/-------

6. Complication /Dehydration y☐ No☐

7. Severity of dehydration ☐No DHN ☐Some ☐ Sever

8. What type of treatment did you receive? 1. ORS 2. Anti-biotic 3.IV fluids 4. Anti-pain 5. Other

9. Status ☐ Improved☐ Not Improved

10. Have you seen any person died by AWD yes ☐ No ☐

If yes How many

11. Do you think CTC is the source of the disease? Yes no ?

12 .What did you did if you get a patient of AWD in your area? A. take to health facility B. take to holy water C. stay at home D. treats culturally

13. Did you visit health facility? Yes …… No…….

B. Epidemiological

1. Have you traveled outside your Village with in the last 7 days? ☐ Yes ☐ No If yes; where……

3. Have you eat or drink outside your home? ☐ Yes ☐ No

If yes; where……....

4. Did you have contact with another person with diarrhoeal case? ☐ Yes ☐ No

If yes; who……Where? ……..

5. Did you attend a gathering (funeral, religious or any other)? If yes, when and where?

6. How do you think you get AWD?

1. by drinking contaminated water
2. By eating contaminated food
3. Burial preparation
4. By not washing hands during critical times
5. Caring for people that are ill with AWD

D. Laboratory Data

1. Sample taken? ☐ Yes ☐ No If yes; A) RDT------ B) Culture if yes date were sample taken ----/---/---

2. Result ……

E. Satiation and Hygiene practices

1. Do you have access to latrine ☐ yes ☐ No

2. If yes, do you use it ☐ Yes ☐ No

3. Yes f yes is there soap for hands washing nearby the toilet?

☐ Yes; ☐ no

4. When do you wash your hands?

a. After using toilet?
b. After cleaning the bottom of children?
c. Before eating food?
d. Before cooking foods?

5. How often do you wash your use hands: 1. Always 2. Sometime 3/Never

6. What do you use to clean utensils/containers for feeding?

☐ Water only ☐ water with soap ☐ chemicals ☐ Ash

7. Where do you dispose of household garbage ☐ Pit ☐ open file ☐ burning ☐ others ---

F. Water related practices

1. From what sources do you get your drinking water? ☐ Pipe ☐ Spring ☐ River ☐ Pump Ponds

2. Do you purify the water? Yes No

If yes by what methods did you treat Water?

a. Boiling b) sedimentation c) chlorination d) Water chemicals (Aqua tab/ Water guard/Beishan Gauri) F) Others specify type

3. Have you been using treated water in the past 1 week/ prior to the onset of your illness? Yes no

4. What type of container do you use in your house for water storage? a) Jerry can b) Bucket

3. How do you fetch water from your storage?

☐ By Deeping ☐ Inclining ☐ With cup always inside the storage ☐

4. How often clean water storage? ☐ Every day ☐ every other day ☐ every week ☐ Other (Specify)

G. **Source of food and type**

1. Did you eat raw/uncooked food in the last 2-3 days before onset of your illness? 1) Yes 2) No

If Yes Where did you feed

a) Hotel b) Neighbor c) Food sold at roadside d) Gathering e) Self Prepared in camp f) others (specify) _____

2. Which type of food did you eat (Tick)? (Before 5 days of illness)

a) Raw meat b) Raw tomato c) Raw salad d) Raw milk products

e) Enjera with wot other (specify)……

3. In the past 2-3 days, did you eat any left-over food? 1. Yes 2. No

4. Did you heat cold food before eating? 1. Yes 2. No

H. **Knowledge and practice**

2. Have you heard about the diarrhea outbreak AWD previously? 1/ Yes 2/ No
3. Did you know the diseases sign and symptom? 1. Yes 2. No .
4. If yes, A) Watery Diarrhea B) Vomiting C) Sunken Eye Ball D) Dry Mouth
5. Do you know mode of transmission for diarrhea (AWD)? 1/ Yes 2/ No
6. If yes to A) Drinking Untreated Water B) Eating uncooked food C) Not washing hands
7. Do you know the prevention methods of AWD? 1/ yes 2/ no

If yes how do you prevent AWD?

