Addis Ababa University, College of Health Sciences, School of Public Health

Compiled Body of Works in Field Epidemiology

Submitted to the School of Public Health of Addis Ababa University in Partial Fulfilment for the Degree of Master of Public Health in Field Epidemiology

By: Belay Regassa Biqila

March 2021
Addis Ababa, Ethiopia

Addis Ababa University, College of Health Sciences, School of Public Health, Ethiopian Field Epidemiology Training Program (EFETP)

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ADDIS ABABA UNIVERSITY

School of Graduate Studies

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Approval by Examining Board

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Examiner

Acknowledgement

I would like to thank Ministry of Health, Oromia Regional Health Bureau and Addis Ababa University; College of Health Science; School of Public Health for giving me the chance to study MPH in Field Epidemiology.

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Finally; my heart felt appreciation goes to my family, all respondents, staffs and organizations, who participated in availing of data and responding to the interviews.

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Abbreviations and acronyms

AIDS	Acquired Immune Deficiency Syndrome
ANC	Anti Natal Care
AOR	Adjusted Odds Ratio
AR	Attack Rate
ART	Anti-Retro Viral Therapy
BCG	Bacilli Chalmette Guerin
BSc	Bachelor of Science
CBN	Community Based Nutrition
CDC	Centre for Disease Prevention and Control
CDC	Centre for Disease Prevention and Control
CFR	Case Fatality Rate
CHW	Community Health Workers
CI	Confidence Interval
CLTSH	Community-Led Total Sanitation and Hygiene
COR	Crude Odds Ratio
COVID-19	Coronavirus disease 2019
CSA	Central Statistics Agency
DHO	District Health Office
EC	Ethiopian Calendar
EDHS	Ethiopian District Health Survey
EOC	Emergency Operation Center
EPHI	Ethiopian Public Health Institute
EPI	Expanded Program of Immunization
EPTB	Extra Pulmonary Tuberculosis
FP	Family Planning
FSOSZ	Finfine Surrounding Oromia Special Zone
GC	Gregorian calendar
GO	Governmental Organization
HC	Health Center
HEW	Health Extension Worker
HF	Health Facility
HH	House Hold
HIV	Human Immune-deficiency Virus
HP	Health Post
IMR	Infant Mortality Rate
ITNs	Insecticide Treated Nets
KG	Kinder Garden
KM	Kilo Meter
LAFP	Long Acting Family Planning
LDI	Litres per Day per Individual
MD	Medical Doctors
MERS	Middle East Respiratory Syndrome
MMR	Maternal Mortality Ratio
MOH	Ministry of Health of Ethiopia
NGO	Non-Governmental Organization
NPW	Non Pregnant Women
NTD	Neglected Tropical Diseases
OD	Open Defecation
ODF	Open Defecation Free

OPV	Oral Polio Vaccine
ORHB	Oromia Regional Health Bureau
OTP	Therapeutic Program
PAB	Protected at Birth
PCV	Pneumonia Conjugated Vaccine
PHEM	Public Health Emergency Management
PLW	Pregnant and Lactating Women
PLWHA	People Living With AIDS
PMTCT	Prevention of HIV from Mother to Child Transmission
PNC	Post Natal Care
PTB	Pulmonary Tuberculosis
PW	Pregnant women
RDV	Rural Drug Vendor
RHB	Regional Health Bureau
SARS	Severe Acute Respiratory Syndrome
SC	Stabilization Centre
SD	Standard Deviation
TB	Tuberculosis
TBA	Traditional Birth attendant
TSF	Targeted Supplementary Feeding
TT	Tetanus Toxoid
U5	Children of less than five years
UNICEF	United Nations Children Fund
VCT	Voluntary Counselling and Testing
VL	Visceral Leishmaniasis
WHO	World Health Organization
ZHD	Zonal Health Department

Chapter I

Outbreak Investigation

1.1 Visceral Leishmaniasis Outbreak Investigation in Borena, Oromia, Ethiopia November 2019

1.2 COVID-19 Outbreak investigation in Oromia, Ethiopia September 2020

Chapter I: Outbreak Investigation

1.1. Visceral Leishmaniasis Outbreak Investigation in Borena, Oromia, Ethiopia, Nov. 2019

Abstract

Background: Visceral Leishmaniasis (VL) is caused by *Leishmania* parasites that infect mammals transmitted by *Phlebotomine* and mostly affects the poorest. VL distributed worldwide and prevalent in Ethiopia. Knowing the occurrence and risk factor is a remedy for prevention and control. The aim of the study was to identify factors associated with VL.

Methodology: Case control study was used during October-November 2019 in Borena. A 1:2 Cases to controls were identified by case definition and 33 cases were included in the study. Participants >18years interviewed and caregivers of <18 were questioned for legitimacy. Epi-info and SPSS were used for data entry and analysis. Primarily predictors were identified using chi-square at significant level P<0.05 with 95%CI, then candidate predictors were analysed using bivariate and multivariate analysis to identify associated factors.

Result: Among 153 suspected cases, 9 suspected deaths reported; 33 (22%) cases and 3 deaths were verified for VL. Among 33 verified cases 15(45.5%) were in July 2019, in comparison of 4years data, there is surge cases in July-August 2019, 26(79%) of cases were from Dire, Attack Rate (AR) = 15/100,000, CFR=9.1%. Among all, 15-64year were highly affected with AR=19.3%. A case control engaged 99(100%) respondents and among all 93(93.9%) were male, 68(68.8%) were 15-64years. Adult education AOR = 30.438(2.378, 389.602), bed-net AOR=9.024 (1.763, 46.205) and walling AOR=0.052(0.004, 0.739) were associated factors with VL at 95%CI with p-value<0.05. Male 15-64years were highly susceptible. Level of education, ITNs and walling were associated factors with VL.

Conclusion: Formulating policies and guidelines for male 15-64 years related vector control and awareness creation regarding feeding habit of sand fly, prevention and control were recommended. Awareness of community on prevention method; using repellents, ITNs utilization, and safe sleeping mechanisms are mandatory. Further investigation on the issue is best remedy to overcome future VL outbreak occurrence.

Key words: Borena zone, outbreak, Visceral Leishmaniasis

1.1.1. Background

Leishmaniasis is a protozoan disease caused by members of the genus *Leishmania,* parasites that infect numerous mammal species including humans, and the organisms are transmitted by *phlebotomine* sand-flies of the genus Phlebotomies in the "Old World" (Asia, Africa, and Europe) and the genus Lutzomyia in the "New World" (the Americas). (1; 2; 3). Some of the Leishmania species known to cause disease in humans are: *Leishmania Donovan* species complex (including *L. Donovan* and *L. infantum/chagasi*), *L. major*, *L. tropica*, *L. aethiopica*, *L. braziliensis* and *L. mexicana* species complex (2; 4).

Transmission may be anthroponotic or zoonotic. Human-to-human transmission via shared infected needles has been documented in IV drug users in the Mediterranean region and in-utero transmission to the foetus occurs rarely (3). Visceral Leishmania (VL) is the most severe form of leishmaniasis, almost always fatal if untreated (5). Common symptoms of VL are prolonged fever, weight loss, signs of bone marrow invasion (anaemia, thrombocytopenia and leukopenia), abdominal distension with hepatosplenomegaly, and lymphadenopathy (6).

Leishmaniasis occurs in 98 countries; most of them are developing in tropical and temperate regions. More than 1.5 million cases occur annually, of which 0.7–1.2 million are CL (and its variations) and 200,000 - 400,000 are VL. More than 350 million people are at risk, with an overall prevalence of 12 million. Although the distribution of Leishmania is limited by the distribution of sand-fly vectors, human leishmaniasis is on the increase worldwide (2; 3). It affects the poorest and most marginalized people and is commonly associated with malnutrition, poor housing and weak immune system (7).

The World Health Organization (WHO) estimates that globally about 500,000 new cases and over 50,000 deaths of VL occur every year. Over 90% of these cases are from seven countries: Bangladesh, Brazil, Ethiopia, India, Nepal, Sudan and South Sudan. In Africa, there are six countries endemic for VL, namely Ethiopia, Kenya, Somalia, Uganda, South Sudan and Sudan. VL generally affects poor and neglected populations living in remote rural areas. If not treated, more than 95% of VL cases will eventually result in death (8; 7).

In East Africa, there are frequent outbreaks of VL in the northern acacia balanite savannah and the southern savannah and forest areas where sand-flies live around termite mounds. Humans are considered the main reservoir of the Leishmania parasites causing VL in this part of Africa. Cutaneous leishmaniasis occurs in the highlands of Ethiopia and other places in East Africa, where increased human–fly contact occurs in villages built on rock hills or river

banks, which are the natural habitat of hyraxes (9). In recent years, leishmaniasis outbreaks have been described with increasing frequency, including those in sub-tropical regions or regions not previously endemic across the global. In Brazil, beginning in 2005 (10), there were reports outbreaks of VL in different parts of the world like Nepal from 2004 – 2007 (11), China in 2014 (12), Kenya in 2008, 2011, 2013 and 2014 (13), Ethiopia in 2007 (14) different site with different number of cases

VL is considered among the most Neglected Tropical Diseases (NTD), and one of several emerging diseases of major public health importance in Ethiopia. An estimated 3.2 million people are at risk of VL in Ethiopia and an estimated 375,633 km^2 (33%) of the landmass in North Eastern, North Western, Western and South Eastern parts of the country is highly suitable for the transmission of VL (2; 15).

Borena zone started reporting Leishmaniasis cases in 2012 from Arero, Dire and Miyo Districts. More cases were reported by Dire District and the problem expanded to additional Districts and currently, cases are coming from six districts. Borena Zonal Health Department (ZHD) reported relatively an increased number of suspected leishmaniasis cases in 2019 considering as suspected VL outbreak, specifically from Magado Kebele, one of the 11 Kebeles of Dire with estimated total population of 59,474.

1.1.2. Notification and Verification

Leishmaniasis is one of the epidemic prone NTD. VL outbreak is defined as the occurrence of numbers of cases exceeding what is expected in a place in a particular time period (5). Outbreak investigation aims to control the outbreak, prevent additional cases of the disease, identify the source and learn lessons for the future. Outbreak management begins with the timely identification of an outbreak. Establishing an operational definition of VL outbreak is an important to suspect a VL outbreak.

When an outbreak is detected, outbreak management team will be expected to: Initiate immediate control measure, identify population at risk by the central level team, and assess the availability of adequate resources to deal with the outbreak. Outbreak management team convene for further investigation and prevention. Investigation of disease outbreaks involves a combination of epidemiological, entomological, and environmental investigations. A case definition is formed by using a standard set of criteria to decide whether an individual should be classified as having the disease or not in this investigation. A case definition usually includes four components:

- Clinical information about the disease
- Characteristics about the people who are affected
- Information regarding the location or place
- Specification of time during which the outbreak occurred

VL case definition

A person who presents with fever for more than two weeks and an enlarged spleen (splenomegaly) AND/OR enlarged lymph nodes (lymphadenopathy), OR either loss of weight, anaemia or leukopenia while living in a known VL endemic area or having travelled to an endemic area

1.1.3. Objective

1.1.3.1. General Objective

To investigate determinants factors of visceral leishmaniasis outbreak in Borena Zone, Oromia, Ethiopia 2019

1.1.3.2. Specific Objective

- To describe Visceral Leishmaniasis case patients by time, place and person
- To identify exposure and assess risk factors for Visceral Leishmaniasis

1.1.4. Methodology

1.1.4.1. Study Area and Period

The study was conducted in Borena Zone, Oromia Region. The area is bordered in North, West Guji Zone, in South bordering Kenya, in West, Somali Regional State and in the West with South Nations, Nationalities and People Regional State. The projected 2019 total population of the affected area was 219,809 and most of the residents of the zone were pastoralists and most districts were low lands. Entomological and environmental parts of the study were conducted in Magado Kebele of Dire district in the zone, which is endemic for Malaria and other NTDs.

1.1.4.2. Study Design

Descriptive followed by case control study design was conducted in the affected area.

A. Descriptive studies

The case was defined cases as, a person who presents with fever for more than two weeks and an enlarged spleen (splenomegaly) AND/OR Enlarged lymph nodes (lymphadenopathy), OR

either loss of weight, anaemia or leukopenia while living in a known VL endemic area or having travelled to an endemic area. Patients' record form the health facilities were reviewed. The socio demographic variables such as age, sex, travel history to endemic areas, vector control program, sleeping area/place, location, date of onset, date health facility visit and clinical information such as symptoms and treatment outcomes were collected.

B. Analytical Epidemiology

The dependent variable for the study was VL illness while independent variable includes variables such as age, sex, marital status, educational status and vector control program activities. We used case control design with 95% CI, 80% power, 30.8% controls exposure, and 3.73 odds ratio and with ratio of 1:2. A total of 33 verified cases and 66 controls were included in the study. We collected information from cases admitted to hospital discharged using structured questionnaire by interviewing the patients, caregivers and respective control group from the same Kebele. There may be limitation of recall bias from those returned to their home. All 99 study subjects were residents of Borena Zone for at least 2 years at time of diagnosis (cases) or at time of enrolment (controls). We included all cases of VL which fulfils cases definition, admitted to Ya'abal'o Hospital and discharged from 13th, July to 13th October, 2019. We entered the data to Epi info and exported to SPSS to analyse predictors using the Chi-square and logistic regression at significant value of $P<0.05$.

Primarily the risk factors were identified as associated significant factors for affecting occurrence of VL by the chi-square at significance level of < 0.2 and these were candidates for binary logistic regression model to identify significant predictor. Variable those identified for eligibility of binary logistic regression model at p-vale of 0.2 were again tested for the significance as risk factor of VL at p-value < 0.05 as candidate for final model of multivariate logistic regression analysis.

C. Entomological/Environmental and Behavioural Study

We carried out collection of sand flies by using two CDC light trap and six sticky paper collection method for both indoor and outdoor to assess the biting and resting behavior of sand fly, species identification and parasite detection for entomological assessment. We also tried to identify environmental risk factors like availability of water sources, marshy areas, housing conditions, type of trees and domestic and/or wild animals by our visitation to Magado Kebele.

1.1.4.3. Ethical Consideration

Addis Ababa University has written attachment letter to the Oromia RHB. Based on the data expected to be collected; official letter was written from Oromia RHB PHEM Department to Borena Zonal Health Office. Oral consent was obtained from all respondents of >18 years and care giver of the patients under 18 year's old cases and controls.

1.1.5. Results

1.1.5.1. Descriptive report

Totally, 153 patients were admitted and treated in Ya'abal'o Hospital from July 2, 2019 to October 23, 2019. All these suspected cases included in the line list. The medical records of these cases were retrieved and thoroughly reviewed to verify the cases and we verified that 33 (22%) patients were VL cases. During the same period, the hospital reported a total of 9 deaths due to VL. The medical records of these deceased cases were also retrieved and thoroughly reviewed to verify the diagnosis and determine the possible cause of death. Only 3 of deceased were found fulfilling the case definition of VL with a possible cause of death cardio-respiratory arrest.

A. Socio-demographic and economic characteristics

All participants (100%) were responded to our interview. Among 99 study subjects 33 (33.3%) of them were cases and 66 (66.7%) of them were controls. During interview, 21 (21.2%) respondents were among treated cases and 78 (78.8%) of respondents were under treatment. Of the 99 participants 93 (93.9%) were male, 41 (41.4%) were have below the average family size of the country (4.8). Among all participants 5 (5%) were in aged dependent age group, 26 (26.3%) were in child dependent age group, and 68 (68.7%) participants were in productive age group. Of all participants 34 of them can't read and write and 65 of them had different level of education. Among the participants 26 of them have no land; this is related to occupation i.e. pastoralists accounts 74 (74.7%), farmers 19 (19.2%) and others 6 (6.1%). The walling materials of their house were earth (mud) 86 (86.9%), wood 10 (10.1%) and thatched and brick 3 (3%) (Table 1).

Table 1: Socio-demographic Characteristics of Borena Zone, Oromia, Ethiopia 2019

Variables	Category	Frequency	Percent
Status of Study Subjects	Case	33	33.3
	Control	66	66.7
Sex	Male	93	93.9
	Female	6	6.1
Age group in years	0-14	26	26.3
	15-64	68	68.7
	65+	5	5.1
Family size	<5	41	41.4
	>=5	58	58.6
Occupation of head of the house hold	Farmer	19	19.2
	Pastoralist	74	74.7
	Others	6	6.1
Level of Education of head of HH	Can't read and write	34	34.3
	Adult education	16	16.2
	Elementary (1-8)	18	18.2
	High school (9-12)	12	12.1
	Higher Education	19	19.2
Ownership of land	Yes	26	26.3
	No	73	73.7
Number of Hectare(s) for the owner of land (n=26)	One hectare	14	53.8
	Two hectares	4	15.4
	Three hectares	6	23.1
	Four hectares	2	7.7
Walling of the house	Earth (mud)	86	86.9
	Wood and thatched	10	10.1
	Brick	3	3.0
Roofing of the house	Thatch	88	88.9
	Iron sheet	11	11.1
Floor of the house	Earthen	93	93.9
	Concrete	6	6.1
Number of rooms of the house	One room	47	47.5
	Two rooms	39	39.4
	Three rooms	9	9.1
	Four rooms	4	4.0
Family having radio	Yes	52	52.5
	No	47	47.5

B. Behavioural and environmental characteristics

Among all study participants 94 (94.9%) of them have no travel histories to other VL endemic area within the last 2 years, 76 (76.8%) HH were not sprayed with anti-mosquito chemicals. Among 23 sprayed HHs 19 (82.6%) of them were sprayed ≤1 year duration.

Among 99 participants 64 (64.6%) HH have no bed net, 35 (35.4%) of them have and of these 35 having bed nets, during night; 27 (77.1%) of them used always, 7 (20%) of them used sometimes & 1 HH hold never used the net. Most of the time; 67 (67.8%) study subjects sleep inside the house and 32 (32.3%) of them sleep outside the house during night time. During night time 78 (78.8%) study subjects were sleep under acacia tree and during day time 95 (96%) of the have behaviour of sleeping under acacia tree (Table 2).

Table 2: Behavioural Characteristics in Borena Zone, Oromia, Ethiopia 2019

Variables	Category	Frequency	Percent
Travel history of study subjects to other	No	94	94.9
VL endemic area	Yes	5	5.1
HH IRS status	No	76	76.8
	Yes	23	23.2
Ownership status of dogs	No	68	68.7
	Yes	31	31.3
Availability of 'Osole' near residential	Yes	80	80.8
area	No	19	19.2
Family having Bed nets	Yes	35	35.4
	No	64	64.6
Utilization of Bed nets during dry	Always used	27	77.1
season (n=35)	Sometimes used	7	20.0
	Never used	1	2.9
Utilization of Bed nets during rainy	Always used	26	74.3
season (n=35)	Sometimes used	8	22.9
	Never used	1	2.9
Sleeping place of study subjects	Inside room in the house	67	67.7
	Outside of the house	32	32.3
Sleeping under acacia tree during night	Yes	78	78.8
time	No	21	21.2
Sleeping under acacia tree during day	Yes	95	96.0
time	No	4	4.0

C. Morbidity and mortality

A total of 153 cases, of which 33 (22%) were verified for VL admitted in Ya'abal'o Hospital during July 2, 2019 to October 23, 2019. In addition, the hospital reported 9 deaths due to VL and 3 of them were verified for VL death. The AR and CFR was 15/100,000 population and 9.1% among verified cases respectively.

D. Distribution of verified cases

i. Distribution by time

Among the total 33 cases 15 (45.5%) of cases were reported with the date of onset in August 2019. The outbreak was started in June 20th, 2019 (Epi-week 25) increased gradually and reached its pick 5 cases in August 2019 (Epi-week 31) and showed decline ever week. There were no cases with the onset dates reported in Epi-week 39 and 40. Upon comparison of trends of cases reported from 2016 to 2019; there is a marked case surge in July and August 2019 more than other years of respective months (Figure 1-3).

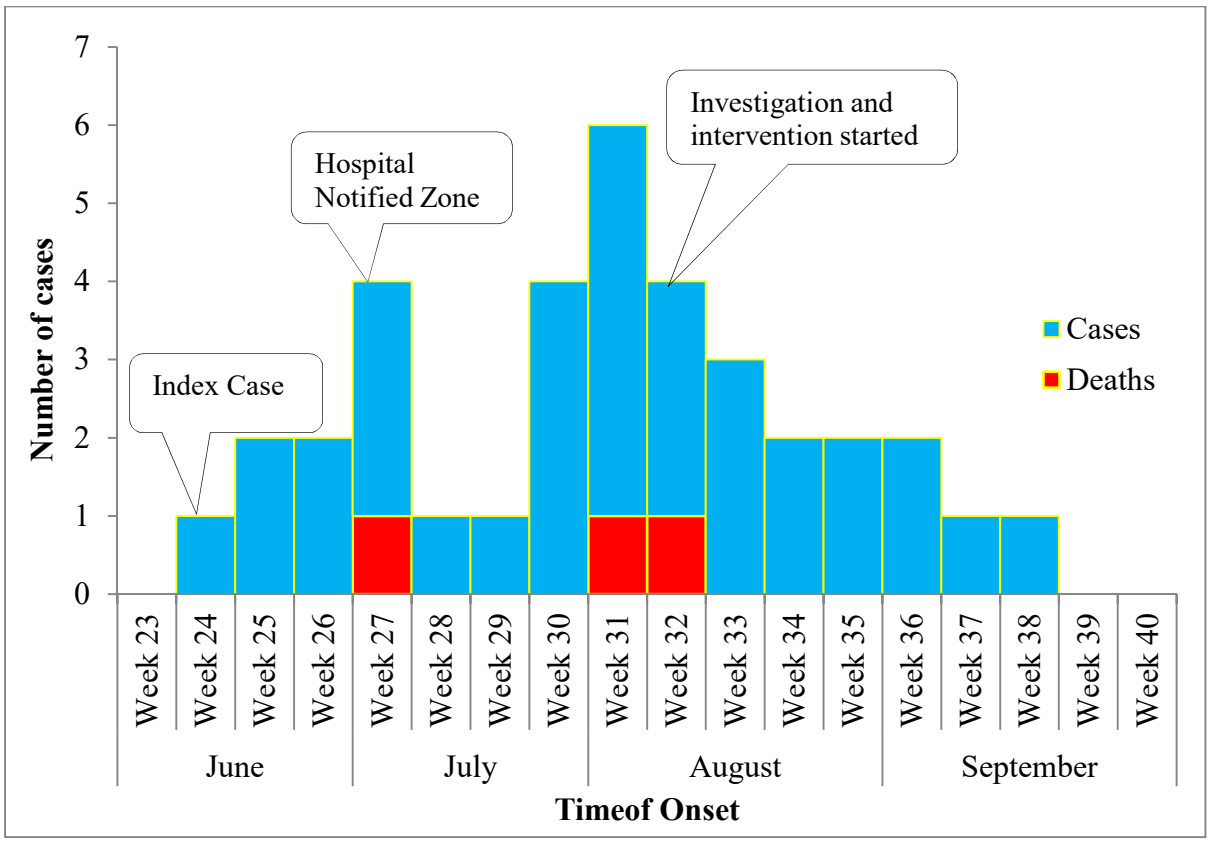

Figure 1: Epi Curve of suspected VL outbreak in Borena Zone, Oromia 2019

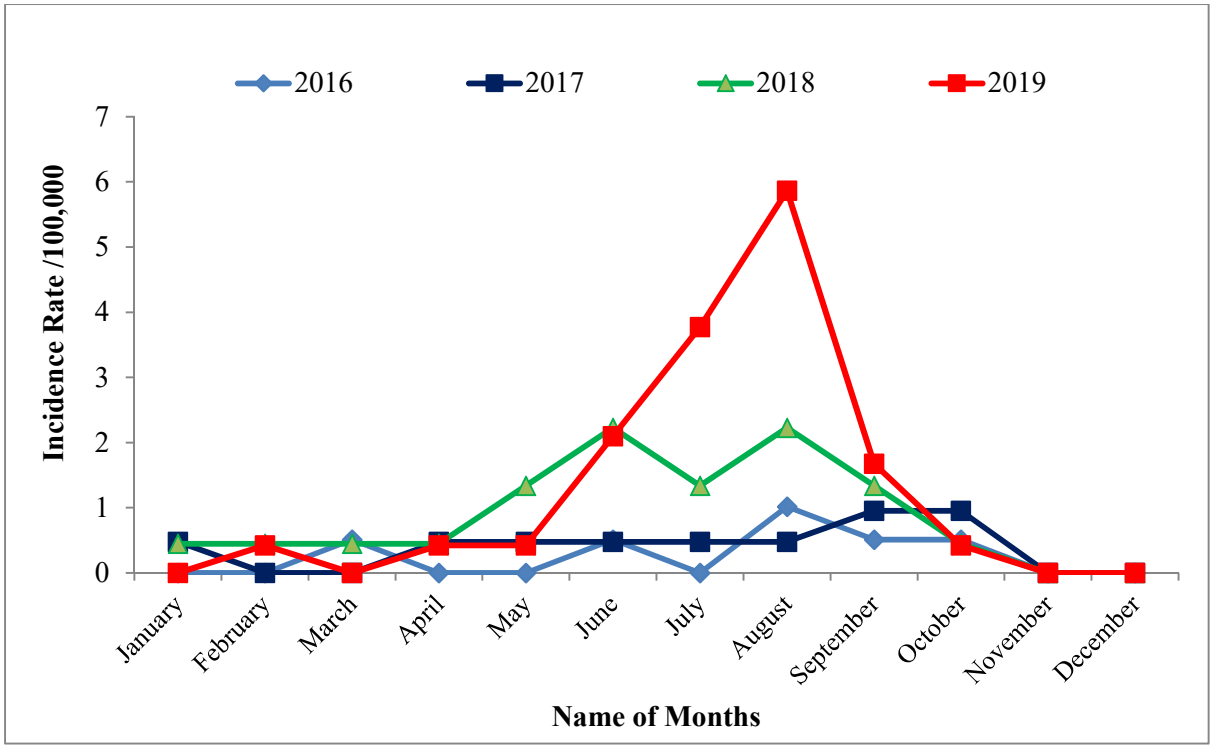

Figure 2: Trend of VL cases in Borena Zone from 2016 -2019, Oromia Ethiopia

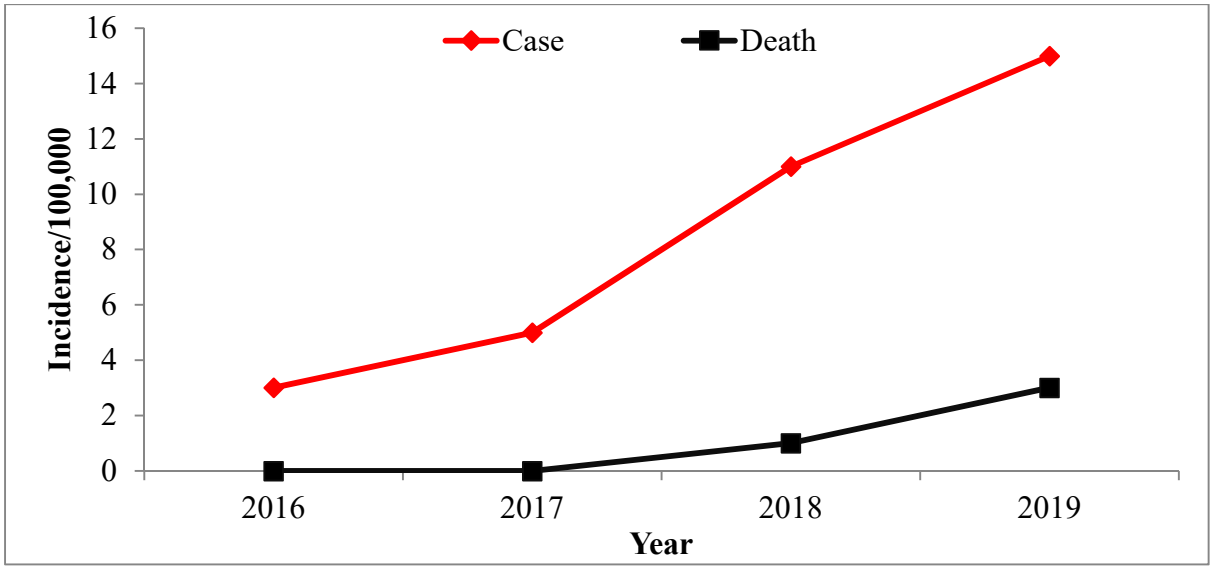

Figure 3: Annual trend of VL cases & deaths in Borena 2016 -2019, Oromia, Ethiopia

ii. Distribution by place

The AR among the Districts per 100,000 populations was: 51.2 in Dire, 6.6 in Elwaya, 6.2 in Dilo, 5.2 in Moyale, 3.3 in Dubuluk and 1.8 in Miyo districts. All confirmed deaths were from Dire (Table 3). Among all cases 26(79%) of them were from Dire District and Magado Kebele contributed 20 (77%) cases for Dire. Other 7 (21%) cases were from Moyale 2 cases, Elweya 2 cases, Dilo 1 case, Dubuluk 1 case and Miyo 1 case. More over all the cases from

other Districts had travel history to Ele-Bora water point in Dire District. All the three deaths were from Dire District (Figure 4 and 5).

Table 3: AR and CFR of VL by District in Borena zone, Oromia Ethiopia, 2019

Name of District	Total Population	Number of Cases	Number of Deaths	AR per 100,000 pop	CFR per 100 cases
Dire	50,760	26	3	51.2	11.5
Elwaya	30,221	2	0	6.6	0.0
Moyale	37,991	2	0	5.3	0.0
Dilo	16,121	1	0	6.2	0.0
Dubuluk	30,285	1	0	3.3	0.0
Miyo	54,431	1	0	1.8	0.0
Total	219,809	33	3	15	9.1

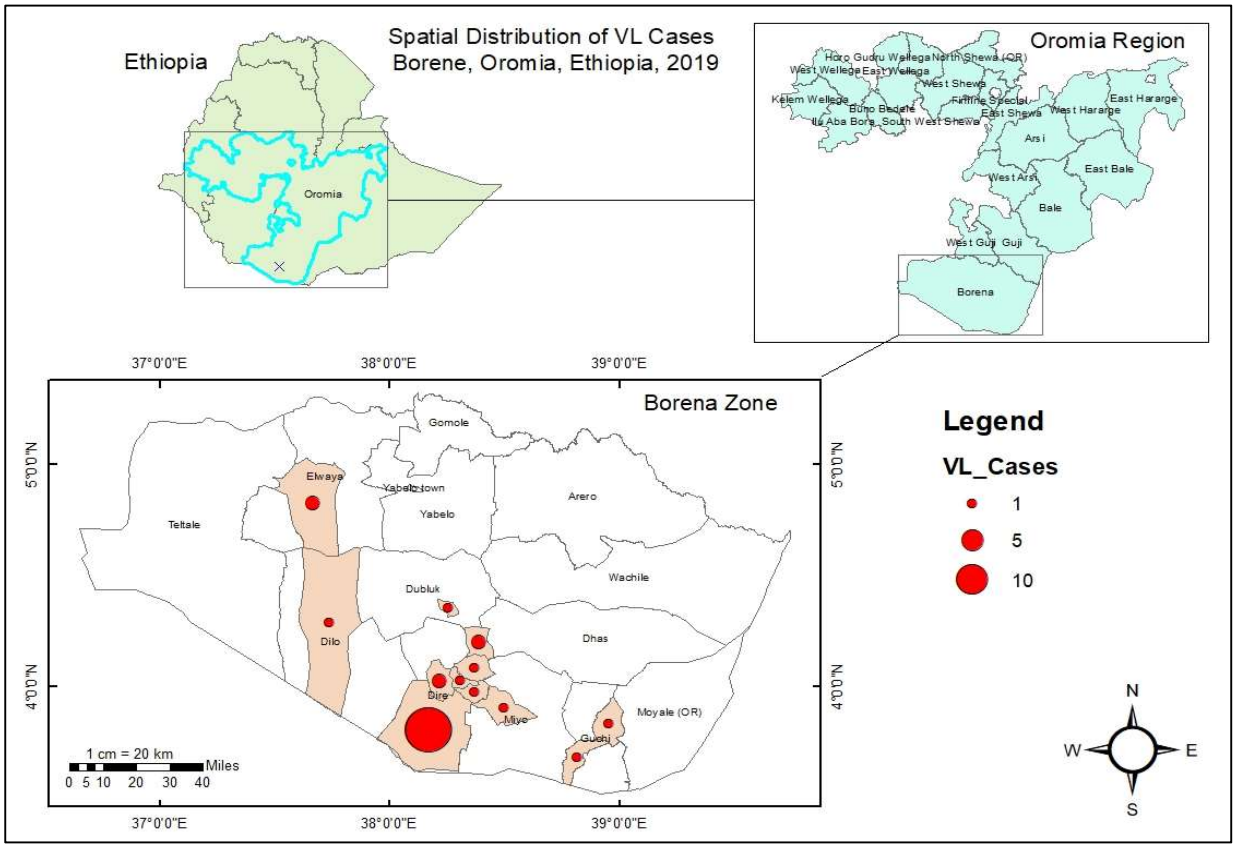

Figure 4: Spatial distribution of VL in Borena, Oromia October 2019

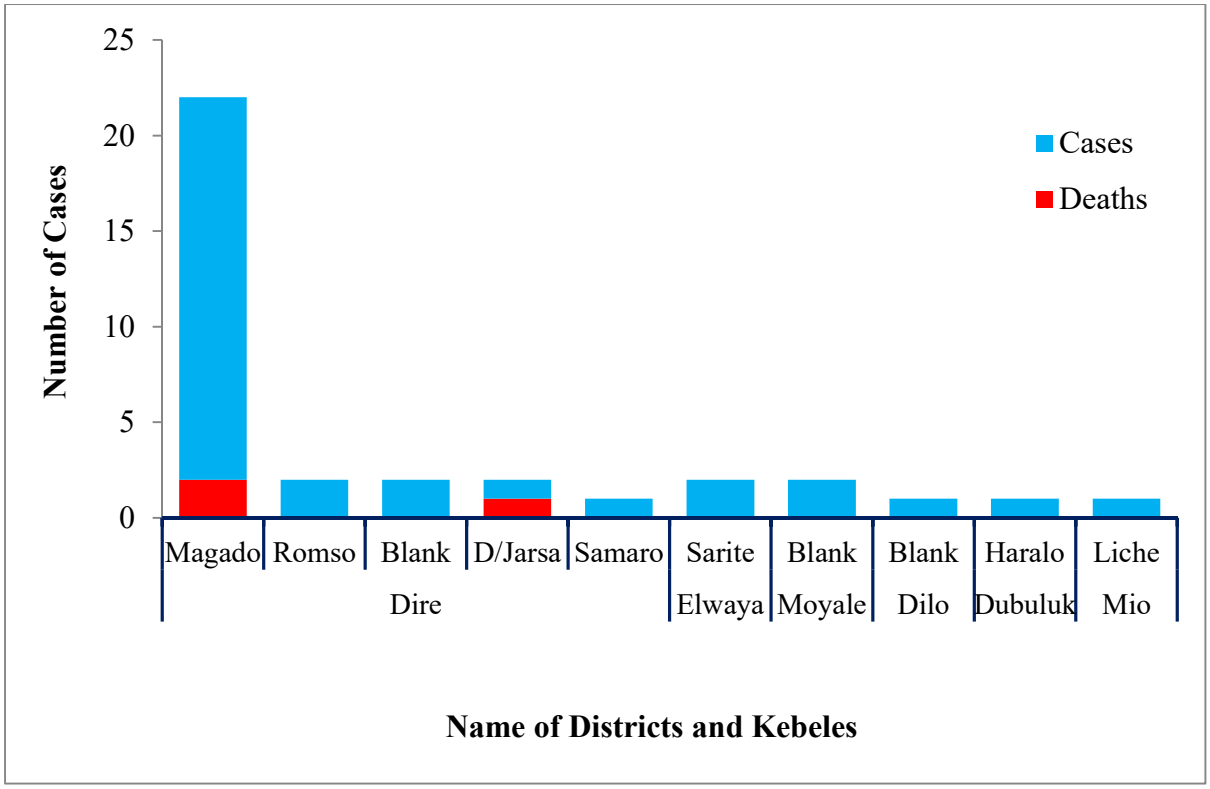

Figure 5: Number of VL cases by Districts in Borena Zone, Oromia South Ethiopia

iii. Distribution by person

The AR per 100,000 populations with age groups was 10.5, 19.3 and 9.0 in 0-14 years, 15-64 years and 65+ years respectively. The age groups highly affected were 15-64 years with AR of 19.3/100, 000 population, while the CFR is high among age groups 0-14 years with CFR of 20%. This is may be due low immunity during child hood (Table 4 and Figure 6). Among all case 31 (94%) of them were male. There were only 2 female cases and both of them were alive.

Table 4: AR and CFR of VL with age group in Borena, Oromia, Ethiopia, 2019

Age Category	Total population	Number of Cases	Number of Deaths	AR per 100,000 pop	CFR per 100 cases
0-14 years	94,936	10	2	10.5	20
15-64 years	113,743	22	1	19.3	4.5
65+ years	11,130	1	0	9.0	0.0
Total	219,809	33	3	15.0	9.1

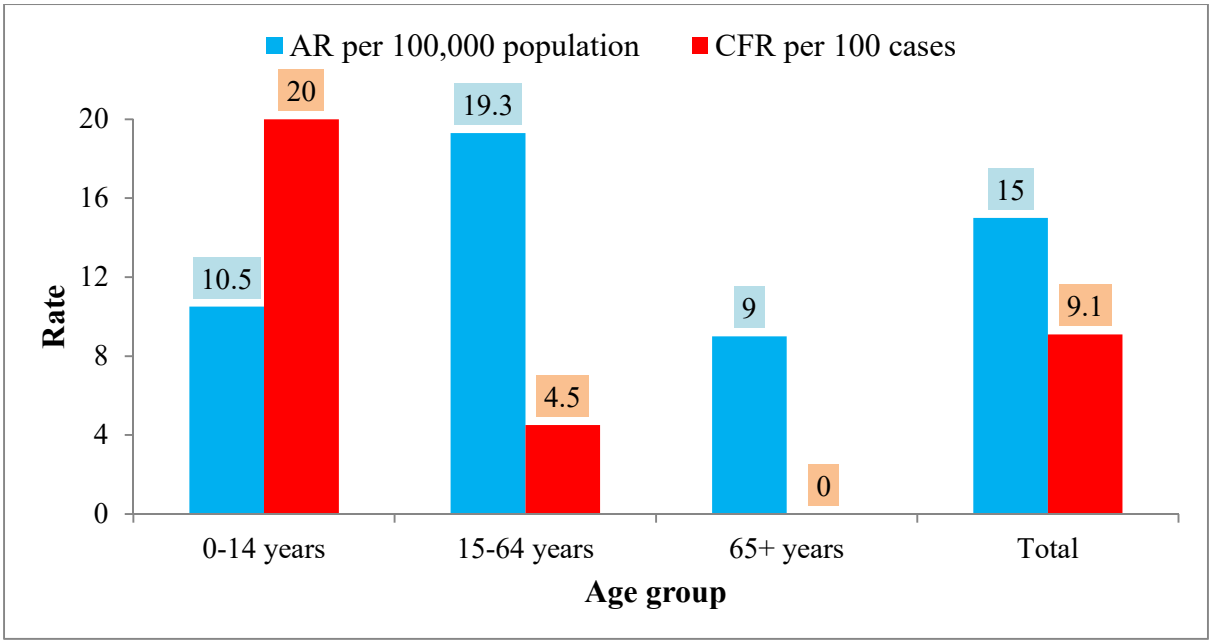

Figure 6: AR and CFR of VL among age groups in Borena, Oromia, Ethiopia 2019

1.1.5.2. Analytic Epidemiology findings

A. Bivariate analysis of risk factors

Level of education of study subjects, HH head ability to read and write ownership of land, having radio, having latrine, HH IRS status, having bed-nets, sleeping place and walling material of housing were identified as associated factors at binary logistic regression model (Table 5).

Table 5: Bivariate Analysis of VL Predictors in Borena Zone, Oromia, Ethiopia, 2019

Variables	Categories	Study Subjects		P-Value	COR (95% C.I.)
		Cases	Controls		
Level of Education of study subject	Can't read and write[1]	16 (47.1%)	18 (52.9%)	.033	
	Adult education*	8 (50%)	8 (50%)	.014	7.555 (1.506,37.894)
	Primary (1-8)*	6 (33.3%)	12 (66.7%)	.017	8.499 (1.458,49.539)
	High school (9-12)	1 (8.3%)	11 (91.7%)	.108	4.249 (0.729.24.769)
	Higher education	3 (10.5%)	18 (89.5%)	.841	0.772 (0.62,9.579)
Ability of HH Head to Read and Write	No*	17 (26.2%)	48 (73.8%)	.038	0.398 (0.167,0.952)
	Yes[1]	16 (47.1%)	18 (52.9%)		
Family ownership status of land	No*	20 (27.4%)	53 (72.6%)	.039	0.377 (0.150,0.952)
	Yes[1]	13 (50%)	13 (50%)		
Having Latrine	No*	12 (52.2%)	11 (47.8%)	.032	2.857 (1.094,7.464)
	Yes[1]	21 (27.6%)	55 (72.4%)		
HH IRS Status	Not sprayed*	31 (40.8%)	45 (59.2%)	.011	7.233 (1.581.33.100)
	Sprayed[1]	2 (8.7%)	21 (91.3%)		
Having Radio	No*	21 (44.7%)	26 (55.3%)	.025	2.692 (1.135,6.389)
	Yes[1]	12 (23.1%)	40 (76.9%)		
Having Bed net	No**	29 (45.3%)	35 (54.7%)	.002	6.421 (2.030,20.315)
	Yes[1]	4 (11.4%)	31 (88.6%)		
Most time sleeping place	Inside room in the house*	17 (25.4%)	50 (74.6%)	.017	0.340 (0.140,0.824)
	Outside of the house[1]	16 (50%)	16 (50%)		
Walling of the house	Earth[1]	26 (30.2%)	60 (69.8%)	.069	
	Brick*	0 (0%)	3 (100%)	.021	0.185 (0.045.0.775)
	Other	7 (70%)	3 (30%)	.999	.000

Note: *** is P-value < 0.01,* * * is P-value <0.05* [1] *Reference*

B. Multivariate analysis of predictors

After adjustment of the confounders using multivariate logistic regression analysis, risk factors: level of education of study subjects, HH head ability to read and write, ownership of land, having bed-nets and walling material of housing remain in the final model as significantly associated factors for the cause of VL.

Study participants with adult education are 30 times more likely to have VL than those of higher education (95% CI of AOR=2.378, 389.602), and similarly primary level of education was 13 times more likely to have VL than those of higher education (95% CI of AOR=1.107, 168.565). HH heads not able to read and write 93% less likely to be free from VL than those able to read and write (95% CI of AOR=0.007, 0.582). Not possessing land is 72% less likely to be free from VL than those possess land (95% CI of AOR=0.078, 0.996). Participants not having bed-nets are 9 times more likely to be infected with VL than those having bed-nets (95% CI of AOR=1.763, 46.205). Living in house with walling of brick is 95% less likely to be susceptible for VL infection than those living in house with walling of earth (mud) (Table 6).

Table 6: Multivariate Analysis of VL Predictors in Borena Zone, Oromia, Ethiopia 2019

Variables	Categories	Study Subjects		P-Value	AOR (95% C.I.)
		Cases	Controls		
Level of Education of study subject	Can't read and write[1]	16 (47.1%)	18 (52.9%)	.055	
	Adult education **	8 (50%)	8 (50%)	**.009**	**30.438 (2.378, 389.602)**
	Primary (1-8) *	6 (33.3%)	12 (66.7%)	**.041**	**13.661 (1.107,168.565)**
	High school (9-12)	1 (8.3%)	11 (91.7%)	.686	0.429 (0.007,26.081)
	Higher education	3 (10.5%)	18 (89.5%)		
Ability of HH Head to Read and Write	No *	17 (26.2%)	48 (73.8%)	**.015**	**0.065 (0.007,0.582)**
	Yes[1]	16 (47.1%)	18 (52.9%)		
Family ownership status of land	No*	20 (27.4%)	53 (72.6%)	**.049**	**0.278 (0.078,0.996)**
	Yes[1]	13 (50%)	13 (50%)		
Having Bed net	No**	29 (45.3%)	35 (54.7%)	**.008**	**9.024 (1.763,46.205)**
	Yes [1]	4 (11.4%)	31 (88.6%)		
Walling of the house	Earth[1]	26 (30.2%)	60 (69.8%)	.092	
	Brick*	0 (0%)	3 (100%)	**.029**	**0.052 (0.004,0.739)**
	Other	7 (70%)	3 (30%)	.999	.000

Note: *** is P-value < 0.01,* * * is P-value <0.05* [1] *Reference*

1.1.5.3. Entomological Findings

A total of 70 entomological specimens were collected. Out of the 70 specimens, 49 (70%) were collected from outdoor sites and 15 (21%) were from vegetation. Only 6 (9%) of the specimens were collected from indoors. Though the sample was not adequate for justification, the density is 8-10 flies per A4 size slide in outdoor near to house compound. In Ele-Bora village black cotton soil is important breeding site for sand fly, the community prefers to sleep outside house due to hot climatic condition results in an increased risk of infection. However, 9% sand fly was collected inside the houses, are not constructed well, have many holes in the wall, so it increases the risk of bite when a person sleeps even inside the house.

The descriptive part of our finding also shows among all study participants 68.7% of them own dogs and 80.8% of them respond that availability of 'Osole' near their residential area. Both dogs and 'Osole' are the reservoirs of sand flies. Additionally; acacia tree which is favorable for the breading of sand fly found in the area and 78.8% of the respondents sleep under this tree during night time.

Figure 7: Sand flies trapped from Ele-Bora village Borena, Ethiopia 2019

1.1.5.4. Environmental findings

Based on the data registered in Ya'abal'o hospital shows high cases were from Dire district specifically from Magado Kebele. The surveillance group of outbreak investigation team tried to identify environmental risk factors for VL in Magado Kebele of Dire District. Accordingly; there was a deep well water source project in Ele-Bora village having tankers and ditches without water which makes the surrounding favourable area for breading of sand flies. For the sake of water source project the community obliged to come and dwell in the area for grazing and getting water for their cattle. Additionally; the area is marshy/swampy during rain; when heavy rain passes the land become cracked and makes small holes which helps for breading of sand flies and related insects.

The walling of house made of wood and thatched having many holes, roofing from thatched and plastic material, and floor from earth not cleanable having cracks and holes. There were also acacia trees in the district which serves as shading from sunlight during day time and as a shelter near herd of cattle for young male during night time. There were domestic animals like dogs and wild animals like "Osole" inhabit in the area.

Figure 8: Marshy place in Ele-Bora grazing land, Borena, Oromia, Ethiopia 2019

Figure 9: Environment of Ele-Bora Village in Borena zone, Oromia, Ethiopia 2019

1.1.6. Discussion

Descriptive

The increment in the number of cases in July and August 2019 might be by the awareness raising activities in the community by the zone health department and respective Districts which can improve the care seeking behaviour of the community and the attention given for complete data recording in the current suspected outbreak.

The number of cases is pitched in Magado Kebele of Dire District. The possible cause for increased number of cases in Magado might be related to settlement of community near water point of Ele_Bora village which is favourable for breading of Sand Flies which are responsible vector for Leishmania infection (3; 11). Additionally the entomological information collected from Ele_Bora village also indicates the presence of sand fly in the village. More over all the cases from other District had travel history to the water point in Dire District.

The age groups highly affected were 15-64 years male due to high risk of exposure to the breading sites of sand fly during outside work activities; in similar way study conducted in North Ethiopia also shows higher number of VL cases were recorded above 14 years of age group, and studies in Libo Kemem showed that males were affected more than females. In contrast to our study the study conducted in South Sudan shows 56% of the cases were under 5 years old (16). The reason for difference could be behavioural and cultural difference between the communities. The reason for similarity of the studies might be due to culture and habits of the male were engaged to keep cattle; they sleep at night time outside the house near their cattle and stays under shed of trees at day time (17). Domestic animals like dog accompany them to keep their cattle during day and night, which are the factors for the transmission of Leishmaniasis (18). The respondents also told that there are wild animals like "Osole" which are another risk factor for the transmission of the disease (19). The result shows that the fatality rate is relatively high among child dependent age group. This might be due low immunity of children than the productive age groups (3).

Factors Associated with Cases of VL

Statistical analysis model we used shows that level of education of study participants were significantly associated with VL cases, which is similar with study conducted in North Ethiopia (17). Similarly study conducted in North Ethiopia showed that educational level below grade five boosted VL odds (19; 20). In contrast to this there were no evidences shown

in studies conducted in Nepal, South Sudan and Libo Kemkem of North West Ethiopia (11; 16; 17). The difference might be due to socio cultural and geographical location difference of study areas.

There is a strong association between VL and poor housing condition like walling material built from mud, similarly study conducted in Nepal with those living in a thatched houses without windows having 3–4 times higher odds of VL (11). In Spain also living in a detached house, were all strongly associated with the prevalence of asymptomatic infection (21). Cracked walls may be favourable area for the breading of and resting of sand flies and houses without window are free for the movement of vectors from outdoor to indoor flight. The study North Ethiopia also shows similar association (19).

Our study also indicates that owning specific land has significant association with VL, and similarly study conducted in Shebelle, Somali Region (15). Previous outbreaks were often related to force migration of non-immune populations into endemic areas following conflict (22). The reason behind might be due to high mobility of the community for grazing and not expected to construct well designed house which hinders the movement and breading of sand fly.

Bed-net is other predictor that is associated to VL cases. Similarly studies proved that having bed nets and utilization of bed nets have significant association with the prevalence of this morbidity (19; 20). This holds true that ITNs are protective factor for the sand flies mechanically as well as chemically by killing the vectors (23; 2). However, like IRS, the usefulness of Long Lasting ITNs very much depends on the biting behaviour of the vectors (indoor vs. outdoor). Another issue regarding the use of nets against sand flies is that much sand fly biting activity occurs during early evening between 19-21 o'clock before most people go to sleep so that exposure to sand fly bites is only reduced but not eliminated (2).

1.1.7. Conclusion

Male productive age group were the highly affected group of community. Mobility of the community to the water source point is and residing the breading site of sand fly without means of protective mechanisms were the reason behind wide spread of the case in Magado Kebele. Level of education, possession of land, having and utilization of bed nets and housing conditions are significantly associated predictors for Visceral Leishmaniasis outbreak occurred in the Zone.

1.1.8. Recommendation

- At policy making level formulating policies and guidelines on awareness creation for male productive age group regarding feeding habit of sand fly and prevention mechanisms control methods specifically for highly mobile community like pastoralists,
- Regional Health Bureau and NTD related NGOs should work on capacity building of health workers in hospital as well as health Center level on screening, diagnosis and management of visceral leishmaniasis,
- At Zonal and District level it is recommended that to mobilize the community from risk area to sand fly breading free location based on assessment and mobilization stakeholders to support vector control. Educating the community on prevention mechanisms like using repellents and safe sleeping mechanisms and
- Additionally; further investigation on the study area is the best remedy to overcome future VL outbreak occurrence.

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1.2. COVID-19 Outbreak Investigation in Oromia Region, Ethiopia, September 2020

Abstract

Background: Coronavirus disease 2019 is defined as illness caused by a novel coronavirus now called sever acute respiratory syndrome coronavirus 2, which was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China beginning in December 2019. Based on the global and national situation and response Oromia Health Bureau has established new Emergency Operation Center having six sections to investigate and describe COVID-19 outbreak in Oromia, Ethiopia.