A) Treating Water
B) Eating well cooked food
C) Hand washing with Soap at critical Times

1.2. Pictorials representation of AWD case areas in Kafta Humera district

A.Tirkan HC CTC entrance

B. Tirkan HC inpatient

C. Baeker HC inpatient

D.Tirkan HC contact tracing

E. Baeker HC catchment river source of AWD t

F. Maysegen, Wedi Haile Farm Camps Tirkan, Maycadra, Baeker Health centers (ORP site)

Annex 2: Questionnaires on investigations of risk factors on controlling brucellosis outbreak

Case status

1. Case □ Control □ Date of Data collection_____

Patient Name_____, Region_____ Zone_____ Woreda_____ Kebelle _____ got _____ Phone_____

Location: Longitude: _____Latitude: _____/Low land, mid land, High land/

I. Socio Demographic characteristics

1.1. Gender a. Male □ b. Female □

1.2. Age groups a. 0-4 years b. 5-14 years c. 15-44 years d. 45-64 years e. >65 years

1.3. Educational level a. red and write b. no education c. primary d. secondary e. tertiary/college

1.4. Occupation a. housewife b. Farmer c. student d. unemployed e. Daily worker f. merchant g. gov. employed

1.5. Marital status a. married b. single c. divorced d. widowed e. separated

1.6. Family size _____

1.7. Religion a. Orthodox b. Muslim c. Catholic d. other/specify

1.8. Ethnic a. Tigray b. Amhara c. Afar d. other specify

II. Clinical history

2.1. Date of onset? _____

2.2. What was the clinical symptoms? a. Undulling Fever b. vomiting c. abdominal discomfort e. headache f. joint pain g. loss of appetite h. diarrhea

2.3. How long would you sleep from the start? a. 1 -3 b. 1-week c. 2 weeks d. 1 month

2.4. Date of seen at health facility? _____

2.5. Do you take treatment? a. yes b. no

2.6. Type of treatment taken a. antibiotics b. anthelminthic c. I don't know

2.7. Progress after treatment a. Cured b. No c. some

2. 8. Either any sick person on the family who have a clinical symptoms of the case? a. yes b. No

2.9. If yes, how many _____

2.10. Do you have animals? a. yes b. no

2.11. Species of animal's a. bovine b. ovine c. caprine d. equine e. canine f. Avian

2.12. Travel history a. yes b. no If yes when _____ where _____

Risk factors to brucellosis

3.1. Do you have aborted animals?

a. yes b. no

3.2. Have you ever heard of brucellosis a. Yes b. No

3.3. Is a brucellosis a disease? a. only animals b. only humans c. humans and animals d. doesn't know

3.4. Can brucellosis transfer from animals to humans? a. Yes b. no

4.1. Is a raw meat, milk and unpasteurized dairy products part of your diet?

a. yes b. no

4.2. Is raw milk boiled prior to human consumption?

a. yes b. no

4.3. Contact with animals during and after birth(abortion)?

a. yes b. no

4.4. What do you do the aborted part of fetus, do you concealed?

a. yes b. no

4.5. Contact with aerosols in working place/house?

a. yes b. no

4.6. Where you ever tested for human brucellosis? A. yes b. no

Annex 3: Data collection tools for surveillance system evaluation in Abi- Adi and K/Temben in Tigray region Ethiopia, December 2018.

I. Health Post Level Questionnaire

Identifiers

Assessment team _____Type of health facility_____ Date _____District_____

Interviewer_____Region_____province_____Respondent_____

Respondent's position_____ Name of health facility _____Surveillance system __

1. Number of Health Post with national surveillance manual

Is there a national manual for surveillance at Health Post?