Methodology: Descriptive study design was used in the affected area. All confirmed cases of COVID-19 investigated, tested and admitted by Oromia Region as well as registered on line list from March 25th 2020 to September 30th, 2020 were reviewed. The socio demographic information were identified and described. All cases listed on the regional line list of COVID-19 from March 25th to September 30th were included in the description of the study.

Result: Totally there were 11,715 confirmed COVID-19 cases and 84 deaths were reported. Among all 11,715 confirmed cases 11,639 (99.4%) of them were asymptomatic. Among all 76 symptomatic cases; only 16 (21%) cases have underling comorbidity condition. The severity statuses of the cases after admission were 11,576 (98.8%) asymptomatic, 51 (0.4%) mild, 17 (0.1%) moderate, 19 (0.2%) sever and 52 (0.4%) were dead body. The overall regional AR was 3/10,000 and CFR was 0.72%. Among all cases 8,143 (69.5%) were male, the top affected occupation category were prisoners 1321 (11.3%), industry worker & daily labourers 1179 (10.1%), private, NGO & GO workers 785 (6.7%), military 553 (4.7%), drivers and merchants 390 (3.3%), health workers 64 (0.5%), bankers and waiters 59 (0.5%), and the occupation of 7352 (62.8%) cases were not identified.

Conclusion: COVID-19 was highly disseminated in the community during July and August following uncontrolled social gatherings not taking care for transmission of the virus. COVID-19 can affect all age group and both sexes. The disease more affects group of community with low sanitation facilities, poor hygienic practice, with no personal protective equipment and being involve in public gatherings. Occupational categories and residential places might be factors for the spread of the virus.

Key words: COVID-19 cases, COVID-19 deaths, Oromia

1.2.1. Background

Coronaviruses are a group of viruses that cause diseases in mammals and birds. In humans, the viruses cause respiratory infections which are typically mild including the common cold but other forms like Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS) and 2019 novel coronaviruses can be lethal (1).

Human coronaviruses were first identified in the mid-1960s. Common human coronaviruses that can infect people are 229E (alpha coronavirus), NL63 (alpha coronavirus), OC43 (beta coronavirus), HKU1 (beta coronavirus), MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome or MERS), SARS-CoV (the beta coronavirus that causes severe acute respiratory syndrome or SARS), and 2019 Novel Coronavirus (2019-nCoV) (1; 2).

Coronavirus disease 2019 (COVID-19) is defined as illness caused by a novel coronavirus now called sever acute respiratory syndrome coronavirus 2 (SARS CoV-2; formerly called 2019-nCoV), which was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China beginning in December 2019 (3). Disease caused by SARS-CoV-2 was called COVID-19 by the WHO, the acronym derived from "coronavirus disease 2019." The name was chosen to avoid stigmatizing the virus's origins in terms of populations, geography, or animal associations (4). On February 11, 2020, the Coronavirus Study Group of the International Committee on Taxonomy of Viruses issued a statement announcing an official designation for the novel virus: severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (5; 4).

Physical contact and respiratory routs are the most important well recognized routs of transmission of the virus. Poor hand hygiene practice, overcrowding, and close physical contacts like hand shaking contributes for the fast blowout of the virus with in very short period of time. Experience from China where the disease was first recognized shows educating the public about the nature of the disease and the rout of transmission, restricting mobility of individuals within the border and across borders is proven to be key in preventing transmission (6; 7).

1.2.2. Notification and Verification

Outbreak investigation aims to control the outbreak, prevent additional cases of the disease, identify the source and learn lessons for the future. Outbreak management begins with the

timely identification of an outbreak (8). As of 31 January 2020, this epidemic had spread to 19 countries with 11,791 confirmed cases, including 213 deaths and the World Health Organization has declared it a Public Health Emergency of International Concern (9) on March 11, 2020 the WHO declared COVID-19 a global pandemic, its first such designation since declaring H1N1 influenza pandemic in 2009 (3; 5).

In an institution one positive specimen result for COVID-19 in a staff is a confirmed outbreak. Even when a COVID-19 case is recognised and an outbreak is confirmed, obtain consent to continue testing all newly symptomatic staff and clients throughout the outbreak until otherwise directed by Public Health (8). In Ethiopia the first coronavirus case was reported on March 13, 2020 and the victim was Japanese citizen (10) and in Oromia region the first case is a 61 years old individual was reported on March 25, 2020 from Adama town with no prior travel history (11).

Based on the global and national situation and response Oromia Health Bureau (OHB) has established new Emergency Operation Center (EOC) under the coordination of Public Health Emergency Management (PHEM) directorate having six sections. A comprehensive COVID-19 prevention and control preparedness plan was prepared having duties and responsibilities to all section which is monitored and evaluated regularly to combat COVID-19 pandemic.

Case definitions for COVID-19

Based on Ethiopian Ministry of Health (MOH) and Ethiopian Public Health Institute (EPHI):

Suspected case

A. A person presenting with fever (>38℃) or history of fever and symptoms of respiratory tract illness e.g. cough, difficulty in breathing AND a history of travel to or residence in a country/area or territory reporting local transmission of COVID-19 disease during the 14 days prior to symptom onset.

   OR

B. A person with fever (>38℃) or history of fever and symptoms of respiratory tract illness e.g. cough, difficulty in breathing AND in the last 14 days before symptom onset, close contact with a person who is under investigation or confirmed for COVID-19

   OR

C. A person with fever (>38℃) or history of fever and symptoms of respiratory tract illness e.g. cough, difficulty in breathing; And requiring hospitalization)And in the absence of alternative diagnoses that fully explains the clinical situation

Probable case:

A. A suspect case for which testing for COVID-19 is inconclusive

OR

B. A suspect case for whom testing could not be performed for any reason

Confirmed case:

A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms

1.2.3. Objective

1.2.3.1. General Objective

To investigate determinants factors of COVID-19 outbreak in Oromia, Ethiopia 2020

1.2.3.2. Specific Objective

- To describe COVID-19 case patients by time
- To describe COVID-19 case patients by place and
- To describe COVID-19 case patients by person

1.2.4. Methodology

1.2.4.1. Study area and period

The study area was Oromia Region, Ethiopia from March to September 2020. Oromia region has a projected 2020 total population of 38,865,436

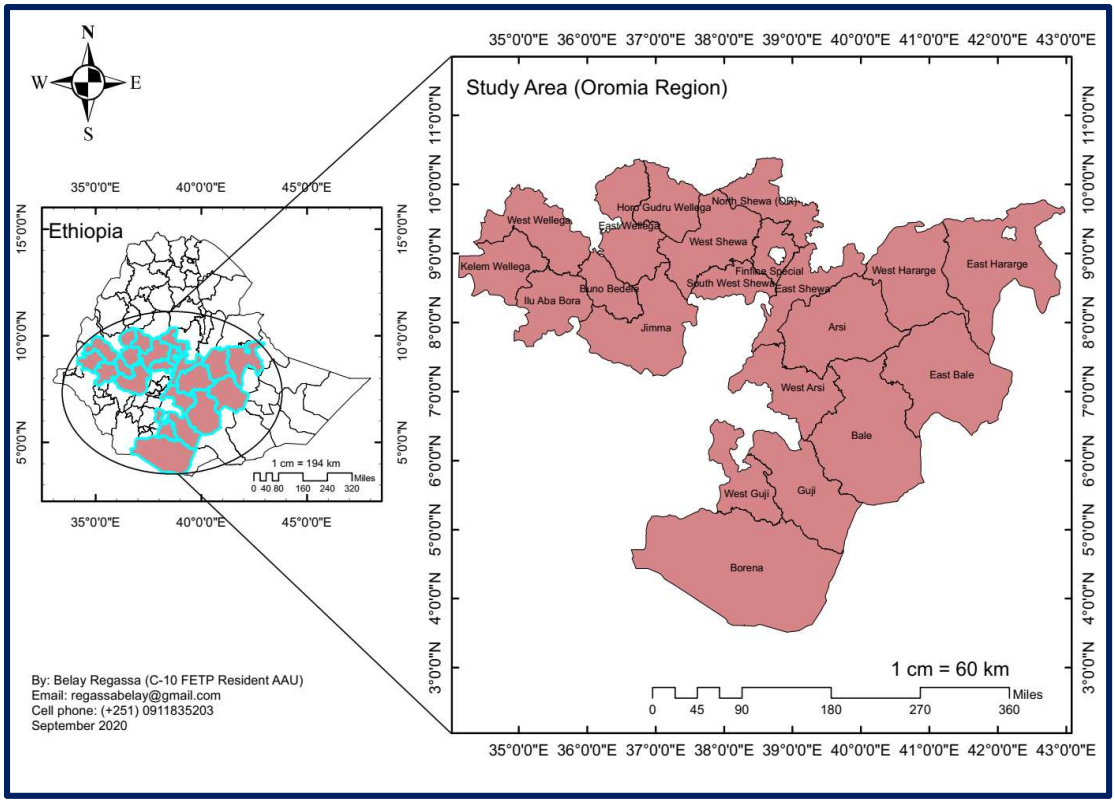


Figure 10: COVID-19 outbreak investigation area, Oromia, Ethiopia September 2020

1.2.4.2. Inclusion Criteria

All confirmed cases of COVID-19 investigated, tested and admitted by Oromia Region as well as registered on line list from March 25th 2020 to September 30th, 2020

1.2.4.3. Study Design

Descriptive study design was used in the affected area. Secondary data from the line list of COVID-19 confirmed cases reported to the region was reviewed. The socio demographic information were identified and collected.

1.2.4.4. Sampling Method

All cases listed on the regional line list of COVID-19 from March 25th to September 30th were included in the description of the study.

1.2.4.5. Study Variables

Socio demographic (age, sex, occupation, place of residence…) date of lab result issued, source of report, source of infection, signs and symptoms and outcome status were the variables described in the study.

1.2.4.6. Ethical Consideration

Addis Ababa University has written letter to the Oromia RHB for residency. Based on the residency attachment the data was obtained from regional EOC, PHEM directorate.

1.2.5. Result

1.2.5.1. Descriptive Report

A. Socio-demographic and economic characteristics

In Oromia region, from March 25 – September 30, 2020 there were 11,715 confirmed COVID-19 cases. Among these 8,143 (69.5%) were male and their occupation category were prisoners 1321 (11.3%), industry worker & daily labourers 1179 (10.1%), private, NGO & GO workers 785 (6.7%), military 553 (4.7%), drivers and merchants 390 (3.3%), health workers 64 (0.5%), bankers and waiters 59 (0.5%), students 10 (0.1%) and farmers 2 (0.02%) and the occupation of 7352 (62.8%) cases were not identified. Among all cases 11,241 (96%), 260 (2.2%), 104 (0.9%), 84 (0.7%), 22 (0.2%) and 4 (0.03%) of them were investigated by community surveillance, isolation centres (contacts), health facility, quarantine site, suspected cases and forensic examination respectively. Of all cases 11,534 (98.5%) of them have no travel history to other country. Among 181 cases having travel history to Djibouti 75 (41.4%), Kenya 34 (18.8%), Lebanon 25 (13.8%), UAE 25 (13.8%), Somali Land and Somalia 16 (8.9%) and remain 6 cases from six different countries. Among all cases their source of infection is 11,088 (94.6%) of community, 451 (3.8%) contact with confirmed case and 176 (1.5%) imported from other country (Table 7). The date of arrival of 181 cases was from April 10th - September 5th, 2020 with many cases (Figure 11).

Table 7 Socio-demographic characteristic of COVID-19 cases; Oromia, Ethiopia 2020

Variable	Category	Number of cases	Percent
Sex	Female	3,572	30.5
	Male	8,143	69.5
Age group	0-14	554	4.7
	15-34	7,897	67.4
	35-64	2,967	25.4
	65+	297	2.5
Occupation	Prisoners	1,321	11.3
	Industrial workers & daily labourers	1,179	10.1
	Private, GO & NGO workers	785	6.7
	Military	553	4.7
	Drivers and merchants	390	3.3
	Health worker	64	0.5
	Bankers and waiters	59	0.5
	Students	10	0.1
	Farmers	2	0
	Unknown	7,352	62.8
Source of report	Community surveillance	11,241	96.0
	Isolation Center (Contacts)	260	2.2

	Health Facility	104	.9
	Quarantine site	84	.7
	Suspected Case	22	.2
	Forensic examination	4	.0
Travel history to other country	No	11,534	98.5
	Yes	181	1.5
Name of the countries came from (N=181)	Djibouti	75	41.4
	Kenya	34	18.8
	Lebanon	25	13.8
	UAE	25	13.8
	Somalia	13	7.2
	Somali Land (Hargessa)	3	1.7
	Bahrain	1	0.6
	Kuwait	1	0.6
	Qatar	1	0.6
	Sudan	1	0.6
	Turkey	1	0.6
	USA	1	0.6
Source of infection (N=11715)	Community	11088	94.6
	Contact	451	3.8
	Imported	176	1.5

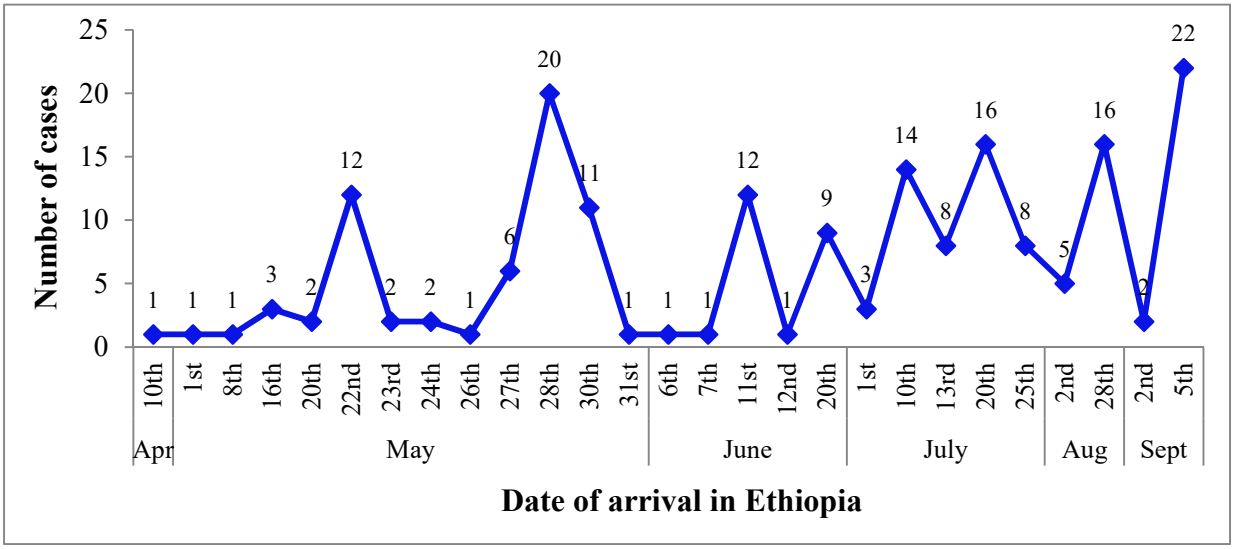


Figure 11: Arrival time of COVID-19 cases from abroad to Oromia, Ethiopia, 2020

B. Morbidity and mortality

From all 11,715 confirmed cases 11,639 (99.4%) of them were asymptomatic and only 76 (0.6%) of them were symptomatic with a minimum of one symptom. Of all case only 16 (21%) cases have underling comorbidity condition. The severity status of the cases were 11,576 (98.8%) asymptomatic, 51 (0.4%) mild, 17 (0.1%) moderate, 19 (0.2%) sever and 52 (0.4%) were dead body. Regarding their final outcome status 11,631 (99.3%) were alive and 84 (0.7%) of them were died (Table 8).

Table 8 Morbidity & mortality of COVID-19 in Oromia, Ethiopia, September 2020

Variable	Category	No of cases	Percent
Symptomatic	No	11,639	99.4
	Yes	76	0.6
Underling comorbidities & conditions	No	11,699	99.8
	Yes	16	0.2
Severity status during follow-up	Asymptomatic	11,576	98.8
	Mild	51	0.4
	Moderate	17	0.1
	Sever	19	0.2
	Dead body	52	0.4
Outcome status	Alive	11,631	99.3
	Died	84	0.7

From all case 84 of them has died and the overall regional AR was 3/10,000 population and the CFR was 0.72%. The AR is relatively high at towns 26.6/10,000 than zones 1.7/10,000 population; but the CFR was relatively high among zones 0.75% than towns 0.62% (Table 9)

Table 9 AR and CFR of COVID-19 from March to September 2020 in Oromia Ethiopia

Settlement	Total Population	Total Cases	Total Deaths	AR per 10000	CFR (%)
Towns	2,007,171	5332	33	26.6	0.62
Zones	36,858,265	6098	46	1.6	0.75
Other regions		285	5	-	1.7
Oromia	**38,865,436**	**11,715**	**84**	**3.0**	**0.72**

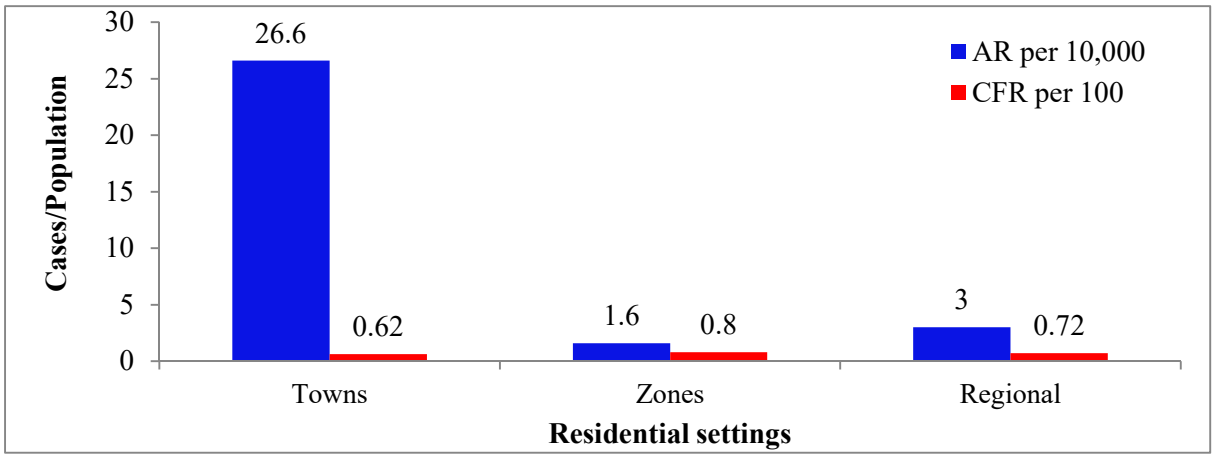


Figure 12 AR and CFR of COVID-19 in Oromia, Ethiopia September 2020

Among 76 symptomatic cases; 56 (73.7%) have cough, 16 (21.1%) have head ach and 15 (19.7%) have shortness of breath (Figure 4). Among the 16 cases having underling comorbidity conditions the common conditions were; hypertension, asthma and diabetes mallets account 6 (37.5%), 4(25%) and 3(18.8%) respectively.

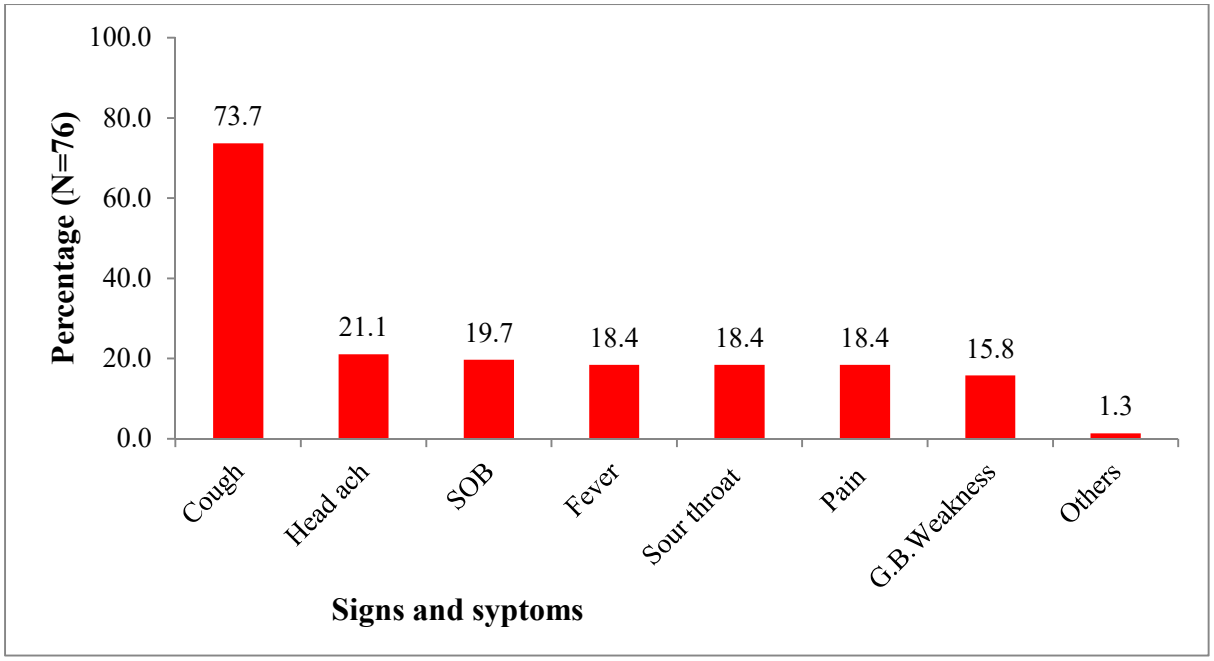


Figure 13 sings of symptomatic case of COVID-19 in Oromia, Ethiopia, 2020

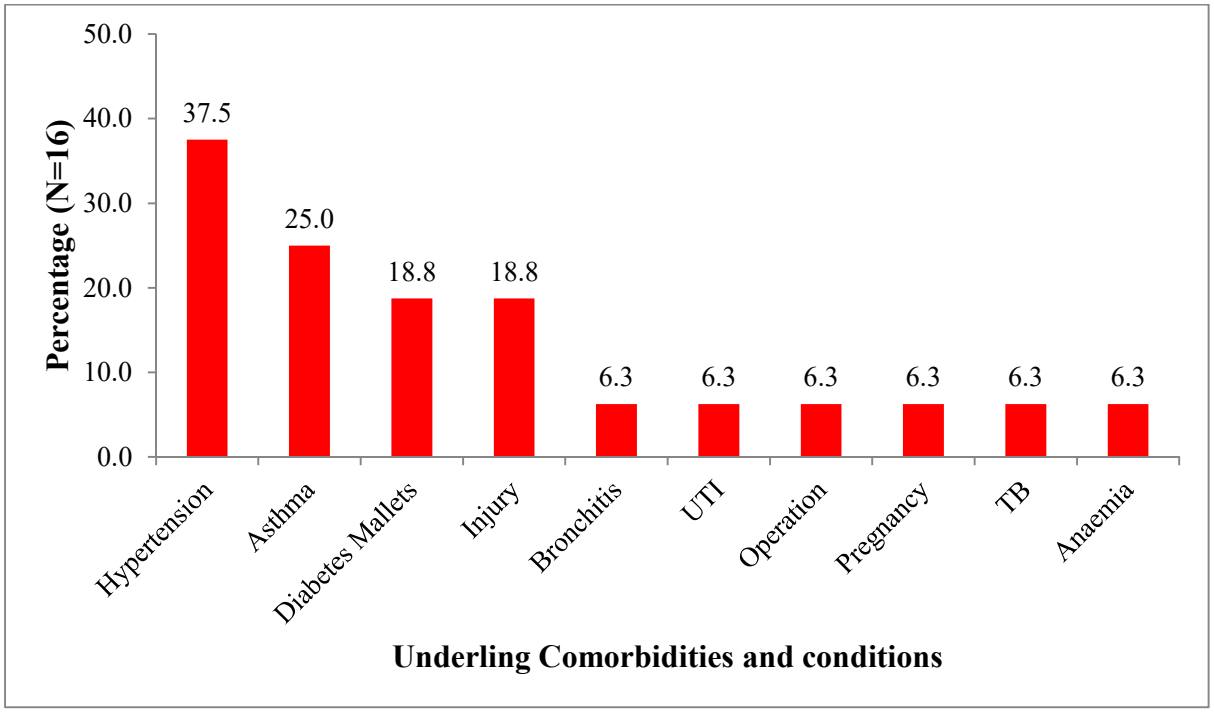


Figure 14 Comorbidity condition with COVID-19 cases in Oromia, Ethiopia, 2020

C. Distribution of cases

i. Distribution by time

The first case was reported on March 25th, 2020. Starting from the first case reported up to September 30, 2020 large number of cases 504 (4.3%) was reported on September 6, 2020. Before conflict erupted in the region, the maximum daily case confirmed were 24 case and preceding two weeks of the conflict, the daily report of confirmed case were above 50 cases.

Among all cases reported 6040 (51.6%) were reported during the ComBAT in the epi weeks 34, 35, 36 and 37 (Figure 15).

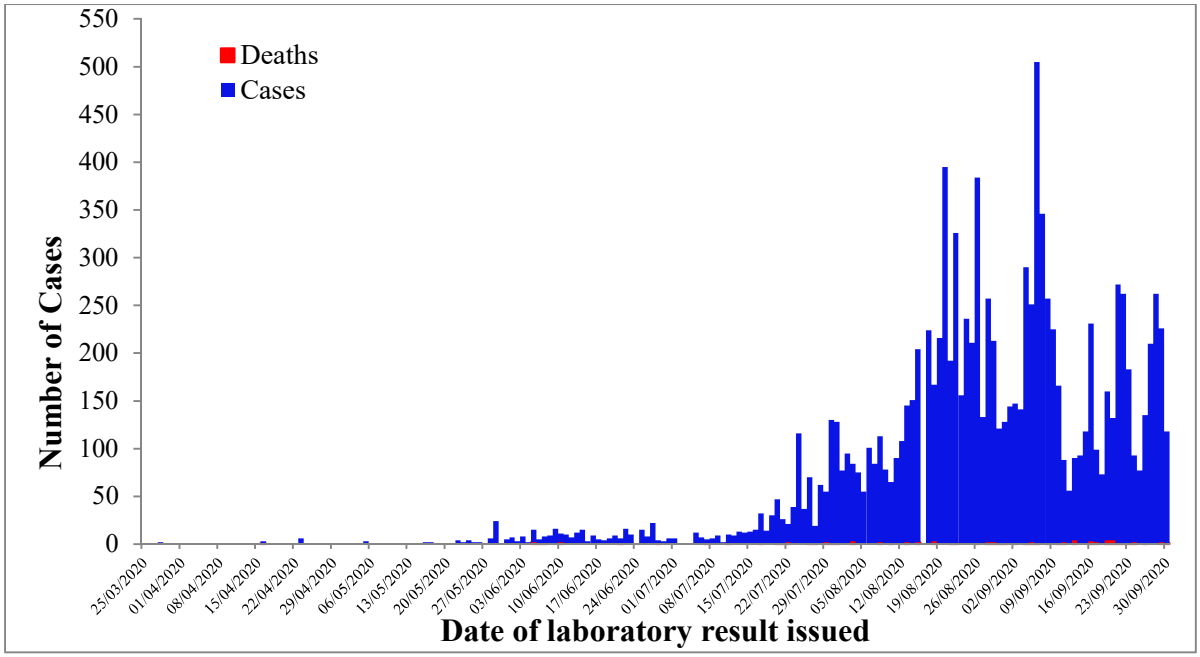


Figure 15 Epi curve of COVID-19 in Oromia, Ethiopia, September 2020

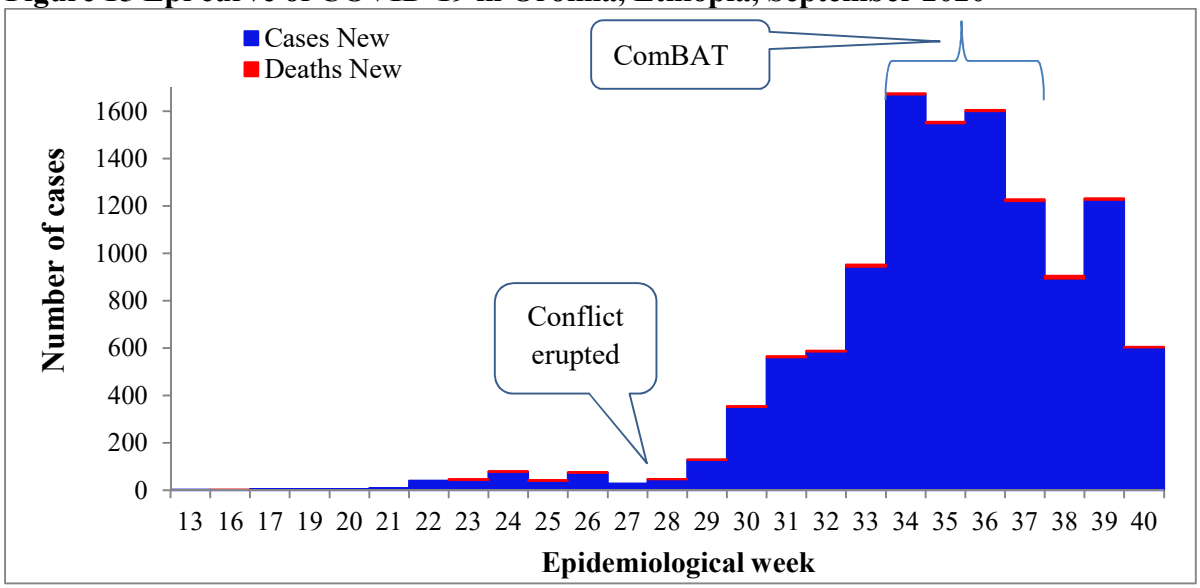


Figure 16 Epi curve of COVID-19 by week in Oromia, Ethiopia, September 2020

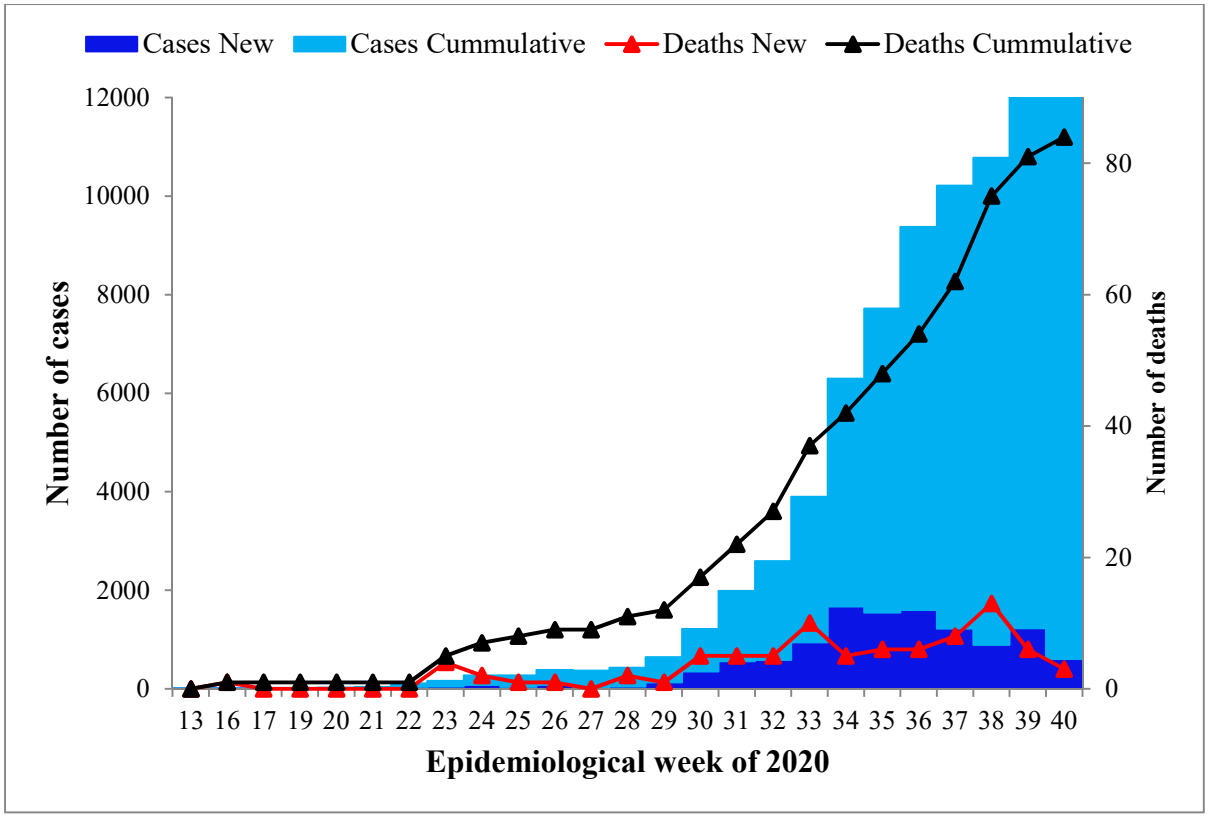


Figure 17 COVID-19 Trends of cases & deaths of in Oromia, Ethiopia September 2020

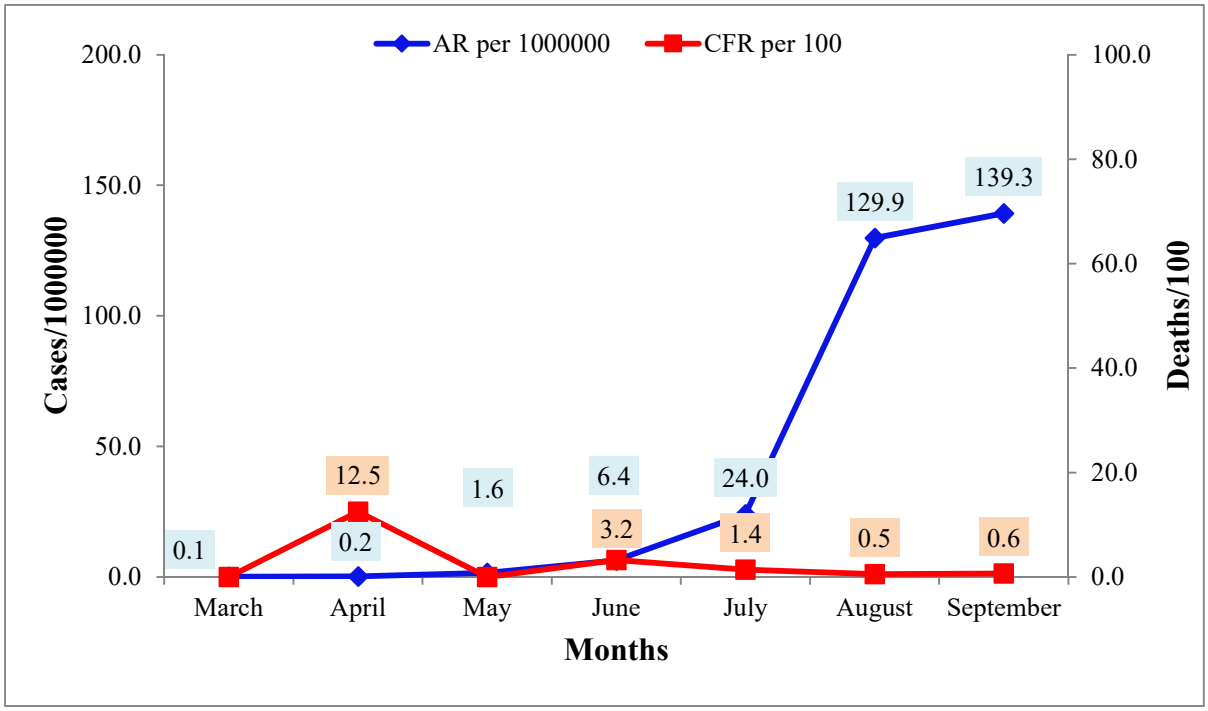


Figure 18: COVID-19 Trend of AR and CFR in Oromia, Ethiopia September 2020

ii. Distribution by place

Among all cases the three top case reporting zones were East Shewa, Jimma and Finfine SOS with number of cases 1227, 524 and 478 respectively. From towns Bishoftu, Dukem and Burayu were the top three towns with number of cases 869, 773 and 649 respectively. The AR is relatively high in Dukem, Gelan and Laga Tafo towns 616.6/10000, 89.1/10000 and 82.5/10000 populations and CFR was high Waliso town, Finfine SOS and West Shewa with rate of 3.23%, 3.14% and 2.92% respectively. Among 11715 cases 285 (2.4%) cases and 5 (6%) deaths investigated by the Oromia region were residents of other regions (Table 4). The spatial distribution of cases reported cases were dense at towns especially in the nearby of laboratory centres (Figure 10).

Table 10 AR and CFR of COVID-19 Oromia. Ethiopia September 2020

Name of Town/Zone	Total Population	Total Cases	Total Deaths	AR per 10000	CFR (%)
Oromia	**38,865,436**	**11,715**	**84**	**3.0**	**0.72**
Arsi	3,663,410	421	2	1.1	0.48
Bale	1,266,366	157	0	1.2	0.00
Borena	551,902	169	0	3.1	0.00
Buno Bedele	838,172	70	0	0.8	0.00
East Bale	600,382	95	0	1.6	0.00
East Hararge	3,855,181	391	1	1.0	0.26
East Shewa	1,615,892	1,227	0	7.6	0.00
East Wollega	1,625,081	207	3	1.3	1.45
Finfine SOS	690,470	478	15	6.9	3.14
Guji	1,509,081	272	0	1.8	0.00
Horo Gudru Wollega	822,516	101	1	1.2	0.99
Ilu Aba Bora	987,191	136	1	1.4	0.74
Jimma Zone	3,489,033	524	2	1.5	0.38
Kelem Wollega	1,119,772	289	1	2.6	0.35
North Shewa	1,685,755	211	4	1.3	1.90
South West Shewa	1,246,461	72	1	0.6	1.39
West Arsi	2,750,732	247	1	0.9	0.40
West Guji	1,273,540	128	1	1.0	0.78
West Hararge	2,652,044	160	4	0.6	2.50
West Shewa	2,690,723	274	8	1.0	2.92
West Wollega	1,924,560	469	1	2.4	0.21

Name of Town/Zone	Total Population	Total Cases	Total Deaths	AR per 10000	CFR (%)
Ambo town	96,521	126	1	13.1	0.79
Asela town	115,055	223	0	19.4	0.00
Batu town	78,784	56	0	7.1	0.00
Bishan Guracha town	50,771	22	0	4.3	0.00
Bishoftu town	172,376	869	0	50.4	0.00
Burayu town	105,486	649	9	61.5	1.39
Dukem town	12,536	773	4	616.6	0.52
Gelan town	15,717	140	1	89.1	0.71
Holeta town	47,527	130	2	27.4	1.54
Jimma town	206,886	132	1	6.4	0.76
Lega Tafo town	21,587	178	0	82.5	0.00
Mojo town	57,006	243	1	42.6	0.41
Nekemte town	128,652	368	4	28.6	1.09
Robe town	75,909	45	0	5.9	0.00
Sebeta town	164,064	418	3	25.5	0.72
Shashemene town	171,813	171	1	10.0	0.58
Sululta town	24,880	151	1	60.7	0.66
Woliso town	64,785	31	1	4.8	3.23
Addis Ababa		*177*	*0*		
Unknown		*106*	*5*		
SNNP		*1*	*0*		
Gambela		*1*	*0*		

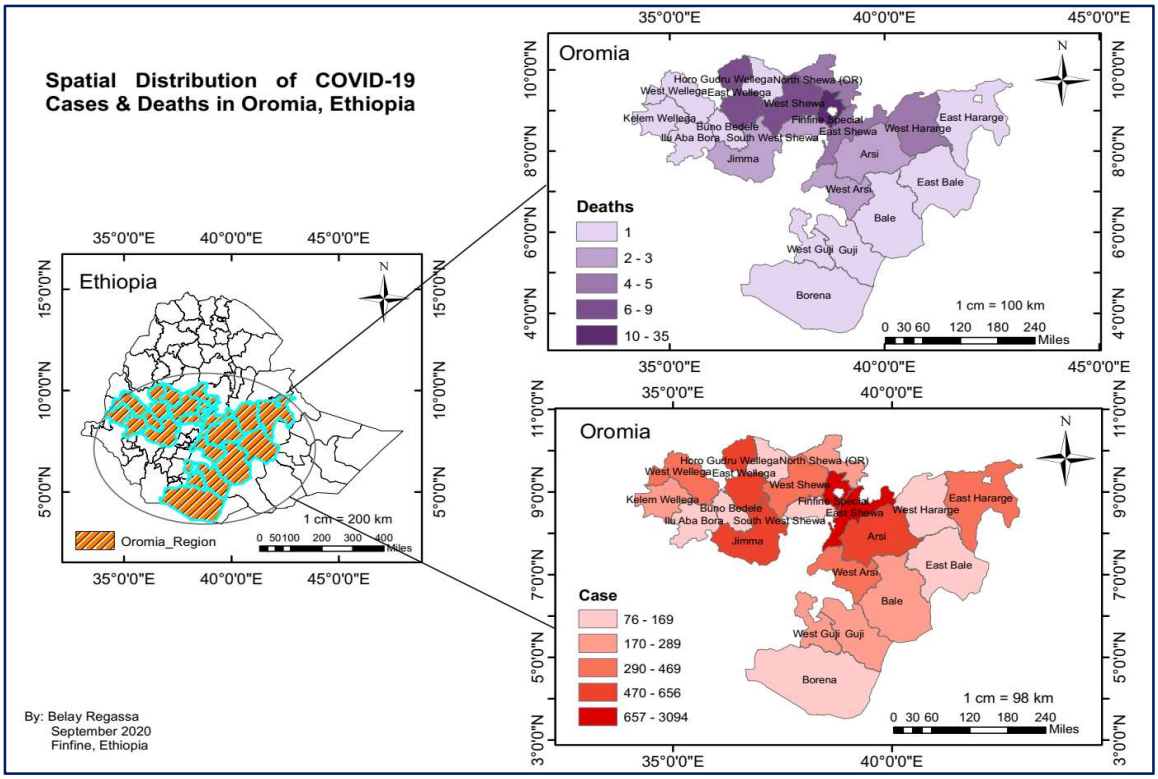


Figure 19 Spatial Distribution of COVID-19 in Oromia, Ethiopia September 2020

iii. Distribution by person

Among all cases 8143 (69.5%) of them were male and their respective AR and CFR is 4/10000 population and 0.7% while the female were 3572 (30.5%) and their respective AR and CFR is 2/10000 population and 0.8% (Table 11)

Table 11: COVID-19 cases distribution by sex in Oromia, Ethiopia September 2020

Sex	Total Population	Cases	Deaths	AR/10000	CFR/100
Female	19,232,777	3572	29	2	0.8
Male	19,632,660	8143	55	4	0.7
Total	38,865,436	11,715	84	3	0.7

The distribution of cases by age group was 4091 (34.4%), 3863 (33%), 1689 (14.4%), 826 (7.1%), 494 (4.7%), 451 (3.8%) and 301 (2.5%) in 15-24, 25-34, 35-44, 45-54, 0-14, 55-64 and 65+ years age groups respectively. The CFR was high in female 65+ year age group with 5.2% and low in female 15-24 years age group with 0.2% (Table 12 and Figure 20).

Table 12 COVID-19 cases & deaths by sex in Oromia, Ethiopia September 2020

Age group in years	Female			Male			Total		
	Cases	Deaths	CFR	Cases	Death	CFR	Cases	Death	CFR
0-14	229	1	0.4	265	2	0.8	494	3	0.6
15-24	1434	3	0.2	2657	12	0.5	4091	15	0.4
25-34	1120	5	0.4	2743	13	0.5	3863	18	0.5
35-44	425	9	2.1	1264	9	0.7	1689	18	1.1
45-54	162	2	1.2	664	9	1.4	826	11	1.3
55-64	106	4	3.8	345	2	0.6	451	6	1.3
65+	96	5	5.2	205	8	3.9	301	13	4.3
Total	3572	29	0.8	8143	55	0.7	11715	84	0.7

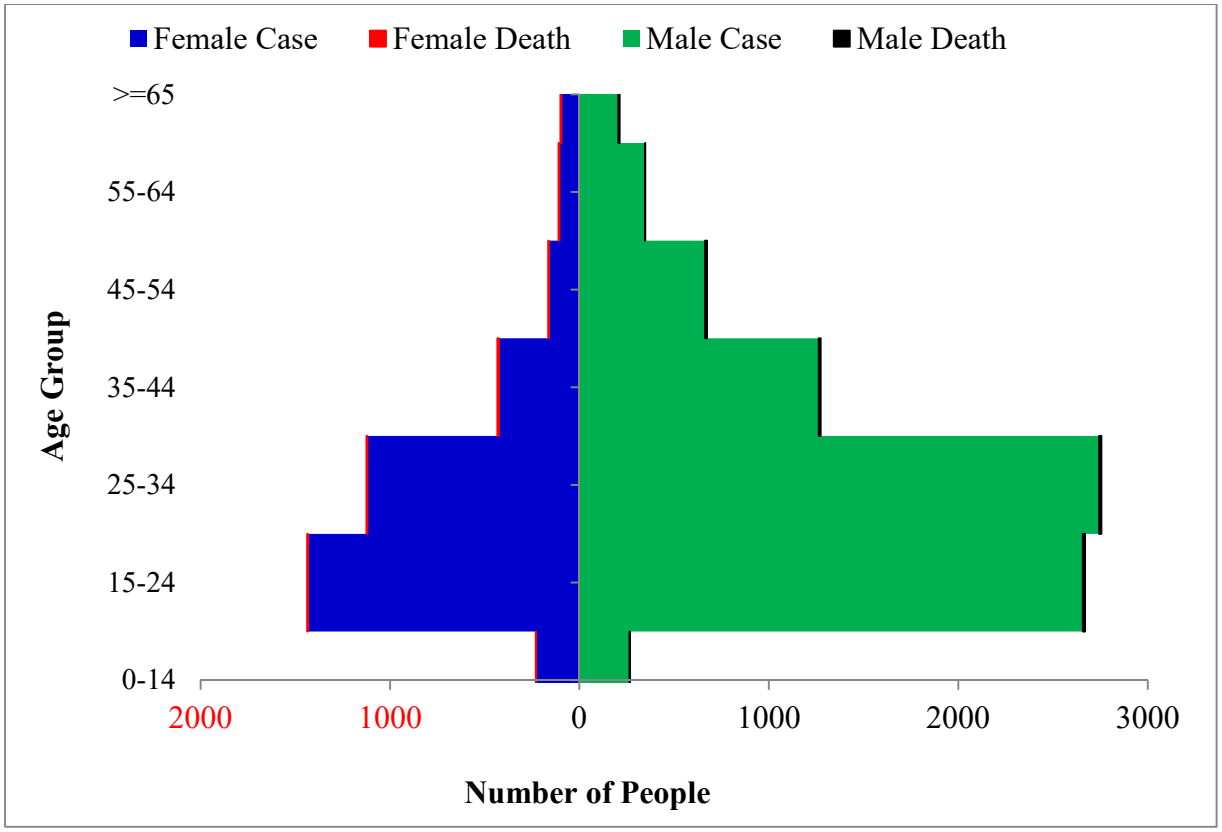


Figure 20 COVID-19 cases & deaths by sex & age group in Oromia, Ethiopia Sep 2020

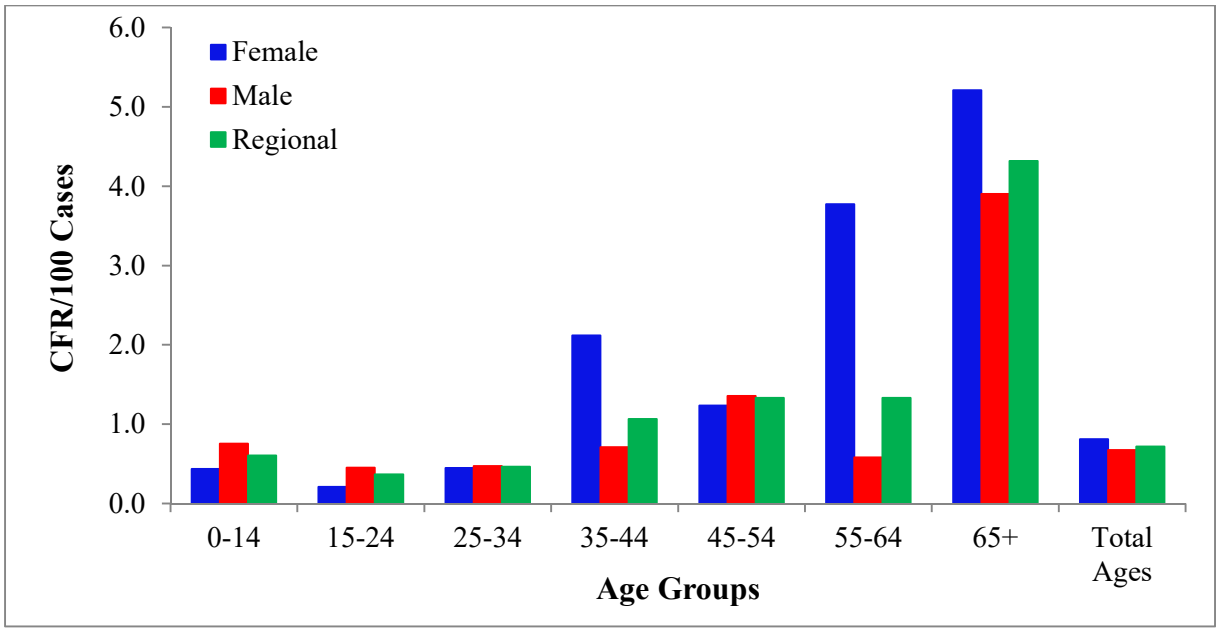
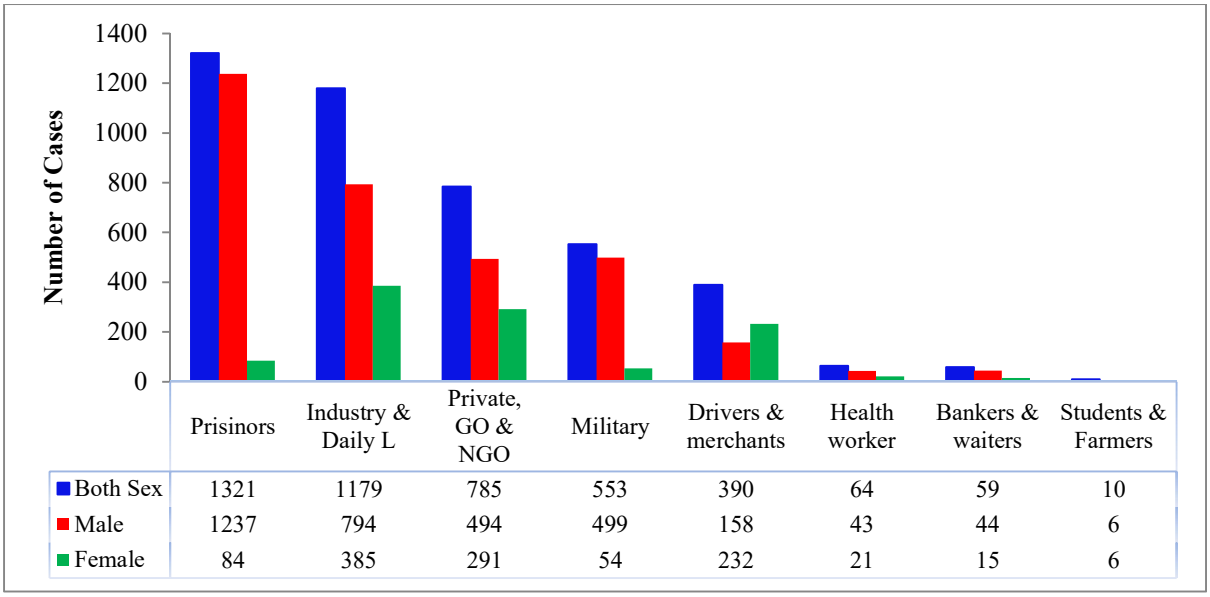


Figure 21 COVID-19 CFR by sex & age group in Oromia, Ethiopia September 2020

Among 4363 cases with known occupational categories; 75% of them were male and 25% 0f them were female. Male prisoners account 28% of all known occupational categories and students and farmers were the least (0.1%) affected occupational category. Industry workers, daily labourers, militaries, health workers, merchants, drivers, bankers and waiters were the affected workers than other unmentioned work categories (Figure 22)



	Prisinors	Industry & Daily L	Private, GO & NGO	Military	Drivers & merchants	Health worker	Bankers & waiters	Students & Farmers
Both Sex	1321	1179	785	553	390	64	59	10
Male	1237	794	494	499	158	43	44	6
Female	84	385	291	54	232	21	15	6

Figure 22 COVID-19 cases with sex & occupation in Oromia, Ethiopia September 2020

1.2.6. Discussion

As the result shows large number of cases were reported starting from July (Epi weeks 29, 30, and 31). This might be related to the conflict erupted after the killing artist Hachalu Hundessa (12; 13). During the conflict; most of the community gathered without taking care for prevention mechanism of the disease. Following the conflicts most youngsters were taken to prisons, which is one of the most risk area for the spread of COVID-19 in the region. During campaign of community based COVID-19 testing declared by the country in mid of August and September (10); the largest numbers of cases were reported. This is well known that the disease was distributed in the community as the source of infection report shows and these results in high number of cases due to large number of community were tested.

Large numbers of cases were reported from zones bordering Addis Ababa city which have largest number of cases in the country (10; 11); and high social interaction between Addis Ababa and the surrounding zone. Additionally zones those having high community movement to the centre also reported high number of cases. This is similar with reports from daily update of COVID-19 report from worldwide (4). Laboratory access for testing the sample might be another reason for prevalence of cases reported from each zone. Zones with easily accessible laboratory have large number of cases and vice versa.

Productive age group were more susceptible to the case than dependent age groups, similar to study in Israel (14), but the disease is more fatal to aged dependent groups than the productive one. High AR at productive age group may be due to high exposure to the risk areas like public gatherings, industrial employment and the reason for high fatality to aged

groups might be due immune-compromise to resist the virulence effect of the disease. The Most cases were reported from prison, this might be due poor ventilation and lack if sanitary facilities in the prison. Industrial workers were the other more affected occupational categories due to their working behavior that exposes the workers to the disease. Other occupational categories GO; NGO and private employees, militaries, health workers, merchants, drivers, bankers and waiters were also reported with high number of cases than unspecified occupations. This shows that occupations that need social relation were more risk than other solo works.

The descriptive result also shows fatality is high among symptomatic cases than asymptomatic one. This is related to more signs and symptoms are related to the cases were affected by the virus and the less immune system and also related to other comorbidities.

1.2.7. Conclusion

Based on our description of regional case line list; COVID-19 was highly disseminated in the community during July and August following uncontrolled social gatherings not taking care for transmission of the virus. COVID-19 can affect all age group and both sexes. The disease more affects group of community with low sanitation facilities, poor hygienic practice, with no personal protective equipment and being involve in public gatherings. Occupational categories and residential places might be factors for the spread of the virus. Spatially the burden of disease is more distributed in highly congested social movements were practiced.

1.2.8. Recommendation

Based on the findings:

- WHO, MOH and the EPHI should facilitate and invite scientific communities for further investigation on natural history, epidemiology, and ways of transmission, diagnosis, treatment, prevention and control mechanisms of COVID-19.
- National and regional health authorities should prepare, revise and disseminate policies, guidelines, protocols and manuals related to COVID-19 prevention and control mechanism as well as COVID-19 surveillance systems.
- The regional health bureau should revise the PHEM structures to incorporate COVID-19 control and prevention team to regional, zonal, district and health facility level working units.

- Regularly; evidence based health education and awareness creation on COVID-19 should be given to the community by influential persons using all media communications except risky public gatherings.
- Due attention should be given by national and local governments to take action on ways of COVID-19 prevention and control in prisons to safe the institutions' community (prisoners and militaries).
- Industrial institutions should fulfil all necessary prevention personal protective devices and sanitary facilities based on recommendation of WHO and MOH protocols.
- Emphasis for social mobilization, awareness creation and health education on COVID-19 should be given at all GO, NGO, Private and public institutions.
- All level health authorities and partners should work together to equip health workers with basic knowledge of IPC as well as furnish health institutions with IPC materials.
- Finally; further investigation on the study area is the best remedy.

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Chapter II

Surveillance Data Analysis

Oromia Region 5 Years Measles Surveillance Data Analysis (2014 - 2018)

Chapter II: Surveillance Data Analysis

2.1 Oromia Region Five Years Measles Surveillance Data Analysis

Abstract

Background: Measles remains a disease of public health importance and has been targeted for elimination in many areas of the world including Africa. This is five years measles data analysis surveillance to identify morbidity and mortality trends in Oromia. This is to assess the five years epidemiology of measles case in Oromia Region from 2014 to 2018 G.C.

Methodology: Facility based descriptive cross-sectional were used to conduct the study. The data was analyzed using Microsoft Office Excel 2007. In order to identify cases of measles; based on World Health Organization definition suspected measles were defined as any person with generalized maculopapular rash and fever plus cough or coryza or conjunctivitis. The data was checked for completeness of information.

Result: Totally 24626 cases and 111 deaths were reported during 2014 to 2018 in the region. The CFR was 450 per 100,000 populations. More cases (16,215) were reported in the year 2015 and relative fewer cases (961) were reported in 2018. 5.7% (1,406) of them are < 1 year, 29.1% (7,167) of them 1-4 years, 19.5% (4,791) of them 5-9 years, 12.9% (3,178) of them 10-14 years, and 12.7% (3,138) of them > 15 years. 20.1% (4,946) cases were reported without age. More cases were reported in February (6,299 cases), March (4,004 cases) & January (3,499 cases) which accounts about 56 % of the total cases and the least cases were reported in the months September (540 cases), August (624 cases) and July (676 cases) & these account 7.5 % of the total reported cases. The distribution of cases by zones are high at West Wollega with 2948, Guji 2624 and West Hararge 2483 cases and relatively less cases in, South W. Shewa 318, Finfine SOSZ 278 and North Shewa with 229 cases.

Conclusion: Age 1-4 years are highly affected children and the burden of the disease high for those not vaccinated to measles antigen. Dry seasons are more favorable climate for transmission of measles than rainy season. Those not vaccinated are more susceptible for the measles than those vaccinated. Laboratory confirmation is mandatory to confirm the cases and it is the basic criterion to launch the case is outbreak or not. After confirmation of significant cases; epidemiological linkage is enough to implement outbreak control interventions and no need of wastage of resource for laboratory investigation of each suspected case.

2.1.1 Introduction

Measles is one of the communicable diseases still causing preventable mortality and morbidity in the country. Epidemiological surveillance of measles is a major public health strategy in prevention and control of disease (1). Measles is an acute, highly infectious viral disease caused by a Morbillivirus and for which humans are the only reservoirs. Transmission is primarily person-to-person via aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons (2; 3). When measles virus is introduced to a non-immune population, nearly 100% of individuals will become infected and develop clinical illness. The incubation period of measles is about 10 to12 days (range 7-18 days) (2). Malnourished children are at higher risk of developing complications and mortality from measles infection. This highly contagious virus is transmitted primarily by respiratory droplets or airborne spray to mucous membranes in the upper respiratory tract or the conjunctiva. It is a significant cause of illness and death worldwide (2; 4; 3).

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

Measles vaccination has markedly reduced the incidence of measles virus infection and is one of the most successful global public health interventions; it prevents millions of deaths annually, primarily among infants and young children. In Africa before the introduction of measles vaccination, measles was mostly a disease affecting young children, and more than 1 million cases were reported annually. Number of measles cases decreased by 81%, from 520,102 cases in 2000 to 98,621 cases in 2015. Measles incidence rate decreased by 85%, from 841 cases in 2000 to 100 cases in 2015 per million population in African region with estimated 85% mortality reduction from 2000 to 2015(4).

By 2008, the successful implementation of strategies across African Region, reported measles cases decreased by 93% and estimated measles mortality decreased by 92% in the African Region compared with the reported measles cases and estimated measles respectively for the year 2000. In September 2011, the Regional Committee of the WHO African Region adopted the goals for Regional measles elimination by 2020(2).

Analyses of surveillance data begin with characterizing the pattern of disease reports by person, place, and time. Compare patterns of disease reports at different times; in different places and among different populations (e.g., the number of measles cases reported among infants, pre-school-age children, school-age children, adolescents, and adults). Vaccination status of cases should also be examined; if there is disease transmission in the community, lack of vaccination is likely to be the factor most strongly associated with illness. Analyses looking at delays in reporting, completeness of reporting of critical variables, and applying case definition criteria also are useful in evaluating the quality of case investigation and reporting, and should be undertaken regularly(5).

2.1.2 Rationale

Routinely analysis of surveillance data is a key function for describing measles epidemiology, characterize the disease burden, develop guidance to improve measles control efforts, monitoring disease trends, and evaluating the effectiveness of disease control programs and policies. Results from data analysis can trigger public health action.

2.1.3 Objective

2.1.3.1 General Objective

To assess the 5 years epidemiology of measles in Oromia Region from 2014 to 2018

2.1.3.2 Specific Objective

- To describe the distribution of measles cases in terms of time, place and person
- To assess socio-demographic characteristics and vaccination status of measles case
- To analyse spatial and temporal trends of measles cases from 2014 to 2018.

2.1.4 Methodology

2.1.4.1 Case definitions

A. **Measles suspected cases at community level:** A community member should report any person with ***rash*** and ***fever*** to a health worker and c also advises the person to go to a health facility (1).

B. **Suspected measles case:** Any person with fever and maculo-papular (non-vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects measles (1).

C. **Confirmed measles case:** A suspected case with laboratory confirmation (positive IgM antibody) or epidemiologically linked to confirmed cases in an outbreak (1).

D. **Epidemiologically linked case:** A suspected measles case that has not had a specimen taken for serologic confirmation and is linked (in place, person and time) to a laboratory confirmed case; i.e., living in the same or in an adjacent district with a laboratory confirmed case where there is a likelihood of transmission; onset of rash of the two cases being within 30 days of each other (1).

E. **Measles death:** For surveillance purposes, a measles death is defined as any death from an illness that occurs in a confirmed case or epidemiologically linked case of measles within one month of the onset of rash(1).

2.1.4.2 Study Area and Period

The study was conducted in Oromia Region, Ethiopia (Figure 1). Data collection, analysis, interpretation and report writing of the last five years 2014 – 2018 measles cases of Oromia region was undertaken from March 15th to April 1st, 2019.

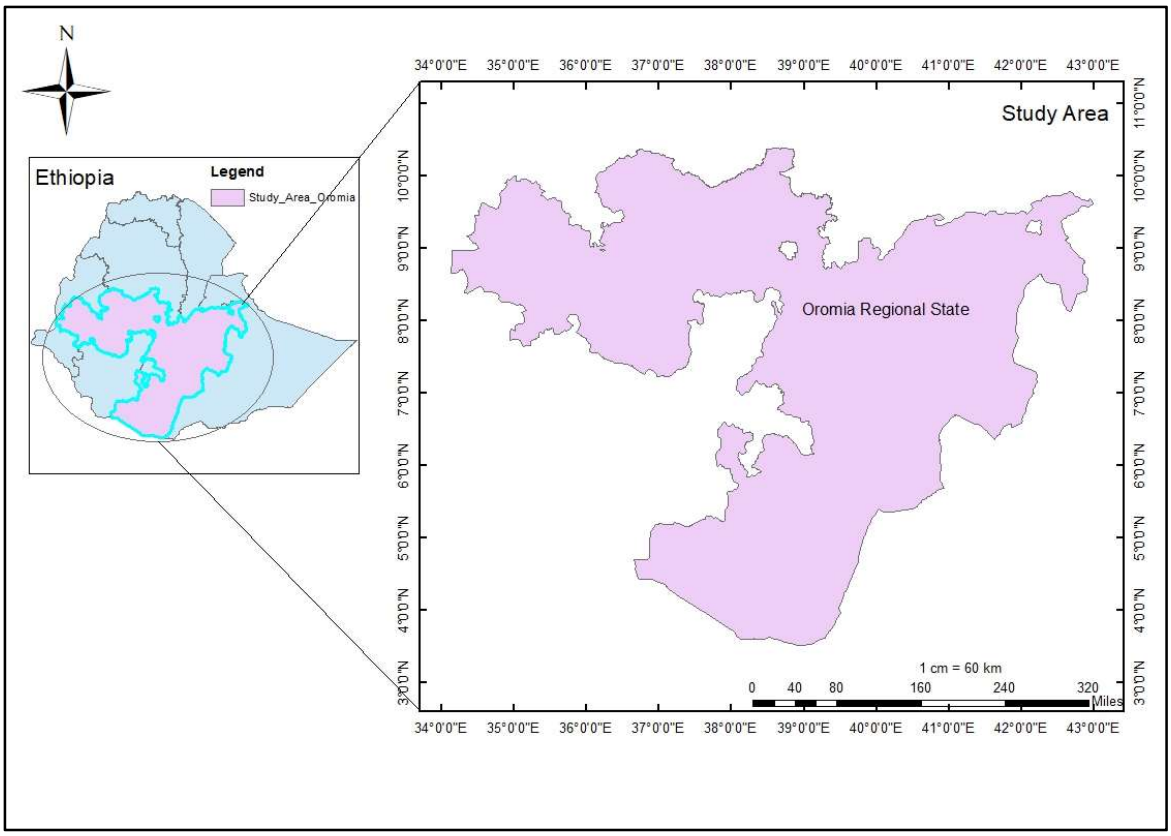

Figure 23: Study area for Surveillance Data Analysis, Oromia. Ethiopia, 2019

2.1.4.3 Study Design and Subject

Facility based descriptive cross-sectional study design was used. All suspected cases of measles i.e. all cases registered on line lists and case based forms were the study subject of this analysis.

2.1.4.4 Data Collection Methods and Analysis

Secondary data of measles cases for the last continuative five years from 2014 - 2018 were reviewed and collected from the line list and case based weekly report of Regional PHEM department by using properly structured questionnaire. The five years data of measles case of the region was organized and analyzed using by Microsoft Office Excel 2007.

2.1.4.5 Inclusion Criteria

All suspected measles cases and deaths with complete variables were included.

2.1.4.6 Exclusion Criteria

Measles cases and deaths with incomplete variables were excluded.

2.1.5 Result

2.1.5.1 Epidemiological Distribution of Measles

A. Distribution by Person

Based on regional public health emergency data containing case based and line listing: totally 24,626 cases and 111 deaths were registered during 2014 to 2018 in the region. The CFR was 450 per 100,000 populations. Most cases (16,215) were reported in the year 2015 and relatively fewer cases (961) were reported in 2018.

The Attack Rate (AR) per 100,000 populations is more prevalent in the year 2015 with prevalence of 48.1/100,000 and proceeded by year 2014 with prevalence of 13.5/100,000. In 2016, 2017 and 2018 the prevalence is 5.8, 2.8 and 2.6 respectively (13).

Table 13 Prevalence of Measles Cases per 100,000 populations in Oromia, 2014 to2018

Year	Population	Number of Cases	AR per 100,000 pop
2014	32,664,340	4,407	13.5
2015	33,697,856	16,215	48.1
2016	34,731,372	2,031	5.8
2017	35,764,888	1,012	2.8
2018	36,798,404	961	2.6

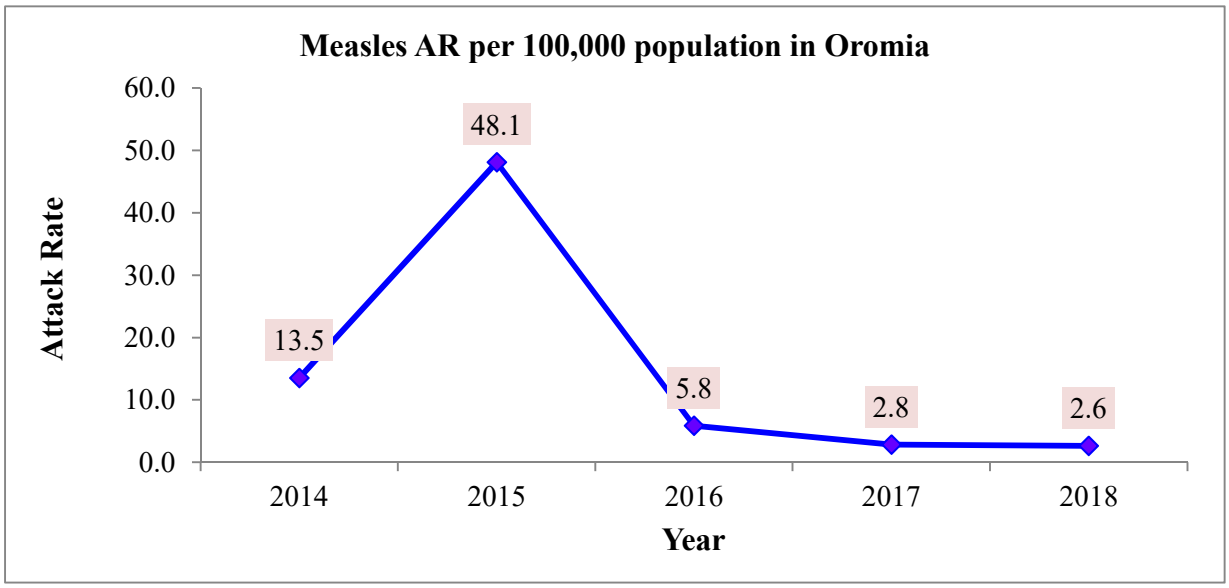

Figure 24: Distribution of Measles Cases by each year in Oromia Region, 2014 to 2018

Among total 24,626 cases; 34.8%(8573) of them were 0-4 years, 19.5% (4,791) of them 5-9 years, 12.9% (3,178) of them 10-14 years, and 12.7% (3,138) of them > 15 years. 20.1% (4,946) cases were reported without age variable (Table 14).

Table 14 Distribution of Measles by year and age group, Oromia region 2014 to 2018

Age group	Number of Cases by year					Total	
	2014	2015	2016	2017	2018	#	%
0 – 4	859	6016	925	419	354	8573	34.8
5 - 9	517	3183	456	275	360	4791	19.5
10 - 14	437	2240	253	120	128	3178	12.9
15 - 19	208	1086	123	83	49	1549	6.3
20 - 24	130	496	84	41	31	782	3.2
25 - 29	89	266	49	22	15	441	1.8
30 - 34	34	124	21	11	12	202	0.8
35+	17	118	17	7	5	164	0.7
Blank	2116	2686	103	34	7	4946	20.1
Total	**4407**	**16215**	**2031**	**1012**	**961**	**24626**	**100.0**

The median age for reported cases is 5.7 years and 80 years case is the maximum age reported. As the data shows age group 0 – 4 years were more affected than other age groups which accounts 8573 (34.8%) of total reported age groups and age group 35+ is least affected scoring 164 (0.7%) cases (Figure 25).

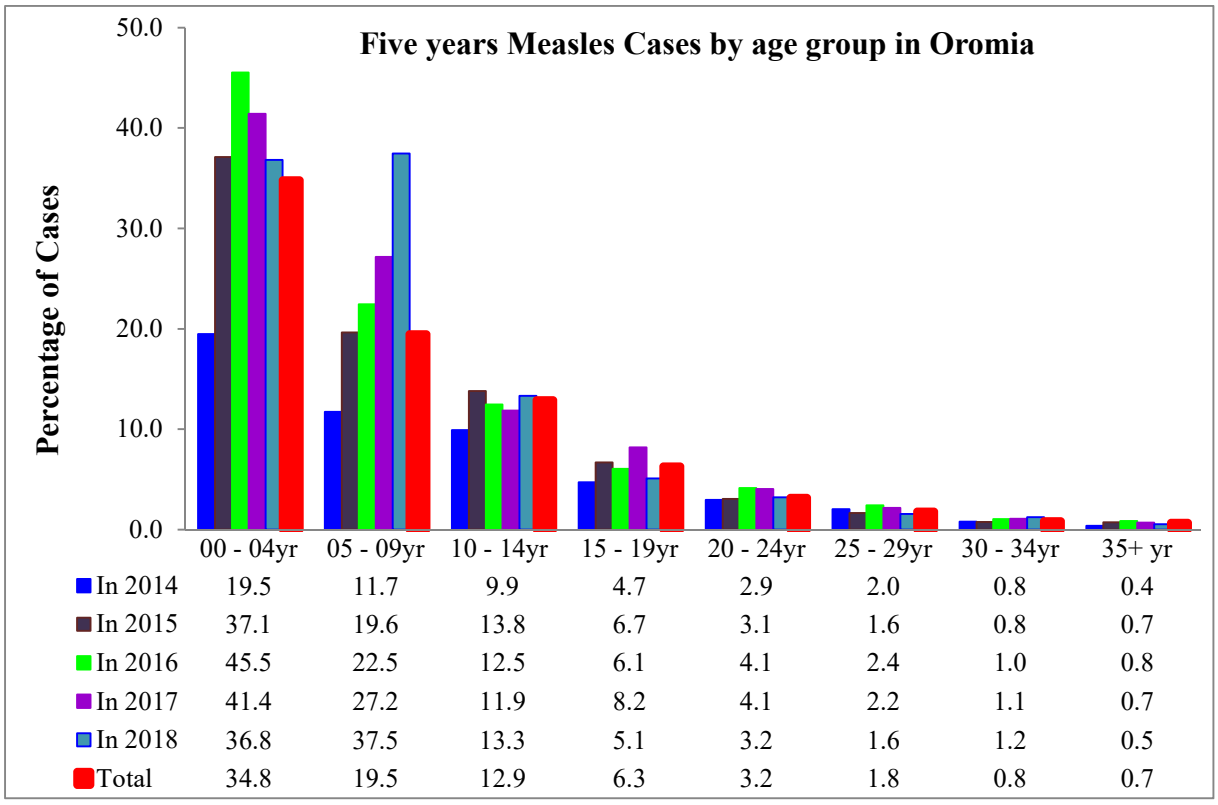

Figure 25 Measles case distribution by age group in Oromia region from 2014 to 2018

B. Distribution by Time

Depending on the regional weekly case based report and outbreak line listing 4407cases, 16215 cases, 2031 cases, 1012 cases and 961 cases were reported in the years 2014, 2015, 2016, 2017 and 2018 respectively. The trend of the cases decreasing starting from the year 2015 to 2018; as the Figure of regional report shows in the year 2015 there is double cases reported than the cumulative of other remain four years.

Monthly distribution of measles in these years; more cases were reported in February (6,299 cases), March (4,004 cases) and January (3,499 cases) which accounts about 56 % of the total cases and the least cases were reported in the months September (540 cases), August (624 cases) and July (676 cases) and these account 7.5 % of the total reported cases. There is no month with zero case report (Figure 26).

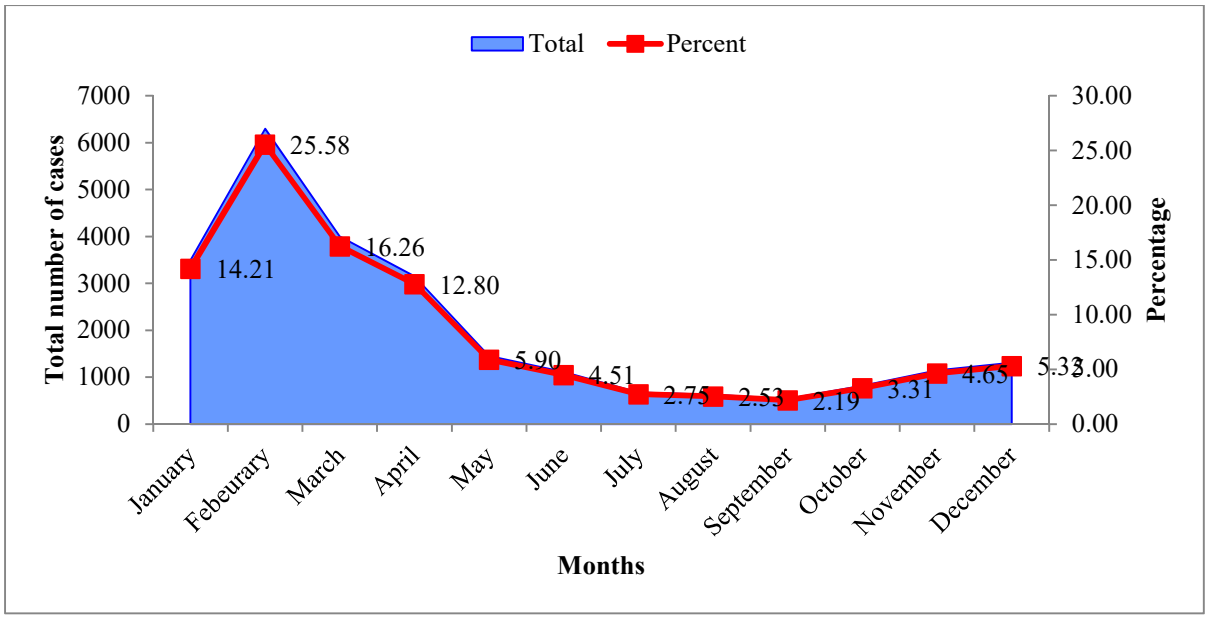

Figure 26: Measles Cases Distribution by Months of 2014 to 2018 in Oromia, Ethiopia

The monthly trends of total five year measles cases are higher at February and least cases in September. Similarly in 2014, 2015, 2016 and 2017 the trend of cases is high at dry season and less at rainy seasons. In 2018 prevalence of the cases are somewhat similar throughout the year with average of 47 (4.9%) cases [97 cases (10.1%) in January and 50 cases (5.2%) in September].

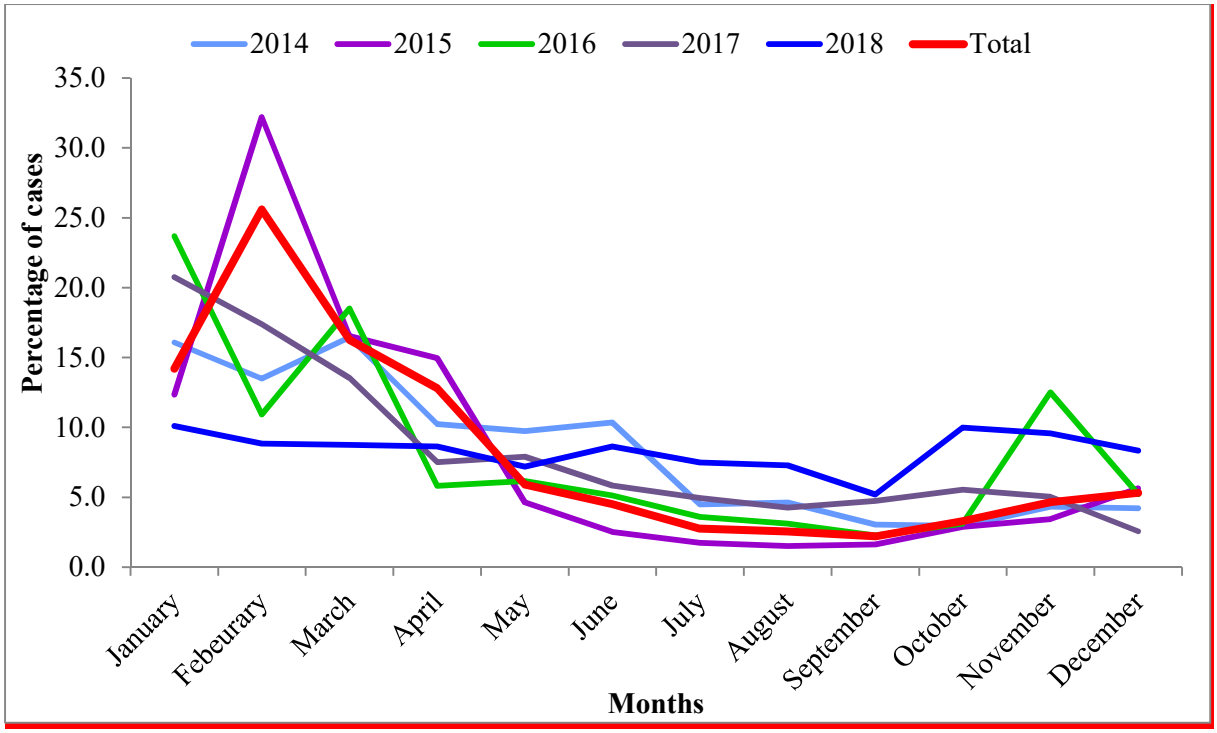

Figure 27 Trend of Measles in each year by months in Oromia region 2014 to 2018

When we see the Epi curve of selected year and place it shows that most of outbreak emerges in the months February, January, March, April, December and November months. In Ethiopia the rainy months May, June, July and August have low prevalence of measles cases. The Epi curve of selected time and location were shown in the Figures 28, 29, 30 and 31.

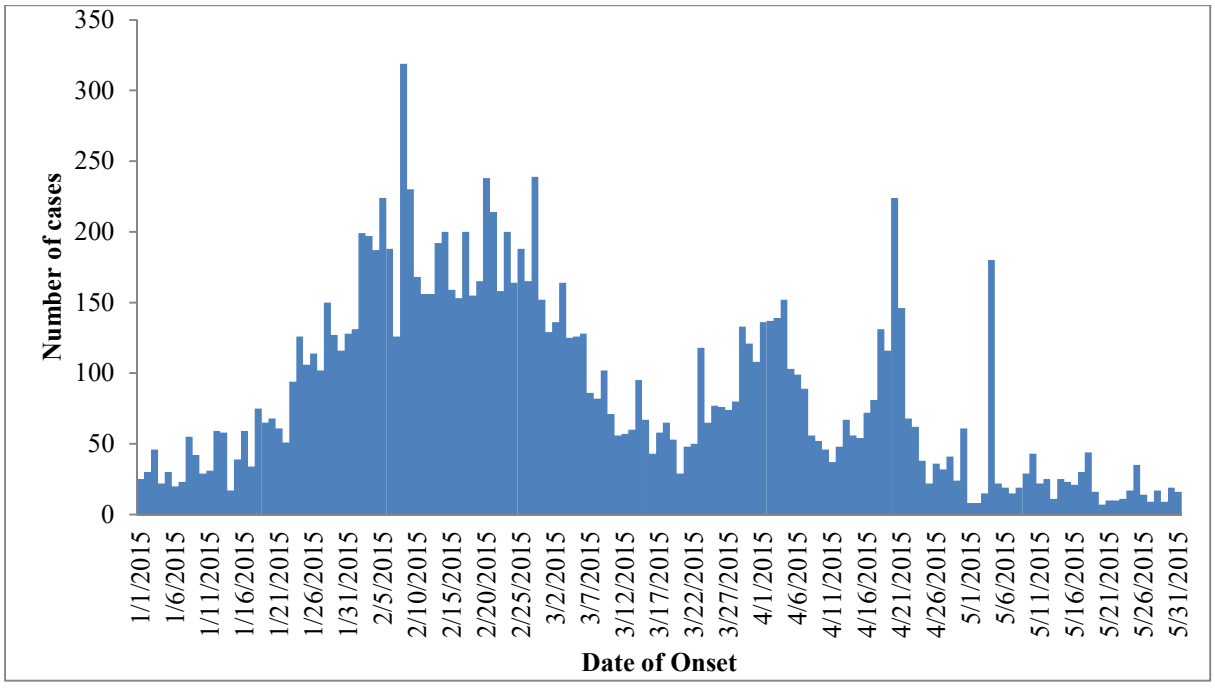

Figure 28 Epi-Curve of Measles cases of Oromia region in 2015

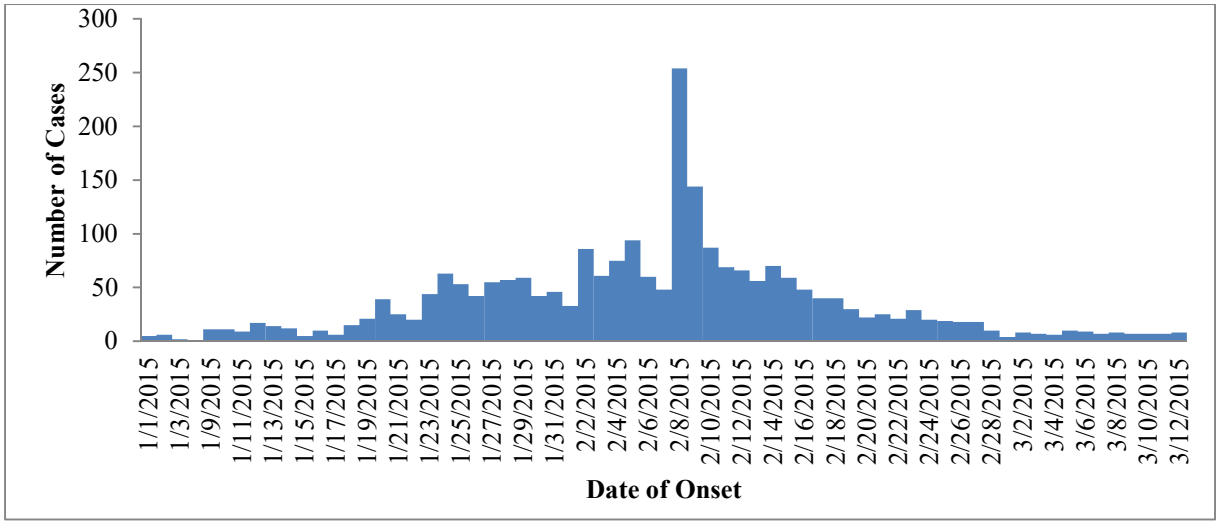

Figure 29 Epi-Curve of Measles Cases in West Wollega zone, Oromia region 2015

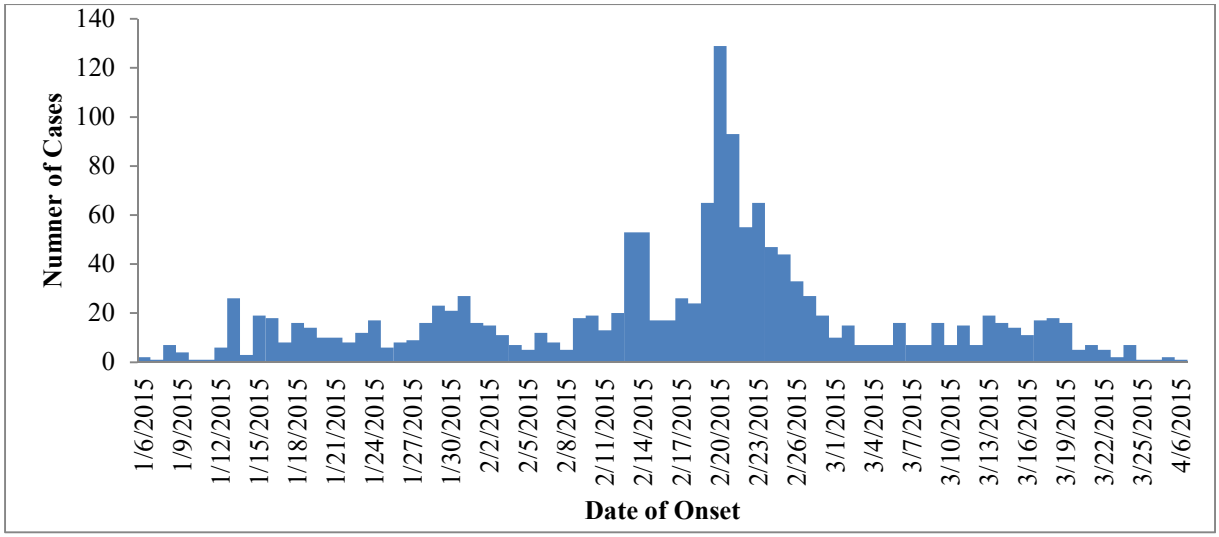

Figure 30 Epi-Curve of Measles Cases in Guji zone, Oromia region 2015

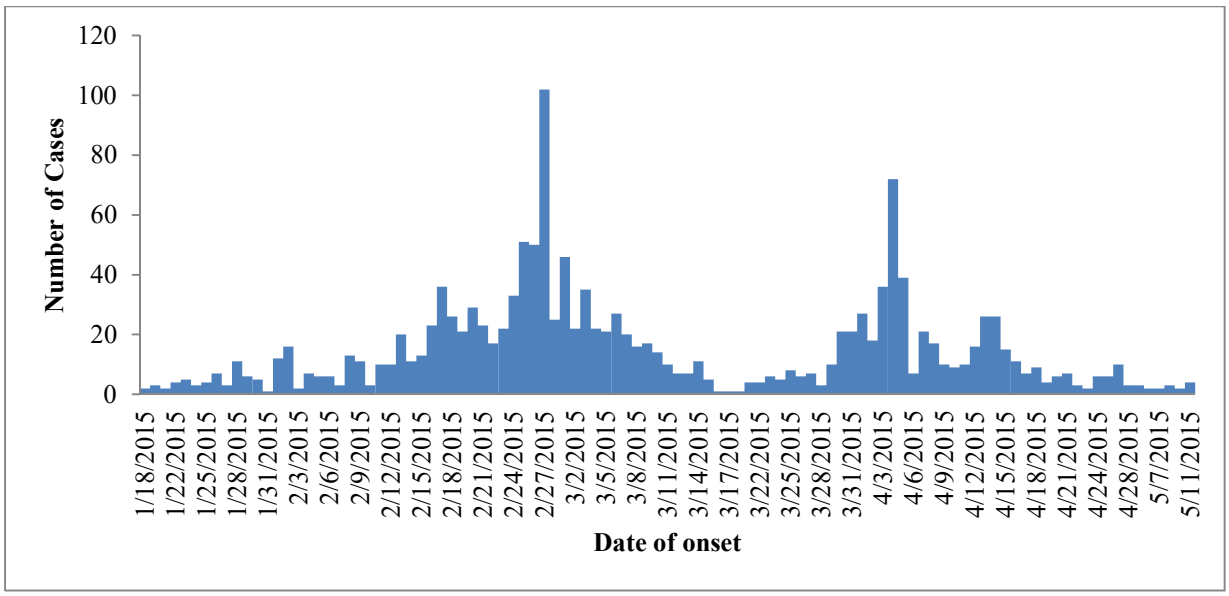

Figure 31Epi Curve of Measles Cases in West Hararge Oromia 2015

C. Distribution by Place

The distribution of cumulative of five years of measles cases by zones of the region are high at West Wollega with 2948 cases, Guji with 2624 cases and West Hararge with 2483 cases and relatively less cases in, South West Shewa with 318 cases, Finfine SOSZ with 278 cases and North Shewa with 229 cases. The trend of measles cases in some zone has large variation (high SD) between each year cases like in West Wollega 1183.4, Horo G. Wollega with 921.8, and Guji with 836.2 and this shows occurrence of epidemic in those zones. Other zones like North Shewa and South West Shewa zones have relatively low SD have relatively constant number of cases throughout the five years which is the characteristic of endemic disease (Table 15).

Table 15 Distribution of Measles Cases by Zones in Oromia Region, 2014 to 2018

Name of Zones	Number of Measles Cases by Year							
	2014	**2015**	**2016**	**2017**	**2018**	**5 years**	**Mean**	**SD**
Arsi	561	171	111	94	90	**1027**	205.4	201.4
Bale	226	371	224	38	42	**901**	180.2	141.2
Borena	305	1019	174	35	50	**1583**	316.6	407.5
East Hararge	177	646	23	39	76	**961**	192.2	260.7
East Shewa	304	306	146	109	152	**1017**	203.4	94.2
East Wollega	314	224	48	34	20	**640**	128	133.0
Finfine SOSZ	119	34	36	46	43	**278**	55.6	35.8
Guji	100	1995	422	42	65	**2624**	524.8	836.2
Horo G. Wollega	125	2134	150	13	21	**2443**	488.6	921.8
Ilu Aba Bora	425	1827	94	33	30	**2409**	481.8	769.5
Jimma	168	888	33	98	34	**1221**	244.2	364.2
North Shewa	44	66	42	30	47	**229**	45.8	13.0
Qelem Wollega	28	1038	40	6	14	**1126**	225.2	454.6
South W. Shewa	53	77	79	57	52	**318**	63.6	13.3
West Arsi	461	541	153	105	114	**1374**	274.8	209.2
West Hararge	579	1666	105	68	65	**2483**	496.6	688.8
West Shewa	285	507	122	107	23	**1044**	208.8	191.8
West Wollega	133	2705	29	58	23	**2948**	589.6	1183.4
Total	**4407**	**16215**	**2031**	**1012**	**961**	**24626**	**4925.2**	**6464.0**

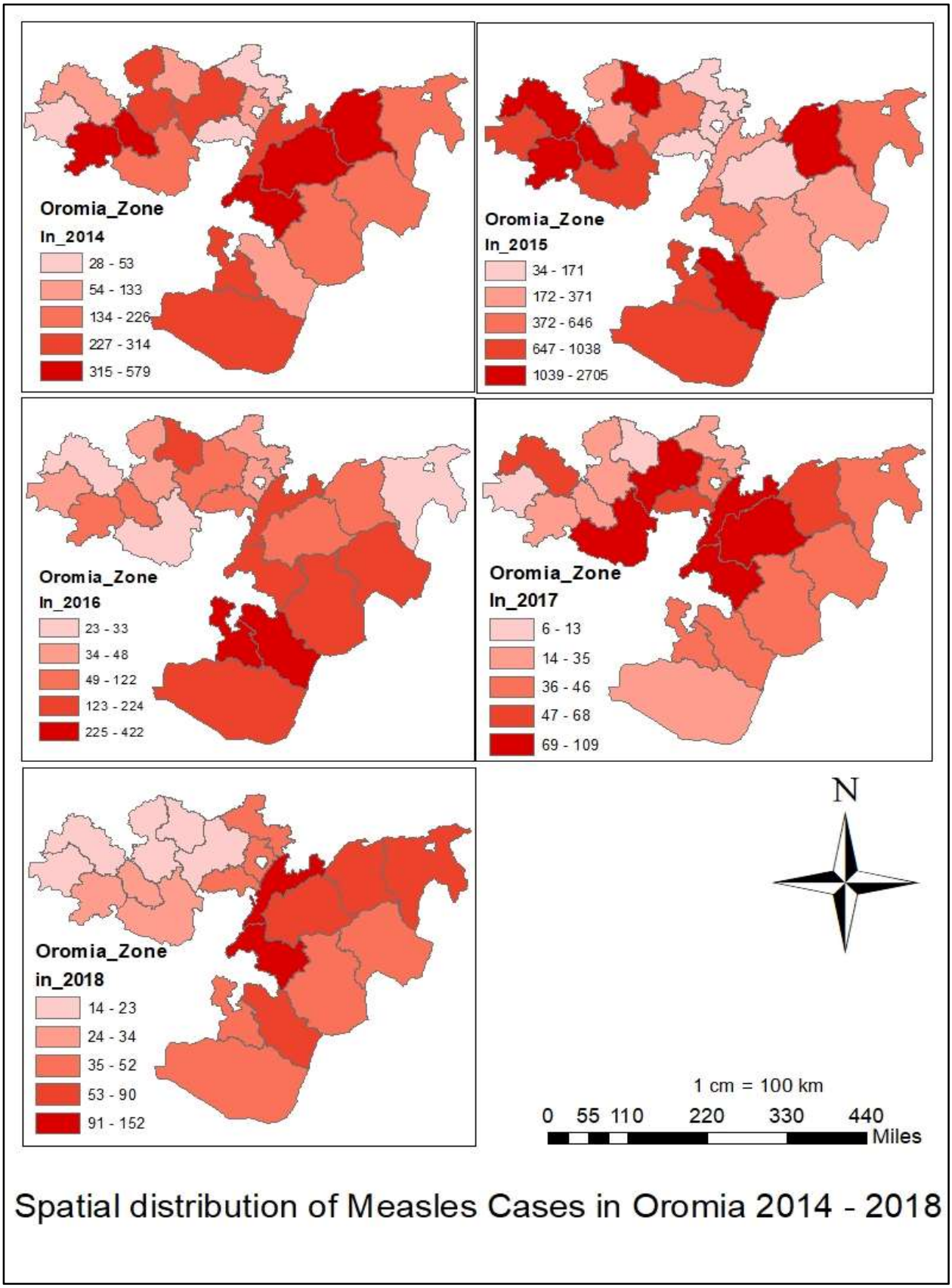

Figure 32: Spatial distribution of Measles by zones in Oromia, Ethiopia 2014-2018

2.1.5.2 Measles Cases and Vaccination Status

Regarding the vaccination status 66.9%, 63.65 and 58.8% Cases reported from Guji, Jimma and West Wollega respectively were unvaccinated cases. High numbers of vaccinated cases were reported from Qelem Wollega with 65.9%, West Hararge with 33.7% and East Wollega 33.4%. Unknown vaccination status of 69%, 61.8% and 57.5% were reported from North Shewa, Finfine SOSZ, and South West Shewa respectively (Figure 33).

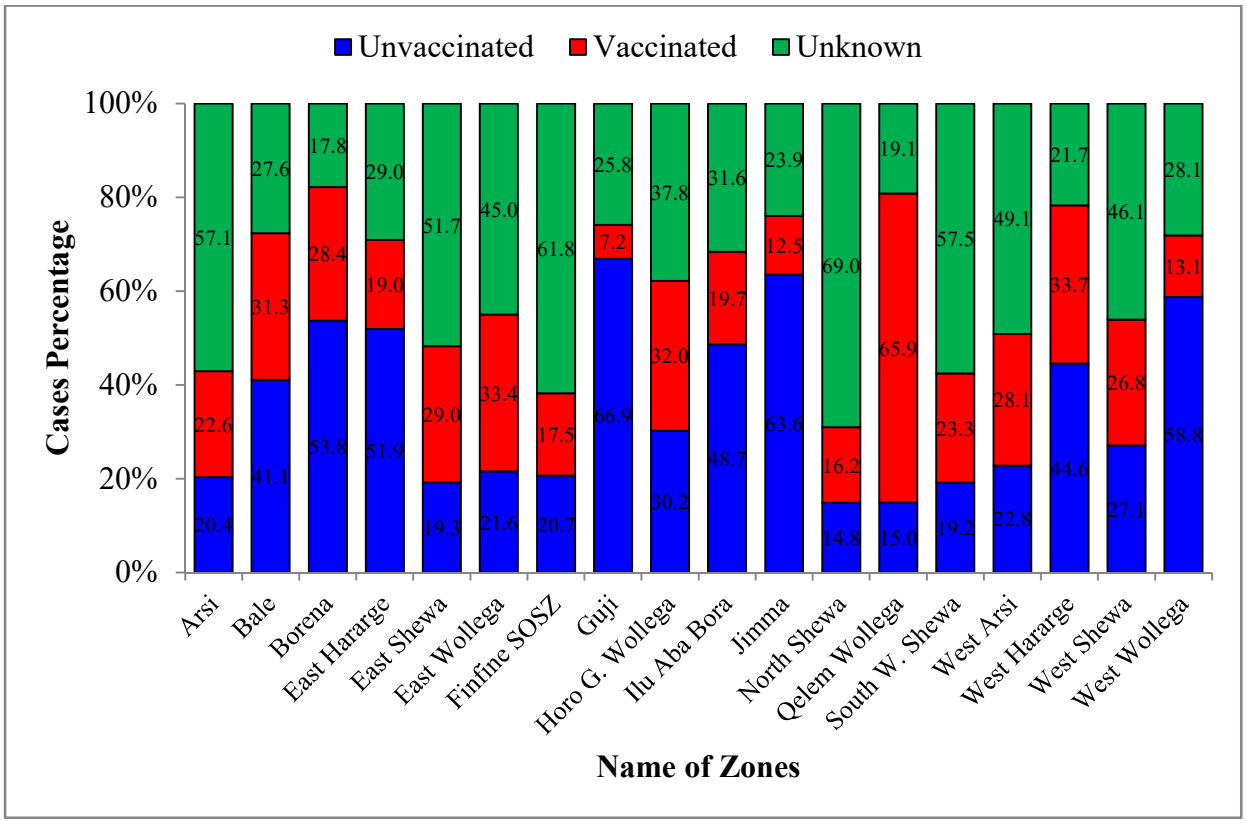

Figure 33: Vaccination Status of Measles cases by Zones in Oromia, 2014 to 2018

Among total cases 24626 reported cases; 10464 (42%) were unvaccinated, 8115 (33%) of them were unknown vaccination status, 5072 (21%) of them were took 1 dose vaccination and 975 (4%) cases were took vaccination dose of 2+ (Figure 34).

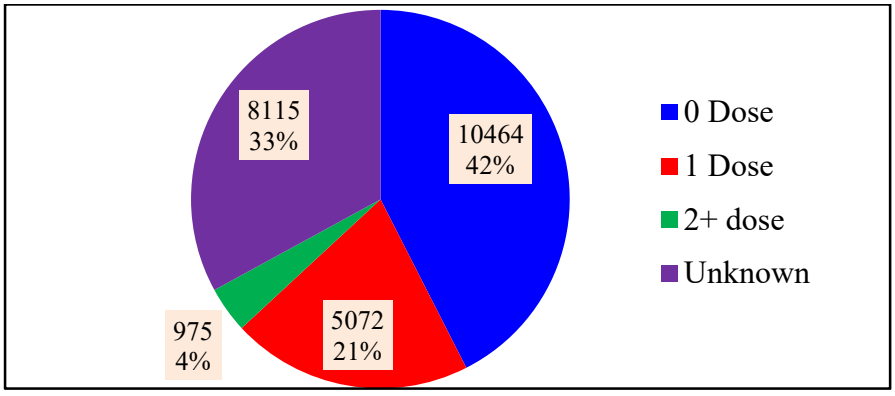

Figure 34: Vaccination Status of Measles Cases in Oromia, 2014 to 2018

2.1.5.3 Classification of Measles Cases

The classification of all measles cases reported in the five years; 77.3% of cases were epidemiologically linked, 15.5% of them were laboratory confirmed cases, and 7.2% of them were classified as clinically compatible cases. There were 83.9% of cases classified as epidemiologically linked in 2015 and which is higher than that of 2014 with 47.4%, 2016 with 71.8%, 2017 with 65.6% and 2018 with 74.6%. More laboratory confirmed cases were reported in 2014 with 40.1% and 33%, 27.3%, 23.9% and 8.6% cases were reported in the year 2017, 2016, 2018 and 2015 respectively (Figure 35).