Observe national surveillance manual: Y□ N□ UK□ N/A □

I. Case detection and registration _____

2. Does the Health Post have a clinical register? Y□ N□ UK□ N/A □

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

Y□ N□ UK□ N/A □

4. Does the Health Post have standardized case definitions for the priority diseases (each priority disease) Meningitis, AFP (polio), measles, malaria, Anthrax? Y□ N□ UK□ N/A □

II. Data reporting _____

5. Does the Health Post have appropriate surveillance forms for that site at all times over the past 6 months Y□ N□ UK□ N/A □

6. Does the Health Post reported accurately cases from the registry into the summary report to go to higher level

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

A. Obs Measles Y□ N□ UK□ N/A □

B. Obs Malaria Y□ N□ UK□ N/A □

C. Obs Meningitis Y□ N□ UK□ N/A □

7. Does the Health Post that reported each reporting period to the next higher level during the past 3 months? Yes □ No □ Uk □ N/A □

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

Observe Weekly: /12 times the number of sites

Observe immediately: /--times the number of sites

9. on time (use national deadlines)

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

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

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

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

11. Strengthening reporting

How can reporting be improved?

_____

_____

III. Data analysis

Percent of sites that:

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

Observe description of data by age and sex

Yes □ No □ Unknown □ Not applicable□

13. Does the Health Post describe data by place?

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

Yes □ No□ Unknown □ Not applicable□

14. Does the Health Post describe data by time?

Observe description of data by time: Yes□ No□ Unknown□ Not applicable □

15. Does the Health Post Perform trend analysis

Observe line graph of cases by time Yes □ No□ Unknown □ not applicable □

IV. Epidemic response_____

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

V. Feedback

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

Yes □ No □ Unknown□ Not applicable □

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

_____

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

Yes □ No □ Unknown □ Not applicable □

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

Yes □ No □ Unknown □ Not applicable□

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

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

Yes □ No □ Unknown □ Not applicable □

VI. Supervision:

22. Was HEWs supervised in the past 6 months?

Yes □ No □ Unknown □Not applicable □

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

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

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

Yes □ No □ Unknown □ Not applicable □

VII. Training

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

Yes □ No□ Unknown □ not applicable □

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

_____

VIII. Resources

27. Does the Health post have?

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

28. Data management a. Stationer b. calculator c. computer d. Software e. printer f. Statistical package

29. Communications a. Telephone service b. fax c. Radio call d. Computers that have modems

30. Information education and communication materials

a. Posters b. Megaphone c. Flipcharts or Image box

d. VCR& TV set e. Generator f. Screen g. Projector (Movie)h. Other:

31. Hygiene and sanitation materials a. Spray pump b. Disinfectant

32. Protection materials (list) _____

_____

IX. Satisfaction with surveillance system

33. Satisfaction with the surveillance system

Are you satisfied with the surveillance system?

Yes □ No □ Unknown □ Not applicable □

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

_____

35. Opportunities for integration

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

_____

Attributes

a) Usefulness

1. Total population of the district under surveillance_____

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

a) Anthrax cases_____ Deaths _____Malaria cases _____Deaths _____b) Measles cases _____Deaths ____

3. Does the surveillance system help?

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

b) To estimate the magnitude of morbidity, mortality and factors related to these Diseases? Yes □ No□ N/A □

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

b) Simplicity

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

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

c) Flexibility

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

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

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

If yes, how_____

d) Data Quality

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

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

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

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

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

e) Acceptability

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

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

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

a) Lack of understanding of the relevance of the data to be collected

b) No feedback / or recognition given by the higher bodies. c) Reporting formats are difficult to understand d) Report formats are time consuming e) If Others:_____.

f) Representativeness

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

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

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

g) Timeliness

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

h) Stability

48. Was there lack of resources that interrupt the surveillance system? Yes□ No□ N/A□

If yes, how did you manage it? _____

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

I. Sensitivity:

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

j. PVP:

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

Yes □ NO□ If No gives explanation

II. HEALTH Center Level Questionnaire

Identifiers

Assessment team_____ Type of health facility_____ Date _____District name _____ Interviewer_____ Region/province_____ Respondent_____

Country_____ Name of health facility _____Surveillance system _____

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

Obs Observe national surveillance manual: Yes □ No □unknown □ Not Applicable

I. Case detection and registration

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

Observe the existence of a clinical register? Yes□ No□ unknown □ Not Applicable □