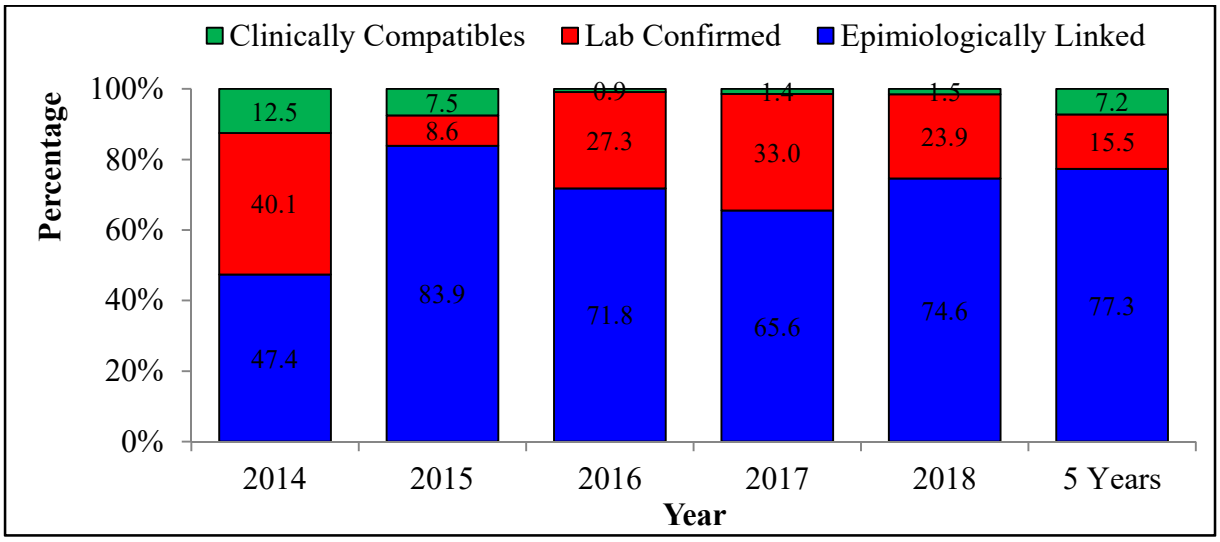

Figure 35 Measles Case Classification in Oromia Region, 2014 to 2018

2.1.6 Discussion

The result of the data shows that age group between 0-4 years were highly affected by measles these accounts about 34.8% of total measles cases equivalent to national measles surveillance data analysis conducted in Ethiopia(6). The younger age under 9 month children may be due to late provision of measles vaccine and early exposure to the virus (7). Affected children from age 5 – 14 years were accounts 32.4% of total cases and this is similar with study conducted in Ethiopia which shows that 35.4 % of similar age group was affected with measles (6).

The regional data shows that there is an outbreak of measles in 2015 with incidence rate 48.8 cases per 100,000 populations especially in dry season from months January to April. Cases were reported throughout the year with relatively less number in rainy season especially in July, August and September. This is similar with data analysis conducted in Italy with high prevalence of measles during dry season than rainy season (7).

Geographical distribution of measles cases is all over zones of the region and there is no zero case report for each zone. The region has all different type of climatic condition and this shows measles can affect the inhabitants of climatic condition of the world. The variation of number of cases in each zone is not due to climatic condition and it may be due to other factors like vaccination status. For example 66.9%, cases from Guji, 63.65%cases from Jimma and 58.8% cases from West Wollega were unvaccinated cases. The same is true for data analysis conducted in Addis Ababa 62.2% cases were claimed that they were not vaccinated; similarly in Atlanta (5; 6).

Epidemiological linkage classification of measles cases is the dominating method used throughout five years and the cumulative accounts for 77.3%; similar to national analysis conducted in Ethiopia. Laboratory confirmed cases we only 15.5% of all suspected cases. This was may be due to the occurrence of outbreaks in most of zones of the region since 2015, which minimizes the number of serum samples to be collected, i.e., no more serum sample collection after five laboratory confirmed cases during an outbreak(6).

2.1.7 Conclusion

Age group 1-4 years are highly affected children and the burden of the disease high for those not vaccinated to measles antigen. There is no evidence that geographical location is to be risk factor for measles case. Dry seasons are more favorable climate for transmission of measles than rainy season. Vaccination is significantly affects measles prevalence, i.e. those not vaccinated are more susceptible for the disease than those vaccinated. Laboratory confirmation is mandatory to confirm the cases and it is the basic criterion to launch the case is outbreak or not. Once after confirmation epidemiological linkage is enough to implement outbreak control interventions and no need of wastage of resource for laboratory investigation of each suspected case.

2.1.8 Recommendation

The Regional Health Bureau and other partners should collaborate and strengthen zones for the improvement of measles vaccination coverage and potency. The seasonality of disease transmission or occurrence of outbreaks could indicate when to conduct supplementary immunization activities, and the needs for further analysis and study. Improvement in the database management for ease analysis; for example sex, age, status of cases and other mandatory variables were inconsistent and were not filled. Further investigation or research is necessary to find out causes of outbreaks highly prevalent zones.

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Chapter III

Public Health Surveillance System Evaluation

3.1 East Hararge Zone Public Health Surveillance System Evaluation

Chapter III: Public Health Surveillance System Evaluation

3.1 Public Health Surveillance System Evaluation in East Hararge Zone

Abstract

Background: Public health surveillance is considered to be an essential public health function. A public health system is said to have five essential functions: population health assessment, health surveillance, health promotion, disease and injury prevention, and health protection. In the last 3 years there is no evaluation of surveillance system done in East Hararge zone. Therefore an evaluation of surveillance system was conducted to make recommendation that may use to improve the current surveillance system of the diseases and preparedness and response against the possible outbreaks in the future.

Methodology: We used cross-sectional descriptive n for evaluation of the system from October 15-30, 2020. In this assessment, PHEM staffs of ZHD, and focal persons of selected DHO and health facilities were participated.

Result: Population under surveillance in this zone were 90.4% rural dwellers which is more than the regional rural dwellers 84.6%. The hospital and have a clinical register correlated to the report in addition to national surveillance guideline accessible at 42.9% of health centres. Health posts consider case detection of only the priority disease like malaria, AFP, measles and cholera using the national case definition. The completeness and timeliness of weekly report is above the national target 80% in most of health centres and district, while more than 80% of HPs are below the national target. The CFR of cholera during the outbreak was 77/1000 population (2 deaths from 26 cases) while the zone CFR was 22/1000 population (3 death from 136 case).

Conclusion: At ZHD activities like cascading national guideline and activities to be implemented at district level, timeliness and completeness of reporting to higher level and giving feedback to subordinates and description of data by time, place and person. Activities like case detection and registration of all surveillance targeted diseases, timeliness and completeness of report, data analysis, outbreak investigation, epidemic preparedness and response, training of health workers, resource allocation and documentation of data to be implemented at health post, health centres and districts level need attention for further improvement of surveillance system.

3.1.1 Background

Epidemiologic surveillance is the on-going and systematic collection, analysis, and interpretation of health data in the process of describing and monitoring a health event. Surveillance, a core function of public health practice, closely integrated with the timely dissemination of the information to those who need to know and act upon that information. Surveillance data are used both to determine the need for public health action and to assess the effectiveness of programs (1; 2). Public health surveillance is considered to be an essential public health function. A public health system is said to have five essential functions: population health assessment, health surveillance, health promotion, disease and injury prevention, and health protection (3).

In integrated disease surveillance, the various surveillance activities become integrated into one system within the broader national health system. 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 (4; 2). A surveillance system, in turn, is a collection of processes and components that enable public health practitioners to conduct surveillance. The evaluation of a surveillance system promotes the best use of data collection resources and assures that systems operate effectively (2). Surveillance system evaluation allows us to define whether a specific system is useful for a particular public health initiative and is achieving the overarching goals of the public health program and the data collection objectives (5; 6; 7). Conduct a formal, system-level review at least once every five years or whenever major revisions or updates to the system are being considered. Assess the overall design and implementation of surveillance (7).

The enabling components of surveillance systems may include laboratory diagnostics to detect or confirm health conditions; information technologies to support the surveillance processes of data collection, analysis, and dissemination; clinician consultation and reporting; clinician, public health, and laboratory worker education and training; legislation, regulations, and policies that support the conduct of surveillance; systems and directories for disseminating alerts, bulletins, clinical guidelines, and prevention recommendations; program administration and management; and human factors (2; 4). The surveillance system is found to be simple, useful, flexible, acceptable, and representative (8).

Federal Ministry of Health (MoH) has launched a reform and restructuring of the health sector in to different directorates, this helps the surveillance of priority diseases to be a dependable system as Public Health Emergency Management (PHEM) Center. This new structure is extended down to the district level in their capacities. The goal of PHEM was to better track and monitor diseases of public health concerns (4). The MoH of Ethiopia identified 21 top priority diseases which are epidemic prone, of international concern and diseases that have eradication and elimination programs for surveillance activities. These diseases are mandatory notifications which are immediately reportable diseases and routine surveillance reported weekly. This starts from health post (community) to health facilities then to District health office and followed by zonal health department; to Regional health bureau PHEM directorate, sends the compiled data and information to the EPHI /PHEM (4).

Measles, malaria, AFP (polio) and cholera were among the top focus cases from 21 surveillance targeted diseases reported on the immediately and weekly bases and they are significant disease burdens to the public. These cases were becoming more frequent and widespread in the region. According to national report, in 2015 there were 19,744 suspected measles cases and 72 deaths were reported from all regions except. The highest number of suspected measles cases and deaths were reported from Oromia Region 16, 216 and 54 respectively. The national and Oromia Case Fatality Rate (CFR) was 0.4% and 0.3% respectively. Malaria and AFP are under eradication program in East Hararge and the zone has experienced to report cholera cases especially in 2019 there were 136 cases and 3 deaths with CFR was 2.2%.

3.1.2 Rationale

Surveillance system evaluation is an important tool to assess the capacity of the system to meet its purpose and objectives; to improve its operation and to optimize the available resources (1). In the last 3 years there is no evaluation of surveillance system done in the zone, and it is difficult to know the effectiveness and efficiency of the system without evaluation. In addition it can be used as a base line for future evaluation of the system. Therefore; an evaluation of surveillance system was conducted to make recommendation that may use to improve the current surveillance system of the diseases and preparedness and response against the possible outbreaks in the future.

3.1.3 Objective

3.1.3.1 General objective

To evaluate the surveillance system of target diseases and forward solutions for improvement in East Hararge Zone, Oromia, Ethiopia 2020

3.1.3.2 Specific objective

- To assess core surveillance activities such as case detection, reporting, analysis and epidemic response in East Hararge Zone
- To evaluate the attributes of the surveillance system of priority disease in East Hararge Zone
- To assess the usefulness of surveillance system in early detection of outbreaks and decreasing morbidity and mortality

3.1.4 Methods

3.1.4.1 Study area

The study area was East Hararge zone of Oromia region having 24 districts and having a projected total population of 3,855,181 in 2020. This zone is selected due to unavailability of surveillance system evaluation undertaken within the last 3 years in the zone.

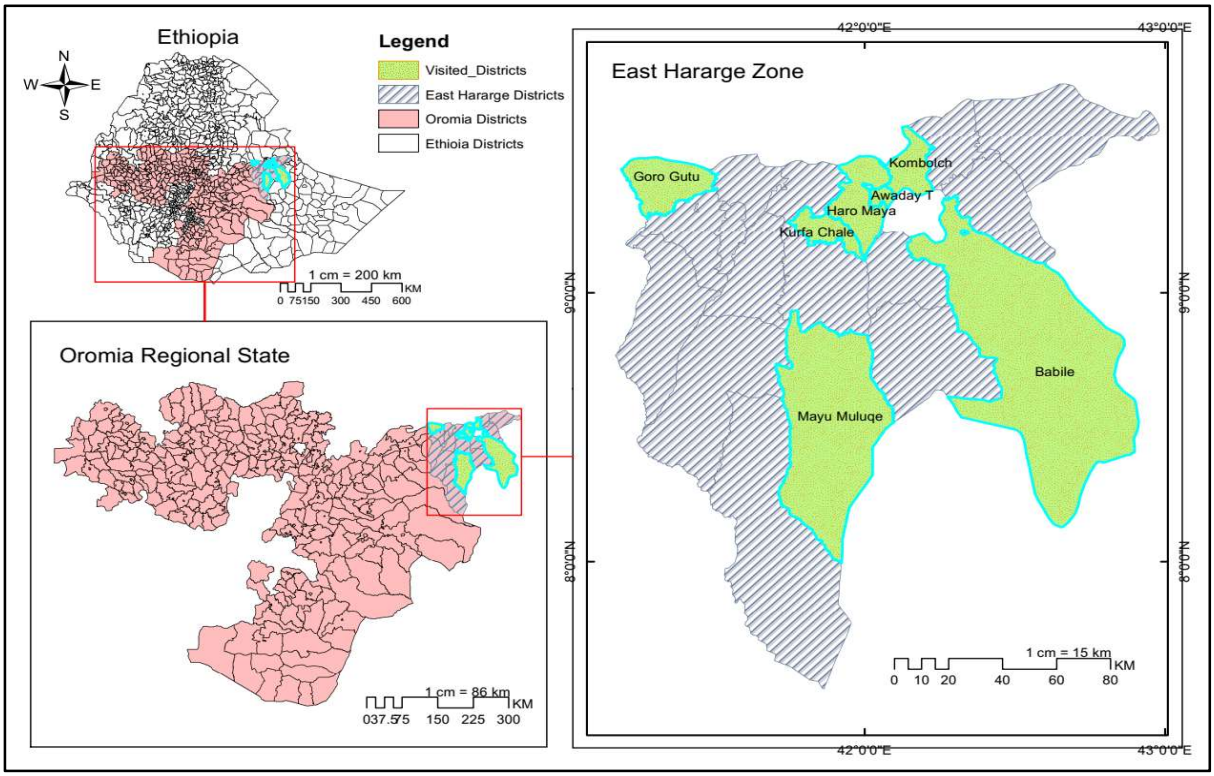

Figure 36: Map of East Hararge (Study Area) by its Districts, 2020

3.1.4.2 Study design and period

We used cross-sectional descriptive n for evaluation of the system from October 15-30, 2020

3.1.4.3 Study subjects

The study subjects of this evaluation were zone health department, district health offices and health facilities (hospital, health centres and health posts).

3.1.4.4 Sample size and sampling

The zonal health department, health centres and health posts were selected using convenient sampling method. Among all 24 districts of the zone 30% were randomly sampled, 1 of 4 hospitals also randomly included in the evaluation. In each selected district there were 1 health centre and 1 health post under each health centre were conveniently included in the evaluation. Accordingly 1 ZHD, 7 DHO, 1 Hospital, 7 Health centres and 7 health posts and totally 23 samples were included in the evaluation.

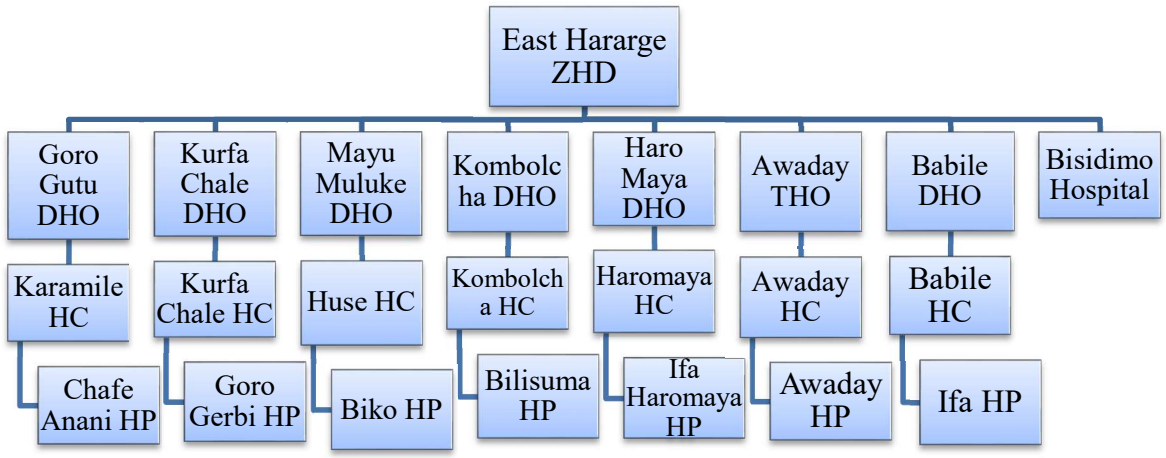

Figure 37: Schematic presentation of sampling technique East Hararge, Ethiopia 2020

3.1.4.5 Data collection technique and analysis

We collected the data using semi-structured questionnaire, qualitative interview, observation of tools for surveillance and secondary data review. The data was entered and analysed using Microsoft Office Excel.

3.1.4.6 Data quality control and dissemination

The obtained data from each site was checked at regional health bureau, zonal health department, district health office and health facilities before summarizing for its accuracy and consistency. We prepared and shared the report for Addis Ababa University School of Public Health, Ethiopian Field Epidemiology Training Program Mentors, Resident Supervisors, Oromia Regional Health Bureau, East Hararge Health Department and all visited district health office and health facilities.

3.1.5 Results

3.1.5.1 Engagement of stockholders

Prior to the evaluation of the surveillance system started, discussion and consultation was made with Regional Public Health Emergency Management (PHEM) Directorate on how to select sites. It is known that stakeholders can provide input to ensure that the evaluation of a public health surveillance system addresses appropriate questions and assesses pertinent attributes and that its findings will be acceptable and useful. The meeting was also first step for assessment and recommendations; which will help for the implementation of recommendations and betterment of the surveillance and response of the major priority diseases of the evaluated zone. In this assessment, PHEM staffs of ZHD, and focal persons of selected DHO and health facilities were participated.

3.1.5.2 Description of the surveillance system

A. Systems in place

Public health emergency is the process of anticipating, preventing, preparing for, detecting, responding to, controlling and recovering from consequences of public health threats in order that health and economic impacts are minimized. Regional PHEM directorate is working with different stakeholders towards different needs and expectation. The Regional directorate has two sub-process namely; early Warning, preparedness, Response and Recovery and Health research. At Zonal level, two health professionals are assigned on PHEM activities. At District level, there is one PHEM focal person. Similarly, at hospital and health centre level there is one surveillance focal person. At health post level HEW are the responsible workers to achieve the expected surveillance activities. Private health facilities also responsible to report surveillance based events to their respective district health office.

We assessed these different health structures in the zone, started from zonal health department. We focused on presence of different updated guidelines, availability of standard case definitions especially for those selected diseases (Cholera, Measles, Malaria and AFP (polio), presence of different clinical registrations, capacity of laboratory service they have, availability of outbreak (if any), presence of preparedness plan and their trends of response activities, different supervision conducted and any feedback given, resource available for surveillance activities and different attributes of surveillance system.

B. Targeted disease under surveillance

National Public Health Emergency Management targets 21 selected diseases such as: AFP, Anthrax, Avian Human Influenza, Cholera, Drancunculiasis (Guinea-worm), Measles, Neonatal Tetanus, Pandemic influenza A (H1N1), Rabies, SARS, Smallpox, Viral haemorrhagic fever (VHF), Yellow fever and Maternal Death to be reported immediately on detection and weekly as zero report. Dysentery, Malaria, Malnutrition, Meningitis, Relapsing fever, Typhoid fever and Typhus are to be reported weekly. East Hararge Zonal Health Department also relies on the national and regional targeted events.

C. Purpose of the surveillance system

The overall objective of the surveillance system is to improve the ability of health workers to detect early and respond to priority communicable diseases, effective and timely decision making based on evidence, increases efficient utilization of available resources for preventing and controlling communicable diseases and improving the health status of the population under surveillance.

D. Population and health facilities under surveillance

The national PHEM targets all population in the country to be under surveillance for all the 21 priority disease. In 2020 East Hararge zone has a population of 3,855,181 of which 1,948,313 are male 1,906,869 are female (projected from 2007 national census). More than 90% of the zone population lives in rural settings (Table 16).

Table 16: Population under surveillance, East Hararge, Oromia, Ethiopia 2020

Assessment Area	Total Population	Male	Female	Urban Pop	Rural Pop
East Hararge Zone	3,855,181	1,948,313	1,906,869	371,052	3,484,130
Bisidimo Hospital	401,543	202,314	199,229	48,474	353,069
Awaday Town	13,146	6,799	6,347	13,146	0
Babile District	103,293	50,693	52,600	0	103,293
Goro Gutu District	205,356	104,991	100,364	17,217	188,139
Haromaya District	310,466	155,431	155,035	19,871	290,595
Kombolcha District	200,721	101,784	98,937	21,576	179,144
Kurfa Chele District	84,258	42,632	41,627	9,859	74,400
Meyu Muluke District	65,917	33,402	32,515	5,449	60,468

There are totally 24 health offices reporting to East Hararge Zonal Health Department. All public, NGO and private health facilities were communicating to their respective districts for

surveillance activities. In all districts there were totally 8 hospitals, 121 health centres and 586 health posts. Based on access to health centres the health coverage of East Hararge zone is 78% and in the assessed districts the coverage ranges from 62% to 218% (Table 17)

Table 17: Health Facility coverage in assessed districts of East Hararge, Oromia 2020

Administrative level	Total Pop	Number of Health Facilities and their coverage						
		Hospital		Health Center		Health Post		Total
		#	%	#	%	#	%	
East Hararge Zone	3,855,181	8	21	121	78	586	76	0
Awaday Town	13,146	0	0	1	190	1	38	0
Babile District	103,293	1	97	9	218	23	111	0
Goro Gutu District	205,356	0	0	6	73	28	68	0
Haromaya District	310,466	1	32	8	64	34	55	0
Kombolcha District	200,721	0	0	5	62	23	57	0
Kurfa Chele District	84,258	0	0	4	119	18	107	0
Meyu Muluke District	65,917	0	0	4	152	17	129	0

Totally 23 health institutions were visited during the assessment. Among these: 1 ZHD, 1 Hospital (Bisidimo Hospital), 7 DHO, 7 HCs and 7 HPs (Table 18)

Table 18: Visited health institutions for evaluation East Hararge, Oromia 2020

Name of Visited Districts	District Health Office	Health Center	Health Post
Awaday Town	Awaday	Awaday	Awaday
Babile District	Babile	Babile	Ifa
Goro Gutu District	Goro Gutu	Kara Mile	Chafe Anani
Haromaya District	Haromaya	Haromaya	Ifa Haromaya
Kombolcha District	Kombolcha	Kombolcha	Bilisuma
Kurfa Chele District	Kurfa Chele	Kurfa Chele	Goro Gerbi
Meyu Muluke District	Meyu Muluke	Huse	Biko

E. Case detection and registration

Among all 23 visited health institutions the ZHD, hospital and all DHO have national manual of PHEM. Among visited HCs 42.9% and none (0%) of HP have national manual. All of DHO, hospital and ZHD have standard case definition of surveillance based events, but none of HPs have standard case definition for each of 21 surveillance based events and 71.4% of HCs have complete standard case definition. All health facilities have clinical register for case detection except 2 HPs and all have completely filled the clinical register except 3 HPs.

Table 19: Case detection and registration status of visited HI in East Hararge, Oromia 2020

Health Institution	visited	Guideline (%)	Clinical register (%)	Correctly filled CR (%)	Case def^n (%)	Facilities Posted standard case definition for (%):			
						Cholera	AFP	measles	malaria
Zonal HD	1	100	NA	NA	100	NA	NA	NA	NA
Hospital	1	100	100	100	100	100	100	100	100
District HO	7	100	NA	NA	100	NA	NA	NA	NA
Health Centre	7	42.9	100	100	71.4	100	100	100	100
Health Post	7	0	71.4	60	0	71.4	85.7	100	57.1

F. Reporting system

Although the reporting format is prepared centrally and distributed to all health institutions; there was a shortage of reporting format at facility level and they are obliged to report by locally modified format. Among visited health institutions, the ZHO and Hospital have no lack of report form for the last 6 months while 57.1% of DHO, 42.9% of HCs and 28.6% of HPs have access to report form for the last 6 months. As the schedule all HF are expected to report on Monday to their respective DHO and the DHO to the zone on Tuesday and the ZHD to RHB on Wednesday (Figure 38). Telephone and mail were the main means of reporting from lower level to the next level.

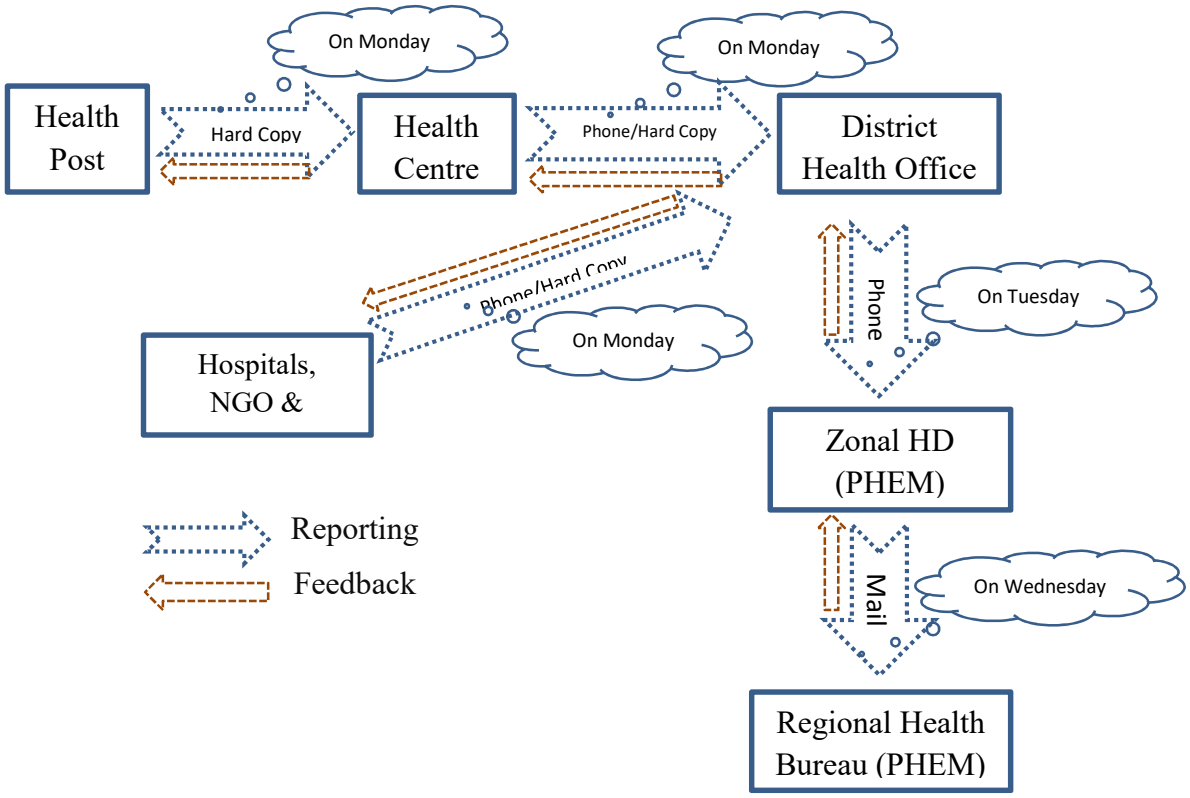

Figure 38: Schematic presentation of weekly reporting system of surveillance, Oromia 2020

The completeness and timeliness of report during continuative three months from January 1st of 2020 to March 22nd of 2020 (Week 1 to week 12) visited health institution was 100% for ZHD, Bisidimo Hospital, Awaday HC, Babile DHO, Haromaya HC, Kombolcha HC, Kurfa Chele HC and Meyu Muluqe DHO. Except Ifa Haromaya HP the completeness and timeliness report of all health post were below the Regional/Zonal target which is 80%.

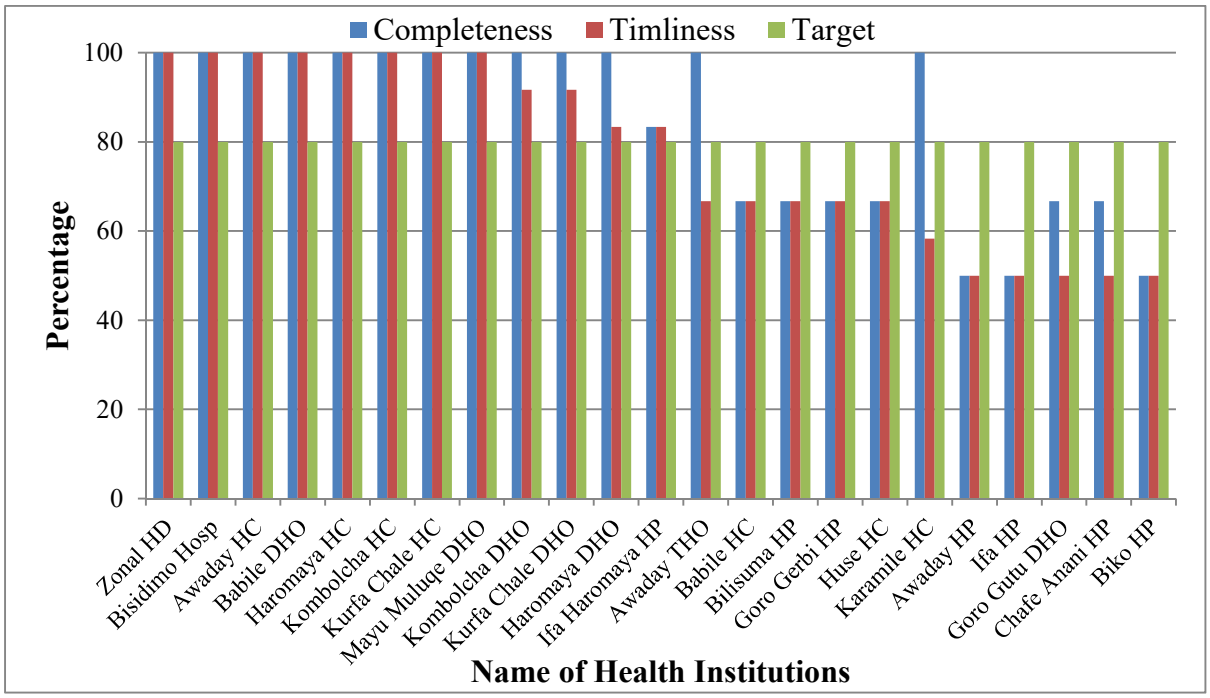

Figure 39: Completeness & timeliness of weekly report of assessed HI, E. Hararge, Oromia 2020

G. Data analysis

At zonal and hospital level PHEM unit and surveillance focal person were the responsible person for data analysis respectively. In all visited health institutions except Bisidimo Hospital data of each reported priority disease were not analysed. Malaria is the only disease that ZHD, some district health office and health centres were describes by person, place and time (Table 20). All of the assessed health institutions have appropriate denominators needed for surveillance data analysis.

Table 20 Description of malaria data in visited HI, E. Hararge, Oromia, Ethiopia 2020

Health Institution	Visited	Described data of malaria by:			
		Person	Place	Time	Trend
Zonal HD	1	100	100	100	100
Hospital	1	100	100	100	100
District HO	7	57	71	29	14
Health Center	7	86	86	86	86
Health Post	7	0	0	0	0

H. Outbreak investigation

Investigating and managing an outbreak appropriately is essential to minimize morbidity and mortality by aborting the outbreak early before it spreads in the area. The ZHD has investigated three outbreak investigations in 2019. Among the 3 outbreak 2 of them were looked for their risk factors and this finding was used for action. Cholera was one of the outbreaks reported in July and August 2019 from visited district included in this assessment. As the line list reported to higher level shows there were 136 cases and 3 deaths due to the outbreak in East Hararge Zone. The outbreak of Cholera reported with 26 cases and 2 deaths was from Goro Gutu District. Based on the District's PHEM team information all PHEM team of DHO, all health centres' surveillance focal person were participated on the investigation of the outbreak. However; there was no written document about outbreak investigation seen during the assessment.

I. Epidemic preparedness and response

The zonal health department and all visited DHO have plan prepared for epidemic preparedness and response but has experienced shortage of emergency stock of drugs, vaccines, and supplies at all times in the past one year. There is no specific budget line for epidemic response alone at all level of the zone. All DHOs and the ZHD have established epidemic management committee and rapid response team. Except Goro Gutu District all DHO epidemic management committee have evaluated their preparedness and response activities at least once during the past year.

J. Feedback of reports and supervision

The ZHD has received six report feedbacks from regional health bureau and Bisidimo hospital has received three feedbacks from ZHD in the last year. The health facilities has conducted meeting with community members except Karamile HC. Among the assessed health institutions 21 (91.3%) of them were have supervisory visits at least once within the last 6 months and 2 (8.7%) of them have no supervisory visited (Table 21).

Among all 15 health facilities visited 13 of them have written document of supervision report and evidence for appropriate review of surveillance practice. The two health facilities Karamile HC and Chafe Anani HP have no document for supervision report and evidence for appropriate review of surveillance practice. The most usual reasons for not making all required supervisory visits of responded from assessed health office were lack of budget, transportation problem and work overload.

Table 21: Feedback status of visited HF, in E. Hararge, Oromia Ethiopia 2020

Name of Health Institution	Received feedback of reports from respective higher level produced in the last year (N=12)		HF conducted meeting with community members in the past six months (N=6).		Supervisory visits made in the last 6 months (N=6)	
	Frequency	%	Frequency	%	Frequency	%
East Hararge ZHD	6	50.0	NA	NA	6	100
Bisidimo Hospital	3	25.0	4	66.7	3	50
Awaday THO	2	16.7	NA	NA	6	100
Awaday HC	8	66.7	4	66.7	6	100
Awaday HP	6	50.0	4	66.7	6	100
Babile DHO	1	8.3	NA	NA	1	17
Babile HC	12	100.0	3	50.0	6	100
Ifa HP	2	16.7	1	16.7	1	17
Goro Gutu DHO	4	33.3	NA	NA	0	0
Karamile HC	0	0.0	0	0.0	0	0
Chafe Anani HP	2	16.7	1	16.7	1	17
Haromaya DHO	10	83.3	NA	NA	6	100
Haromaya HC	8	66.7	4	66.7	6	100
Ifa Haromaya HP	6	50.0	3	50.0	6	100
Kombolcha DHO	4	33.3	NA	NA	4	67
Kombolcha HC	2	16.7	2	33.3	6	100
Bilisuma HP	2	16.7	1	16.7	1	17
Kurfa Chale DHO	4	33.3	NA	NA	4	67
Kurfa Chale HC	2	16.7	2	33.3	6	100
Goro Gerbi HP	2	16.7	1	16.7	1	17
Mayu Muluqe DHO	1	8.3	NA	NA	1	17
Huse HC	12	100.0	3	50.0	6	100
Biko HP	2	16.7	1	16.7	1	17

K. Training

Regarding training of on public health surveillance 70% of zonal PHEM working subordinates were trained on different topics of surveillance activity and Except Goro Gutu and Mayu Muluke districts other district subordinates of PHEM workers were also trained at least once in the last one year (Figure 40).

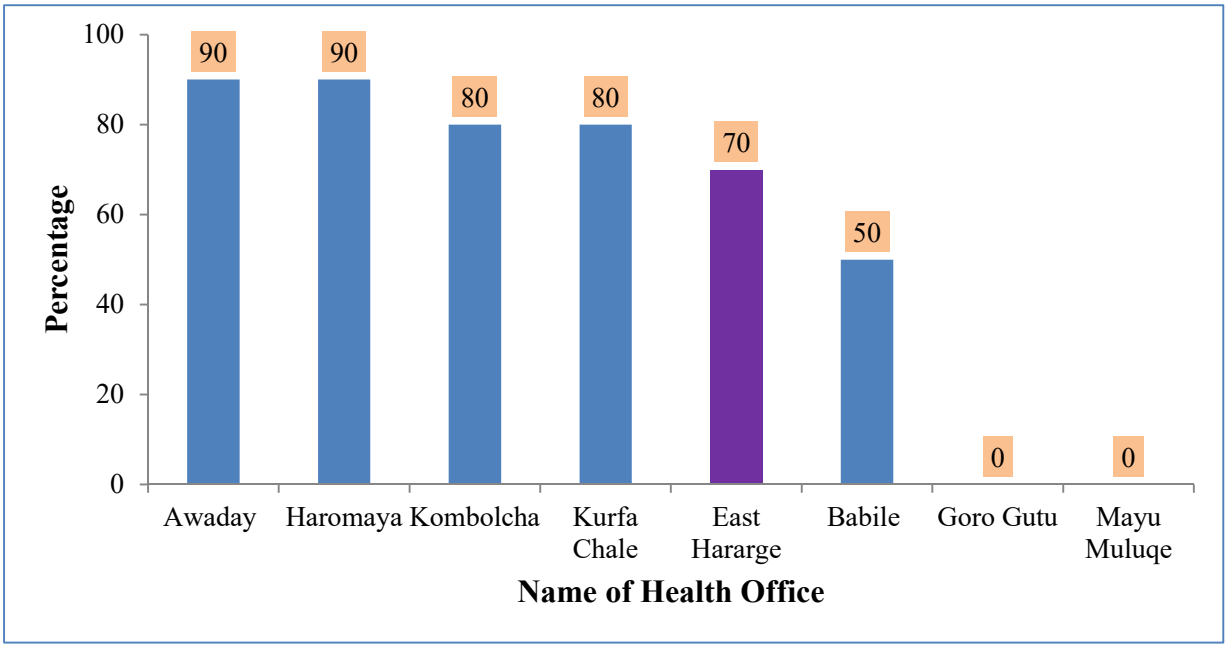

Figure 40: Training status of subordinate staff of health office E. Hararge Ethiopia 2020

The training status for the respondents of this assessment was 100% for zone and hospital respondents, 42.9% for DHO and HC respondents and 28.6% for HP respondents (Table 22).

Table 22 Surveillance training status respondents of E. Harerge zone, Ethiopia 2020

Health Institution	Visited	Trained on Surveillance (%)
Zonal Health Department	1	100
Hospital	1	100
District Health Office	7	42.9
Health Center	7	42.9
Health Post	7	28.6

The training topic of all trained respondents is cholera outbreak investigation at district level by zonal health professionals for one day. Health personnel working at office those have received post-basic training in epidemic management were 100% at ZHD and Awaday DHO, 80% at Goro Gutu and Haramaya DHOs and none for remain assessed district health offices.

L. Resources available for surveillance

The zonal health department have budget for PHEM activities shared and allocated from regional health bureau and donors those support surveillance activities. At district and health facility level there is no budget allocated separately for PHEM activities. The districts PHEM unit perform activities with coordination of disease control and prevention, MCH and planning units. Two district health offices were not satisfied with the existing surveillance system due to lack of budget and recommend having budget code for the system for improvement. The average resource availability was 75% at ZHD, 95.2% at Hospital, 56.5% at, 38.6% at health centres and 57.1% at health posts (Table 23).

Table 23: Resource availability at different level of E, Hararge, Ethiopia 2020

Resource categories		Zonal HD (N=1)	Hospital (N=1)	District HO (N=7)	Health Centres (N=7)	Health Posts (N=7)
Logistics	Electricity	100.0	100.0	85.7	100.0	14.3
	Bicycles	NA	NA	NA	NA	14.3
	Motor cycles	NA	100.0	100.0	14.3	NA
	Vehicles	100.0	100.0	0.0	0.0	NA
Data management	Stationery	100.0	100.0	100.0	100.0	100.0
	Calculator	100.0	100.0	100.0	100.0	100.0
	Computer	100.0	100.0	100.0	0.0	NA
	Printer	100.0	100.0	100.0	0.0	NA
	Stat. package	100.0	100.0	0.0	0.0	NA
Communication	Telephone	100.0	100.0	100.0	100.0	100.0
	Fax	0.0	100.0	0.0	0.0	NA
	radio	0.0	0.0	0.0	0.0	NA
	Modems	100.0	100.0	100.0	NA	NA
IEC materials	Posters	100.0	100.0	100.0	100.0	100.0
	Megaphone	0.0	100.0	0.0	0.0	0.0
	Flipcharts	100.0	100.0	100.0	100.0	100.0
	VCR	0.0	100.0	0.0	0.0	NA
	Generator	100.0	100.0	0.0	0.0	0.0
	Screen	0.0	100.0	0.0	0.0	0.0
	Projector	100.0	100.0	0.0	0.0	NA
EH materials	Spray pump	100.0	100.0	100.0	57.1	NA
	Disinfectant	100.0	100.0	100.0	100.0	100.0
AVERAGE		**75.0**	**95.2**	**56.5**	**38.6**	**57.1**

The opportunities for integration of surveillance activity explained by assessed health institution were training, using resources, having guideline, supervision, budget and transportation.

M. The laboratory

All district health offices have guidelines for specimen collection, handling and transportation to next level and have cold chain system capacity to handle sputum, stool, blood and CSF until transportation. Except Mayu Muluqe DHO all districts have capacity to transport specimen to higher level laboratory centre.

Among the assessed health facilities the hospital and all HCs have capacity to collect specimens of sputum, stool and blood/serum; and among this HFs the hospital and 2 HCs have capacity to collect specimens of CSF but 5 HCs have no capacity to collect specimens of CSF (Table 24).

Table 24: HFs capacity of collecting specimen, E. Hararge, Ethiopia 2020

Name of Health Institution	Capacity to collect specimens			
	Sputum	Stool	Blood	CSF
Bisidimo Hospital	yes	yes	yes	yes
Awaday HC	yes	yes	yes	no
Babile HC	yes	yes	yes	yes
Karamile HC	yes	yes	yes	yes
Haromaya HC	yes	yes	yes	no
Kombolcha HC	yes	yes	yes	no
Kurfa Chale HC	yes	yes	yes	no
Huse HC	yes	yes	yes	no

3.1.5.3 Description of attributes of the surveillance system

A. Usefulness

The existing surveillance system helps the assessed health institutions to estimate magnitude of morbidity, mortality and identify factors associated with the priority diseases, permit assessment of the effect of prevention and control programs and for interventions of diseases and trends analysis. The ZHD, Bisidimo hospital, all DHO and 42% of HCs used the national guideline for the intended purpose.

B. Simplicity

The simplicity of a public health surveillance system refers to both its structure and ease of operation. Surveillance systems should be as simple as possible while still meeting their objectives. All assessed HI easily understood the cases definition of the priority diseases for detection of cases. Among all visited 23 HI all 100% knows the case definition of cholera,

malaria AFP and measles to detect the cases. All assessed health institutions easily understood from were to receiving from and to whom they should to report and agreed that the time of reporting to their respective higher level institutions. Except one DHO they do not feel that additional data collection on a case is time consuming. The average time consumption for filling the report form is 10 -15 minutes. Regarding the average time taken for laboratory confirmation of cholera 1 week, measles 1 month, AFP 1 month and malaria 15-20 minutes.

C. Flexibility

A flexible public health surveillance system can adapt to changing information needs or operating conditions with little additional time, personnel, or allocated funds. Flexible system can accommodate new health related events, changes in case definition or technology and variations in funding or reporting sources. The ZHD, the hospital and all DHO responded that they can use the current reporting format for other newly occurring health events (disease) without much difficulty. Based on their response; there is no difficulty for the implementation of change in the existing procedure of case detection reporting and format in ZHD and 6 (85.7%) of DHO. Goro Gutu district health office thinks that any change in the existing procedure of case detection, reporting and formats will be difficult to implement.

D. Data quality

Among all assessed DHO 6 (85.7%) of them responded that data collection formats for priority diseases are clear and easy to fill for all data collectors or reporting site, while it is not clear and easy to fill for data collectors according to Goro Gutu DHO response. There is no regular training and supervision for the reporting sites or data collectors in all visited district health offices. There is little (no) unknown or blank response to variables in each of the reported formats in all DHO and ZHD.

E. Acceptability

The acceptability of the surveillance system assessed based on the engagement of the reporting agents and active participation in the case detection and reporting. During the first 12 WHO weeks; at zonal level all reporting agents (24 DHO) were engaged to the surveillance activities. At district level among 7 assessed districts in 3 (42.9%) districts all expected reporting agents were engaged, but in 4 (57.1%) districts all expected agents were not participated to the surveillance activities.

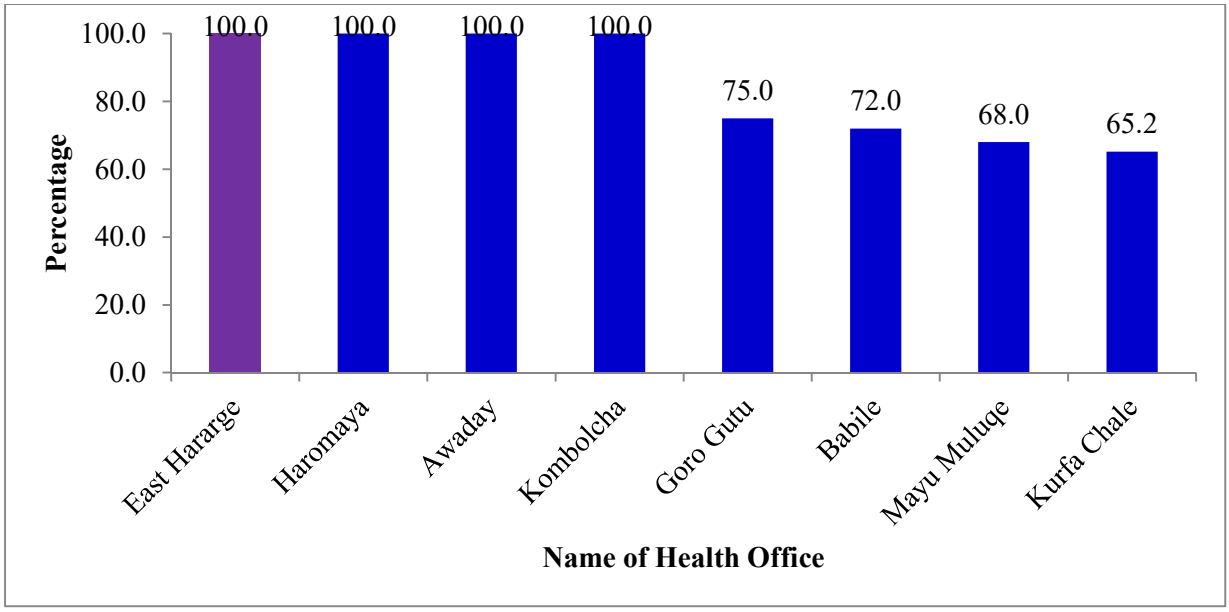

Figure 41: Engagement of reporting agents to surveillance activity in E. Hararge, Ethiopia 2020

The main reasons that reporting agents not engaged to the surveillance activity were lack of understanding of relevance of the data to be collected and not getting appropriate feedback from higher bodies for their contribution.

F. Representativeness

This is related to health service coverage, health seeking behaviour of population under surveillance and residential setting. Based on the data obtained from ZHD and DHO the overall health service coverage of East Hararge zone is 78% and the districts' coverage ranges from 62% to 218% Regarding the health seeking behaviour of population under surveillance all DHO respond that the population have good awareness of surveillance due to awareness creation by HEWs assigned at each Kebele and gives health education door to door from time to time on different types of health information. Among all 7 DHO, the respondents think that the surveillance data report represents 4 (57.1%) both rural and urban, 2 (28.6%) rural and 1 (14.3%) urban population,

G. Completeness and Timeliness

Timely report of surveillance data is important for early public health interventions. Timeliness of the public health surveillance is usually considered that time interval between the onset of health-related event and the reporting of the event within the time period specified in national PHEM guideline to the public health agency responsible for immediate control effort, prevention of continued exposure or program planning. The minimum expected reporting timeliness is 80% as per recommendation of the national PHEM

guideline. In The zonal HD and five DHO have achieved the minimum expected reporting timeliness and 2 districts achieved below the minimum (Figure 42).

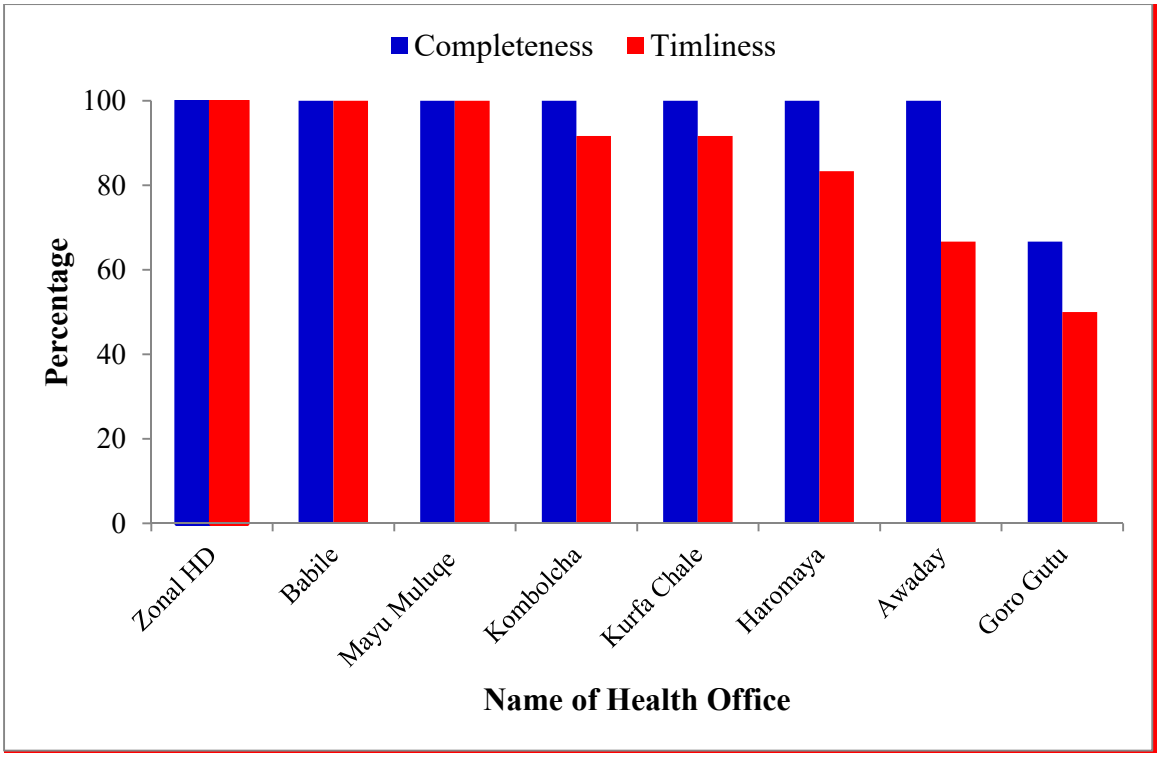

Figure 42 Completeness & timeliness of assessed districts in E, Hararge, Ethiopia 2020

H. Stability

Stability refers to the reliability (the ability to collect, manage, and provide data properly without failure) and availability (the ability to be operational when it is needed) of the public health surveillance system. The newly restructuring of health working force does not affect the procedures and activities of the surveillance system in all assessed districts and ZHD except in Goro Gutu district. Even though there is scarcity of resources in all health institutions, the surveillance system is not interrupted due to lack of resources.

3.1.6 Discussion

For surveillance systems to achieve their greatest impact, it is necessary to identify system stakeholders, understand their roles and engage them throughout the surveillance process (1). Prior to the initiation of surveillance, the stakeholder input, such as the information sought for decision making, may inform the definition of system objectives.

When the surveillance system is active, stakeholders can help interpret the reported data based on their knowledge of the health outcome or the environment in which the data are collected (2). Zonal health department, district health office and health facility PHEM

working units respond to the information generated by the surveillance system and recommend and influence surveillance system evaluation to ensure the system is meeting its objectives. The 21 national target diseases under surveillance were also under consideration of the surveillance system of East Hararge Zone. Population under surveillance in this zone were 90.4% rural dwellers which is more than the regional rural dwellers 84.6%.

Case detection of the target diseases were emphasized at hospitals and health centre. The hospital and have a clinical register correlated to the report in addition to national surveillance guideline accessible at 42.9% of health centres. Health posts consider case detection of only the priority disease like malaria, AFP, measles and cholera using the national case definition. This is due to lack of providing training for health extension worker related to surveillance activities. In addition to gap of case detection at HP level there was also lack of reporting form in 71.4% of health posts.

The completeness and timeliness of weekly report is above the national target 80% in most of health centres and district, while more than 80% of HPs are below the national target. This under achievement might be related to scarcity of resource. Completeness of report was observed in health facilities those have lack of reporting form. The average completeness and timeliness of report is similar to the regional PHEM report and Dangila district of Northwest Ethiopia (8). The similarity might be due to the same guideline and reporting period.

Surveillance data analysis and interpretation should directly support the surveillance system objectives and be performed in alignment with surveillance system processes. Similarly, standard analytic routines should be specified prior to receipt of surveillance data and performed at each major data update (2). In East Hararge there is lack of analysis of data at health facility and district level. This might be due to lack of trained man power at each level especially at district and health centres. As the data result shows the only priority disease weekly analysed is malaria at all levels. This related to especial attention given for malaria eradication program in the zone supported by partners.

Regarding cholera outbreak investigation Goro Gutu district health office have gap of preparedness and response plan, which is justified by the CFR. The CFR of cholera during the outbreak was 77/1000 population (2 deaths from 26 cases) while the zone CFR was 22/1000 population (3 death from 136 case). In addition to high CFR; the district has not documented the outbreak investigation and the epidemic committee have not evaluated their preparedness and response activities during the outbreak.

Discrepancies between actual and planned system performance are identified via routine monitoring, and corrective actions are taken in to quality improvement approaches intended to systematically improve the performance of any system. A routine monitoring perspective recognizes that surveillance system performance indicators are not static (2). Supportive supervision and feedback were means of monitoring and evaluation that national and regional PHEM department were implementing. The zonal health department and all assessed districts were practiced at least one feedback and supervision from higher level and to their subordinates. In Dangila even though all study sites had a supervision plan, but as mentioned by surveillance stakeholders it was not conducted regularly (8) and this is similar with the scenario of assessed health facility of East Hararge.

There was training gap of surveillance related activities in all assessed health posts, health centre and most district health office. This is one factor for gap of reporting and case detection activities. In addition to training gap there were resource discrepancies especially lack of budget in all districts and health facilities. Lack of training and training directly related to different attributes of surveillance system like data quality, timeliness and completeness of reports and holds true for this assessment i.e. health institutions have good access of resources and training have well achieved surveillance activities and vice versa.

3.1.7 Conclusion

Surveillance is information for action which is critical for public health interventions, and surveillance systems are needed to conduct surveillance efficiently and effectively. The main output of surveillance systems is information that drives action; consequently, systems require data of sufficient quality and with a resolution and timeliness that match public health objectives. In conclusion; there were best achievements in East Hararge surveillance system at hospital level in case detection and registration, reporting system and documentation of data and training of staffs on surveillance activities. At ZHD activities like cascading national guideline and activities to be implemented at district level, timeliness and completeness of reporting to higher level and giving feedback to subordinates and description of data by time, place and person.

Activities like case detection and registration of all surveillance targeted diseases, timeliness and completeness of report, data analysis, outbreak investigation, epidemic preparedness and response, training of health workers, resource allocation and documentation of data to be

implemented at health post, health centres and districts level need attention for further improvement of surveillance system.

3.1.8 Recommendation

For national and regional level:

- Preparation and distribution of sufficient surveillance guideline and standard weekly reporting formats,
- Allocation of resources (budget, means of transportation, communication tools, IEC materials and data management equipment) and
- Strengthening capacity of districts by giving TOT training on surveillance activities.

For ZHD and DHO:

- Giving continuous and regular supportive supervision for their respective health facilities and having written documents for each activity,
- Regularly preparing and availing routine feedback for weekly report of surveillance targeted diseases and
- Creating collaboration with other sectors and integrating surveillance activities to other health service activities.

Health Facilities:

- Assigning appropriate health professional focal person for surveillance activity,
- Detecting and registration of each surveillance targeted events and
- Describing the data by time, person and place.

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Chapter IV

Health Profile Description

Health Profile Description of Walmara District, Finfine SOS Zone, Oromia Ethiopia 2018

Chapter IV: Health Profile Description

4.1 Health Profile Description of Walmara District, Finfine SOS Zone, Oromia, Ethiopia 2018

Abstract

Background: Health profile is a collection, organizing and summarizing, presenting and discussing of health data health related indicators which provide a snapshot of health and wellbeing, pull together existing information in one place. We performed and developed health profile assessment of Walmara district in, Oromia Region.

Methodology: We conducted in the assessment Walmara District, of Oromia Region from February 11th – 29th, 2019 using descriptive cross sectional study having quantitative secondary data of 2017/8 was collected from the district government office using purposely prepared questionnaire. Microsoft Office Excel 2007 was used to analyse the collected data.

Result: Located at Latitude: 8° 54' 59.99" N Longitude: 38° 34' 59.99" and established in 1974. The district has a total of 24 Kebeles, 31 government offices. Based on 2007 census population of rural 109, 842(95%) and Urban 5854 (5%) with 59007 male and 56689 female. The performance of HCT 85.6%, Latrine coverage with HH 67.4%, ANC-162.7%, PNC-1 60.5%, TB Detection 39%, ODF 37.5%, LAFP 35.4%, ANC-4 22% and skilled delivery 17.9%. The annual health budget for health office is ETB 142,791,464.00. Child dependency ratio 0.83, aged dependency ratio 0.10 and the total dependency ratio is 0.93. AURI is the District's public health problem leading by 24% AFI, diarrhoeal and pneumonia is 39.8%.

Conclusion: These leading causes of public health problems are housing conditions, environmental sanitation and personal hygiene and health seeking behaviours. AURI, AFI, Diarrhoea and pneumonia are the top causes of morbidity. Environmental health activities like WaSH, institutional health, housing conditions, latrine utilization lacks attention and not included in main activity reports.

4.1.1 Introduction

In Ethiopia the fourth district health survey (DHS) conducted, following the 2000, 2005, and 2011 Ethiopian district health survey (EDHS), the 2016 EDHS provides valuable information on trends in key demographic and health indicators over time. The information collected through the 2016 EDHS is intended to assist policymakers and program managers in evaluating and designing programmes and strategies for improving the health of the country's population.(1)

Health Profiles provide a snapshot of health and wellbeing for each local authority using a range of charts and text. They pull together existing information in one place and contain data on a range of indicators for local populations. Health Profiles are intended as 'conversation starters' to highlight local issues and priorities for members, and for discussion at Health and Wellbeing Boards. (2)

Health profile is a collection, organizing and summarizing ,presenting and discussing of health data and important health related indicators about the characteristics of community, the health resource within the community, the community's perceptions of health and to describe health and others health related conditions, demographic, socio-economic, political, cultural and others aspect of a particular geographic areas of interest. It is also a process of gathering, analysing and interpreting information from different, multiple and diverse sources in order to develop understanding of the health of a community (3).

Health profile is a vital and basic for prioritizing health and health related problems of the community for planning and appropriate intervention. It is also an essential entry point for community based research for Stakeholders of health and health related issues. Health profile assessment includes both previously identified health concern and those newly identified as well as newly emerging issues.(4) In general Problem Identification and Priority Setting for the community based on public health importance, magnitude, seriousness, community concern, and feasibility of the problems.(4)

Community health profile report includes; historical aspects of the area, geography and climate condition of the area, political and administrative organization, population and population structures, economy, educational status, transportation ways, telecommunication, power supply, disaster status in the area, hygiene and sanitation status, vital statistics and health indicators, status of primary health care components, health facilities coverage and human resource distribution, top cause of morbidity and of mortality in the area as well as a

narrative description of the given community, community strengths and challenges, from both the perspective of the health office and the broader community.(5)

This provides summary health information to support local authority members, officers and community partners to lead for health improvement. It also helps to improve availability and accessibility for health and health related information in country. In general factual information that is compiled as health profile used for decision and policy making and conclusions made about the health status of the district/area based on the findings as well as Action plan and recommendations on how to address the problems identified required resources and timeline of that area or country.

The main sources of data used for this document preparation are from all necessary government and non-government sectors in that district like district administration, Agriculture, Health, Educational, Culture and Tourism, Water Resource and Energy Office, Finance and Economic Development Office, NGO and other related organizations. Data of most annual performance of activities are of the period 2017/18 GC (2010EC).

4.1.2 Objectives

4.1.2.1 General objective

To perform health profile assessment of Walmara district in Finfine Surrounding Oromia Special Zone, Oromia Region, 2019.

4.1.2.2 Specific objectives

- To describe health and health related information of the District
- To assess the health indicators and others health related condition of the District.
- To assess human resources and primary health care coverage of the District

4.1.3 Methods and Materials

4.1.3.1 Study Area and Period

This health profile description was conducted in Walmara District which is one of Finfine Surrounding Oromia Special Zone (FSOSZ) of Oromia Region (Figure 36). All required data of the 2017/18 was collected, analyzed and interpreted from February 11th – 29th, 2019

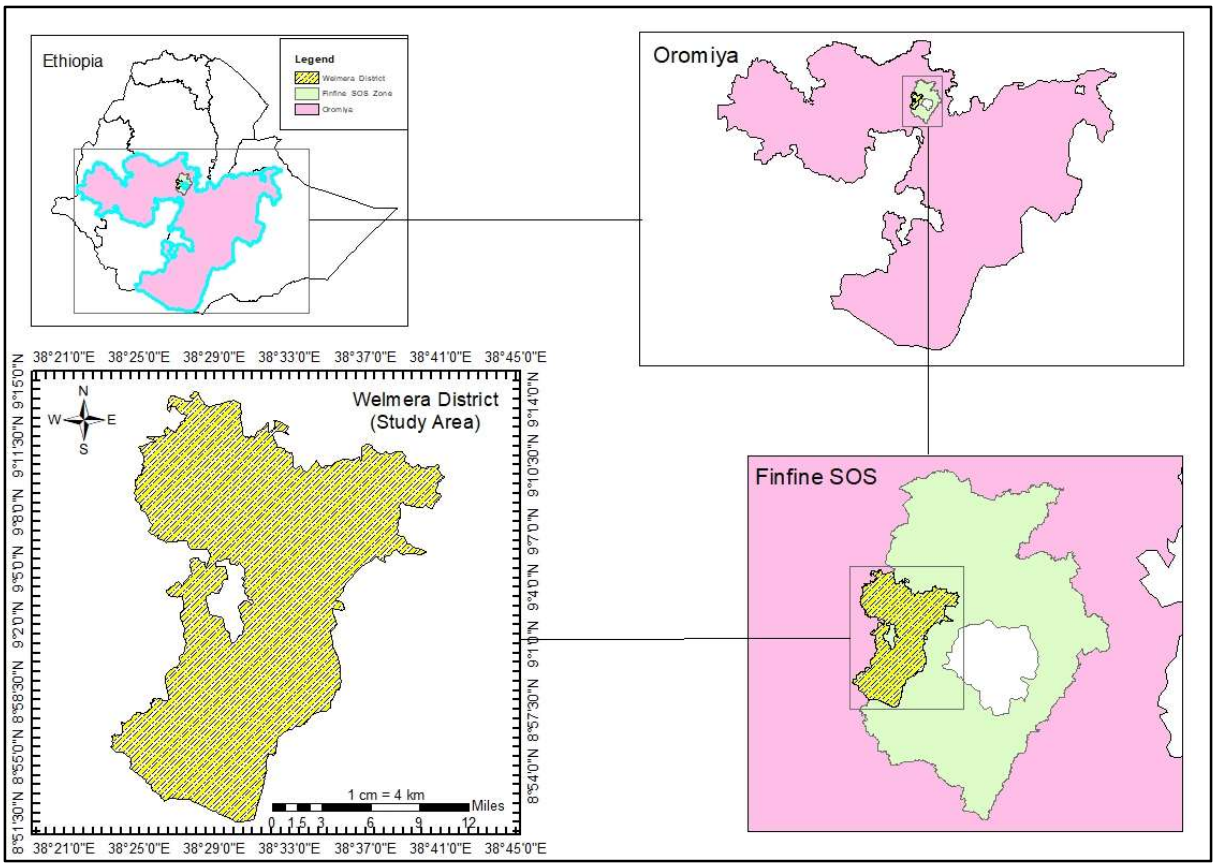

Figure 43 Walmara District (Study Area)

4.1.3.2 Study Design

Descriptive cross-sectional study having quantitative data was used for the assessment.

4.1.3.3 Sample Size and Sampling Technique

For health profile description there is no need of sampling technique and sample size determination. Because the study was conducted on already documented data from different offices to explain District's image for planning and prioritizing by gathering information from different concerned offices report of different sectors at district level.

4.1.3.4 Data Collection Methods

Health and health related data of 2017/18 G.C was collected and analyzed from District Health Office, Health Institution, Education Office, Water & Energy Office, District Administrative Office, Culture & Tourism Office and different literature and publications of the District to incorporate other un available information.

4.1.3.5 Data Analysis Procedures

Collected data from different sources was processed and analyzed by using Microsoft Office Excel 2007 to organize and analyse the data appropriately.

4.1.3.6 Ethical Consideration

Addis Ababa University has already written to the regional health bureau. Based on the data expected to be collected; official letter was written from Oromia Regional Health Bureau PHEM Department to District Health Office. Accordingly the letter was copied to all office and oral consent has made with office that the data was collected.

4.1.3.7 Dissemination of the Result

After the final report has compiled the result was disseminated to the Regional Health Bureau PHEM Department, FSOS Zonal Health Office, Walmara District Administration, Walmara District Health Office and the related stockholders in order to implementation and follow up of recommendations.

4.1.4 Results

4.1.4.1 Historical Background

According to the District Culture and Tourism name "Walmara" comes from Afan Oromo which means curvature or over round land and historically the name was related to forest found in Walmara Choke kebele which is green and attractive and serves as local recreation area for youngsters come together with their friends. The District was established as district administration in 1974.

4.1.4.2 Geographical Location and Climate

Walmara is one of districts found in Finfine Surrounding Oromia Special Zone, Oromia Region, of Ethiopia. Walmara is located at 29 KM far from Addis Ababa to West direction on the main road to Ambo. The boundaries are on the North by Mulo District, on the northeast by the Sululta District, on the south by the Sebeta Hawas District, on the East by Burayu City Administration and on the West by East Shewa Zone. Holeta town is its capital and which is separated from district by administration and serves home town for district's administrative office. Menagesha Kolobo is the other town located in this District.

Most of the areas of the District are high lands (Dega) and mid highlands (Weyna Dega) with an altitude above sea level ranges from 2060 to 3380 m. The area has bimodal rainfall pattern. One is a “belg” rainfall season (usually from December to April) and the other is a summer season (meher) which covers months from June to September accounting more than 80% of the annual rainfall. The average, maximum and minimum annual temperature of the area is 24, 27, and0.1°C, respectively. Specifically the District is located at Latitude: 8° 54' 59.99" N Longitude: 38° 34' 59.99". The highest point in Walmara is Mount Wechacha with

3191 meters, located in the southern part of the District. The Menagesha National Forest covers the southern and western slopes of this mountain; it is 2500 hectares in size. Other notable peaks include Mount Menagesha (between 2800 and 2900 meters).

4.1.4.3 Government and Administrative Structure

The District has a total of 24 Kebeles, with 23 rural and 1 towns which is the smallest government administrative unit. The district has 31 government offices at district level. Other organizations like banks are found in this District. Politically the district is now governed by the governing party ODP/EPRDF and the community has high influence in shaping the country's politics allied with Ambo and other nearby districts like Ejere and Ginchi of West Shewa Zone.

Table 25: Total Population by Kebele in Walmara, FSOSZ, Oromia, Ethiopia, 2019

Name of Kebeles	Total Population			Total HH (T.P/4.8)	<1 years (3.1%)	<5 years (16.4%)	<15 years (48%)	>65 years (4.47%)	WCBA (22.1%)
	Male	Female	Total						
Barfata 1st	2467	2370	4837	1008	150	793	2322	229	1069
D/Laafto	1620	1556	3176	662	98	521	1524	151	702
F/T/Rada	2372	2279	4651	969	144	763	2232	220	1028
G/Seda	2114	2031	4145	864	128	680	1990	196	916
G/Kamisa	2914	2799	5713	1190	177	937	2742	271	1263
G/Liban	3280	3151	6431	1340	199	1055	3087	305	1421
N/Suba	3190	3065	6255	1303	194	1026	3002	296	1382
N/Karsa	3214	3087	6301	1313	195	1033	3024	299	1393
T/W/Dalacha	2434	2339	4773	994	148	783	2291	226	1055
W/Harbu	1488	1430	2918	608	90	479	1401	138	645
Barfata 2nd	2941	2825	5766	1201	179	946	2768	273	1274
Wachacha	1410	1355	2765	576	86	453	1327	131	611
W/Choqe	2354	2261	4615	961	143	757	2215	219	1020
M/Kolobo	2986	2868	5854	1220	181	960	2810	277	1294
B/Q/Odo	1673	1608	3281	684	102	538	1575	156	725
Dufa	1563	1502	3065	639	95	503	1471	145	677
B/G/Robi	2858	2746	5604	1168	174	919	2690	266	1238
Talacho	2098	2015	4113	857	128	675	1974	195	909
Ula Foata	2208	2121	4329	902	134	710	2078	205	957
U/Sillasie	1421	1366	2787	581	86	457	1338	132	616
A/S/Qotu	3548	3408	6956	1449	216	1141	3339	330	1537
H/Boki	2923	2809	5732	1194	178	940	2751	272	1267
S/Hawaso	2671	2566	5237	1091	162	859	2514	248	1157
W/Minjaro	3260	3132	6392	1332	198	1048	3068	303	1413
Total	**59007**	**56689**	**115696**	**24106**	**3587**	**18974**	**55534**	**5484**	**25569**

In addition to above tabulate other mandatory administrative data includes; Children between 6 to 59 months are 17355, between 24 to 59 months are 11571, pregnant women are 4014, non-pregnant women are 21832 and lactating mothers are 3721 (6).

4.1.4.4 Demographic Information

The sex ratio of Male to Female in this District is 1.04:1 which means for every 100 female there is 104 male in the District. Walmara District has a population of rural 109, 842(95%) and Urban 5854 (5%).The ratio of rural to urban population is 18.8:1. Based on 2007 census religious composition of the inhabitants said they practiced Ethiopian Orthodox Christianity, with 86.72% of the population reporting they observed this belief, while 6.36% of the population practiced traditional beliefs, and 4.61% were Protestant.

The distribution of age group from which the District's population pyramid derived is shown in table 17. The child dependency ratio in this district is 0.83, aged dependency is 0.10 and total dependency ratio of tis district is 0.93.

Table 26: Population by age category, Walmara, FSOSZ, Oromia, Ethiopia February, 2019

Age group in years	Number of population			% by age group	Cumulative % by age group
	Male	Female	Total		
0 - 4	8,463	8,006	16,469	14.2	14.2
5 - 9	8,835	8,386	17,221	14.9	29.1
10 - 14	8,603	7,676	16,279	14.1	43.2
15 - 19	6,759	6,264	13,023	11.3	54.4
20 - 24	5,205	5,180	10,385	9.0	63.4
25 - 29	4,122	4,362	8,483	7.3	70.8
30 - 34	3,352	3,059	6,411	5.5	76.3
35 - 39	2,551	2,978	5,529	4.8	81.1
40 - 44	2,250	2,183	4,433	3.8	84.9
45 - 49	1,724	1,799	3,523	3.0	88.0
50 - 54	1,520	1,868	3,388	2.9	90.9
55 - 59	1,132	1,084	2,215	1.9	92.8
60 - 64	1,244	1,233	2,477	2.1	94.9
65 - 69	1,070	848	1,919	1.7	96.6
70 - 74	803	849	1,652	1.4	98.0
75 - 79	567	356	924	0.8	98.8
80 - 84	480	316	796	0.7	99.5
85 - 89	169	92	261	0.2	99.7
90 - 94	103	94	197	0.2	99.9
95+	53	58	111	0.1	100.0
Total	**59,005**	**56,691**	**115,696**	**100.0**	

As the population pyramid shows (Figure 37) the population of this District is similar with that of low income countries with wider bottom (younger age) and narrow and sharp top (old age) population. The pyramid also shows that there is high death of younger age groups than aged groups.

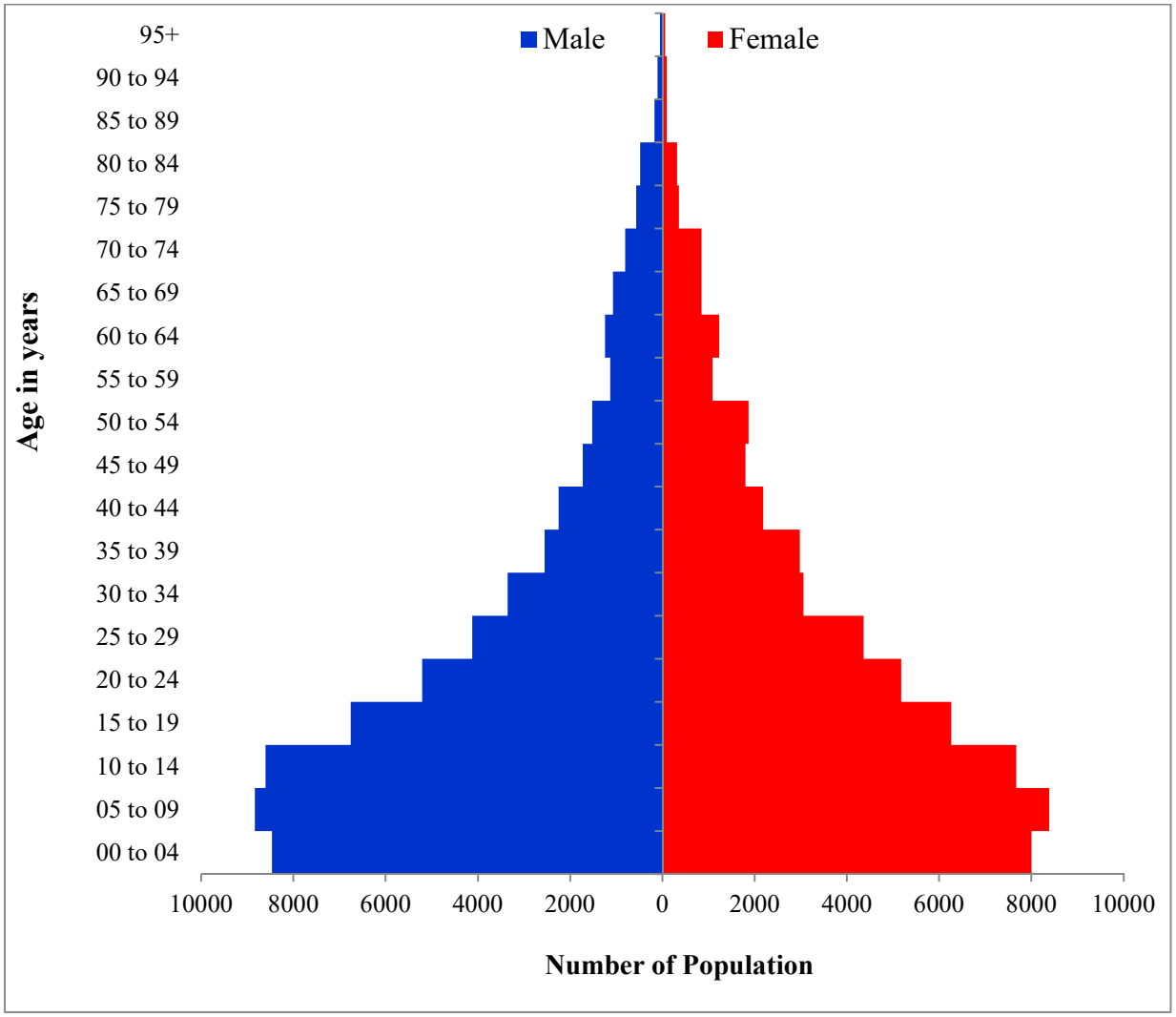

Figure 44: Population Pyramid of Walmara, FSOSZ, Oromia, Ethiopia, 2019

4.1.4.5 Economy

The major crops in the farming system are wheat, teff, barley, and faba bean. Most farmers had two plots for wheat, teff, and barley and only one plot for pulses. All farmers own cattle, which are kept mainly for draft power (land preparation and threshing) and sold during crop failures to meet immediate cash needs (7). Crop-livestock mixed farming is a typical agriculture practice in the area. Livestock production consists of cattle, sheep, goats, equines and poultry. Cattle are kept for dairy and meat. Dairy farm is carried out in the area both in large-scale dairy production system for commercial purpose and in smallholder farming

system (8).Most of the smallholder dairy farms keep indigenous breeds although some farmers use crossbreds of Boran-Friesian cows, while commercial dairy farms use exotic and crossbred dairy cows (8).

Floriculture is the other source of income for the country manufactured in this District. The cultivation of flower has negative impact on the dwellers by polluting environment (soil & water), as well as by direct and indirect health impact on workers and dwellers, also economic impact on the surrounding farmers. According to Oromia Regional Health Bureau Afri-flower is one of floriculture found in this district which harms the health of employees and polluting the environment in 2017. (9)

As data from District's Custom and Revenue Authority shows the trend of annual income of Walmara is slightly increasing from 2013/14 – 2017/18. As graph shows in the countries birr there is a difference if increment of Birr 28,392, 892 between 1st and 5th year. When the Eth Birr is change to US $ the increment is only 821,745 (Figure 45).

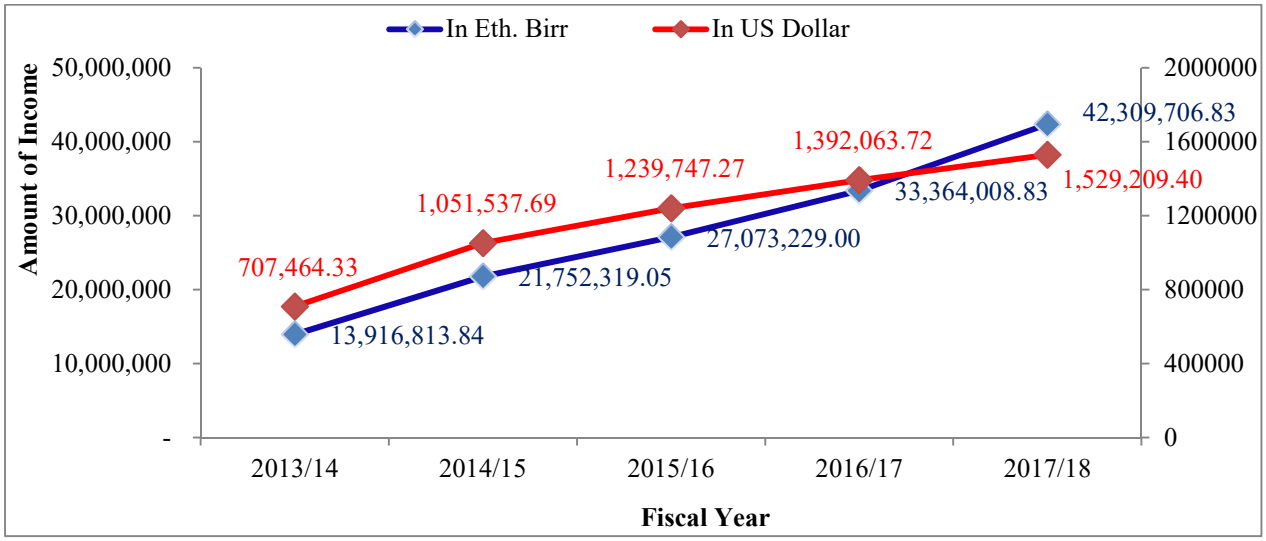

Figure 45: Trend of 5 years annual income of Walmara, Oromia, Ethiopia, 2019

Based on four years data from District's Finance and Economic development the proclaimed running cost of annual budget and share of health sector is shown in Figure 3. The data does not include additional budget which is shared in quarters or any other time. In gross; the graph indicates that there is an increment of percentage of sharing budget for health sector from 8.9 % of 2014/15 to 14.7% of 2018/19 of the total proclaimed running cost (Figure 46).

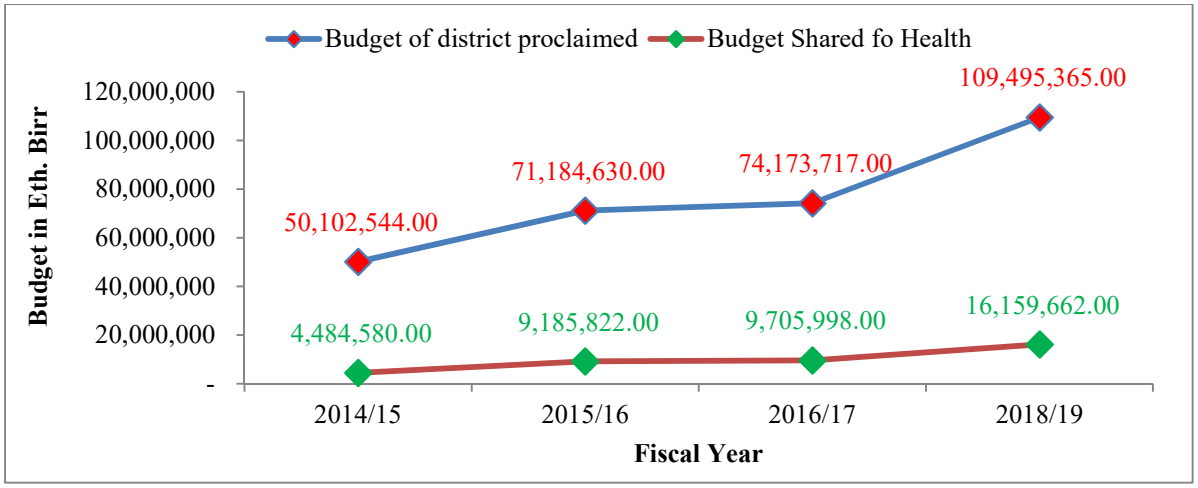

Figure 46: Budget proclaimed and health sector share in Walmara, Oromia, Ethiopia

4.1.4.6 Education

Based on the information from Walmara District Education Office; there are total of 54 formal educational institutions; of these 7 kindergartens, 43 are primary and 4 are secondary schools. There are 10425 male, 8825 female and 19250 total students in the District. The cumulative students per teacher ratio are 37. The detail number and sex of teachers and students are summarized in table 27.

Table 27: Teachers & students in Walmara, Oromia, Ethiopia February, 2019

Categories			Type of Schools					Total
			KG	1 to 4	5 to 8	9 to 10	11 to 12	
Total # of schools			7	10	33	3	1	54
Number of teachers	≤ grade 12	M	5	0	0	0	0	5
		F	27	0	0	0	0	27
	TTI	M	2	2	2	0	0	6
		F	5	4	1	0	0	10
	Diploma	M	5	56	97	0	2	160
		F	8	101	66	0	0	175
	1st Degree	M	0	11	39	37	9	96
		F	0	5	24	9	1	39
	2nd Degree	M	0	0	0	0	3	3
		F	0	0	0	0	0	0
	Total	M	12	69	138	37	14	270
		F	40	110	91	9	1	251
	Total # of Teachers		52	179	229	46	15	521
Number of students		M	392	6262	3213	474	84	10425
		F	443	5286	2645	382	69	8825
		Total	835	11548	5858	856	153	19250
Teacher per Students			16	65	26	19	10	37

The data of teacher from District's Education Office shows 64.3% of teachers are Diploma, 23.9% are first degree, 6.2% are <grade 12, 3.1% are certificate (TTI) and the remain 0.6% are male 2nd degree level (Figure 47).

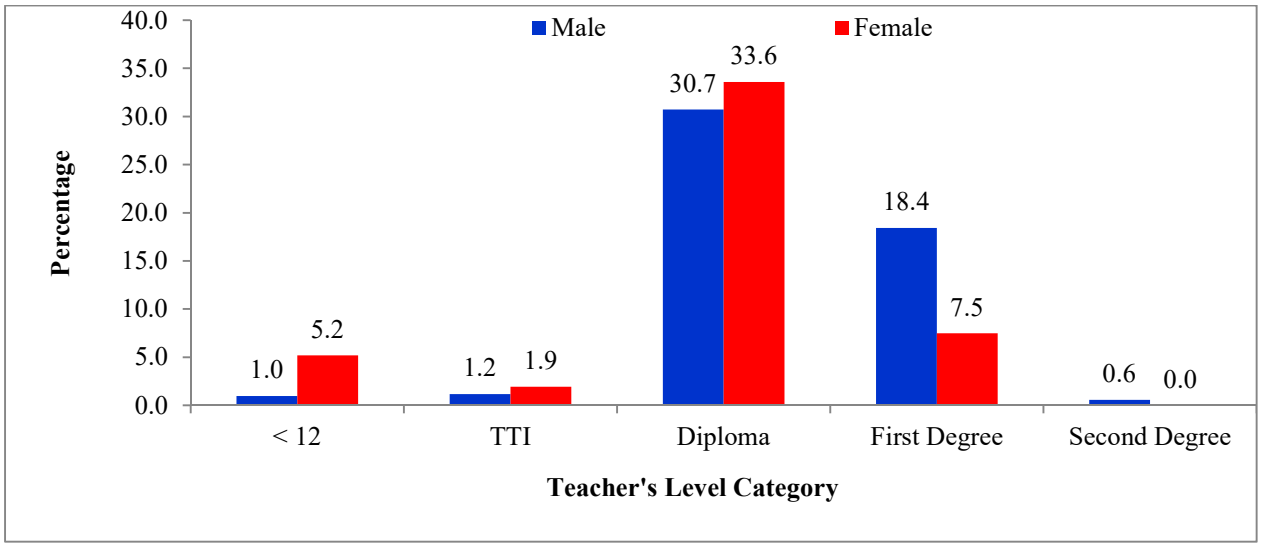

Figure 47: Teachers level of education in Walmara, Oromia, Ethiopia February 2019

The graph in Figure 5 shows that most female teachers (76.9%) are teaching KG level and most male teachers (83.6) are teaching at High Schools level (Figure 48).

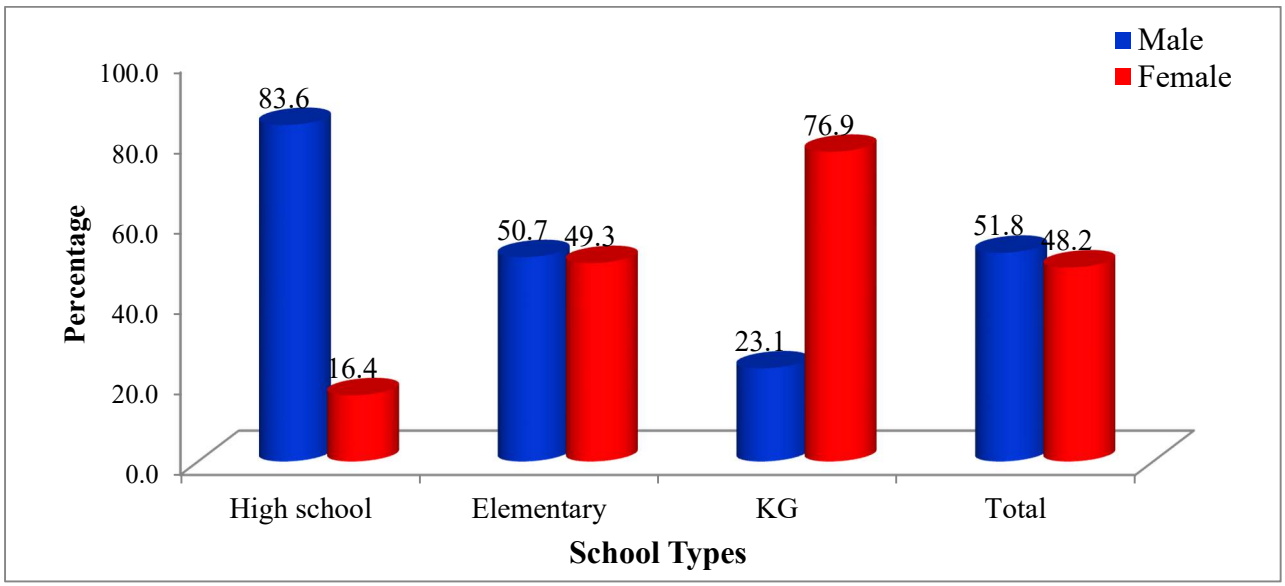

Figure 48: Teachers employment in Walmara, Oromia, Ethiopia February, 2019

Regarding the enrolment of students of all school age students 44.7% of them are not enrolled to school and of those enrolled 55.3% 9.1 of them are dropped out from their learning. The dropouts of female 14.2% are more than that of Male 4.5% (Table 28).

Table 28: School age, enrolment & drop out students in Walmara, Ethiopia 2019

Sex	Total School Age Children	Total enrolled to school		Drop Out from enrolled	
		Number	%	Number	%
Male	17070	10033	58.8	493	4.9
Female	16223	8382	51.7	1190	14.2
Total	33293	18415	55.3	1683	9.1

4.1.4.7 Transport

Walmara has accessibility to main road from Addis Ababa to Western part of the country. All weather road of the District is 264.25 KM road serves 21 Kebeles and dry weather 176 KM serves for 3 Kebele. There is no any Kebele without access to any weather road. (Source: District Transport office)

4.1.4.8 Telecommunication

Even though the interruptions of connection problem occur; all 24 Kebeles of the district are accessible to mobile telephone connection. Data for mobile telephone users in this District is not specifically accessible, because Holota town dwellers are included under the district for the sake of geographical location.

4.1.4.9 Power Supply

According to information from District Water and Energy Resource 10,545 HH (43.7%) of the district's HHs have access to safe drinking water sources. In addition to hydroelectric power there are solar, generators and gravity force power supply for different water source (spring, well) development. In addition to this the power supplies are used for domestic purposes.

4.1.4.10 Disaster Status in the area

Disease outbreak: There has been report of cases with chemical intoxication in floriculture in 2017 and admitted to hospital. That is due to exposure to suffocated (poorly ventilated) room with spray of high dose hypochlorite solution and other preservative chemicals sprayed on flowers for preservation. The problem results in no death and all cases cured after admission. The floriculture has been stopped working for one month until it takes corrective actions for incompliance.

4.1.4.11 Vital Statistics and Health Indicators

There is no data accessible for number of still birth, infant Mortality, child mortality, maternal death and registration on any mortality. According to administrative report of

Walmara DHO; the performance of HCT 85.6%, Latrine coverage with HH 67.4%, ANC-162.7%, PNC-1 60.5%, TB Detection 39%, ODF Kebele 37.5%, LAFP 35.4%, Malaria detection 34.7%, ANC-4 22% and skilled delivery 17.9% (Figure 49).

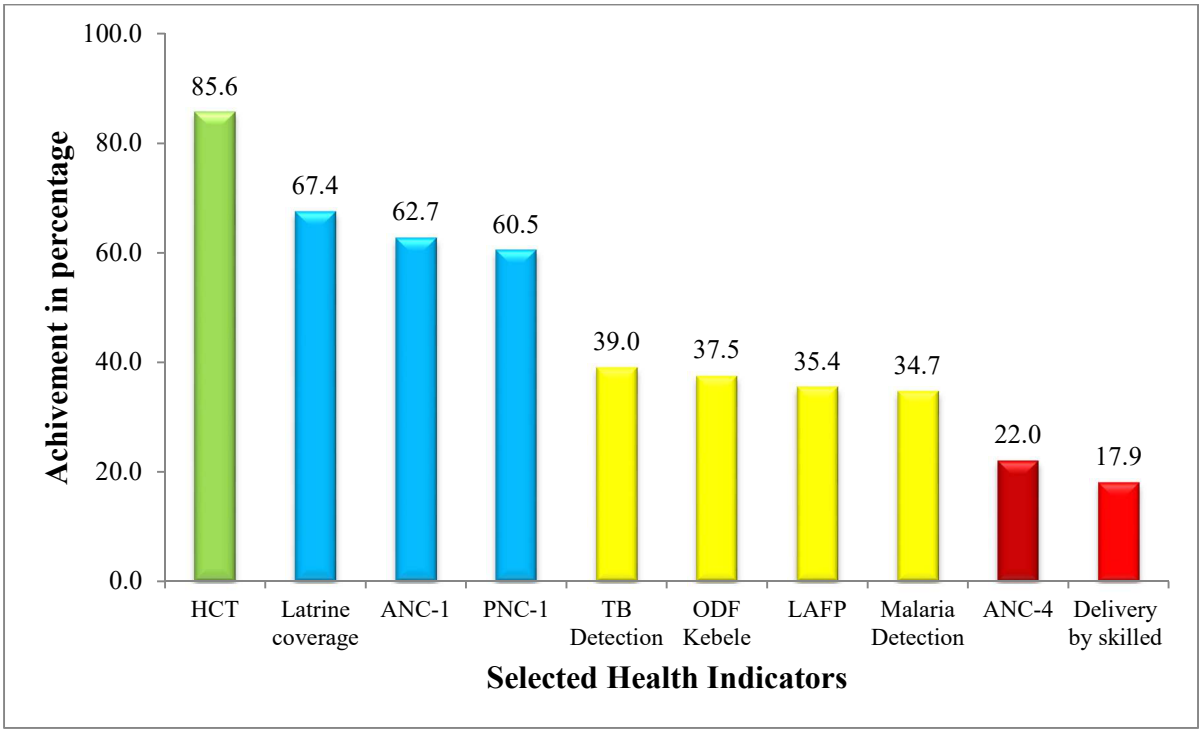

Figure 49 Health indicator of 2017/18 in Walmara, Oromia, Ethiopia February 2019

Contraceptive Prevalence Rate

The Percent of WCBA who are using (or whose partner is using) a contraceptive method at a particular point in time, almost always reported for women married or in sexual union. Generally, the measure includes all contraceptive methods (modern and traditional), but it may include modern methods only. The indicator is calculated as follows: (10)

$$Contraceptive\ prevalence\ rate = \frac{\#\ \text{of women 15–4 using a contraceptive method}}{(\text{total \# of women 15–4})} \text{x } 100$$

$$Contraceptive\ prevalence\ rate = \frac{21{,}992}{24{,}976} \text{X} 100$$

$$Contraceptive\ prevalence\ rate = \underline{\underline{\mathbf{88\%}}}$$

4.1.4.12 Health Services

A. Health Service Coverage

There are 29 governmental and 8 private health institutions in Walmara District. The coverage of Health Center by total population of the District is 86.4%. The District has no any hospital and this is one problem for the district to give proper health service for the community.

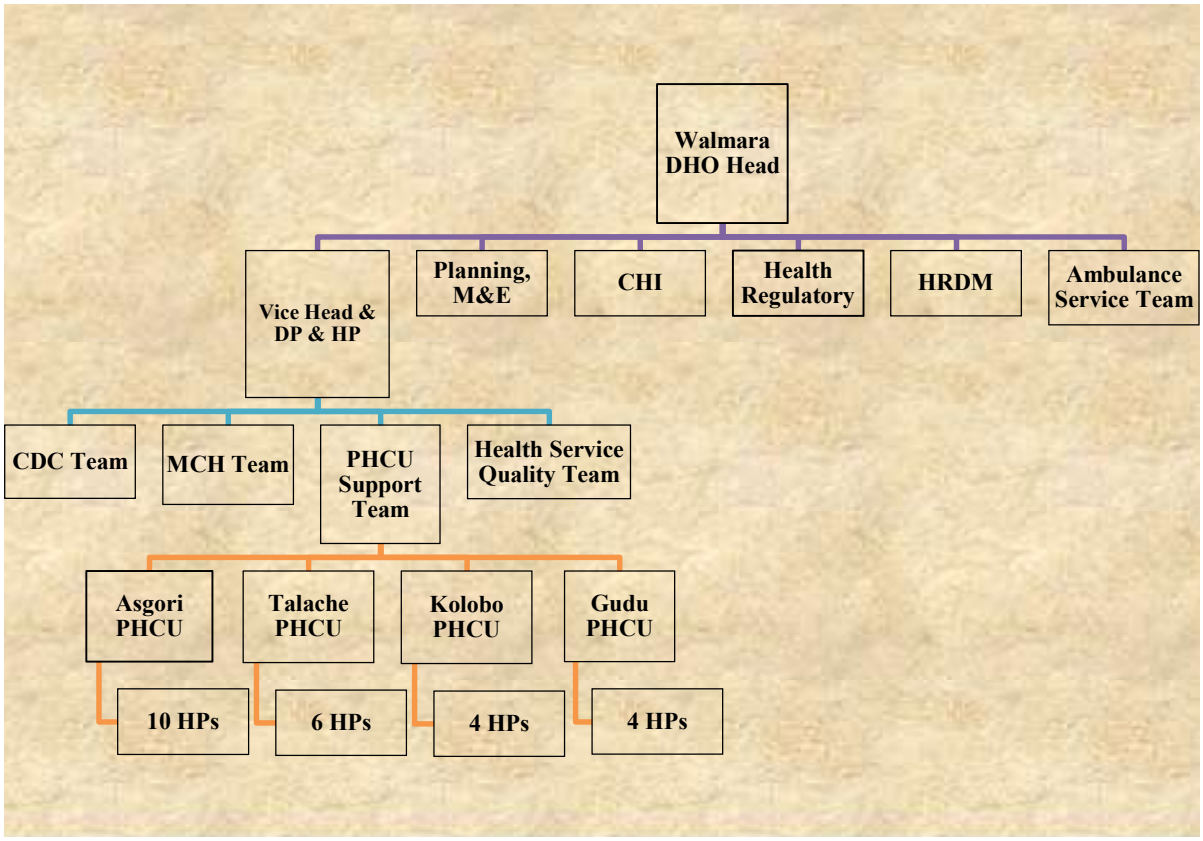

Figure 50: Administrative Structure of Walmara Health Office, Oromia, Ethiopia 2019

Walmara district has a total 44 male, 89 female health workers; as well as 22 male and 20 female supportive staffs. These health professionals and supportive staffs were distributed in different government heath institutions (Table 29).

Table 29: Health Facility & their Human Resource in Walmara, Oromia, Ethiopia 2019

Type of Health Institution	# of Health Institution	Health Facility to Population Ratio	Number of Workers		
			Required	Available	%
District Health office	1	1 : 115696	51	30	58.8
Health Centers	4	1: 28924	252	74	29.4
Health Posts	24	1 : 4821	48	53	100
Medium Clinics (Private)	1	1: 115696	5	4	80. 0
Primary Clinics (Private)	6	1: 19283	18	12	66.7
Drug store (Private)	1	1: 115696	2	2	100

Table 30: Health Professionals Ratio in Walmara, Oromia, Ethiopia February 2019

Type of Health professionals	# of Available Health Professionals	Professional to Population Ratio
General MPH	1	1 : 155696
Health officer	17	1 : 9159
All Nurses	28	1 : 5561
Midwife	7	1 : 22242
Laboratory	7	1 : 22242
Environmental Health	3	1 : 51899
Pharmacist/Druggist	5	1 : 31139
Health E & Promotion	2	1 : 77848
Town Health Ex workers	2	1 : 77848
Health Extension Workers	51	1 : 3053

B. Top Causes of Morbidity, Admission, and Mortality

The report from DHO shows that the three quarter (July 1st, 2017 to March, 2018) ten top causes of morbidity in the district are shown in table 8. In 4th quarter of 2010 E.C District health officials complain that the reports of ten top causes are excluded from regular HMIS report by order of higher officials; So that there is no data starting from March, 2018 forwards. Regarding causes of admission there is no report of cases due to absence of hospital in the district as well as no registration and report of causes of mortality.

Table 31: Ten top causes of Morbidity in 3 Qs of 2017/18 of Walmara, Oromia, Ethiopia 2019

Name of disease	# of cases	%
Acute upper respiratory infections	860	23.98
Acute febrile Illness (AFI)	584	16.29
Diarrhea (non-bloody)	434	12.10
Pneumonia	408	11.38
Trauma (injury, fracture, etc.)	311	8.67
Infections of skin and subcutaneous tissue	266	7.42
Dyspepsia	230	6.41
Urinary tract infection	222	6.19
Helminthiasis	151	4.21
Diseases of musculoskeletal system and connective tissues	120	3.35
Total cases	**3586**	**100**

As the data shows the AURI is the leading cause of morbidity for the quarter in Walmara District. Based on the three quarter report of cause of morbidity we may get hint for preparation of plan for prevention and curative services to be provided. The scarce of data for causes of morbidity, admission and mortality are challenging to prioritize intervention proposal related to tackle the causes.

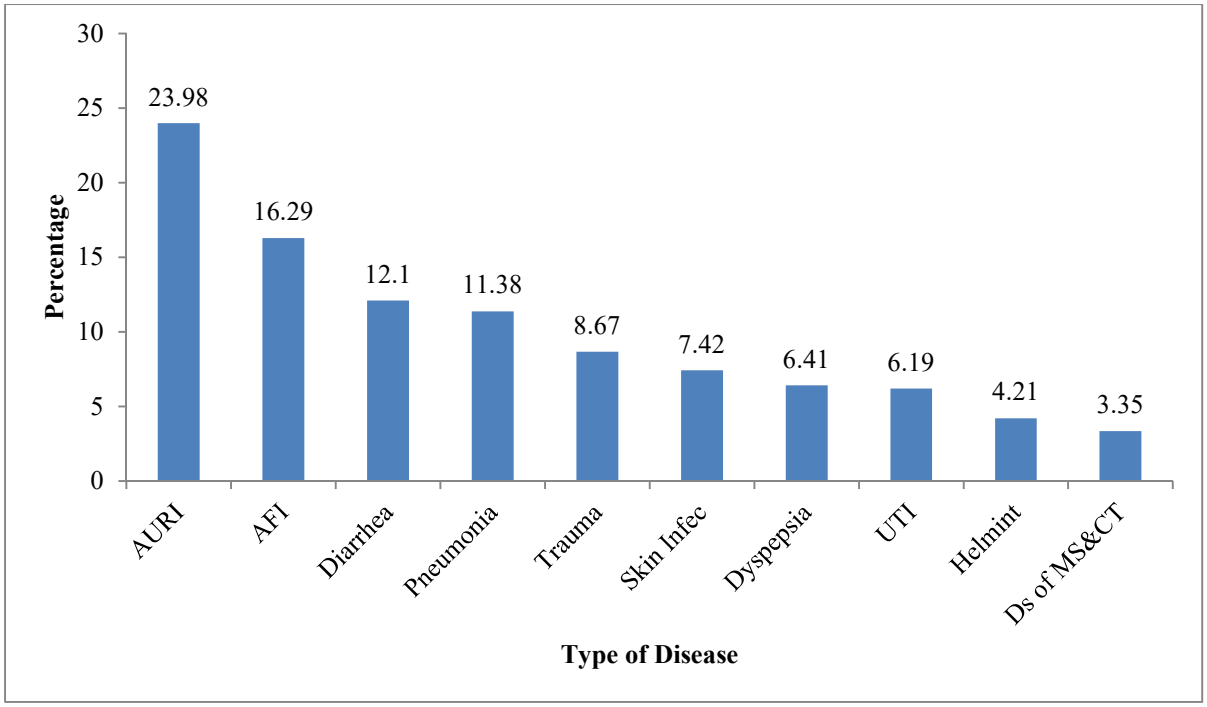

Figure 51: Top 10 morbidity 3 Q of 2017/18 in Walmara, Oromia, Ethiopia February, 2019

C. Annual Health Budget

The 2018/19 GC annual health budget breakdown has prepared for district health office and each health facility. This budget includes all running costs and salary of all health workers as well as supportive staffs.

Health Institution	Budget In ETB	Catchment population
District Health office	6,694,523.00	**115,697**
All 24 Health Posts	3,722,515.00	**115,697**
Asgori Primary Health Care Unit	17,768,616.00	49,200
Kolobo Primary Health Care Unit	83,038,072.00	19,000
Talache Primary Health Care Unit	15,783,869.00	23,179
Gudu Primary Health Care Unit	15,783,869.00	24,318
Total	**142,791,464.00**	**115,697**

4.1.4.13 Services Provided by Community Health Workers

There is no documented report or data on work of traditional birth attendants and community health worker. Health extension workers are experienced to implement the health extension program activities by immediate supportive supervision of respective health centre and DHO. The program at rural level includes 4 basic packages with 16 program areas (Table 32).