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

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

Yes□ No□ unknown □ Not Applicable □

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

Yes □ No □ unknown □ Not Applicable □

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

Yes□ No□ unknown □ Not Applicable □

II. Case confirmation

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

Are you able to collect sputum Yes□ No□ unknown □ Not Applicable □

Stool Yes□ No□ unknown □ Not Applicable □

Blood Y: Yes□ No□ unknown □ Not Applicable □

CSF at this facility? Yes□ No□ unknown □ Not Applicable □

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

Stool? Yes□ No□ unknown □ Not Applicable □

Blood/serum Yes□ No□ unknown □ Not Applicable □

CSF Y: Yes□ No□ unknown □ Not Applicable □

9. Does The Hospital/Health Center have the capacity to handle specimens like sputum, stool, blood/serum and CSF until shipment? Yes□ No□ unknown □ Not Applicable □

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

Yes□ No□ unknown □ Not Applicable □

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

Yes□ No □ unknown □ Not Applicable □

12. Does the Hospital/health Center have packing materials for shipment of specimens at health facility? Yes□ No□ unknown □ Not Applicable □

III. Data reporting

13. Does the Hospital/health Center have appropriate surveillance forms for that site at all times over the past 6 months. Yes□ No□ unknown □ Not Applicable □

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

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

A. Observe Measles Yes□ No□ unknown □ Not Applicable □

B. Observe Malaria Yes□ No□ unknown □ Not Applicable □

C. Observe AFP (polio) Yes□ No□ unknown □ Not Applicable □

D. Observe Meningitis Yes□ No□ unknown □ Not Applicable □

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

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

Observe Weekly: /12 times the number of sites

Observe immediately: /--times the number of sites

16. 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

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

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

18. Strengthening reporting

How can reporting be improved?

_____

IV. Data analysis

Percent of sites that:

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

Observed description of data by age and sex

Y: □ N: □ U: □ N/A:□

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

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

Y: □ N: □ U: □ N/A:□

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

Observed description of data by time

Y: □ N: □ U: □ N/A:□

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

Observed line graph of cases by time

Y: □ N: □ U: □ N/A:□

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

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

Y: □ N: □ U: □ N/A:□

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

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

_____

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

a. Daily b. weekly c. Every 2 weeks d. Monthly e. quarterly f. As needed g. None

27. Does the Hospital/health Center have appropriate denominators?

Observed presence of demographic data at site (E.g. Population<5 yr., population by village, total population) Y: □ N: □ U: □ N/A:□

V. Epidemic preparedness

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

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

Y: □ N: □ U:□ N/A:□

VI. Epidemic response

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

Y: □ N: □ U:□ N/A:□

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

Observed that the health facility achieved an acceptable case fatality rate for most recent outbreak Y: □ N: □ U:□ N/A:□

VII. Feedback

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

Y: □ N: □ U:□ N/A:□

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

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

Y: □ N: □ U:□ N/A:□

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

VIII. Supervision:

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

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

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

Y: □ N: □ U: □ N/A:□

IX. Training

35. Does health personnel In Hospital/Health center trained in disease surveillance and epidemic management? Y: □ N: □ U: □ N/A:□

36. Number of Health Personnel trained _____

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

_____

X. Resources

38. Number of Hospital/Health center that have Logistics

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

39. Data management in Health Center/Hospital

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

40. Communications in Health Center/Hospital

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

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

a. Posters b. Megaphone c. Flipcharts or Image box d. VCR and TV set

e. Generator f. Screen g. Projector (Movie) h. Other:

42. Hygiene and sanitation materials in Health Center/Hospital

a. Spray pump b. Disinfectant

43. Protection materials (list)

_____

XI. Satisfaction with surveillance system

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

Are you satisfied with the surveillance system?

45. Yes □ No □ UK □ N/A □

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

_____

46. Opportunities for integration

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

_____

III. DISTRICT Level Questionnaire

Identifiers

Assessmentteam_____District_____Date_____region…….province_____

Interviewer_____country_____Respondent_____surveillancesystem_____

Is the Districts having available national surveillance manual?