Table 32: Health Extension Programs Accomplished by Health Extension Workers

Hygiene and Environmental Sanitation	Family Health Services	Disease Control & Prevention	HE & communication
Proper Excreta Disposal	MCH	HIV/AIDS	Cross Cutting program at all program areas
S and L Waste Management	Family Planning	Tuberculosis	
Water Supply Measures	Immunization	Malaria	
Food Hygiene and safety	Adolescent RH	First Aid	
Health Home Environment	Nutrition		
Arthropod & Rodent Control			
Personal Hygiene			

Note: The detail activities of health extension workers on each program are monthly and quarterly reported to their respective supervising health centre.

4.1.4.14 Status of Primary Health Care Components

A. Mother and Child Health Services

As table 9 shows the least achievement of MCH service in Walmara District is skilled delivery with 18% and maximum is ANC-1 with 63%. All forms of FP were reported as 105% achievement and this over achievement needs additional investigation of planning and reporting trustfulness rather than taking as strength. Because other related services are much less than this achievement.

Table 33: Performance of 2017/18 MCH Services in Walmara, Oromia, Ethiopia 2019

S.N	List of Health Care Components		Target/Plan	Achieved	%
1	ANC-1		3912	2452	63
2	ANC-4		3912	861	22
3	Delivery	Skilled	3912	702	18
		By HEW		*ND*	*ND*
		By TBA		*ND*	*ND*
4	PNC-1		3,912	2,365	60
5	FP	LAFP	10,514	3,725	35
		All forms	21,025	21,992	105
6	PMTCT		3,912	1998	51

ND = No data

B. Expanded Program on Immunization (EPI) Services

Kolobo and Talacho PHCU achieved all immunization services above their target. As a district the achievement of immunization services are 91% Measles, 91% fully vaccinated, 96% BCG, 100% Penta-3 and PCV-3, 104% Penta-1 and PCV-1 and 105% Rota-1 (Figure 52 & 53).

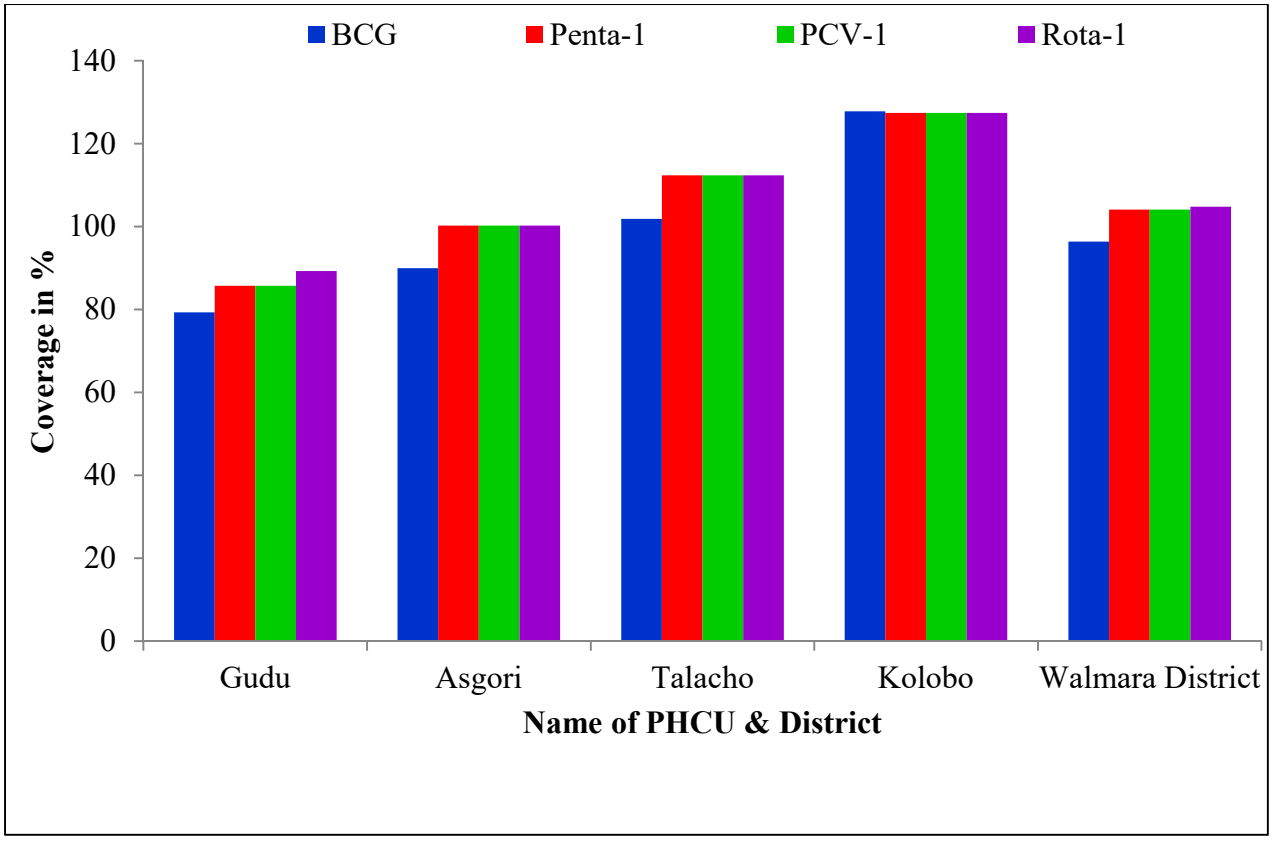

Figure 52: Immunization Coverage of 2017/18 in Walmara, FSOSZ, Oromia, Ethiopia

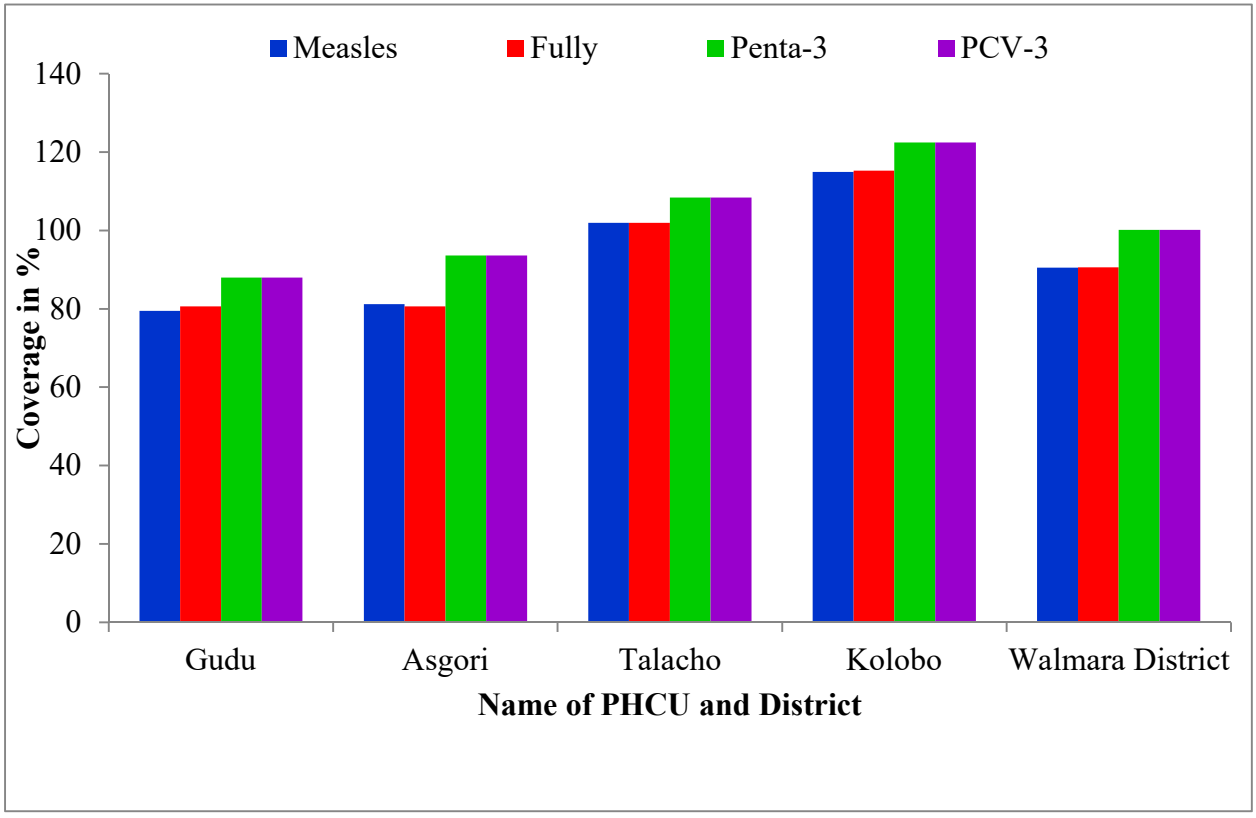

Figure 53: Immunization coverage of 2017/18 in Walmara, Oromia Ethiopia 2019

C. Environmental Health

Among all 16 programs of rural health extension program 7(43.75%) are package of environmental health activities. These programs contribute basic improvement of public health promotion. Some objectively selected measurable achievement of environmental health activities compiled at district level given in Table 34.

Table 34: Environmental Health Activity of 2017/18 in Walmara, Oromia, Ethiopia

S.N	List of Health Care Components	Target/Plan	Achieved	%
1	Households access to any latrine	23512	22170	77
2	Households access to standard latrine	23512	15853	67
3	Open defecation free kebeles	24	9	38

D. Health Education

Health education is a cross cutting issue in all programs of health service delivery system. The District also uses information, communication and education (IEC) as well as behavioural change communication (BCC) as a key for providing all program specially on those programs related to the community. Even though the District has no separate report and structure at district level all work processes and teams uses health education as a tool to provide the services.

E. Endemic diseases

Malaria

The incidence of all type of malaria is 40 per 10,000 in 2017/18 GC (51 confirmed cases of malaria from populations at risk); which is from 6 malarias Kebeles of the District having 4,842 HHs to be sprayed by anti-malaria chemicals and total population of 12,760 to be served. All 100% HHs and target population are sprayed and served respectively. A total of 16,500 ITNs are distributed in the respective Kebeles.

TB/Leprosy

In the District of 14740 TB suspected OPD attendants 102 presumptive TB Cases were identified. There is no any case of leprosy in Walmara. Detail status of cases and treatment of TB cases are summarized in Tables 35 and 36.

Table 35: Screened & Rx in 2017/18 of Walmara, Oromia, Ethiopia

PHCU Name	New Cases				Re-Treatment case				Other	All Forms of TB
	P.Pos	P.Neg	EP	Total	Defaulter	Failure	Relapse	Total		
Talacho	5	4	1	10	0	0	1	1	0	11
Kolobo	7	3	6	16	0	0	1	1	0	17
Gudu	4	8	7	19	0	0	0	0	0	19
Asgori	15	6	12	33	0	0	2	2	0	35
TOTAL	31	20	26	78	0	0	2	4	0	82

Table 36: New TB Rx Outcome in 2017/18 of Walmara, Oromia, Ethiopia

Type of TB	Total Cases	Cured	Completed	Defaulter	%	Relapse	%	Dead	%	Failure	%	Transfer Out	%	CR %	TSR %
P.Pose	21	18	1	0	87	0	0	2	10	0	0	0	0	86	91
P.Neg	25	0	25	0	89	0	0	0	11	0	0	0	0		100
EPTB	26	0	25	0	93	0	0	1	3.9	0	0	0	0		97
Total	72	18	51	0	90	0	0	3	4	0	0	0	0	0	91

Nutrition

237 pregnant women were screened for malnutrition at health facility level and the District has no community based nutrition (CBN) program.

Essential Drugs

The district has used 49% (ETB 501,982) of health care financing income generation to purchase essential drugs in addition to shared annual health sector budget and distribution of donation drugs.

4.1.5 Discussion

The sex ratio of Male to Female in this District is 1.04:1 which means for every 100 female there is 104 male in the District. This shows the sex ratio of the district is similar with that of the regional sex ratio which is 1.01 (1). The ratio of rural to urban population is 18.8:1 which is greater than that of the region's 7.4:1. (1) The reason for much difference from the region may be due to separation of Holota town from the district which is the centre and giving different services for surrounding Walmara's rural dwellers.

Based on projected data from CSA 2007 census; child dependency ratio contributes great value for the total dependency ratio of the District, which is 0.83 and 65+ year dependency ratio is 0.10 and the total dependency ratio of the district is 0.93.

Acute upper respiratory infection (AURI) is the District's public health problem leading by 24% (of the total diseases reported at outpatient visited. AFI, diarrhoea and pneumonia are other 39.8% next contributors for ten top diseases in the District. These leading causes of public health problems are preventable when if activities related to housing conditions, environmental sanitation and personal hygiene and health seeking behaviours are practiced in the community. This indicates us special attention could be given to strengthen the primary health care services to protect the community from related health hazards.

Diarrhoea and helmenthiasis are the good indicators for poor environmental sanitation and other lack of sanitation facilities observed in the top ten causes of morbidity. These causes proof that the sanitation coverage and ODF villages and Kebeles (38%) having relation with activities apart from the expected goal and pointing attention toward sanitation and hygiene activities. There are good opportunities like District Transformation Agenda and high commitment of donors for WaSH activities to improve the problem indicated in top causes of morbidity.

Absence of accurate and timely data for cases of admission leads to poor planning of activities which solve public health problems. If there is no data on causes of admission it is not only difficult to forecast preparing strategies for prevention and control but also to provide services and logistics to overcome public health problems. The scenario holds true for improper registration and reporting of causes of mortality in the district.

Other area that needs special attention in Walmara District is achievement of skilled delivery with only 702 (18%) of targeted service, women who attended delivery by skilled professional. This achievement contradicts to the countries sustainable development plan targeted to decrease MMR and IMR planned in HSTP (4).

When we compare the District immunization coverage measles 91% and fully vaccination 91% is higher than that of the regional and country coverage. Immunization activities in this District are the best achievement and expected to keep up for better public health improvement. Based on this achievement vaccine preventable diseases are expected to be minimal. To compare the prevalence of vaccine preventable diseases with coverage of immunization, there is no specific data for top causes morbidity, admission and mortality of U5 children.

4.1.6 Limitations

- Lack of voluntariness to avail health related data from some district sectors;
- Absence of causes of admission and mortality of health problems at health facility and office;
- Incompleteness and inconsistency of some primary health care services;

4.1.7 Conclusion

AURI, AFI, Diarrhoea and pneumonia are the top causes of morbidity in Walmara District in 2017/18 Ethiopian fiscal year. Additional other ten top diseases of this District are related to environmental and behavioural health problems which can be managed by thorough planning, implementation, monitoring and evaluation of related activities.

Activities performed under MCH service skilled delivery, ANC-4, PMTCT, PNC within 24 hours etc… needs special attention due to their sensitiveness and below the coverage of region and country level.

Environmental health activities like WaSH activities, institutional health and housing conditions, latrine utilization lacks attention and not included in main activity reports. Even the reported activities (Latrine coverage and ODF Kebeles) are below 70% achievement.

4.1.8 Recommendation

- The population of this District is > 100,000 without any level of hospital; so that FMoH, RHB and other stockholders should plan to construct hospital for Walmara District to deliver expected health care service.
- The regional health bureau and zonal health office should give clear guidance to DHO on activities to be included in planning, implementation, monitoring and evaluation of basic primary health care services.
- The DHO should compile, register, report and document all health and health related vital statistics, top causes of morbidity, admission and mortality by population category and age group.
- Starting from regional health bureau to community level; each higher level officials and professionals should give objectively and routinely organized supportive supervision to their subordinates.

- The DHO and PHCUs should revise and take corrective measures by incorporating mandatory services to their annual plan targeting to implement primary health care service.
- PHCUs and DHO should identifying unplanned and least performed activities (health education, environmental health activities, mother and child health care, communicable diseases prevention and control, non-communicable diseases prevention and control) and preparing action plan to incorporate and improve performance respectively.

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Chapter V

Scientific Manuscript for Peer Reviewed Journals

5.1 Outbreak investigation of Visceral Leishmaniasis in Borena Zone, Oromia Region, Ethiopia November 2019: Case Control study

5.2 Description of COVID-19 Outbreak Investigation in Oromia Region, Ethiopia, September 2020: Descriptive study

Chapter V: Scientific Manuscript for Peer Reviewed Journals

(Formatted based on guideline of PLOS ONE journal)

5.1 Outbreak investigation of Visceral Leishmaniasis in Borena Zone, Oromia Region, Ethiopia, November 2019: A Case Control study

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Abstract

Visceral Leishmaniasis (VL) is caused by *Leishmania* parasites that infect mammals transmitted by *Phlebotomine* and mostly affects the poorest. VL distributed worldwide and prevalent in Ethiopia. Knowing the occurrence and risk factor is a remedy for control. The aim of study was to identify factors associated with VL. Case control study was used during October-November 2019 in Borena. A 1:2 Cases and controls were identified by case definition and 33 cases were included in the study. Participants >18years interviewed and caregivers of <18 were questioned for legal issue. Epi-info and SPSS were used for data entry and analysis. Primarily predictors were identified using chi-square at significant level P<0.05 with 95%CI, then candidate predictors were analysed using bivariate and multivariate analysis to identify associated factors. Among 153 suspected cases, 9 suspected deaths reported; 33 (22%) cases and 3 deaths were verified for VL. Among 33 verified cases 15(45.5%) were in July 2019, in comparison of 4years data, there is surge cases in July-August 2019, 26(79%) of cases were from Dire, Attack Rate (AR) = 15/100,000, CFR=9.1%. Among all, 15-64year were highly affected with AR=19.3. A case control engaged 99(100%) respondents and among all 93(93.9%) were male, 68(68.8%) were 15-64years. Adult education Adjusted Odds Ratio (AOR) = 30.438(2.378, 389.602), bed-net AOR=9.024 (1.763, 46.205) and walling AOR=0.052(0.004, 0.739) were associated factors with VL at 95%CI with p-value<0.05. Male 15-64years were highly susceptible. Level of education, ITNs and walling were associated factors with VL. Formulating policies and guidelines for male 15-64 years related vector control and awareness creation regarding feeding habit of sand fly, prevention and control were recommended. Awareness of community on prevention method; using repellents, ITNs utilization, and safe sleeping mechanisms are mandatory. Further investigation on the issue is best remedy to overcome future VL outbreak occurrence.

5.1.1. Introduction

Leishmaniasis is a protozoan disease caused by members of the genus *Leishmania,* parasites that infect numerous mammal species including humans, and transmitted by *Phlebotomine* sand-flies (1; 2; 3). Leishmania species produce widely varying clinical syndromes ranging from self-healing cutaneous ulcers to fatal visceral disease with the syndromes fall into visceral leishmaniasis (VL), cutaneous leishmaniasis, and mucosal leishmaniasis (3). Common symptoms of VL are prolonged fever, weight loss, signs of bone marrow invasion (anaemia, thrombocytopenia and leukopenia), abdominal distension with hepatosplenomegaly, and lymphadenopathy (4).

Transmission may be anthroponomical or zoonotic. Human-to-human transmission via shared infected needles and in-utero transmission to the foetus occurs rarely (3). Although the distribution of Leishmania is limited by the distribution of sand-fly vectors, human leishmaniasis is on the increase worldwide (2; 3). It affects the poorest and most marginalized people and is commonly associated with malnutrition, poor housing and weak immune system (5). Kala–azar generally affects poor and neglected populations living in remote rural areas. If not treated, more than 95% of Kala–azar cases will eventually result in death (6; 5). In recent years, leishmaniasis outbreaks have been described with increasing frequency, including those in sub-tropical regions or regions not previously endemic across the global. In Brazil, beginning in 2005 (7), There is reports outbreaks of VL in different parts of the world like Nepal from 2004 – 2007 (8), China in 2014 (9), Kenya in 2008, 2011, 2013 and 2014 (10), Ethiopia in 2007 (11) different site with different number of cases.

VL is considered among the most neglected tropical diseases (NTD), is one of several emerging diseases of major public health importance in Ethiopia. An estimated 3.2 million people are at risk of VL in Ethiopia and VL is endemic in six regions of the country (2; 12). Based on the report of Oromia Regional Health Bureau NTD report; it is endemic in Borena, Guji and Bale Zones. Borena zone started reporting Leishmaniasis cases in 2012 from Arero, Dire and

Miyo Districts. More cases are reported by Dire District and the problem expanded to additional districts and currently, cases are coming from six districts. The Zone Health Department (ZHD) reported relatively an increased number of suspected leishmaniasis cases in 2019, specifically from Magado Kebele.

Following reports of increased number of leishmaniasis cases in the zone, a team consisting of different experts drawn from Federal, Regional and WHO is established and deployed to the zone to provide technical support to ZHD from 14-25 October 2019. We conducted the investigation with a combination of epidemiological, entomological, and case control study and formed case definition by using a standard set of criteria to decide whether an individual should be classified as having the disease or not in this investigation. We further divided into two sub-teams each taking responsibility for case management and surveillance. The case management team dealt with verifications of case diagnosis, management and capacity building of health workers in Ya'abal'o hospital.

5.1.2. Materials and methods

5.1.2.1 Case Definition

A case definition is formed by using a standard set of criteria to verify and decide whether an individual should be classified as having the disease or not in this investigation. Usually includes four components:

- Clinical information about the disease
- Characteristics about the people who are affected
- Information regarding the location or place
- Specification of time during which the outbreak occurred

VL case definition: A person who presents with fever for more than two weeks and an enlarged spleen (splenomegaly) **AND/OR** Enlarged lymph nodes (lymphadenopathy) **OR**

either loss of weight, anaemia or leukopenia; while living in a known VL endemic area or having travelled to an endemic area.

5.1.2.2 Study area and period

The study was conducted in Borena Zone, Oromia Region. The area is bordered in North, West Guji Zone, in South bordering Kenya, in West, Somali Regional State and in the West with South Nations, Nationalities and People Regional State. The 2019 projected total population of the affected area was 219,809 and most of the residents of the zone were pastoralists and most Districts were low lands. Entomological and environmental parts of the study were conducted in Magado village in Dire district of Borena Zone, which is endemic for Malaria and other NTDs.

5.1.2.3 Study design

Descriptive design followed by case control study was conducted in the affected area.

A. Descriptive studies

Based on case definition, we reviewed patients' record from the health facilities to verify the cases. We included socio demographic variables such as age, sex, travel history, to endemic areas, vector control program, sleeping area/place, location, date of onset, date health facility visit and clinical information such as symptoms and treatment outcomes.

B. Analytical Epidemiology

The dependent variable for the study was verified VL cases while independent variable includes variables such as age, sex, marital status, educational status, occupation and economic characteristics. We used case control design with 95% CI, 80% power, 30.8% controls exposure, and 3.73 odds ratio and with ratio of 1:2. All 33 verified cases and 66 controls were included in the study. We collected all variables' information from cases admitted to hospital discharged using structured questionnaire by interviewing the patients, caregivers and respective control group from the same village. There may be limitation of

recall bias from those returned to their home. All 99 study subjects were residents of Borena Zone for at least 2 years at time of diagnosis (cases) or at time of enrolment (controls). We included all cases of VL which fulfils cases definition, admitted to Ya'abal'o Hospital and discharged from 13th, July to 13th October, 2019. We entered the data to Epi info and exported to SPSS to analyse predictors using the Pearson's chi-square and logistic regression at significant value of $P<0.05$.

Primarily the risk factors were identified as associated significant factors for affecting occurrence of VL by Pearson chi-square at significance level of < 0.2 and these were candidates for binary logistic regression model to identify significant predictor. Variable those identified for eligibility of binary logistic regression model at p-vale of 0.2 were again tested for the significance as risk factor of VL at p-value < 0.05 as candidate for final model of multivariate logistic regression analysis.

C. Entomological and Environmental Study

We carried out collection of sand flies by using two CDC light trap and six sticky paper collection method for both indoor and outdoor to assess the biting and resting behavior of sand fly, species identification and parasite detection for environmental and entomological assessment. We also tried to identify environmental risk factors like availability of water sources, marshy areas, housing conditions, type of trees and domestic and/or wild animals by our visitation to Magado village in Dire district of Borena Zone. A total of 70 entomological specimens were collected. Out of the 70 specimens, 49 (70%) were collected from outdoor near house, 15 (21%) from bushes sites. Only 6 (9%) of the specimens were collected from indoors. Though the sample was not adequate for justification, the density is high in outdoor near to house compound. All mounted sand fly specimens was used to identify vector species based on identification key. However, PCR analysis for parasite detection could was not conducted due to absence of necessary reagent (Leishmania primers).

5.1.2.4 Operational definitions

Cases: all verified VL cases admitted to Ya'abal'o hospital during the study period

Control: study participants having similar age group, sex and village with cases.

Child dependent age group: are participants of the study with age group ≤14 years old.

Productive age group: are participants of the study with age group from15-64 years old.

Aged dependent age group: are participants of the study with age group ≥ 65 years old.

5.1.3. Results

5.1.3.1 Descriptive report

A. Socio-demographic and economic characteristics

All participants (100%) were responded to our interview. Among 99 study subjects 33 (33.3%) of them were cases and 66 (66.7%) of them were controls. During interview, 21 (21.2%) respondents were treated cases and 78 (78.8%) of respondents were under treatment. Of the 99 participants 93 (93.9%) were male, 41 (41.4%) were have below the average family size of the country (4.8). Among all participants 5 (5%) were in aged dependent age group, 26 (26.3%) were in child dependent age group, and 68 (68.7%) participants were in productive age group. Of all participants 34 of them can't read and write and 65 of them had different level of education. Among the participants 26 of them have no land; this is related to occupation i.e. pastoralists accounts 74 (74.7%), farmers 19 (19.2%) and others 6 (6.1%). The walling materials of their house were earth (mud) 86 (86.9%), wood 10 (10.1%) and thatched and brick 3 (3%) (Table 37).

Table 37: Socio-demographic Characteristics of Borena Zone, Oromia, Ethiopia 2019

Variables	Category	Frequency	Percent
Status of Study Subjects	Case	33	33.3
	Control	66	66.7
Sex	Male	93	93.9
	Female	6	6.1
Age group in years	0-14	26	26.3
	15-64	68	68.7
	65+	5	5.1
Family size	<5	41	41.4
	>=5	58	58.6
Occupation of head of the house hold	Farmer	19	19.2
	Pastoralist	74	74.7
	Others	6	6.1
Level of Education of head of HH	Can't read and write	34	34.3
	Adult education	16	16.2
	Elementary (1-8)	18	18.2
	High school (9-12)	12	12.1
	Higher Education	19	19.2
Ownership of land	Yes	26	26.3
	No	73	73.7
Number of Hectare(s) for the owner of land (n=26)	One hectare	14	53.8
	Two hectares	4	15.4
	Three hectares	6	23.1
	Four hectares	2	7.7
Walling of the house	Earth (mud)	86	86.9
	Wood and thatched	10	10.1
	Brick	3	3.0
Roofing of the house	Thatch	88	88.9
	Iron sheet	11	11.1
Floor of the house	Earthen	93	93.9
	Concrete	6	6.1
Number of rooms of the house	One room	47	47.5
	Two rooms	39	39.4
	Three rooms	9	9.1
	Four rooms	4	4.0
Family having radio	Yes	52	52.5
	No	47	47.5

B. Behavioural and environmental characteristics

Among all study participants 94 (94.9%) of them have no travel histories to other VL endemic area within the last 2 years, 76 (76.8%) HH were sprayed with anti-mosquito chemicals. Among 23 sprayed HHs 19 (82.6%) of them were sprayed ≤1 year duration. Among study participants 64 (64.6%) households had no bed net, 27 (77.1%) of them used always, 7 (20%) of them used sometimes & 1 household never used the net. Most of the time; 67 (67.8%) study subjects sleep inside the house and 32 (32.3%) of them sleep outside the house during night time. During night time 78 (78.8%) study subjects were sleep under acacia tree and during day time 95 (96%) of the have behaviour of sleeping under acacia tree (Table 38).

Table 38: Behavioural Characteristics in Borena Zone, Oromia, Ethiopia 2019

Variables	Category	Frequency	Percent
Travel history of study subjects to other VL endemic area	No	94	94.9
	Yes	5	5.1
HH IRS status	No	76	76.8
	Yes	23	23.2
Ownership status of dogs	No	68	68.7
	Yes	31	31.3
Availability of 'Osole' near residential area	Yes	80	80.8
	No	19	19.2
Family having Bed nets	Yes	35	35.4
	No	64	64.6
Utilization of Bed nets during dry season (n=35)	Always used	27	77.1
	Sometimes used	7	20.0
	Never used	1	2.9
Utilization of Bed nets during rainy season (n=35)	Always used	26	74.3
	Sometimes used	8	22.9
	Never used	1	2.9
Sleeping place of study subjects	Inside room in the house	67	67.7
	Outside of the house	32	32.3
Sleeping under acacia tree during night time	Yes	78	78.8
	No	21	21.2
Sleeping under acacia tree during day time	Yes	95	96.0
	No	4	4.0

C. Visceral Leishmaniasis (VL) morbidity and mortality

A total of 153 cases, of which 33 (22%) were verified for VL admitted in Ya'abal'o Hospital during July 2, 2019 to October 23, 2019. In addition, the hospital reported 9 deaths due to VL and 3 of them were verified for VL death. The AR and CFR among verified cases was 15/100,000 and 9.1% respectively.

D. Distribution of visceral leishmaniasis by time

Among the total 33 cases 15 (45.5%) of cases were reported with the date of onset in August 2019. The outbreak was started in June 20th, 2019 (Epi-week 25) increased gradually and reached its pick 5 cases in August 2019 (Epi-week 31) and showed decline ever week. There were no cases with the onset dates reported in Epi-week 39 and 40. Upon comparison of trends of cases reported from 2016 to 2019 there is a marked case surge in July and August 2019 more than other years of respective months (Figure 54 - 56).

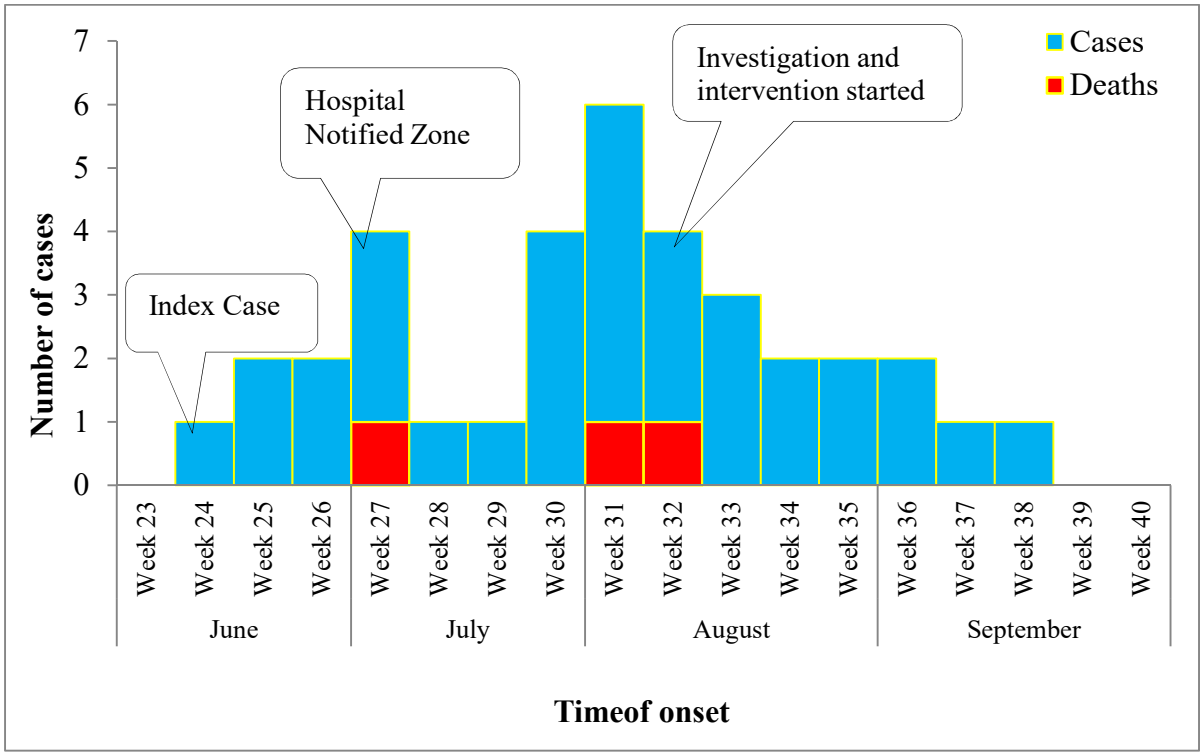

Figure 54 Epi Curve of suspected VL outbreak in Borena Zone, Oromia, Ethiopia 2019

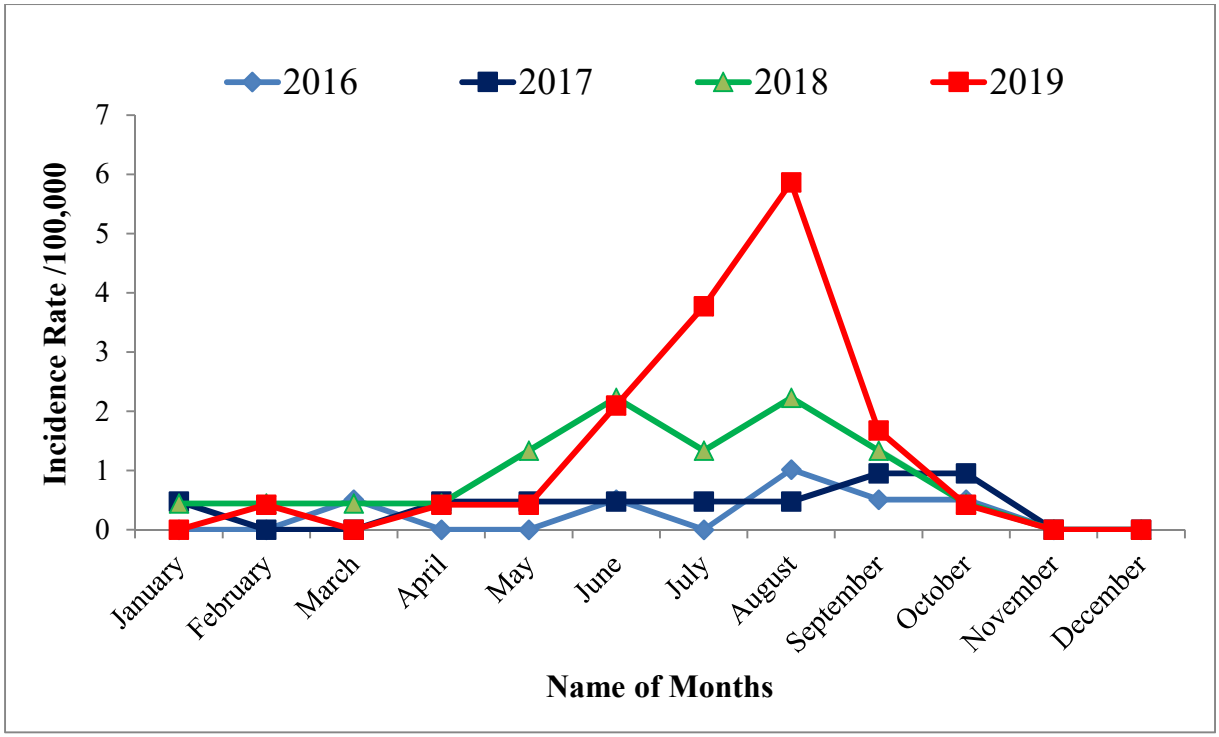

Figure 55: Monthly trend of VL cases in Borena 2016 -2019, Oromia, Ethiopia

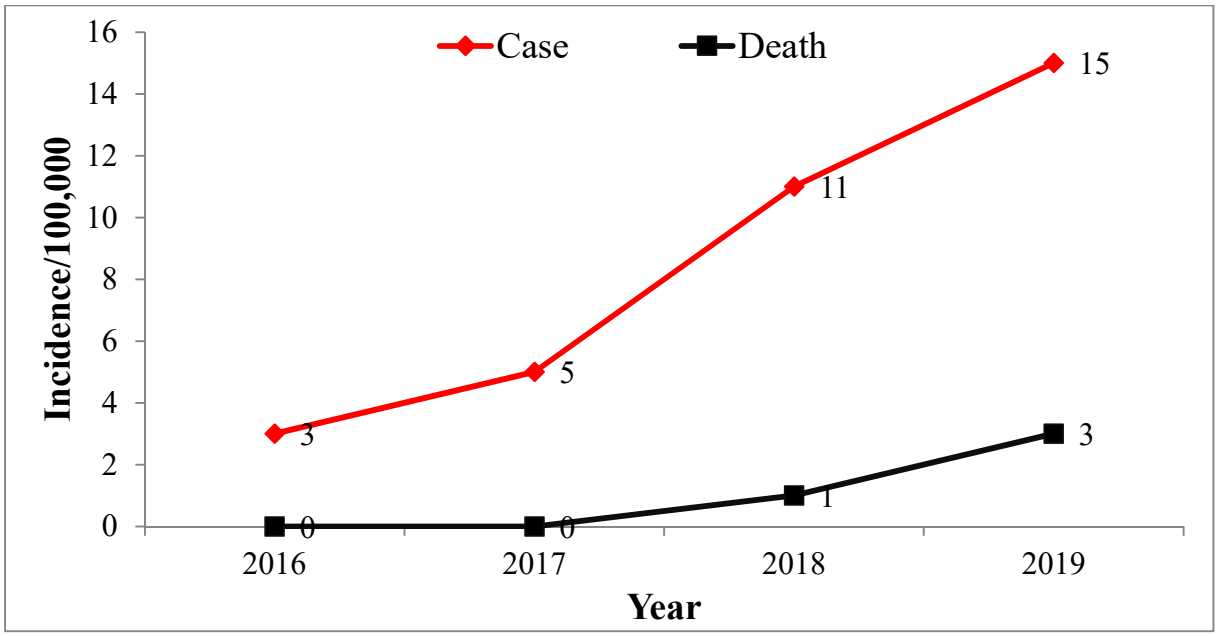

Figure 56: Annual trend of VL cases & deaths in Borena, Oromia, Ethiopia

E. Distribution of visceral leishmaniasis by place

The AR among the Districts per 100,000 populations was: 51.2 in Dire, 6.6 in Elwaya, 6.2 in Dilo, 5.2 in Moyale, 3.3 in Dubuluk and 1.8 in Miyo districts. All confirmed deaths were from Dire (Table 39).

Table 39: AR and Death Rate of VL by District in Borena, Oromia, Ethiopia 2020

Name of District	Total Population	Number of Cases	Number of Deaths	AR per 100,000	CFR
Dire	50,760	26	3	51.2	11.5
Elwaya	30,221	2	0	6.6	0
Moyale	37,991	2	0	5.3	0
Dilo	16,121	1	0	6.2	0
Dubuluk	30,285	1	0	3.3	0
Mi'o	54,431	1	0	1.8	0
Total	219,809	33	3	15	9.1

Among all cases; 26(79%) of them were from Dire District and Magado Kebele contributed 20 (77%) cases for Dire. Other 7 (21%) cases were from Moyale 2 cases, Elweya 2 cases, Dilo 1 case, Dubuluk 1 case and Miyo 1 case (Figure 50 and 51). More over all the cases from other Districts had travel history to Ele-Bora water point. All the confirmed three deaths were from Dire District.

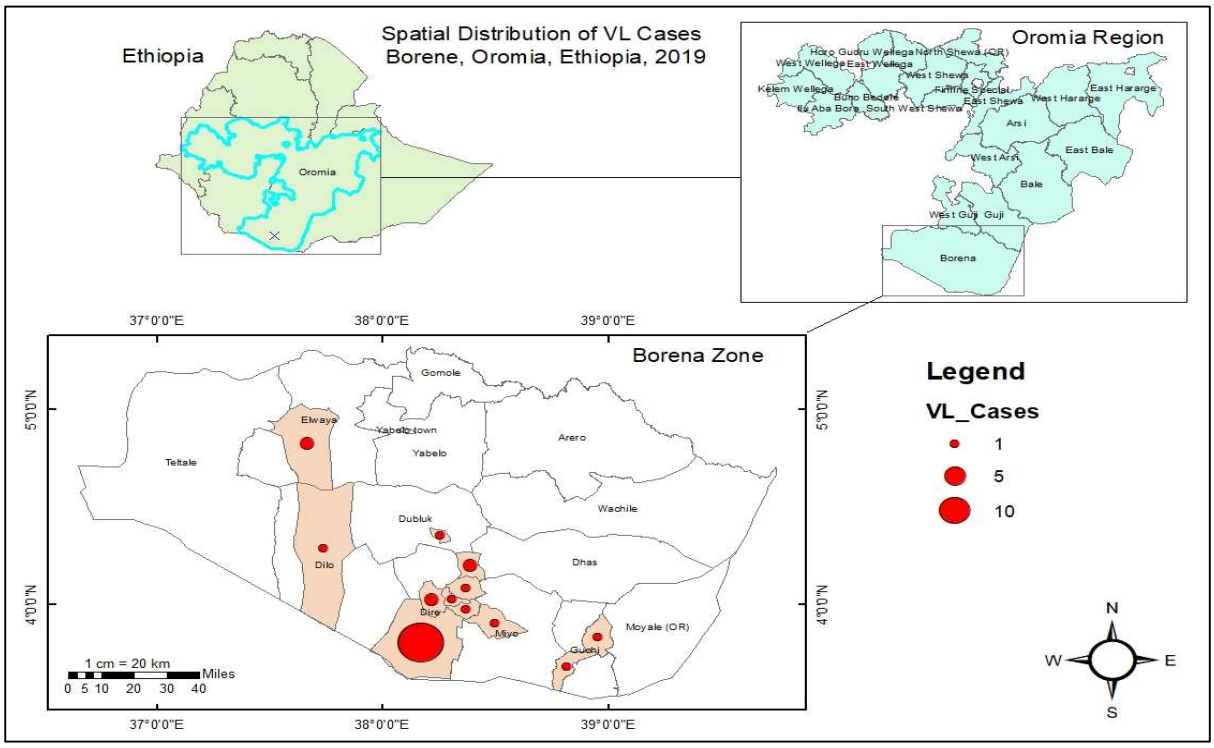

Figure 57 Spatial distribution of VL in Borena, Oromia, Ethiopia 2019

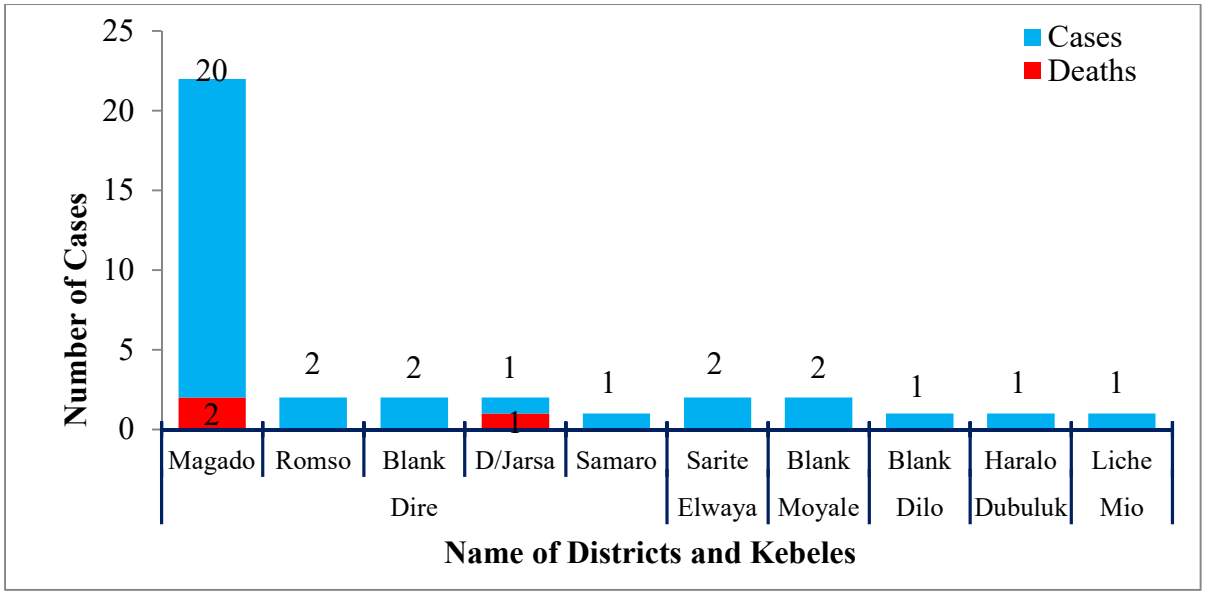

Figure 58 Number of VL cases by Districts in Borena Zone, Oromia Ethiopia 2019

F. Distribution of visceral leishmaniasis by person

The AR per 100,000 populations with age groups was 10.5, 19.3 and 9.0 in 0-14 years, 15-64 years and 65+ years respectively. The age groups highly affected were 15-64 years with AR of 19.3/100, 000 population, while the CFR is high among age groups 0-14 years with CFR of 20%. This is may be due low immunity during child hood (Table 40 and Figure 59). Among all case 31 (94%) of them were male. There were only 2 female cases and both of them were alive.

Table 40 AR and CFR of VL with age group in Borena Zone, Oromia, Ethiopia, 2019

Age Category	Total population	Number of Cases	Number of Deaths	AR per 100,000 pop	CFR per 100 cases
0-14 years	94,936	10	2	10.5	20
15-64 years	11,3743	22	1	19.3	4.5
65+ years	11,130	1	0	9.0	0.0
Total	219,809	33	3	15.0	9.1

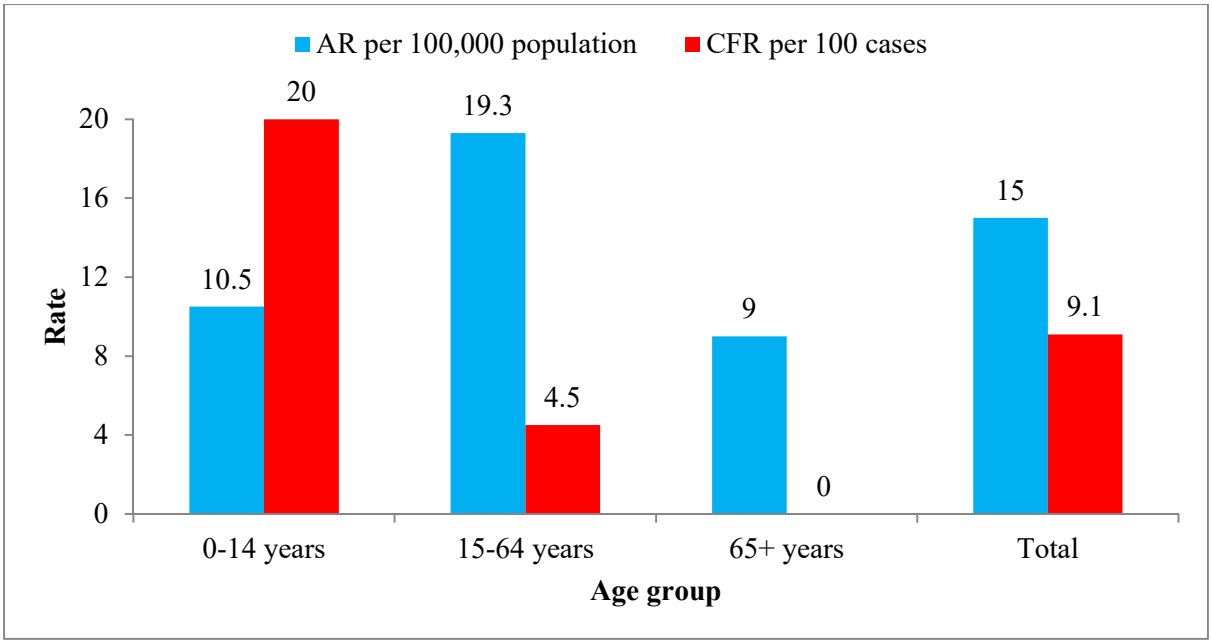

Figure 59: VL Distribution by age group in Borena, Oromia, Ethiopia 2019

5.1.3.2 Analytic Epidemiology findings

Study participants with adult education are 30 times more likely to have VL than those of having higher educational level (95% CI of AOR=2.378, 389.602), and similarly primary level of education are 13 times more likely to develop VL than those of having higher educational level (95% CI of AOR=1.107, 168.565). HH heads not able to read and write 93% less likely to be free from VL than those able to read and write (95% CI of AOR=0.007,0.582) and not owning land is 72% less likely to be free from VL than those owning land (95% CI of AOR=0.078,0.996). Participants not having bed-nets are 9 times more likely to be infected with VL than those having bed-nets (95% CI of AOR=1.763, 46.205). Living in house with walling of brick is 95% less likely to be susceptible for VL infection than those living in house with walling of earth (mud) (Table 41).

Table 41 Multivariate Analysis of VL risk factors in Borena Zone, Oromia, South Ethiopia

Risk Factors	Categories	Cases		Controls		COR (95%CI)	AOR (95% C.I.)	P-Value
		Number	Percent	Number	Percent			
Level of Education of study subject	Can't read &write[1]	16	47.1%	18	52.9%			.055
	Adult education **	8	50%	8	50%	7.55 (1.51,37.89)	**30.44 (2.378, 38.60)**	**.009**
	Primary (1-8) *	6	33.3%	12	66.7%	8.50 (1.46,49.54)	**13.66 (1.10,168.56)**	**.041**
	High school (9-12)	1	8.3%	11	91.7%	4.25 (0.73.24.77)	0.42 (0.01,26.08)	.686
	Higher education	3	10.5%	18	89.5%	0.77 (0.62,9.58)		
Ability of household head to read and write	No *	17	26.2%	48	73.8%	0.398 (0.17,0.95)	**0.065 (0.007,0.582)**	.015
	Yes[1]	16	47.1%	18	52.9%			
Family ownership status of land	No*	20	27.4%	53	72.6%	0.377 (0.15,0.95)	**0.278 (0.08,0.99)**	**.049**
	Yes[1]	13	50%	13	50%			
Having bed net	No**	29	45.3%	35	54.7%	6.421 (2.03,20.32)	**9.024 (1.76,46.21)**	**.008**
	Yes [1]	4	11.4%	31	88.6%			
Walling of the house	Earth[1]	26	30.2%	60	69.8%			.092
	Brick*	0	0%	3	100%	0.185 (0.05.0.78)	**0.052 (0.004,0.739)**	**.029**
	Other	7	70%	3	30%	.000	.000	.999

Note:
** is P-value < 0.01,
* is P-value <0.05
[1] Reference

5.1.3.3 Entomological findings

A total of 70 entomological specimens were collected. Out of the 70 specimens, 49 (70%) were collected from outdoor sites and 15 (21%) were from vegetation. Only 6 (9%) of the specimens were collected from indoors. Though the sample was not adequate for justification, the density is 8-10 flies per A4 size slide in outdoor near to house compound. In Ele-Bora village black cotton soil is important breeding site for sand fly, the community prefers to sleep outside house due to hot climatic condition results in an increased risk of infection. However, 9% sand fly was collected inside the houses, are not constructed well, have many holes in the wall, so it increases the risk of bite when a person sleeps even inside the house.

The descriptive part of our finding also shows among all study participants 68.7% of them own dogs and 80.8% of them respond that availability of 'Osole' near their residential area. Both dogs and 'Osole' are the reservoirs of sand flies. Additionally; acacia tree which is favorable for the breading of sand fly found in the area and 78.8% of the respondents sleep under this tree during night time.