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

Obs Observe national surveillance manual:

Yes □ No □ unknown □ Not Applicable □

I. Case confirmation

Is the Districts having the capacity to transport specimens to a higher level laboratory

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

3. Yes □ No□ unknown □ Not Applicable □

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

Yes □ No □ unknown □ Not Applicable □

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

Yes □ No □ unknown □ Not Applicable □

II. Data reporting_____

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

Yes □ No □ unknown □ Not Applicable □

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

Weekly: _____ /12 times the number of health facilities

Immediately: _____/_____times the number of health facilities

On time (use national deadlines)

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

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

10. Is the Districts have means for reporting to next level? How do you report?

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

Strengthening reporting

11. How can reporting be improved?

III. Data analysis

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

Obs Observed description of data by age and sex

Yes □ No □ unknown □ Not Applicable □

13. Describe data by place

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

Yes □ No □ unknown □ Not Applicable □

14. Describe data by time

Obs Observed description of data by time

Yes □ No □ unknown □ Not Applicable □

15. Perform trend analysis

Obs Observed line graph of cases by time

Yes □ No □ unknown □ Not Applicable □

16. List:

_____

17. Have an action threshold for each priority disease

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

Yes □ No □ unknown □ Not Applicable □

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

(Ask for 2 priority diseases)

_____

19. Have appropriate denominators

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

20. Yes □ No □ unknown □ Not Applicable □

21. Who is responsible for data analysis? _____

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

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

IV. Outbreak investigation

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

Yes □ No□

Number of outbreaks suspected in the past 6 months_____ Investigated_____?

Have you ever conducted an outbreak investigation?

Has your District ever investigated an outbreak?

Yes □ No □ unknown □ Not Applicable □

V. Epidemic preparedness

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

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

Yes □ No □ unknown □ Not Applicable □

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

Observed the stocks of drugs and supplies at time of assessment

Yes □ No □ unknown □ Not Applicable □

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

Yes □ No □ unknown □ Not Applicable □

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

Yes □ No □ unknown □ Not Applicable □

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

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

Yes □ No □ unknown □ Not Applicable □

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

Yes □ No □ unknown □ Not Applicable □

VI. Responses

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

Yes □ No □ unknown □ Not Applicable □

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

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

Yes □ No □ unknown □ Not Applicable □

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

Yes □ No □ unknown □ Not Applicable □

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

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

Yes □ No □ unknown □ Not Applicable □

VII. Feedback

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

Yes □ No □ unknown □ Not Applicable□

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

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

VIII. Supervision

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

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

Yes □ No □ unknown □ Not Applicable □

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

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

a. Expected b. Achieved: c. Not Done:

(Obtain required number of visits from central level)_____

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

Reason 1_____

Reason 2_____

Reason 3_____

IX. Training

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

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

_____

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

X. Resources

42. I. Do the District have Important Logistics?

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

43. Data management

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

44. Communication a. Telephone service b. Fax c. B radio d. Computers that have modems

45. Information education and communication materials

a. Posters b. Megaphone c. Flipcharts or Image box d. VCR and TV set

e. Generator f. Screen g. Projector (Movie) h. Other……

46. Hygiene and sanitation materials

a. Spray pump b. Disinfectant

list_____

XI. Surveillance co-ordination:

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

Yes □ No □ unknown □ Not Applicable □

XII. Satisfaction with surveillance system

48. Are you satisfied with the surveillance system?

Yes □ No □ unknown □ Not Applicable □

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

_____

50. Opportunities for integration

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

_____

Attributes

a) Usefulness

51. Total population of the district under surveillance_____

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

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

53. Does the surveillance system help?

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

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

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

b) Simplicity:

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

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

c) Flexibility:

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

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

If yes, how_____.

d) Data Quality:

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

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

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

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

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

e) Acceptability:

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

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

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

a) Lack of understanding of the relevance of the data to be collected

b) No feedback / or recognition given by the higher bodies. c) Reporting formats are difficult to understand d) Report formats are time consuming

e) If Others: _____.

f) Representativeness:

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

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

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

g) Timeliness:

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

h) Stability:

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

If yes, how did you manage it? _____

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

Annex 4: Data collection tools for health profile assessment in Kola temben Woreda, Tigray Region (2007-2010 EFY

Table 19: Description of Kebeles population and house hold size of Kola temben District 2010EFY