5.1.3.4 Environmental findings

Based on the data registered in Ya'abal'o hospital shows high cases were from Dire District specifically from Magado Kebele. We tried to identify environmental risk factors for VL in Magado Kebele. Accordingly; there was a deep well water source project in Ele-Bora village having tankers and ditches without water which makes the surrounding favourable area for breading of sand flies. For the sake of water source project the community obliged to come and dwell in the area for grazing and getting water for their cattle. Additionally; the area is marshy/swampy during rain; when heavy rain passes the land become cracked and makes small holes which helps for breading of sand flies and related insects.

The walling of house made of wood and thatched having many holes, roofing from thatched and plastic material, and floor from earth not easily cleanable having cracks and holes. There were also acacia trees in the district which serves as shading from sunlight during day time and as a shelter near herd of cattle for young male during night time. There were domestic animals like dogs and wild animals like “Osole” inhabit in the area

5.1.4. Discussion

The increment in the number of cases in July and August 2019 might be by the awareness raising activities in the community by the zone health department and respective Districts which can improve the care seeking behaviour of the community and the attention given for complete data recording in the current suspected outbreak. The number of cases is pitched in Magado Kebele of Dire District. The possible cause for increased number of cases in Magado might be related to settlement of community near water point of Ele_Bora village which is favourable for breading of Sand Flies which are responsible vector for Leishmania infection (3; 8). Additionally the entomological information collected from Ele_Bora village also indicates the presence of sand fly in the village. More over all the cases from other District had travel history to the water point in Dire District.

The age groups highly affected were 15-64 years male due to high risk of exposure to the breading sites of sand fly during outside work activities; in similar way study conducted in North Ethiopia also shows higher number of VL cases were recorded above 14 years of age group, and studies in Libo Kemem showed that males were affected more than females. In contrast to our study the study conducted in South Sudan shows 56% of the cases were under 5 years old (13). The reason for difference could be behavioural and cultural difference between the communities. The reason for similarity of the studies might be due to culture and habits of the male were

engaged to keep cattle; they sleep at night time outside the house near their cattle and stays under shed of trees at day time (14). Domestic animals like dog accompany them to keep their cattle during day and night, which are the factors for the transmission of Leishmaniasis (15). The respondents also told that there are wild animals like “Osole” which are another risk factor for the transmission of the disease (16). The result shows that the fatality rate is relatively high among child dependent age group. This might be due low immunity of children than the productive age groups (3).

Statistical analysis model we used shows that level of education of study participants were significantly associated with VL cases, which is similar with study conducted in North Ethiopia (14). Similarly study conducted in North Ethiopia showed that educational level below grade five boosted VL odds (16; 17). In contrast to this there were no evidences shown in studies conducted in Nepal, South Sudan and Libo Kemkem of North West Ethiopia (8; 13; 14). The difference might be due to socio cultural and geographical location difference of study areas.

We found that there is a strong association between VL and poor housing condition like walling material built from mud (earth)and similar study conducted in Nepal with those living in a thatched houses without windows having 3–4 times higher odds of Kala-azar (8). In Spain also living in a detached house, were all strongly associated with the prevalence of asymptomatic infection (18). Cracked walls may be favourable area for the breading of and resting of sand flies and houses without window are free for the movement of vectors from outdoor to indoor flight. The study North Ethiopia also shows similar association (16).

Our study also indicates that owning specific land has significant association with VL, and similarly study conducted in Shebelle, Somali Region (12). Previous outbreaks were often related to force migration of non-immune populations into endemic areas following conflict (19).

The reason behind might be due to high mobility of the community for grazing and not expected to construct well designed house which hinders the movement and breading of sand fly.

Bed-net is other predictor that is associated to VL cases. Similarly studies proved that having bed nets and utilization of bed nets have significant association with the prevalence of this morbidity (16; 17). This holds true that ITNs are protective factor for the sand flies mechanically as well as chemically by killing the vectors (20; 2). However, like IRS, the usefulness of Long Lasting ITNs very much depends on the biting behaviour of the vectors (indoor vs. outdoor). Another issue regarding the use of nets against sand flies is that much sand fly biting activity occurs during early evening between 19-21 o'clock before most people go to sleep so that exposure to sand fly bites is only reduced but not eliminated (2).

To conclude the findings: male productive age group were the affected group, level of education, ownership of land, having and utilization of bed nets and housing conditions are significantly associated with Visceral Leishmaniasis. Based on the main findings of our study we recommend that: formulating policies and guidelines on awareness creation for male productive age group regarding feeding habit of sand fly and prevention mechanisms control methods, Educating the community on prevention mechanisms like using repellents and safe sleeping mechanisms and additionally further investigation on the study area is the best remedy to overcome future VL outbreak occurrence.

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5.2COVID-19 Outbreak Investigation in Oromia Region, Ethiopia, September 2020 A Descriptive Study

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Abstract

Coronavirus disease 2019 is illness caused by a novel coronavirus called SARS CoV-2; formerly called 2019-nCoV, which was first, identified amongst an outbreak of respiratory illness cases in Wuhan City, China beginning in December 2019. Based on the global and national situation and response Oromia Health Bureau has established new EOC having six sections to investigate and describe COVID-19 outbreak in Oromia, Ethiopia. Descriptive study design was used in the affected area. All confirmed cases of COVID-19 investigated, tested and admitted and registered on line list from March 25th - September 30th, 2020 were reviewed. The socio demographic information were identified and described. All cases listed on the regional line list of COVID-19 were included in the description. Totally 11,715 confirmed COVID-19 cases and 84 deaths were reported. Among all confirmed cases 11,639 (99.4%) of them were asymptomatic. Among all 76 symptomatic cases; only 16 (21%) cases have underling comorbidity. Severity status of the cases were 11,576 (98.8%) asymptomatic, 51 (0.4%) mild, 17 (0.1%) moderate, 19 (0.2%) sever and 52 (0.4%) were dead body. The overall regional AR was 3/10,000 and CFR was 0.72%. Among all cases 8,143 (69.5%) were male, the top affected occupation category were prisoners 1321 (11.3%), industry worker & daily labourers 1179 (10.1%), private, NGO & GO workers 785 (6.7%), military 553 (4.7%), drivers and merchants 390 (3.3%), health workers 64 (0.5%), bankers and waiters 59 (0.5%), and the occupation of 7352 (62.8%) cases were not identified. COVID-19 was highly disseminated in the community during July and August following uncontrolled social gatherings not taking care for transmission of the virus. COVID-19 can affect all age group and both sexes. The disease more affects group of community with low sanitation facilities, poor hygienic practice, with no personal protective equipment and being involve in public gatherings.

5.2.1 Introduction

Coronaviruses are a group of viruses that cause diseases in mammals and birds. In humans, the viruses cause respiratory infections which are typically mild including the common cold but other forms like Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS) and 2019 novel coronaviruses can be lethal (1).

Human coronaviruses were first identified in the mid-1960s. The seven Common human coronaviruses that can infect people are 229E (alpha coronavirus), NL63 (alpha coronavirus), OC43 (beta coronavirus), HKU1 (beta coronavirus), MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome or MERS), SARS-CoV (the beta coronavirus that causes severe acute respiratory syndrome or SARS), and 2019 Novel Coronavirus (2019-nCoV) (1; 2).

Coronavirus disease 2019 (COVID-19) is defined as illness caused by a novel coronavirus now called sever acute respiratory syndrome coronavirus 2 (SARS CoV-2; formerly called 2019-nCoV), which was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China beginning in December 2019 (3). Illness caused by SARS-CoV-2 was termed COVID-19 by the World Health Organization (WHO), the acronym derived from "coronavirus disease 2019." The name was chosen to avoid stigmatizing the virus's origins in terms of populations, geography, or animal associations (4). On February 11, 2020, the Coronavirus Study Group of the International Committee on Taxonomy of Viruses issued a statement announcing an official designation for the novel virus: severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (5; 4).

Physical contact and respiratory routs are the two most important well established routs of transmission of the virus. Poor hand hygiene practice, overcrowding, and close physical contacts like hand shaking contributes for the fast spread of the virus with in very short period of

time. Experience from China where the disease was first recognized shows educating the public about the nature of the disease and the rout of transmission, restricting mobility of individuals within the border and across borders is proven to be key in preventing transmission (6; 7).

Outbreak investigation aims to control the outbreak, prevent additional cases of the disease, identify the source and learn lessons for the future. Outbreak management begins with the timely identification of an outbreak (8). As of 31 January 2020, this epidemic had spread to 19 countries with 11,791 confirmed cases, including 213 deaths and the World Health Organization has declared it a Public Health Emergency of International Concern (9). On March 11, 2020 the WHO declared COVID-19 a global pandemic, its first such designation since declaring H1N1 influenza pandemic in 2009 (3; 5).

In an institution one positive specimen result for COVID-19 in a staff is a confirmed outbreak. Even when a COVID-19 case is identified and an outbreak is declared, obtain consent to continue testing all newly symptomatic staff and residents/clients throughout the outbreak until otherwise directed by Public Health (8).

In Ethiopia the first coronavirus case was reported on March 13, 2020 and the victim was Japanese citizen (10) and in Oromia region the first case is a 61 years old individual was reported on March 25, 2020 from Adama town with no prior travel history (11).

Based on the global and national situation and response Oromia Health Bureau (OHB) has established new Emergency Operation Center (EOC) under the coordination of Public Health Emergency Management (PHEM) directorate having six sections. A comprehensive COVID-19 prevention and control preparedness plan was prepared having duties and responsibilities to all section which is monitored and evaluated regularly to combat COVID-19 pandemic.

5.2.2 Materials and methods

5.2.2.1 Case definitions

Based on Ethiopian Ministry of Health (MOH) and Ethiopian Public Health Institute:

Suspected case

A. A person presenting with fever (>38°C) or history of fever and symptoms of respiratory tract illness e.g. cough, difficulty in breathing AND a history of travel to or residence in a country/area or territory reporting local transmission of COVID-19 disease during the 14 days prior to symptom onset.

OR

B. A person with fever (>38°C) or history of fever and symptoms of respiratory tract illness e.g. cough, difficulty in breathing AND in the last 14 days before symptom onset, close contact with a person who is under investigation or confirmed for COVID-19

OR

C. A person with fever (>38°C) or history of fever and symptoms of respiratory tract illness e.g. cough, difficulty in breathing; And requiring hospitalization)And in the absence of alternative diagnoses that fully explains the clinical situation

Probable case: A suspect case for which testing for COVID-19 is inconclusive **OR** A suspect case for whom testing could not be performed for any reason

Confirmed case: A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms

5.2.2.2 Study area and period

The study area was Oromia Region, Ethiopia from March to September 2020. Oromia region has a projected 2020 total population of 38,865,436

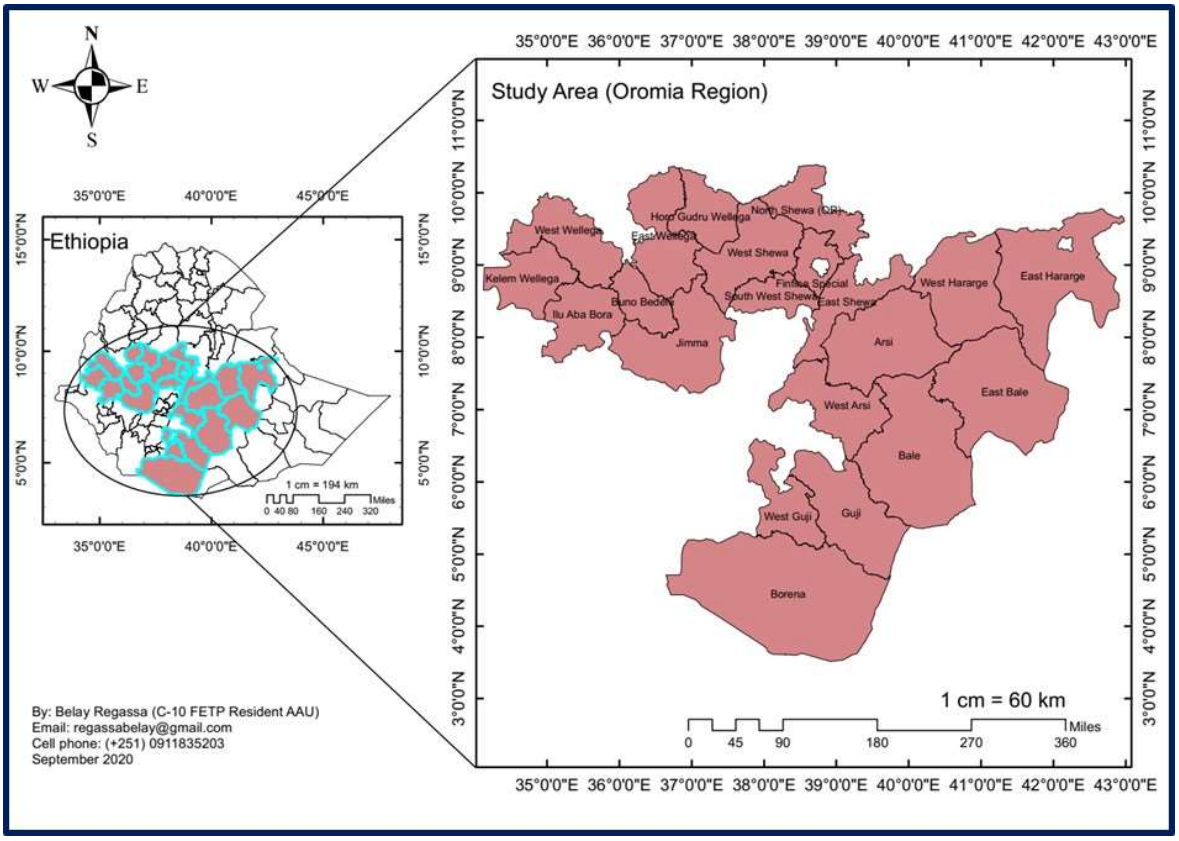


Figure 60: COVID-19 outbreak investigation area, Oromia, Ethiopia September 2020

5.2.2.3 Study Design

Descriptive study design was used in the affected area. Secondary data from the line list of COVID-19 confirmed cases reported to the region was reviewed. The socio demographic information were identified and collected.

We defined cases based on guideline of Ethiopian Ministry of Health (MOH) and Ethiopian Public Health Institute as: Suspected case is a person presenting with fever (>38°C) or history of fever and symptoms of respiratory tract illness e.g. cough, difficulty in breathing AND a history of travel to or residence in a country/area or territory reporting local transmission of COVID-19 disease during the 14 days prior to symptom onset OR a person with fever (>38°C) or history of fever and symptoms of respiratory tract illness e.g. cough, difficulty in breathing AND in the last 14 days before symptom onset, close contact with a person who is under investigation

or confirmed for COVID-19 OR a person with fever (>38℃) or history of fever and symptoms of respiratory tract illness e.g. cough, difficulty in breathing; And requiring hospitalization)And in the absence of alternative diagnoses that fully explains the clinical situation. Probable case is a suspect case for which testing for COVID-19 is inconclusive OR a suspect case for whom testing could not be performed for any reason. Confirmed case is a person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms

All cases listed on the regional line list of COVID-19 from March 25th to September 30th were included in the description of the study. Socio demographic (age, sex, occupation, place of residence…) date of lab result issued, source of report, source of infection, signs and symptoms and outcome status were the variables described in the study.

5.2.3 Result

5.2.3.1 Descriptive report

5.2.3.1.1 Socio-demographic and economic characteristics

In Oromia region, from March 25 – September 30, 2020 there were 11,715 confirmed COVID-19 cases. Among these 8,143 (69.5%) were male and their occupation category were prisoners 1321 (11.3%), industry worker & daily labourers 1179 (10.1%), private, NGO & GO workers 785 (6.7%), military 553 (4.7%), drivers and merchants 390 (3.3%), health workers 64 (0.5%), bankers and waiters 59 (0.5%), students 10 (0.1%) and farmers 2 (0.02%) and the occupation of 7352 (62.8%) cases were not identified. Among all cases 11,241 (96%), 260 (2.2%), 104 (0.9%), 84 (0.7%), 22 (0.2%) and 4 (0.03%) of them were investigated by community surveillance, isolation centres (contacts), health facility, quarantine site, suspected cases and forensic examination respectively. Of all cases 11,534 (98.5%) of them have no travel history to other country. Among 181 cases having travel history to Djibouti 75 (41.4%), Kenya 34 (18.8%), Lebanon 25 (13.8%), UAE 25 (13.8%), Somali Land and Somalia 16 (8.9%) and remain 6 cases from six different countries (Table 1). Among all cases their source of infection is 11,088 (94.6%) of community, 451 (3.8%) contact with confirmed case and 176 (1.5%) imported from other country (Table 42). The date of arrival of 181 cases was from April 10th - September 5th, 2020 with many cases (Fig 61).

Table 42 Socio-demographic characteristic of COVID-19 cases in Oromia, Ethiopia, 2020

Variable	Category	Number of cases	Percent
Sex	Female	3,572	30.5
	Male	8,143	69.5
Age group	0-14	554	4.7
	15-34	7,897	67.4
	35-64	2,967	25.4
	65+	297	2.5
Occupation	Prisoners	1,321	11.3
	Industrial workers & daily labourers	1,179	10.1
	Private, GO & NGO workers	785	6.7
	Military	553	4.7
	Drivers and merchants	390	3.3
	Health worker	64	0.5
	Bankers and waiters	59	0.5
	Students	10	0.1
	Farmers	2	0
	Unknown	7,352	62.8
Source of report (Rumour)	Community surveillance	11,241	96.0
	Isolation Center (Contacts)	260	2.2
	Health Facility	104	.9
	Quarantine site	84	.7
	Suspected Case	22	.2
	Forensic examination	4	.0
Travel history to other country	No	11,534	98.5
	Yes	181	1.5
Name of the countries came from (N=181)	Djibouti	75	41.4
	Kenya	34	18.8
	Lebanon	25	13.8
	UAE	25	13.8
	Somalia	13	7.2
	Somali Land (Hargessa)	3	1.7
	Bahrain	1	0.6
	Kuwait	1	0.6
	Qatar	1	0.6
	Sudan	1	0.6
	Turkey	1	0.6
	USA	1	0.6
Source of infection (N=11715)	Community	11088	94.6
	Contact	451	3.8
	Imported	176	1.5

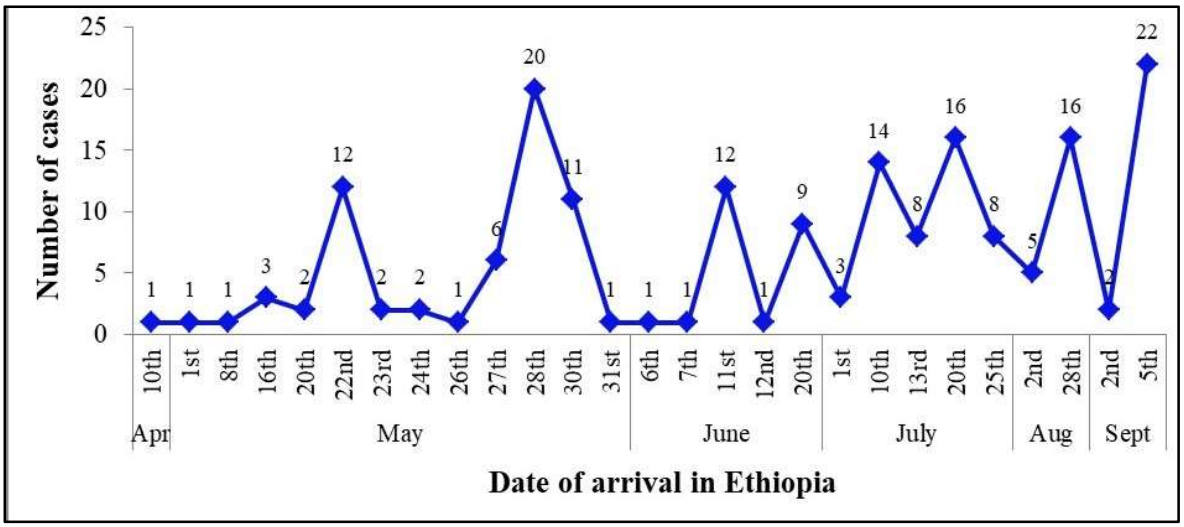


Figure 61: Arrival time of COVID-19 cases from abroad to Oromia, Ethiopia, 2020

5.2.3.1.2 Morbidity and mortality

From all 11,715 confirmed cases 11,639 (99.4%) of them were asymptomatic and only 76 (0.6%) of them were symptomatic with a minimum of one symptom. Of all case only 16 (21%) cases have underling comorbidity condition. The severity status of the cases were 11,576 (98.8%) asymptomatic, 51 (0.4%) mild, 17 (0.1%) moderate, 19 (0.2%) sever and 52 (0.4%) were dead body. Regarding their final outcome status 11,631 (99.3%) were alive and 84 (0.7%) of them were died (Table 43).

Table 43 Morbidity & mortality of COVID-19 in Oromia, Ethiopia, September 2020

Variable	Category	No of cases	Percent
Symptomatic	No	11,639	99.4
	Yes	76	0.6
Underling comorbidities & conditions	No	11,699	99.8
	Yes	16	0.2
Severity status	Asymptomatic	11,576	98.8
	Mild	51	0.4
	Moderate	17	0.1
	Sever	19	0.2
	Dead body	52	0.4
Outcome status	Alive	11,631	99.3
	Died	84	0.7

From all case 84 of them has died and the overall regional AR was 3/10,000 population and the CFR was 0.72%. The AR is relatively high at towns 26.6/10,000 than zones 1.7/10,000 population; but the CFR was relatively high among zones 0.75% than towns 0.62% (Table 44)

Table 44 AR & CFR of COVID-19 March - September 2020 in towns of Oromia, Ethiopia

Settlement	Total Population	Total Cases	Total Deaths	AR per 10000	CFR (%)
Towns	2,007,171	5332	33	26.6	0.62
Zones	36,858,265	6098	46	1.6	0.75
Other regions		285	5	-	-
Oromia	38,865,436	11,715	84	3.0	0.72

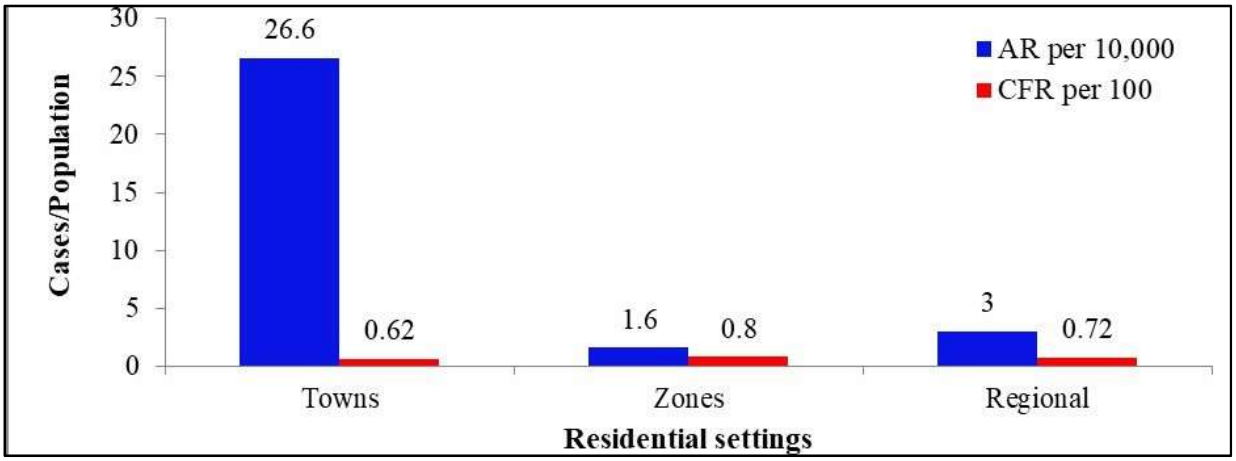


Figure 62: AR and CFR of COVID-19 in Oromia, Ethiopia September 2020

Among 76 symptomatic cases; 56 (73.7%) have cough, 16 (21.1%) have head ach and 15 (19.7%) have shortness of breath (Fig 4). Among the 16 cases having underling comorbidity conditions the common conditions were; hypertension, asthma and diabetes mallets account 6 (37.5%), 4(25%) and 3(18.8%) respectively.

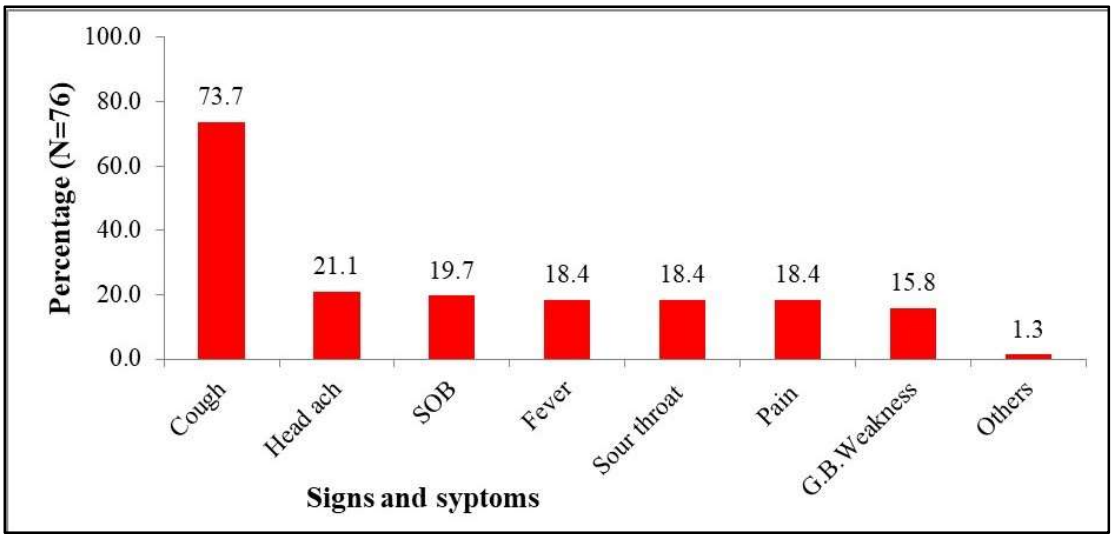


Figure 63: Sings of symptomatic case of COVID-19 in Oromia, Ethiopia, 2020

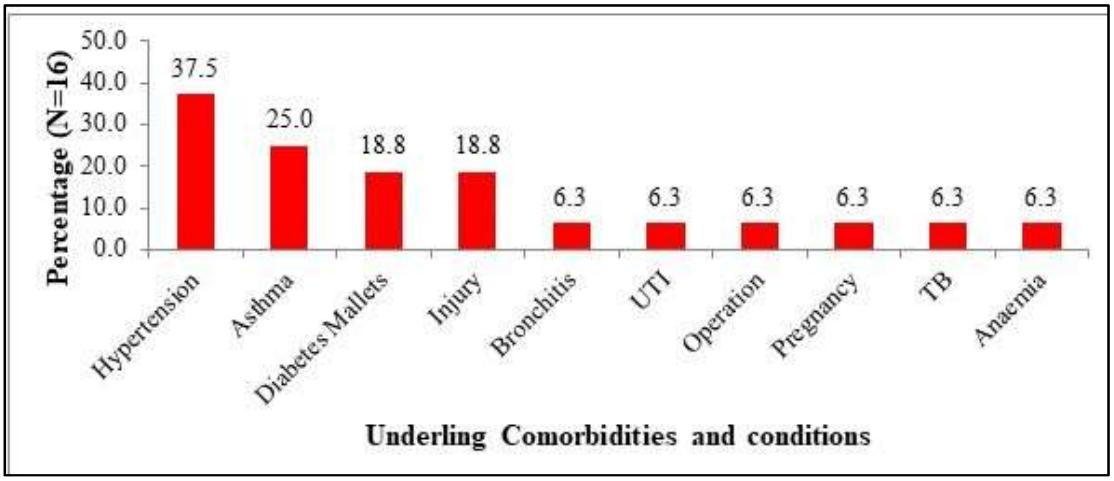


Figure 64: Comorbidity condition with COVID-19 cases in Oromia, Ethiopia, 2020

5.2.3.1.3 Distribution of cases

A. Distribution by time

The first case was reported on March 25th, 2020. Starting from the first case reported up to September 30, 2020 large number of cases 504 (4.3%) was reported on September 6, 2020. Before conflict erupted in the region, the maximum daily case confirmed were 24 case and preceding two weeks of the conflict, the daily report of confirmed case were above 50 cases. Among all cases reported 6040 (51.6%) were reported during the ComBAT in the epi weeks 34, 35, 36 and 37 (Figure 65).

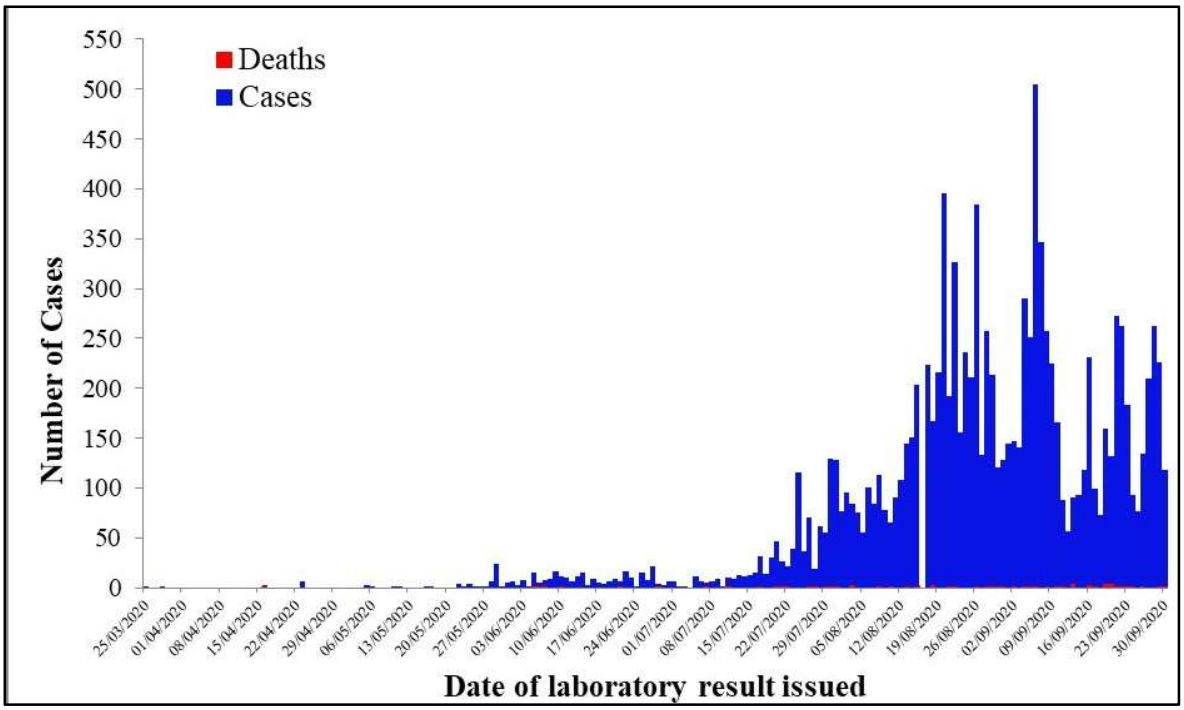


Figure 65: Epi curve of COVID-19 in Oromia, Ethiopia, September 2020

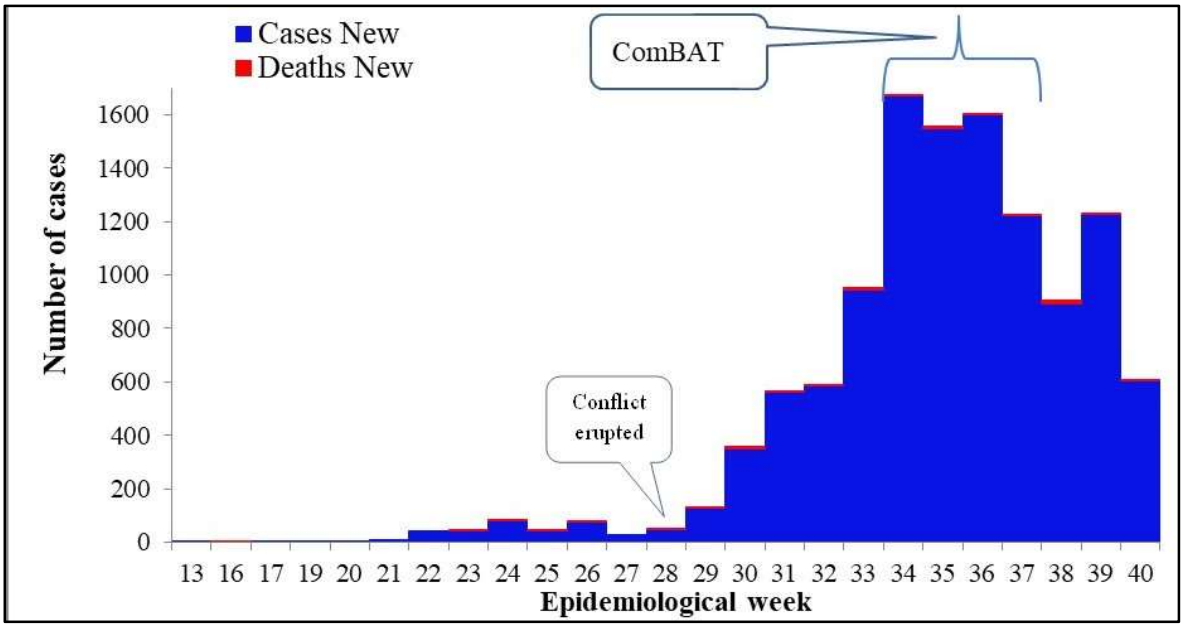


Figure 66: Epi curve of COVID-19 by week in Oromia, Ethiopia, September 2020

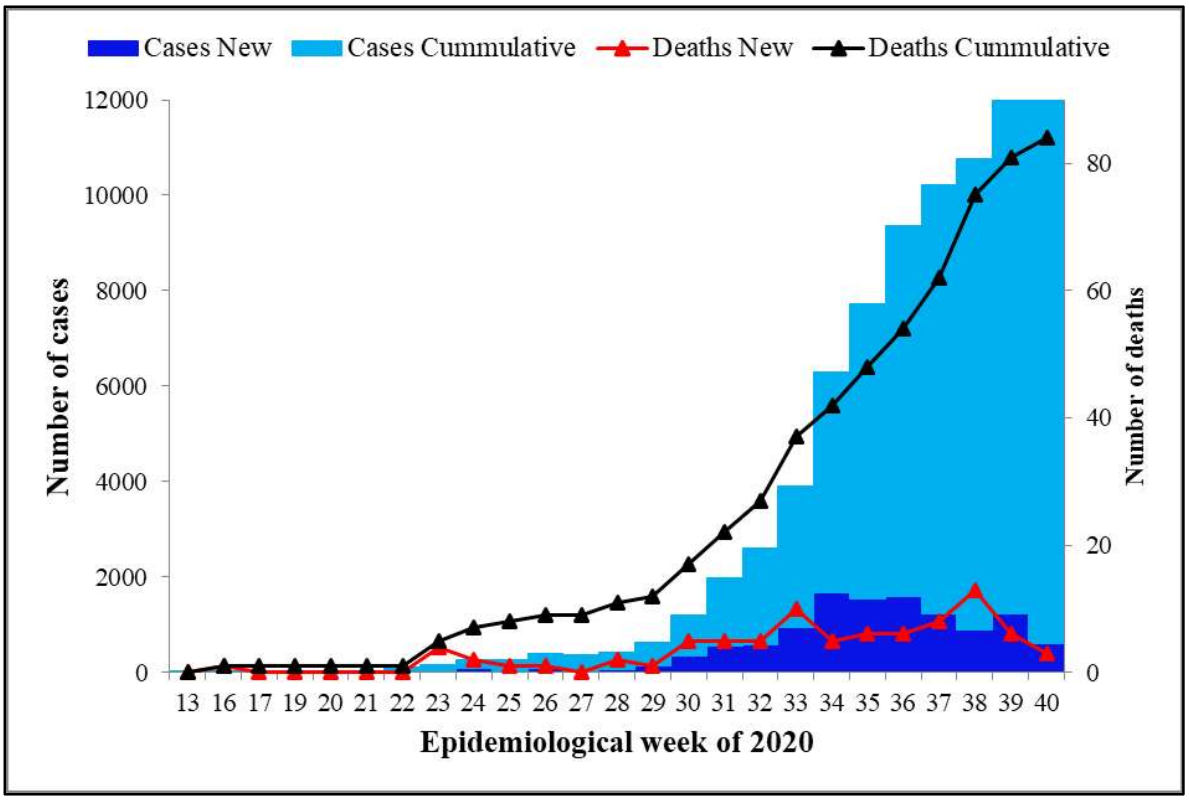


Figure 67: COVID-19 Trends of cases and deaths of in Oromia, Ethiopia September 2020

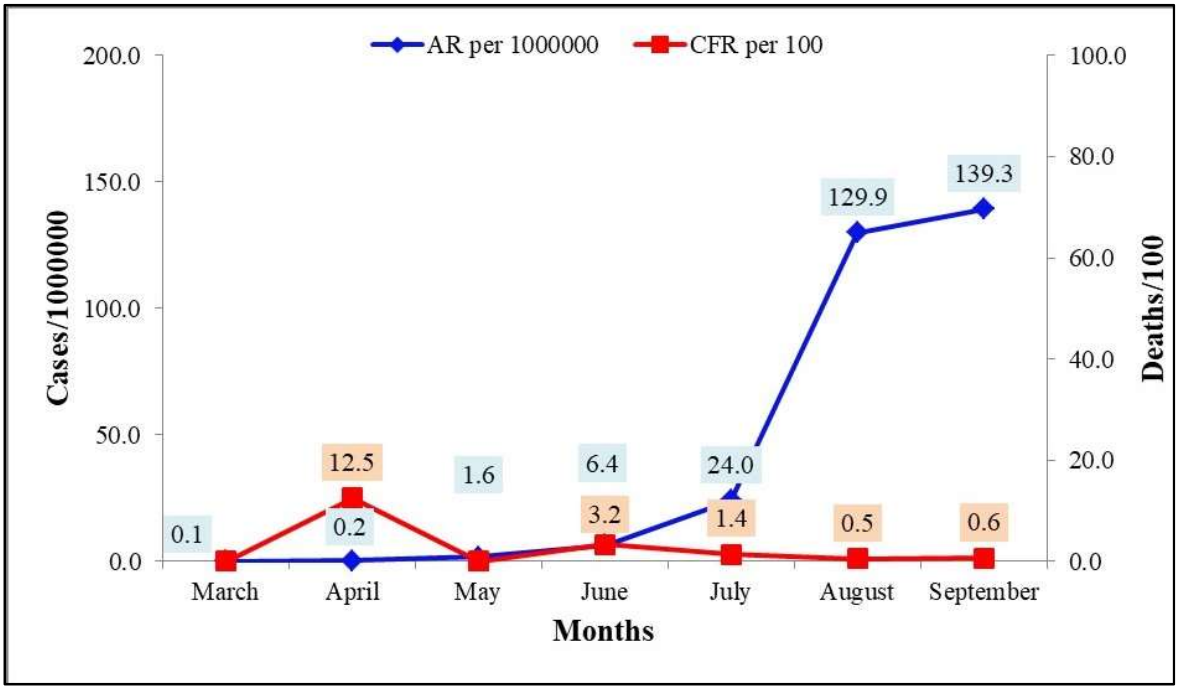


Figure 68: COVID-19 Trend of AR and CFR in Oromia, Ethiopia September 2020

B. Distribution by place

Among all cases the three top case reporting zones were East Shewa, Jimma and Finfine SOS with number of cases 1227, 524 and 478 respectively. From towns Bishoftu, Dukem and Burayu were the top three towns with number of cases 869, 773 and 649 respectively. The AR is relatively high in Dukem, Gelan and Laga Tafo towns 616.6/10000, 89.1/10000 and 82.5/10000 populations and CFR was high Waliso town, Finfine SOS and West Shewa with rate of 3.23%, 3.14% and 2.92% respectively. Among 11715 cases 285 (2.4%) cases and 5 (6%) deaths investigated by the Oromia region were residents of other regions (Table 45). The spatial distribution of cases reported cases were dense at towns especially in the nearby of laboratory centres (Fig 69).

Table 45 AR and CFR of COVID-19 Oromia. Ethiopia September 2020

Name of Town/Zone	Total Population	Total Cases	Total Deaths	AR per 10000	CFR (%)
Oromia	**38,865,436**	**11,715**	**84**	**3.0**	**0.72**
Arsi	3,663,410	421	2	1.1	0.48
Bale	1,266,366	157	0	1.2	0.00
Borena	551,902	169	0	3.1	0.00
Buno Bedele	838,172	70	0	0.8	0.00
East Bale	600,382	95	0	1.6	0.00
East Hararge	3,855,181	391	1	1.0	0.26
East Shewa	1,615,892	1,227	0	7.6	0.00
East Wollega	1,625,081	207	3	1.3	1.45
Finfine SOS	690,470	478	15	6.9	3.14
Guji	1,509,081	272	0	1.8	0.00
Horo Gudru Wollega	822,516	101	1	1.2	0.99
Ilu Aba Bora	987,191	136	1	1.4	0.74
Jimma Zone	3,489,033	524	2	1.5	0.38
Kelem Wollega	1,119,772	289	1	2.6	0.35
North Shewa	1,685,755	211	4	1.3	1.90
South West Shewa	1,246,461	72	1	0.6	1.39
West Arsi	2,750,732	247	1	0.9	0.40
West Guji	1,273,540	128	1	1.0	0.78

West Hararge	2,652,044	160	4	0.6	2.50
West Shewa	2,690,723	274	8	1.0	2.92
West Wellega	1,924,560	469	1	2.4	0.21
Adama town	396,817	607	4	15.3	0.66
Ambo town	96,521	126	1	13.1	0.79
Asela town	115,055	223	0	19.4	0.00
Batu town	78,784	56	0	7.1	0.00
Bishan Guracha town	50,771	22	0	4.3	0.00
Bishoftu town	172,376	869	0	50.4	0.00
Burayu town	105,486	649	9	61.5	1.39
Dukem town	12,536	773	4	616.6	0.52
Gelan town	15,717	140	1	89.1	0.71
Holeta town	47,527	130	2	27.4	1.54
Jimma town	206,886	132	1	6.4	0.76
Lega Tafo town	21,587	178	0	82.5	0.00
Mojo town	57,006	243	1	42.6	0.41
Nekemte town	128,652	368	4	28.6	1.09
Robe town	75,909	45	0	5.9	0.00
Sebeta town	164,064	418	3	25.5	0.72
Shashemene town	171,813	171	1	10.0	0.58
Sululta town	24,880	151	1	60.7	0.66
Woliso town	64,785	31	1	4.8	3.23
Addis Ababa		*177*	*0*		
Unknown		*106*	*5*		
SNNP		*1*	*0*		
Gambela		*1*	*0*		

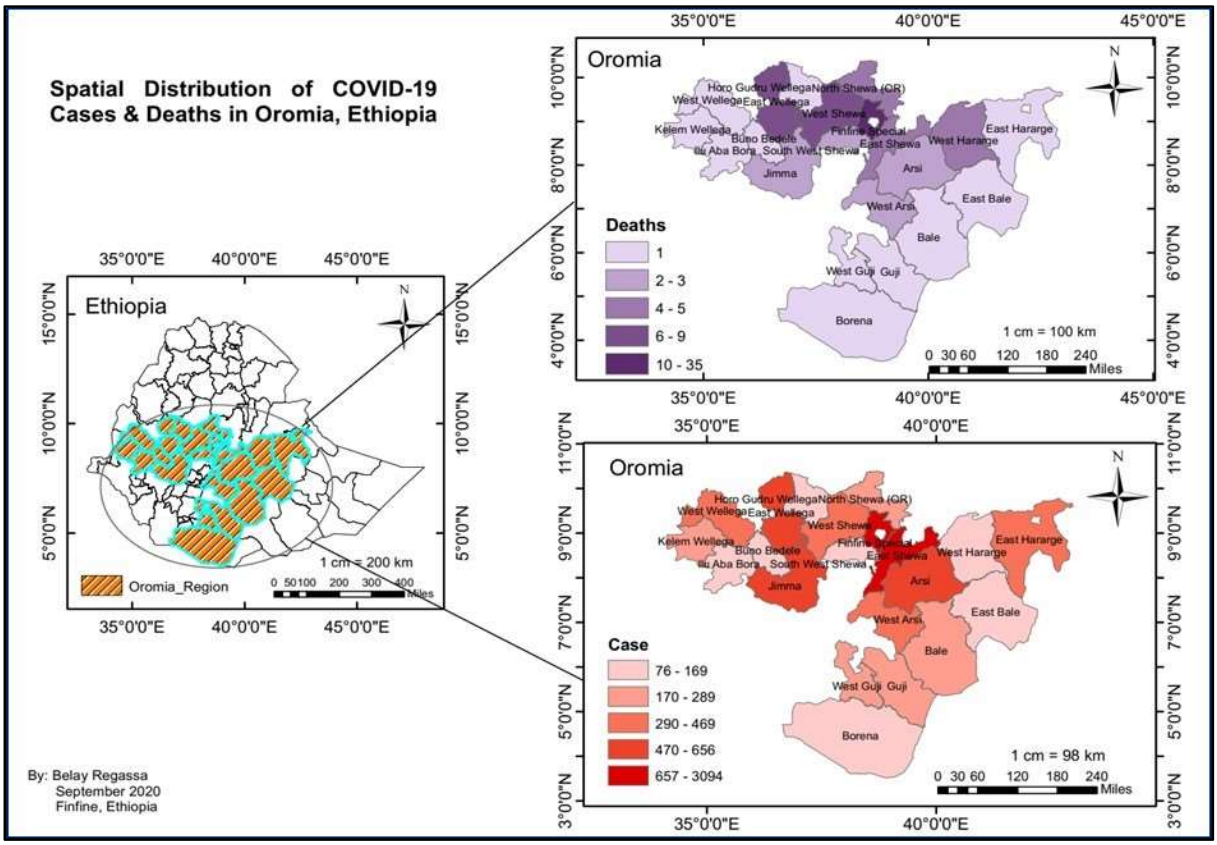


Figure 69: Spatial Distribution of COVID-19 in Oromia, Ethiopia September 2020

C. Distribution by person

Among all cases 8143 (69.5%) of them were male and their respective AR and CFR is 4/10000 population and 0.7% while the female were 3572 (30.5%) and their respective AR and CFR is 2/10000 population and 0.8% (Table 46).

Table 46 COVID-19 cases distribution by sex in Oromia, Ethiopia September 2020

Sex	Total Population	Cases	Deaths	AR/10000	CFR/100
Female	19,232,777	3572	29	2	0.8
Male	19,632,660	8143	55	4	0.7
Total	38,865,436	11,715	84	3	0.7

Regarding the distribution of cases by age group was 4091 (34.4%), 3863 (33%), 1689 (14.4%), 826 (7.1%), 494 (4.7%), 451 (3.8%) and 301 (2.5%) in 15-24, 25-34, 35-44, 45-54, 0-14, 55-64 and 65+ age groups respectively. The CFR was high in female 65+ age group with 5.2% and low in female 15-24 years age group with 0.2% (Table 47 and Fig 70).

Table 47 COVID-19 cases & deaths by sex in Oromia, Ethiopia September 2020

Age group	Female			Male			Total		
	Cases	Deaths	CFR	Cases	Death	CFR	Cases	Death	CFR
0-14	229	1	0.4	265	2	0.8	494	3	0.6
15-24	1434	3	0.2	2657	12	0.5	4091	15	0.4
25-34	1120	5	0.4	2743	13	0.5	3863	18	0.5
35-44	425	9	2.1	1264	9	0.7	1689	18	1.1
45-54	162	2	1.2	664	9	1.4	826	11	1.3
55-64	106	4	3.8	345	2	0.6	451	6	1.3
65+	96	5	5.2	205	8	3.9	301	13	4.3
Total	3572	29	0.8	8143	55	0.7	11715	84	0.7

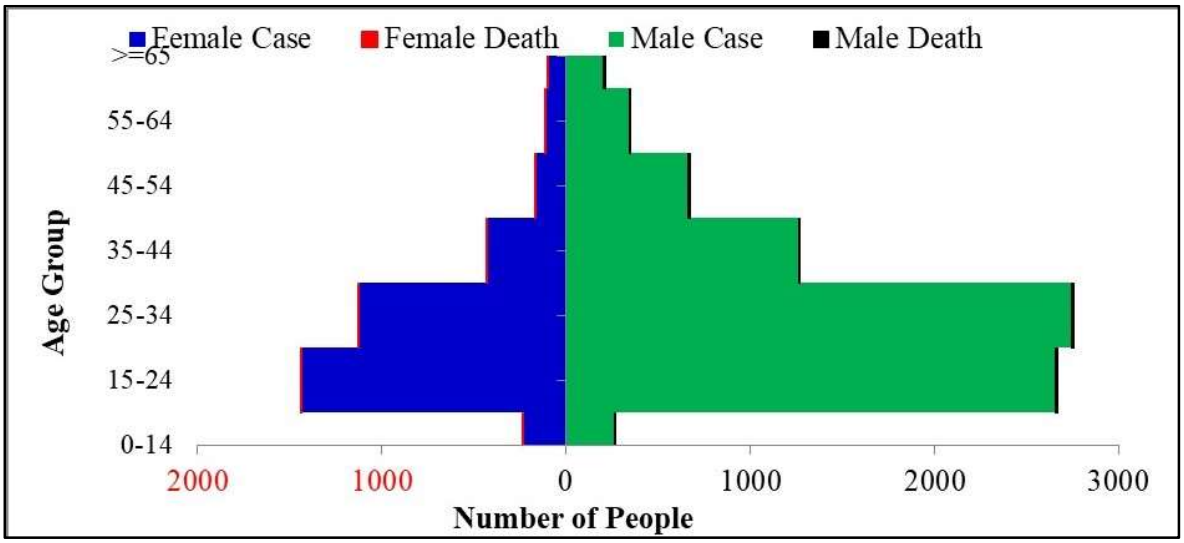


Figure 70: COVID-19 cases & deaths by sex & age group in Oromia, Ethiopia Sep 2020

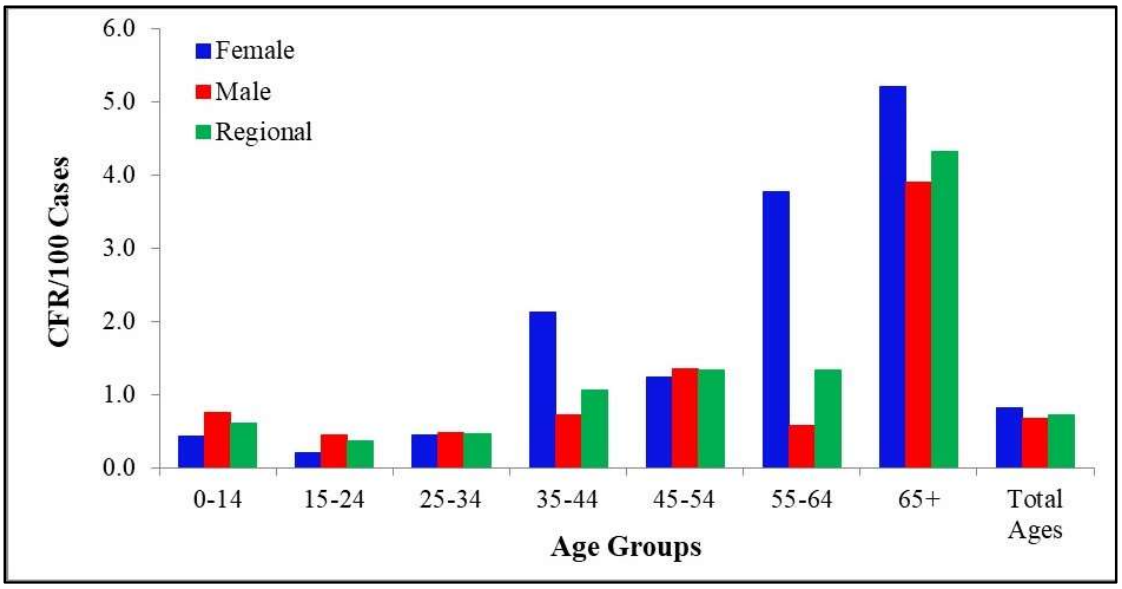
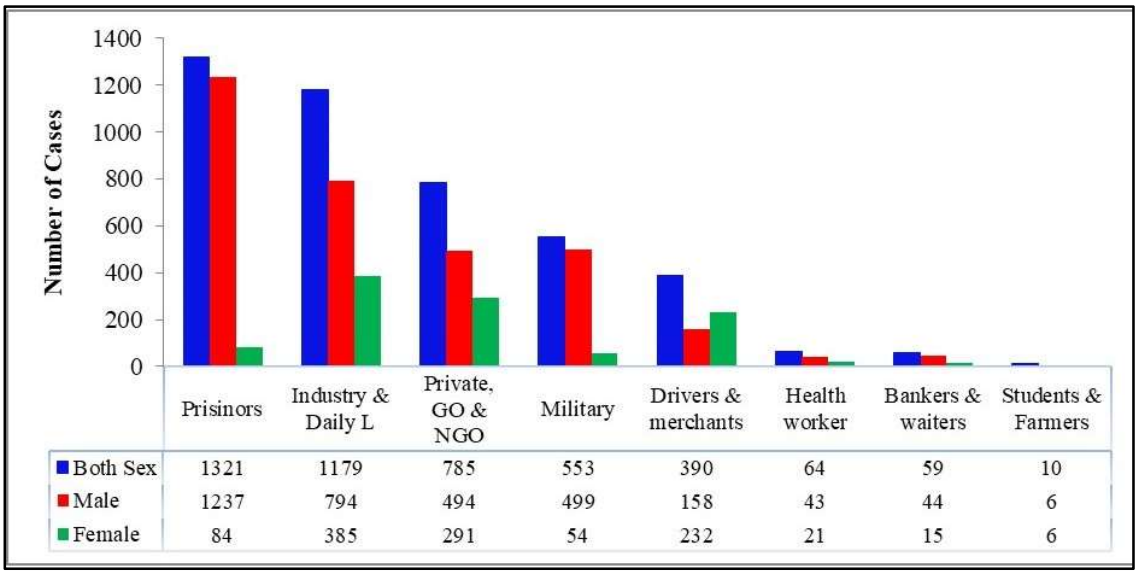


Figure 71: COVID-19 CFR by sex & age group in Oromia, Ethiopia September 2020

Among 4363 cases with known occupational categories; 75% of them were male and 25% 0f them were female. Male prisoners account 28% of all known occupational categories and students and farmers were the least (0.1%) affected occupational category. Industry workers, daily labourers, militaries, health workers, merchants, drivers, bankers and waiters were the affected workers than other unmentioned work categories (Fig 72).