		Total population			Households		
S/n	KEBELE	M	F	Total	M	F	T
1	DEDERE	2150	2138	4288	892	140	1032
2	CHAMO	1759	1750	3509	717	128	845
3	NEWI	3008	3118	6126	1134	341	1495
4	D/TSEB	3055	3253	6308	1214	304	1518
5	MERERE	3147	3268	6415	1314	230	1544
6	T/GIORG	3110	3115	6225	1198	300	1498
7	SELAM	3428	3468	6896	1361	299	1660
8	DABANOW	2701	2634	5335	996	288	1284
9	WUHDER	2095	2047	4142	762	235	997
10	S/GELEBEDA	4346	4363	8709	1660	490	2096
11	A/BKALSI	2149	2311	4460	723	350	1073
12	ADIHA	2627	2607	5234	902	358	1260
13	G/W/AMBA	2867	2166	5033	1037	387	1424
14	LIMAT	1371	1316	2687	527	120	647
15	G/MILESLEY	2545	2444	4989	1032	169	1201
16	D/TSEHAY	936	928	1864	339	109	448
17	D/GENET	689	682	1371	233	97	330
18	D/ATAKLTY	3863	3913	7776	1585	287	1872
19	MENJI	2512	2633	5145	1082	156	1238
20	GURORO	3092	3282	6374	1166	368	1534
21	M/WERY	3166	3287	6453	1363	190	1553
22	ZELAKME	1618	1519	3137	699	109	808
23	ARENA	2036	2064	4100	869	118	987
24	SH/EMNY	2923	3007	5930	1084	343	1427
25	GUYA	3328	3602	6930	1282	385	1667
26	SIMRET	3986	4101	8087	1654	292	1948
27	BEGASHEKA	3080	3278	6358	1262	268	1530
		71587	72294	143881	28033	6861	34914

1. Historical Aspects of the area (if available)
The name how and why_____
How was the woreda formed_____
Any other historical aspect_____

2. Geography and Climate
Area of the woreda _____
Distance from Addis and Mekelle _____
Altitude_____
Latitude_____
Average Annual rain fall _____
Average Annual temp _____
Land bodies_____
Water bodies_____

3. Demographic information
Total Population size_____
Male_____
Female_____
Urban_____
Rural_____
Sex ratio_____
Age structure: - percentage of children < 1yrs_____. <5yrs____< 15 yrs.
Percentage of old people >65 years_____
Women child bearing age_____
Percentage of pregnant women_____
Dependency ratio_____
Population size by religion
Orthodox_____ Catholic_____
Protestant_____ Muslim_____ Others_____

Woreda Boundaries: Southern ___Northern ___Western____Easter
Estimated Population size by kebelle

no	Name of kebelles	Population size by year											
		2007				2008				2009			
		<5	5-15	>15	total	<5	5-15	>15	total	<5	5-15	>15	total
1													
2													
3													
4													
5													
6													
7													
8													
	Total												

Health Facility coverage

Types of Health Facility	Year						Remark
	2007		2008		2009		
General Hospital							
Primary Hospital							
Health Center							
Health post							
Total							
Name of disciplinary	2007		2008		2009		Remark
	M	F	M	F	M	F	
Health officers							
Laboratory technician/technologist							
Pharmacy technician/Pharmacist							
Nurses							
Midwife							
ENHS							
HEWs							
TBA							

Ratio of health facility and professional to population

Description Ratio	Ratio			Remark
	2007	2008	2009	
Health center: population				
Health post: population				
Health officer: population				
Nurse: population				
Midwife: population				
HEW: population				

Top causes of morbidity and mortality

No	2007		2008		2009		Remark
	Diseases classification	No (%)	Diseases classification	No (%)	Diseases classification	No (%)	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

MCH and EPI coverage

Description	2007 No (%)	2008 No (%)	2009 No (%)
ANC coverage			
PNC coverage			
BCG coverage			
Measles vaccine			
OPV			
Penta1			
Penta2			
Penta3			
Contraceptive prevalence			
TT2 for pregnant			
TT2 for no pregnant			
Latrine coverage			
Safe water supply coverage			
Total people screened for			
HIV			
VCT			
PICT			
PMTCT			
HIV Prevalence			
TB prevalence			

HIV/AIDS activities

Activities	Male	Female	total	Remark
Total people screened for HIV				
VCT				
PICT				
PMTCT				
HIV Prevalence				
Total PLWHIV				
On ART				
Pre ART				

Health Education Facilities

Level of School	2007				2008				2009			
	No of school	Number of student			No of School	Number of student			No of school	Number of student		
		M	F	T		M	F	T		M	F	T
Primary												
Secondary												
Total												
Schools with functional latrines												
schools with water supply												
Schools with HIV/other Health clubs												
Literacy ratio												
Employed												
Unemployed												
Employed; unemployed												
HF access to transportation												
HF access to telecommunication												
HF access to Electric power												
for all woreda sectors												
for all health sector												

Nutrition activities

Type of food intervention Program	2007		2008		2009	
	Health post	Health center	Health Post	Health center	Health post	Health Center
No of OTP sites						
No of TFU program						
No of TSF program						
No of CBN program						
No of EOS program						
No of SAM						

Disaster situation in Kolatemben district from 2007 -2009EFY

Annex 5: Questionnaires on assessment of Knowledge Attitude and Practice on risk factors of brucellosis at community level and occupational

Case status

1. Case □ Control □ Date of Data collection_____

Patient Name_____, Region_____ Zone_____ Woreda_____ Kebelle _____ got _____ Phone_____

Location: Longitude: _____Latitude: _____/Low land, mid land, High land/

I. Socio Demographic characteristics

1.1. Gender a. Male □ b. Female □

1.2. Age groups a. 0-4 years b. 5-14 years c. 15-44 years d. 45-64 years e. >65 years

Type of Hazard	2007		2008		2009	
	disaster	Control measures/ solutions	Disaster	Control measures/ Solutions	disaster	Control measures/ solutions

1.3. Educational level a. red and write b. no education c. primary d. secondary e. tertiary/college

1.4. Occupation a. housewife b. Farmer c. student d. unemployed e. Daily worker f. merchant g. gov. employed

1.5. Marital status a. married b. single c. divorced d. widowed e. separated

1.6. Family size _____

1.7. Religion a. Orthodox b. Muslim c. Catholic d. other/specify

1.8. Ethnic a. Tigray b. Amhara c. Afar d. other specify

II. Clinical history

2.1. Date of onset? _____

2.2. What was the clinical symptoms? a. Undulling Fever b. vomiting c. abdominal discomfort e. headache f. joint pain g. loss of appetite h. diarrhea

2.3. How long would you sleep from the start? a. 1 -3 b. 1-week c. 2 weeks d. 1 month

2.4. Date of seen at health facility? _____

2.5. Do you take treatment? a. yes b. no

2.6. Type of treatment taken a. antibiotics b. anti-helminthic c. I don't know

2.7. Progress after treatment a. Cured b. No c. some

2. 8. Either any sick person on the family who have a clinical symptoms of the case? a. yes b. No

2.9. If yes, how many _____

2.10. Do you have animals? a. yes b. no

2.11. Species of animal's a. bovine b. ovine c. caprine d. equine e. canine f. Avian

2.12. Travel history a. yes b. no If yes when _____ where _____

Risk factors to brucellosis

3.1. Do you have aborted animals?

a. yes b. no

3.2. Have you ever heard of brucellosis a. Yes b. No

3.3. Is a brucellosis a disease? a. only animals b. only humans c. humans and animals d. doesn't know

3.4. Can brucellosis transfer from animals to humans? a. Yes b. no

4.1. Is a raw meat, milk and unpasteurized dairy products part of your diet?

a. yes b. no

4.2. Is raw milk boiled prior to human consumption?

a. yes b. no

4.3. Contact with animals during and after birth (abortion)?

a. yes b. no

4.4. What do you do the aborted part of fetus, do you concealed?

a. yes b. no

4.5. Contact with aerosols in working place/house?

a. yes b. no

4.6. Where you ever tested for human brucellosis?

a. yes b.

4.7. Do you slaughtering /incise animals?

a. Yes b. No