	Prisinors	Industry & Daily L	Private, GO & NGO	Military	Drivers & merchants	Health worker	Bankers & waiters	Students & Farmers
Both Sex	1321	1179	785	553	390	64	59	10
Male	1237	794	494	499	158	43	44	6
Female	84	385	291	54	232	21	15	6

Figure 72: COVID-19 cases with sex & occupation in Oromia, Ethiopia September 2020

5.2.4 Discussion

As the result shows large number of cases were reported starting from July (Epi weeks 29, 30, and 31). This might be related to the conflict erupted after the killing artist Hachalu Hundessa (12; 13). During the conflict; most of the community gathered without taking care for prevention mechanism of the disease. Following the conflicts most youngsters were taken to prisons, which is one of the most risk area for the spread of COVID-19 in the region. During campaign of community based COVID-19 testing declared by the country in mid of August and September (10); the largest numbers of cases were reported. This is well known that the disease was distributed in the community as the source of infection report shows and these results in high number of cases due to large number of community were tested.

Large numbers of cases were reported from zones bordering Addis Ababa city which have largest number of cases in the country (10; 11); and high social interaction between Addis Ababa and the surrounding zone. Additionally zones those having high community movement to the centre also reported high number of cases. This is similar with reports from daily update of COVID-19 report from worldwide (4). Laboratory access for testing the sample might be another reason for prevalence of cases reported from each zone. Zones with easily accessible laboratory have large number of cases and vice versa.

Productive age group were more susceptible to the case than dependent age groups, similar to study in Israel (14), but the disease is more fatal to aged dependent groups than the productive one. High AR at productive age group may be due to high exposure to the risk areas like public gatherings, industrial employment and the reason for high fatality to aged groups might be due immune-compromise to resist the virulence effect of the disease. The Most cases were reported from prison, this might be due poor ventilation and lack if sanitary facilities in the prison. Industrial workers were the other more affected occupational categories due to their

working behavior that exposes the workers to the disease. Other occupational categories GO; NGO and private employees, militaries, health workers, merchants, drivers, bankers and waiters were also reported with high number of cases than unspecified occupations. This shows that occupations that need social relation were more risk than other solo works.

The descriptive result also shows fatality is high among symptomatic cases than asymptomatic one. This is related to more signs and symptoms are related to the cases were affected by the virus and the less immune system and also related to other comorbidities.

Based on our description of regional case line list; COVID-19 was highly disseminated in the community during July and August following uncontrolled social gatherings not taking care for transmission of the virus. COVID-19 can affect all age group and both sexes. The disease more affects group of community with low sanitation facilities, poor hygienic practice, with no personal protective equipment and being involve in public gatherings. Occupational categories and residential places might be factors for the spread of the virus. Spatially the burden of disease is more distributed in highly congested social movements were practiced.

5.2.5 Recommendation

Based on the findings:

- WHO, MOH and the EPHI should facilitate and invite scientific communities for further investigation on natural history, epidemiology, ways of transmission, diagnosis, treatment, prevention and control mechanisms of COVID-19.
- National and regional health authorities should prepare, revise and disseminate policies, guidelines, protocols and manuals related to COVID-19 prevention and control mechanism as well as COVID-19 surveillance systems.
- The regional health bureau should revise the PHEM structures to incorporate COVID-19 control and prevention team to regional, zonal, district and health facility level working units.

- Regularly; evidence based health education and awareness creation on COVID-19 should be given to the community by influential persons using all media communications except risky public gatherings.
- Due attention should be given by national and local governments to take action on ways of COVID-19 prevention and control in prisons to safe the institutions' community (prisoners and militaries).
- Industrial institutions should fulfil all necessary prevention personal protective devices and sanitary facilities based on recommendation of WHO and MOH protocols.
- Emphasis for social mobilization, awareness creation and health education on COVID-19 should be given at all GO, NGO, Private and public institutions.
- All level health authorities and partners should work together to equip health workers with basic knowledge of IPC as well as furnish health institutions with IPC materials.
- Finally; further investigation on the study area is the best remedy.

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Chapter VI

Abstracts for Scientific Presentation

6.1 VL Outbreak Investigation in Borena Zone, Oromia Region, Ethiopia 2019

6.2 COVID-19 Outbreak Investigation in Oromia Region, Ethiopia, September 2020

6.3 Health Profile Description of Walmara District, Oromia, Ethiopia 2019

6.4 Measles Surveillance Data Analysis of 5 Years in Oromia Region, Ethiopia 2019

Chapter VI: Abstracts for Scientific Presentation

6.1VL Outbreak Investigation in Borena Zone, Oromia Region, Ethiopia 2019

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Abstract

Introduction: Visceral Leishmaniasis (VL) is caused by *Leishmania* parasites that infect mammals transmitted by *Phlebotomine* and mostly affects the poorest. VL distributed worldwide and prevalent in Ethiopia. Knowing the occurrence and risk factor is a remedy for control. The aim of study was to identify factors associated with VL.

Methods: Case control study was used during October-November 2019 in Borena. A 1:2 Cases and controls were identified by case definition and 33 cases were included in the study. Participants >18years interviewed and caregivers of <18 were questioned for legal issue. Epi-info and SPSS were used for data entry and analysis. Primarily predictors were identified using chi-square at significant level P<0.05 with 95%CI, then candidate predictors were analysed using bivariate and multivariate analysis to identify associated factors.

Result: Among 153 suspected cases, 9 suspected deaths reported; 33 (22%) cases and 3 deaths were verified for VL. Among 33 verified cases 15(45.5%) were in July 2019, in comparison of 4years data, there is surge cases in July-August 2019, 26(79%) of cases were from Dire, Attack Rate (AR) = 15/100,000, CFR=9.1%. Among all, 15-64year were highly affected with AR=19.3. A case control engaged 99(100%) respondents and among all 93(93.9%) were male, 68(68.8%) were 15-64years. Adult education Adjusted Odds Ratio (AOR) = 30.438(2.378, 389.602), bed-net AOR=9.024 (1.763, 46.205) and walling AOR=0.052(0.004, 0.739) were associated factors with VL at 95%CI with p-value<0.05.

Conclusion: Male 15-64years were highly susceptible. Level of education, ITNs and walling were associated factors with VL. Formulating policies and guidelines for male 15-64 years related vector control and awareness creation regarding feeding habit of sand fly, prevention and control were recommended. Awareness of community on prevention method; using repellents, ITNs utilization, and safe sleeping mechanisms are mandatory. Further investigation on the issue is best remedy to overcome future VL outbreak occurrence.

6.2COVID-19 Outbreak Investigation Description in Oromia Region, Ethiopia, September 2020

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Abstract

Background: Coronavirus disease 2019 is illness caused by a novel coronavirus called SARS CoV-2; formerly called 2019-nCoV, which was first, identified amongst an outbreak of respiratory illness cases in Wuhan City, China beginning in December 2019. Based on the global and national situation and response Oromia Health Bureau has established new EOC having six sections to investigate and describe COVID-19 outbreak in Oromia, Ethiopia.

Methods: Descriptive study design was used in the affected area. All confirmed cases of COVID-19 investigated, tested and admitted and registered on line list from March 25th - September 30th, 2020 were reviewed. The socio demographic information were identified and described. All cases listed on the regional line list of COVID-19 were included in the description.

Result: Totally 11,715 confirmed COVID-19 cases and 84 deaths were reported. Among all confirmed cases 11,639 (99.4%) of them were asymptomatic. Among all 76 symptomatic cases; only 16 (21%) cases have underling comorbidity. Severity status of the cases were 11,576 (98.8%) asymptomatic, 51 (0.4%) mild, 17 (0.1%) moderate, 19 (0.2%) sever and 52 (0.4%) were dead body. The overall regional AR was 3/10,000 and CFR was 0.72%. Among all cases 8,143 (69.5%) were male, the top affected occupation category were prisoners 1321 (11.3%), industry worker & daily labourers 1179 (10.1%), private, NGO & GO workers 785 (6.7%), military 553 (4.7%), drivers and merchants 390 (3.3%), health workers 64 (0.5%), bankers and waiters 59 (0.5%), and the occupation of 7352 (62.8%) cases were not identified.

Conclusion: COVID-19 was highly disseminated in the community during July and August following uncontrolled social gatherings not taking care for transmission of the virus. COVID-19 can affect all age group and both sexes. The disease more affects group of community with low sanitation facilities, poor hygienic practice, with no personal protective equipment and being involve in public gatherings.

6.3Health Profile Description of Walmara District, Oromia, Ethiopia 2019

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Abstract

Background: Health profile is a collection, organizing and summarizing, presenting and discussing of health data health related indicators which provide a snapshot of health and wellbeing, pull together existing information in one place. We performed and developed health profile assessment of Walmara district in, Oromia Region.

Methodology: We conducted in the assessment Walmara District, of Oromia Region from February 11th – 29th, 2019 using descriptive cross sectional study having quantitative secondary data of 2017/8 was collected from the district government office using purposely prepared questionnaire. Microsoft Office Excel 2007 was used to analyse the collected data.

Result: Located at Latitude: 8° 54' 59.99" N Longitude: 38° 34' 59.99" and established in 1974. The district has a total of 24 Kebeles, 31 government offices. Based on 2007 census population of rural 109, 842(95%) and Urban 5854 (5%) with 59007 male and 56689 female. The performance of HCT 85.6%, Latrine coverage with HH 67.4%, ANC-162.7%, PNC-1 60.5%, TB Detection 39%, ODF 37.5%, LAFP 35.4%, ANC-4 22% and skilled delivery 17.9%. The annual health budget for health office is ETB 142,791,464.00. Child dependency ratio 0.83, aged dependency ratio 0.10 and the total dependency ratio is 0.93. AURI is the District's public health problem leading by 24% AFI, diarrhoeal and pneumonia is 39.8%. These leading causes of public health problems are housing conditions, environmental sanitation and personal hygiene and health seeking behaviours.

Conclusion: AURI, AFI, Diarrhoea and pneumonia are the top causes of morbidity. Environmental health activities like WaSH, institutional health, housing conditions, latrine utilization lacks attention and not included in main activity reports.

6.4Measles Surveillance Data Analysis of 5 Years in Oromia Region, Ethiopia 2019

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Abstract

Background: Measles is an acute, highly infectious viral disease caused by a Morbilli virus and for which humans are the only reservoirs and remains a disease of public health importance targeted for elimination in many areas of the world including Africa. We analyzed five years measles surveillance data analysis to identify morbidity and mortality trends in Oromia Region.

Methodology: We used facility based descriptive cross-sectional study in Oromia Regional Health Bureau based on data of 2014-2018. We defined measles case based on WHO definition as suspected, confirmed, and epidemiologically linked. After we checked for completeness of information we rejected those with incomplete information and analyzed the data using Microsoft Office Excel 2007.

Result: Totally 24626 cases and 111 deaths were reported during 2014 to 2018 in the region. The CFR was 450 per 100,000 populations. More cases (16,215) were reported in 2015 and fewer cases (961) were in 2018. The maximum age group affected was 1-4years with 29.1% (7169). More cases were reported in February and least in September. The distribution of cases by zones is high at W. Wollega with 2948, and low in N. Shewa with 229 cases. Of all reported cases 42% were unvaccinated and only 4% took 2 doses. Unvaccinated cases were high in Guji (66.9%) and Vaccinated cases were high in Q. Wollega (65.9%). Among all cases 15.5% of them were confirmed cases.

Conclusion: Age 1-4years were highly affected and the burden of the disease high unvaccinated. Dry seasons were more favorable climate for transmission of measles than rainy season. A significant laboratory confirmation is mandatory to launch the case is outbreak or not. After confirmation; epidemiological linkage is enough to implement outbreak control interventions and no need laboratory investigation of each suspected case.

Chapter VII

Protocol/Proposal for Epidemiologic Research Project

3.2 Prevalence of Under-five diarrhoea and Associated Factors in Open defecation free and Open Defecating Kebeles of Walmara District, Finfine SOS Zone, Oromia Ethiopia

Chapter VII: Protocol/Proposal for Epidemiologic Research Project

7.1 Prevalence of Under-five diarrhoea and Associated Factors in Open defecation free and Open Defecating Kebeles of Walmara District, Finfine SOS Zone, Oromia Ethiopia

Summery

Background: Approximately 37% of the world's population lacks approved sanitation. 11% of the global population is not drinking safe water and 319 million of these people live in sub-Saharan Africa. Moreover, the lack of sanitation facilities even obliges people to practice open defecation (OD), which is a major risk factor for diarrhoeal disease. The majority of OD practices, referred to in national surveys as defecating in fields, forests, bushes, bodies of water or other open spaces, take place in rural areas of low-income countries. Based on the district health profile of 2017/18 of Walmara district the ODF Kebeles are 37.5%, and out of ten top diseases in the district 3rd most cause of morbidity is diarrhoeal disease. Regarding this issue there is no study conducted in this district that described and quantified whether the CLTSH strategy has been made a remarkable improvement in the reduction of U5 diarrhoea.

Methodology: Community based comparative cross-sectional study design will be used. All U5 children who visited health centre in one month with diarrhoea case from all ODF declared Kebeles and similar number of OD Kebeles of Walmara District. When additional 10% non-response rate is included the final sample size becomes 479 ≈ 480. Therefore the sample size for ODF Kebeles will be 240 and for OD krbeles will be 240 cases. The dependent variable will be number of u5 diarrhoea morbidity visited health facility in one month and the independent variables: socio-demographic factors, mother and child status, environmental factors and behavioural factors. The factors will be evaluated that variables identified as associated ($P < 0.05$) with diarrhoea in the binary and multivariate logistic regression analysis will be used to predict U5 diarrhoea. The results to be presented in the form of tables, Figures and text using frequencies and summary statistics such as standard deviation, mean, and percentage to describe the study population in relation to relevant variables.

7.1.1 Introduction

7.1.1.1 Background

The World Health Organization (WHO) defines diarrhoea as the passage of three or more loose or watery stools within a day or unusual frequency of diarrhoea episodes. Diarrhoeal is usually a symptom of an infection in the intestinal tract which can be caused by bacteria, viral and parasitic organisms (1; 2). In 2017, almost 1.6 million people died from diarrhoeal diseases globally. Each year 525000 children of under 5 year (U5) died from diarrhoeal diseases were children under five years old (3; 1). Among U5, diarrhoeal disease is second to lower respiratory infection as the most common infectious cause of death (4; 5; 1).

Acute diarrhoeal disease is a leading cause of illness globally and is associated with an estimated 1.4 million deaths per year (3). Among people die from diarrhoeal diseases each year, > 80% of cases are U5. Diarrhoea remains the leading cause of morbidity and mortality in U5 worldwide (4). The incidence rate of diarrhoeal disease among children in low- and middle-income countries is estimated to be 2.9 episodes per child per year, for a total of 1.7 billion episodes annually; an average of 2.6 episodes of diarrhoea each year, with the peak incidence occurring between 6 and 11 months of age (4; 5).

Approximately 37% of the world's population lacks approved sanitation. 11% of the global population is not drinking safe water and 319 million of these people live in sub-Saharan Africa (2). Moreover, the lack of sanitation facilities even obliges people to practice open defecation (OD), which is a major risk factor for diarrhoeal disease (6). The majority of OD practices, referred to in national surveys as defecating in fields, forests, bushes, bodies of water or other open spaces, take place in rural areas of low-income countries (7)

Ethiopia began to adopt a Community-Led Total Sanitation and Hygiene (CLTSH) approach which aimed at generating a collective sense of intolerance towards OD through empowering local communities to find solutions for sanitation related problems such as diarrhoea (8).

7.1.1.2 Statement of Problem:

Diarrhoea spread through contaminated food or drinking-water or from person-to-person as a result of poor hygiene (1). Recurrent, acute diarrhoea in children in tropical countries results in environmental enteropathy with long-term impacts on physical and intellectual development (5). Inadequate quantities and quality of drinking water, lack of sanitation facilities, and poor hygiene cause millions of the world's poorest people to die from preventable primarily diarrhoeal diseases each year (4).

The burden of diarrhoeal diseases is disproportionately high among children in low- and middle-income countries. In the year 2016 alone, diarrhoea kills almost 15,000 U5 in Ethiopia (4). It is estimated that 15% of the global population (7) and 27% of Ethiopia population are practicing OD which contributes to the high prevalence of diarrhoea-related morbidity and mortality (6).

Over 75-80% of the communicable disease in Ethiopia are caused due to poor environmental health conditions arising from unsafe and inadequate water supply and poor hygienic and sanitation practices (9). To tackle this high diarrhoeal prevalence, the Federal Ministry of Health of Ethiopia (FMoH) had promising to achieve a substantial improvement in safe water provision and sanitation facilities including a reduction in OD practice through CLTS approach (10).

Even though; ODF status reduced the overall prevalence of U5 diarrhoea among the individuals living in the ODF villages compared with the OD villages (7), in the year 2017 diarrhoea is 1st for cause of U5 morbidity, 4th for the cause of adult morbidity, 6th for the cause of U5 admission, 10th for the cause of adult admission, and 10th for the cause of U5 mortality among the ten top causes in Ethiopia (11).

Based on the district health profile of 2017/18 of Walmara district the ODF Kebeles are 37.5%, and out of ten top diseases in the district 3rd most cause of morbidity is diarrhoeal disease. Regarding this issue there is no study conducted in this district that described and quantified whether the CLTSH strategy has been made a remarkable improvement in the reduction of U5 diarrhoea.

7.1.1.3 Significance of the Study

The burden of diarrhoeal disease and impact of CLTSH on diarrhoeal disease in the district needs investigation by considering those OD and ODF Kebeles. Therefore, this study aimed to assess the prevalence of diarrhoea among under-five children in open defecation free and open defecating Kebeles in Walmara District, Central Ethiopia. Additionally this study contributes for other investigators as a source of information who wants to study on the area.

7.1.2 Literature Review

7.1.2.1 Prevalence and Risk Factors of Diarrhoea among U5 Children

In 2016, diarrhoea was the 8th leading cause of death among all ages and the 5th leading cause of death among U5. Childhood wasting, unsafe water, and unsafe sanitation were the leading risk factors for diarrhoea, responsible for 80·4%, 72·1%, and 56·4% of diarrhoea deaths in U5, respectively. Prevention of wasting in 1762 children could avert one death from diarrhoea (12). The highest death rates in Sub-Saharan Africa and South Asia, where rates typically range from 50 to 150 per 100,000; in the Central African Republic and Chad rates are estimated to be over 150 per 100,000. Across most of the rest of the world, rates are below 5 per 100,000 and in some cases below 1 per 100,000 and moving the time slider back to 1990 shows that the death rates were much higher back then (3).

In Haiti the World Vision conducts about 89% of its operations, have the highest prevalence of diarrhoea for U5 in the whole country. Approximately one in every four child in these departments suffers from diarrhoea, while one in every five children is affected by diarrhoea in other parts of the country (13). In Indian study shows children less than 2 year were 4.26 times more likely to suffer from diarrhoea compared to the age group of 2 to 5 years. Association of fever and cough showed statistical significance. Qualitative data showed cause of diarrhoea was mainly due to food poisoning, unhygienic food; eating food from outside food and the main organism was viral followed by bacteria. Fever and cough were due to cross infection (14).

According to study conducted in Nigeria high cases were recorded in the month of January 22.5%, which showed that dry weather with high humidity is a good condition for parasites to grow, since the wet season lasted from April to October while the dry season lasted from November to March, that easily led to contamination of food, as many people due to low income

cannot afford a refrigerator for food storage (15). The overall prevalence of diarrhoea was 13% in North East and 17% higher in other regions than 9% in the south west. The odds of diarrhoea was significantly higher among rural households in the South-South but more prevalent in urban North East and South East (16)

The study conducted in Sidama Zone shows the 2 weeks prevalence of diarrhoea among children U5 was 13.6. Factors like; educational level, age of indexed child, nutritional status, and hand washing method, hand washing after latrine, refuse disposal method and housing floor material were significantly associated with the occurrence of childhood diarrhoeal diseases. More males than females were infected in nearly all age groups in both diarrhoeal and control groups. Mothers learned about the problem through health workers, television and in medical centres (17; 15).

Study in Eastern Ethiopia indicates; the two week prevalence of diarrhoea among children U5 was 22.5%. Improper refuse disposal practices, lack of hand washing facilities, living in rural area, the presence of two or more siblings in a household, and age of the child were the major risk factors for diarrhoea. Risk correlated with mother's education, occupation, latrine type, waste water disposal, hand washing, kitchen cleaning; sources and storage of water; and bottle milk. Ignorance greatly contributed to the spread of parasitic disease in the Umuahia of Nigeria (18; 15).

In Northern Ethiopia diarrhoeal disease in U5 was more common among non-model model families compared to model families. The occurrence of diarrhoeal disease in U5 children was 8.1% among model and 20.2% among non-model families. Maternal history of diarrhoea in the last 2 weeks preceding the survey was 15.2% among model and 20.9% in non-model families. Diarrhoea in U5 was 2.6 times more likely to occur among families who practice improper method compared to families who apply proper waste disposal method (19).

The two weeks period prevalence of diarrhoeal disease among U5 in Hadaleala District of Ethiopia was 26.1%. Childhood diarrhoeal disease was statistically associated with unprotected drinking water sources, inadequate drinking water service level; drinking water sources not protected from animal contact, un-availability of any type of latrine, presence of human excreta in the compound, not washing hand after visiting toilet, and live in one living room (20)

Unmatched case-control study of children 6-59 months conducted in Chire Hospital, Hawasa, Ethiopia showed that age of 6-11 months, five or more persons in the house-hold, inappropriate disposal of infant faeces, lack of vitamin-A supplementation, maternal history of recent diarrhoea and poor knowledge of respondents about risk factors were significantly associated with acute diarrhoea (21).

7.1.2.2 Impact of Open Defecation Free on Diarrhoea Prevalence

Globally, an estimated 892 million people, approximately 12% of the global population, defecates in the open. Ending open defecation by 2030 is the aim of Sustainable Development Goal target 6.2, importantly shifting focus to sanitation behavior from just sanitation access, as was the focus in the Millennium Development Goal era. In India, where an estimated 60% of those practicing open defecation reside, the government has also shifted focus to prioritize ending open defecation over increasing coverage alone (22).

OD results in water-borne diseases, such as acute diarrhoea that is responsible for high morbidity and mortality among all age groups. Repeated incidence of diarrhoea due to poor sanitation, improper disposal of human and animal excreta, lack of hand washing after defection and before eating food, and the use of unsafe drinking water severely affects both physical and cognitive development of children. In India more than 1.7 million children U5 died in 2010, with diarrhoea being responsible for more than 13% of deaths (23).

World Vision Haiti implemented a series of activities focused on reducing OD, improving access to clean water and promoting hygiene behavior change. The household census revealed that more than 90% of the most vulnerable families practice OD in holes or ditches and less than 4% of them have access to improved sanitation facilities, such as individually owned or shared modern toilets or latrines. Three years after CLTSH approach, close to 8,000 families have dug their own latrines at home, pushing access to improved sanitation up to 28.5% among the most vulnerable families and reducing OD down to 68.4% (24).

Diarrhoea accounts for 9% (800,000) of deaths of children U5 worldwide due to constant exposure and ingestion of germs from faecal matter. In Ethiopia for instance; diarrhoea is the leading cause of mortality for U5, causing 23% of deaths. Other study in Ethiopia demonstrated that “the overall prevalence of U5 diarrhoea among the individuals living in the ODF village was

lower as compared with the OD. A similar result was observed in Kenya, where the only two sub-districts in the country that were ODF had significantly lower prevalence of diarrhoea than other areas (25; 7).

Study in Mali shows access to private latrines was almost twice as high in intervention villages and reported OD was reduced in female and in male adults. Children in CLTS villages were taller and less likely to be stunted than children in control villages. 22% of children were underweight in CLTS compared with 26% in control villages. In villages that received a behavioural sanitation intervention with no monetary subsidies, diarrhoeal prevalence remained similar to control villages. However, access to toilets substantially increased and child growth improved, particularly in children <2 years. CLTS might have prevented growth faltering through pathways other than reducing diarrhoea. (26).

UNICEF reports that in India, 48% of U5 are stunted, resulting most often from malnutrition and poor sanitation. Stunting is associated with an underdeveloped brain, with long-lasting harmful consequences, including diminished mental ability and learning capacity, and poor performance continuing into adulthood (23).

A study on effect of eliminating OD on diarrhoea morbidity in Kenya shows mean monthly diarrhoeal cases a year before OD were eliminated was 208. One year after elimination of OD, the mean monthly diarrhoea cases were 149, and 92 two years after elimination of OD. Diarrhoea cases declined by 28.4% one year after being declared OD and 38.3% two years after being declared OD. Number of diarrhoeal cases reduced significantly after eliminating OD. It shows some promising results that eradicating OD coupled with practice of hygiene may reduce diarrhoea in children. The two study area sub-counties certified ODF showed a decline in diarrhoea cases in children across the three years compared to sub-countries yet to attain ODF status (27).

In Philippines a study compared prevalence of soil transmitted helminthes in two villages where CLTS had been implemented attaining OD status. One CLTS village had a significantly higher cumulative prevalence of soil transmitted helminthes at 67.4 % while the other had a significantly lower cumulative prevalence of 4.9 %. On the other hand, the non- CLTS villages

had cumulative prevalence of 16.7 and 16.8 %. Reasons given for the high prevalence in one CLTS village include possible reversion to OD and non-utilization of latrines (28).

According to the report of CLTSH program evaluation: in the intervention areas, of all sampled households having U5, about a third (30%) had seen their children affected by diarrhoea in the two weeks prior to the survey and in comparable control areas, some (24.8%) households had seen this same problem among their children (8). In the Mali study, 97 % of villages were declared ODF. Follow up found some villages had reverted to OD as human faeces in latrine floor or compound was observed in 10 and 5.4 % of CLTS households. Also over a third of CLTS households shared latrines (27).

Child stunting and wasting is observed to be one of the most widespread consequences of OD and poor sanitation around the world. A study published in India demonstrated that child stunting statistics were significantly higher in areas where the practice of OD was more frequent. In these districts, it was noted that "Over half of the children are stunted, and almost a third of children are severely stunted." In another paper, Spears has stated that living with or near neighbours that continue to practice OD the negative health effects of OD are significantly more pronounced owing to densely populated regions (25; 29).

Availability and accessibility of improved latrine facilities for families not only helps maintain their health but it also helps keep their social dignity; which is especially more important for women than for men in most Ethiopian cultures as it is socially more embarrassing for the women to be seen while defecating (8).

The study conducted in Goba-Bale shows; two weeks diarrhoeal prevalence in U5 among ODF and OD households were 17.2% and 23.2%, respectively. A significant difference in the occurrence of diarrhoea was observed between ODF and OD households. Unsanitary disposal of children`s faeces, exclusive breastfeeding and mother not attend formal education were factors associated with diarrhoea in ODF households. On the other hand, latrines, presence of faces in the compound and child age were factors associated with diarrhoea in OD households (6).

Yaya Gulale study revealed that; two weeks period diarrhoea prevalence was 13.4% in implemented CLTSH and 36.3% in unimplemented CLTSH. Having two or more children under

five years old, lack of clean water storage, negative attitude of mothers/caregivers toward diarrhoea, presence of faeces in the compound, and lack of hand washing facility in the compound were associated factors of the outcome (30).

In Dangla District the prevalence of diarrhoea was 9.9% in ODF and 36.1% in OD Kebeles. In ODF Kebeles, child immunization, latrine presence, water shortage, and solid waste disposal have statistically significant association with diarrhoea occurrence. While in OD Kebeles child immunization, water access of 7.5–15 litres/day, water shortage, and proper solid waste disposal have significant association with diarrhoea occurrence (7).

7.1.2.3 Conceptual Framework

Based on the literatures reviewed factors predominantly associated with prevalence of diarrhoea among children of less than 5 years are socio-demographic factors (age, level of education, residential place, family size and occupation), Environmental health related factors (unsafe source and storage of water, unsafe food, poor housing condition, latrine, other sanitary facilities), maternal and child status (malnutrition, bottle milk, history of diarrhoea, cross infection, lack of Vit A supplementation and poor knowledge of mother) and behavioural factors (poor critical hand washing practice, unsafe handling and disposal of child faeces, poor breast feeding habit and ignorance). Open defecation results in water-borne and food borne diseases such as acute diarrhoea that is responsible for high morbidity and mortality among all age groups. ODF cannot be looked at in isolation but affected and affects other factors which is reported as a significant contributor for the prevalence of diarrhoeal disease (Figure 60).

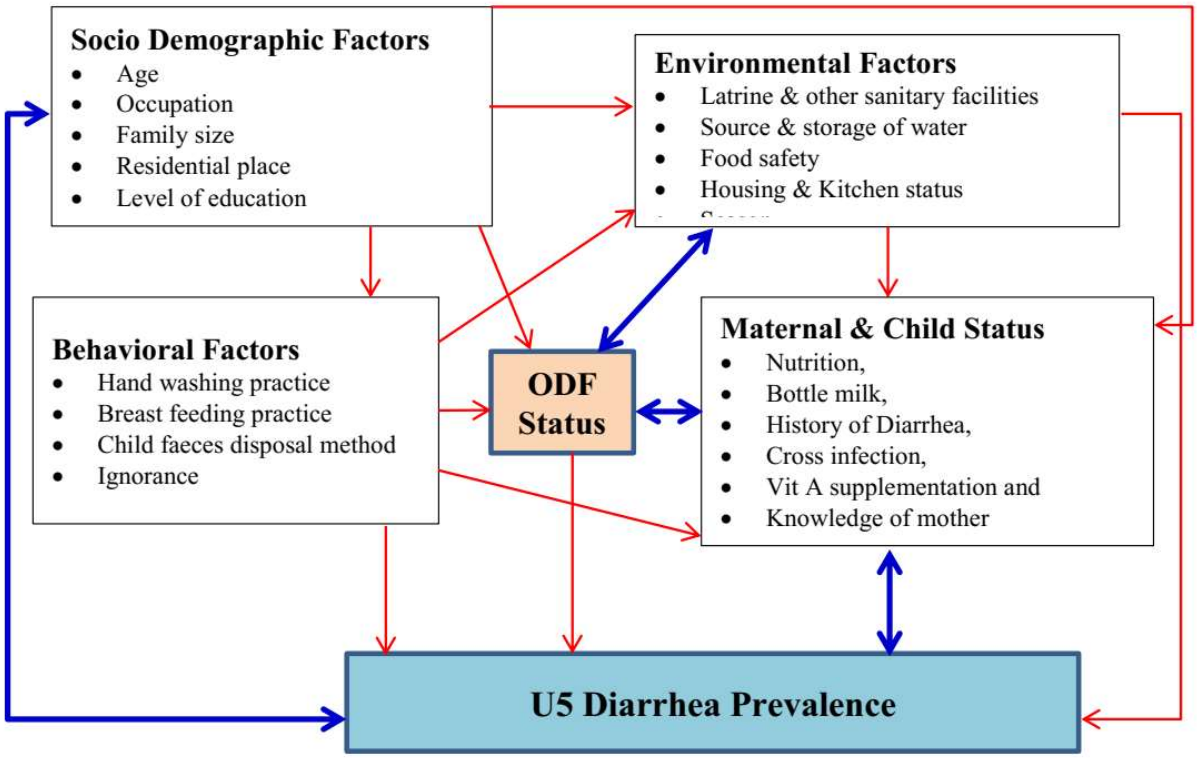

Figure 73: Conceptual Framework of U5 Diarrhea and Related Factors

7.1.3 Objective

7.1.3.1 General Objective

To assess diarrhoeal prevalence of one month in under five children in open defecating and open defecation free Kebeles in Walmara district, central Ethiopia, 2020

7.1.3.2 Specific objective

- To describe prevalence of U5 diarrhoea morbidity of one month among OD and ODF Kebeles
- To identify factors associated with U5 diarrhoea morbidity among OD and ODF Kebeles
- To compare prevalence of diarrhoeal diseases in OD and ODF Kebeles

7.1.4 Methodology

7.1.4.1 Study Area and Period

The study will be undertaken in Walmara District, Oromia region located at Western direction of Addis Ababa at 29 KM. to West direction on the main road to Ambo (Figure 74). The study period will be from May to July 2020.

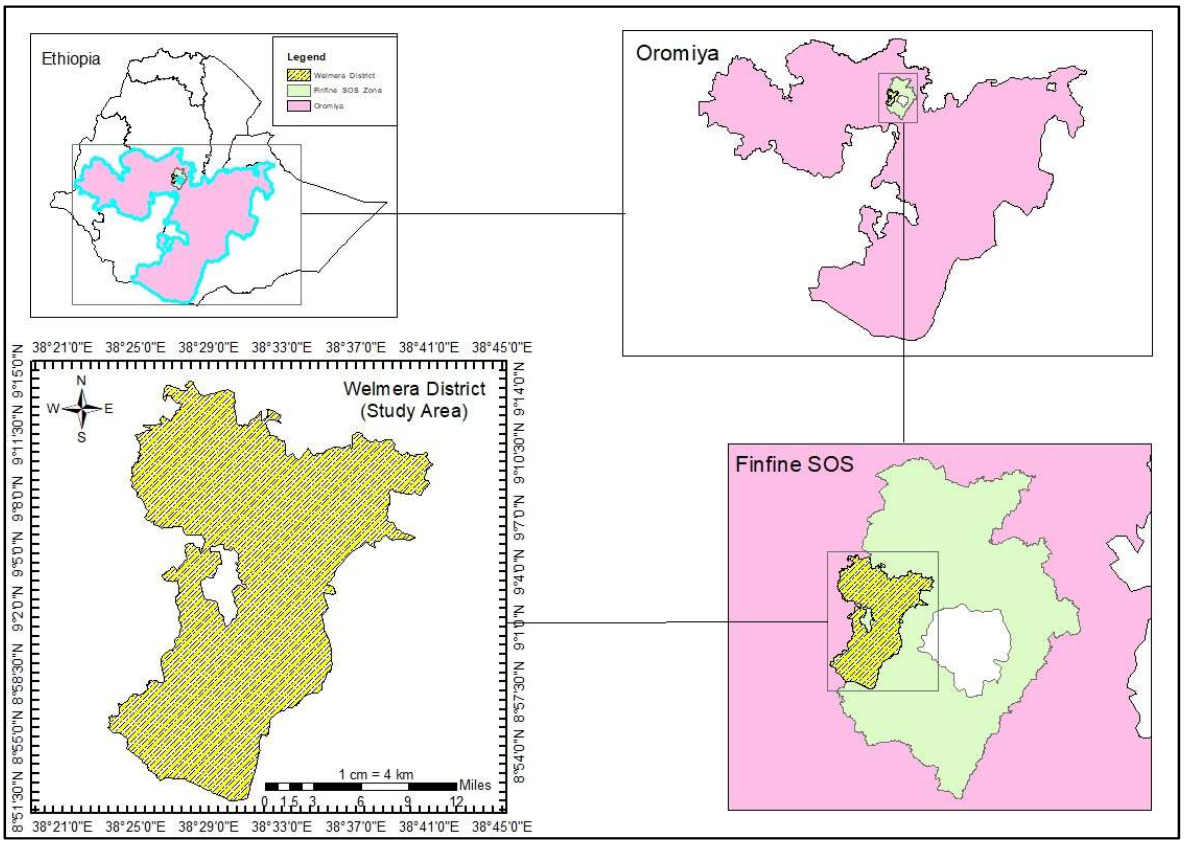

Figure 74: Map of Walmara District, Oromia, Ethiopia February 2020

7.1.4.2 Study Design

Community based comparative cross-sectional study design will be used.

7.1.4.3 Source Population

All one month outpatient attendants of all Health Centres from all ODF declared Kebeles and similar number of OD Kebeles in Walmara District of Oromia Region in 2020 GC will be the source population of this study. Only Kebeles that declare ODF status before one year prior to the study were included in ODF setting.

7.1.4.4 Study population

All U5 children who visited health centre in one month with diarrhoea case from all ODF declared Kebeles and similar number of OD Kebeles of Walmara District. Only Kebeles that declare ODF status before one year prior to the study were included in ODF setting.

7.1.4.5 Eligibility Criteria

A. Inclusion Criteria

All U5 diarrhoea cases visited all health facilities from ODF Kebele and similar number of OD Kebeles in Walamara District during one month.

B. Exclusion Criteria

Those U5 diarrhoea cases visited the health centres from outside Kebeles of the District and Kebeles out of selected similar OD Kebeles of Walmara District

7.1.4.6 Sample Size Determination

The assumptions used for sample size calculation will be double population proportion:

- The ratio (r) between OD and ODF Kebeles will be 1,
- From previous study result of Goba District of Bale Zone (6), the prevalence of Diarrhoea in ODF Kebeles (p_1) = 17.2% and in OD Kebeles (p_2) = 23.2%
- $P = \frac{p_1 + r\ _2}{1+r} = \frac{0.172+1(0.232)}{1+1} = 0.202$
- 95% confidence interval and
- 80% power
- The sample size n will be calculated using double proportion formula:

$$n = \frac{(Z_{\alpha/2}\sqrt{2P(1-P)} + Z_{1-\beta}\sqrt{p_1(1-p_1)p_2(1-p_2))2}}{(p_1 - p_2)^2}$$

$$n = \frac{(1.96\sqrt{2 * 0.202(1-0.202)} + 0.84\sqrt{0.172(1-0.172)0.232(1-0.232))2}}{(0.172 - 0.232)^2}$$

$$n = \frac{(1.96*0.57+0.84*0.16)^2}{(0.172-0.232)^2} = \frac{1.5665}{0.0036} = \underline{\underline{435}}$$

When additional 10% non-response rate is included the final sample size becomes 479 ≈ 480. Therefore the sample size for ODF Kebeles will be 240 and for OD krbeles will be 240 cases.

7.1.4.7 Sampling Procedure

All 480 samples will be proportionally distributed to four health centre of the District based on their size of catchment population. Based on this for Asgori HC 204, for Gudu HC 101, for Talache HC 96 and for Kolobo HC 79 samples will be distributed.

Figure 75: Schematic Presentation of Sampling Procedure

7.1.4.8 Data Collection

A. Data Collection Tools

Structured interviewer administered questionnaire will be adapted from similar conducted studies in the country concerning the topic and restructured to be used objectively. The questionnaire will consist of socio-demographic and economic, mother and child status, Environmental health issues, and behavioural factors. The questionnaire will carefully translated from English to Afan Oromo and back to English by two language experts in both languages. The questions will be grouped and arranged according to the logical order of variables, so that objectives and all important variables of the study will be addressed.

B. Data Collectors

At each health centres 2 health workers will be assigned and there will be totally 8 data collectors. The investigator will be the supervisor of data collectors. All data collectors will be oriented on contents of data collection tool/the questionnaire.

C. Data Collection Procedure

Data will be collected from care giver of U5 children with case of diarrhoea in the health centre. Difficult terminologies will be explained to the respondents in work language based on data collection guideline to reduce interpersonal information differences.

D. Quality Control

Data collection tools will be originally prepared by English and translated to Afan Oromo and the back to English to by both languages professional. Before actual data collection, pre-test will be done on 5% of the sample households who have similar socio demographic characteristic in neighbouring district to check items in the questionnaire and revision of the questionnaire will be made based on the result of the pre-test. 10% of the entered data was re-checked by comparing the entered data with the actual questionnaire. Any errors identified at this time were corrected after revision of the original data using the code number. One day training will be given for data collectors on the final version of questionnaire by the investigator.

7.1.4.9 Study Variables

A. Dependent Variables

- Number of U5 diarrhoea morbidity visited health facility in one month

B. Independent Variables

- **Socio-demographic factors:** Age of child and mother/caregiver, family size, residential place, occupation, average annual income and educational status of the mother/caregiver.
- **Mother and child status:** Vaccination, history of diarrhoea and other infections, Vit. A supplementation and knowledge on diarrhoea.
- **Environmental factors**: Latrine & other sanitary facilities, Source & storage of water, Food safety and Housing & Kitchen status
- **Behavioral factors**: Hand washing practice, Breast feeding practice, Child faeces disposal method

7.1.4.10 Operational Definition

Diarrhoea: is defined as a disease characterized by frequent loose stool at least 3 times in 24 hours as evidenced from mother/ caregiver during the visit of health facility.

Hand washing at a critical time: if a mother/caregiver reported to practiced hand washings with soap before eating, before food preparation, before child feeding, after child cleaning, and after latrine visiting was considered as "all practiced" unless considered as "partially practiced".

Safe water sources: Piped water connection to household, public taps or standpipes, boreholes or tube wells, protected dug well, protected spring and rainwater cistern.

Open defecation free: is a status given by an independent, third-party group of relevant stakeholders for a given community village, Kebele, District or an entire region has 100% HH latrine coverage and totally free of open defecating practices.

Unsafe water sources: Unprotected dug well, unprotected spring, cart with small tank or drum, surface water (e.g., river, dam, lake, pond, stream, irrigation canal) and bottled water.

Unsanitary disposal of children's faeces: includes put/rinsed faeces into drain or ditch, faeces were thrown into the garbage or faeces left, or the child was not seen during defecation.

7.1.4.11 Data Processing and Analysis

The collected data will be cleaned, coded and entered to Epi info^{TM}7 and exported to SPSS version 20 software for analysis. The X^2 statistic tests the overall statistical significance of the model, and adjusted odds ratios and their corresponding 95% CI will be reported to assess the association between individual variables and diarrhoea case.

Finally, it will be evaluated that variables identified as associated at p-value < 0.05 and its 95% CI with diarrhoea in the binary and multivariate logistic regression analysis will be used to predict U5 diarrhoea. The results to be presented in the form of tables, Figures and text using frequencies and summary statistics such as standard deviation, mean, and percentage to describe the study population in relation to relevant variables.

7.1.4.12 Ethical Consideration

Before data collection, ethical clearance will be obtained from Ethical Review Committee of Addis Ababa University School of Public Health and Oromia Regional Health Bureau for revision and approval by Ethical Clearance Committee of the bureau and permission letter will be written to Walmara District Health office and communicated to each HC directors. The purpose and the importance of the study will be explained and verbal consent to be obtained

from each participants of the study. Finally, confidentiality of the information will be guaranteed by using unspecified questionnaires and by keeping the data secretly.

7.1.4.13 Dissemination of Result

After the completion of the study, it will be presented to AAU School of Public Health. Attempts will also be made to present it on regional health bureau and scientific conferences. Findings will be submitted to SPHMMC and to Oromia Regional Heath Bureau, Walmara DHO and disseminated to all concerned stakeholders.

7.1.5 Action Plan

Table 48: Action Plan of U5 Diarrhoea Investigation in Walmara, Oromia Ethiopia 2020

List of Activities to be done	Time of Implementation						
	Feb	Mar	Apr	May	Jun	Jul	Aug
First draft proposal development	√	√					
Final proposal submission			√				
Proposal presentation and defense			√				
Ethical approval				√			
Data collection				√			
Data entry and analysis				√	√		
Thesis first draft writing					√		
Incorporating comments and submission of second draft					√	√	
Submission of thesis						√	
Thesis defense							√

Key

√ - implementation time

7.1.6 Budget Breakdown

Table 49: Budget for Investigation of U5 Diarrhoea in Walmara, Oromia, Ethiopia 2020

S.N	Item description	Unit	Quantity	Unit price	Total Price
1	**Stationery**				**3,170.00**
1.1	Note book (Writing pad)	pcs	10	10	100
1.2	Lexi Pen	pcs	10	5	50
1.3	Pencil	pcs	10	2	20
1.4	Duplication paper for questionnaire	pkt	4	400	1600
1.5	Bags for carrying questionnaires	pcs	4	350	1400
2	**Professional allowance and per diem**				**24,080.00**
2.1	Cost for data collectors per Questionnaire	pcs	504	20	10080
2.4	Per diem for driver	Days	10	300	3000
2.5	5 days per diem for data encoder	Days	10	200	2000
2.6	5 days per diem for investigator	Days	10	500	5000
2.7	Refreshment on training	person	20	200	4000
3	**Transportation**				**6,500.00**
3.1	Car rent for 5 days	Days	5	500	2500
3.2	Fuel for 300 KM for 5 days	Litter	200	20	4000
4	**Sub Total (1+2+3)**				**33,750.00**
5	Contingency (5% of #4)				1,687.50
6	**Total budget required for the study (#4+#5)**				**35,437.50**

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Chapter VIII

Other Additional Outputs

8.1 COVID-19 Outbreak Contact Tracing and Follow-up Narrative Report in Oromia, Ethiopia, September 2020

8.2 Narrative Summery of Internally Displaced Population in Nejo District, West Wollega, Oromia, Ethiopia, August 2019

Chapter VIII: Other Additional Outputs

8.1 COVID-19 Outbreak Contact Investigation and Follow-up Narrative Report in Oromia, Ethiopia, September 2020

8.1.1 Introduction

The coronavirus disease (COVID-19) has been identified as the cause of an outbreak of respiratory illness in Wuhan, Hubei Province, China beginning in December 2019. As of 31 January 2020, this epidemic had spread to 19 countries with 11,791 confirmed cases, including 213 deaths. The World Health Organization has declared it a Public Health Emergency of International Concern (1).

Physical contact and respiratory routs are the two most important well established routs of transmission of the virus. Poor hand hygiene practice, overcrowding, and close physical contacts like hand shaking contributes for the fast spread of the virus with in very short period of time. Experience from China where the disease was first recognized shows educating the public about the nature of the disease and the rout of transmission, restricting mobility of individuals within the border and across borders is proven to be key in preventing transmission (2; 3).

Case investigation and contact tracing, a core disease control measure employed by local and state health department personnel for decades, is a key strategy for preventing further spread of COVID-19. Identifying contacts and ensuring they do not interact with others is critical to protect communities from further spread. If communities are unable to effectively isolate patients and ensure contacts can separate themselves from others, rapid community spread of COVID-19 is likely to increase to the point that strict mitigation strategies will again be needed to contain the virus (4).

Case investigators and contact tracers need to: Immediately identify and interview people with SARS CoV-2 infections and COVID-19, Support isolation of those who are infected, Warn contacts of their exposure, assess their symptoms and risk, and provide instructions for next steps and link those with symptoms to testing and care.

In Ethiopia the first case was reported on 13rd, March of 2020 and the victim was Japanese citizen. The process of contact tracing was taken place as soon as the case was identified. In

Oromia region alone 25 contacts of this first case were traced, 6 contacts from Adama town and 19 of them from Arsi zone.

8.1.2 Oromia Region COVID-19 Prevention and Control Preparedness

To combat COVID-19 pandemic Oromia Health Bureau (OHB) has established new Emergency Operation Center (EOC) under the coordination of Public Health Emergency Management (PHEM) directorate having six sections. A comprehensive COVID-19 prevention and control preparedness plan was prepared having duties and responsibilities to all section which is monitored and evaluated regularly.

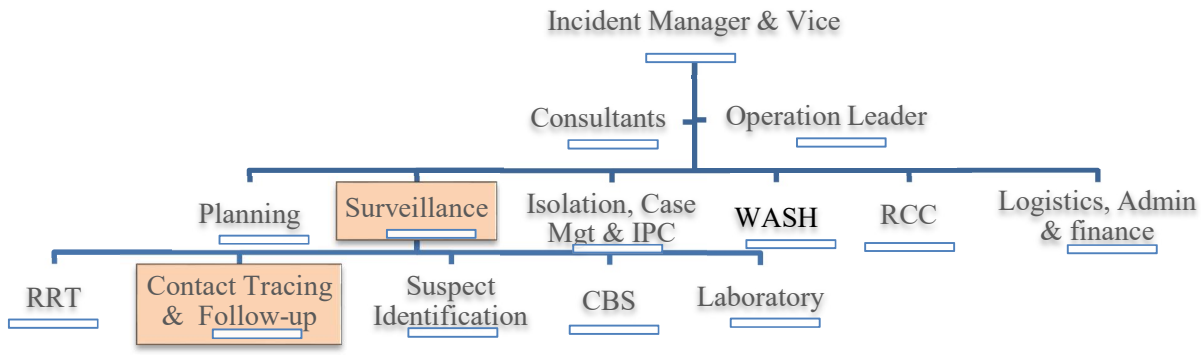

Figure 76: Oromia Region COVID-19 EOC Organography, September 2020

Accordingly; under the Surveillance section (Figure 64) the Contact Tracing and Follow-up team, has shared mandate of the following duties.

- Develop standardized reporting format contact tracing and follow-up
- Provide information, orient and support zone and town PHEM focal persons on the surveillance elements such as use of case definitions, how to use reporting formats, how to identify contacts type and category by using different Medias.
- On daily bases; compile, analyse, interpret and use the information of contact investigation and follow-up data reported from all zones and towns of the region.
- Provide updated information to top level management and other concerned sections and provide feedback to zones and towns.

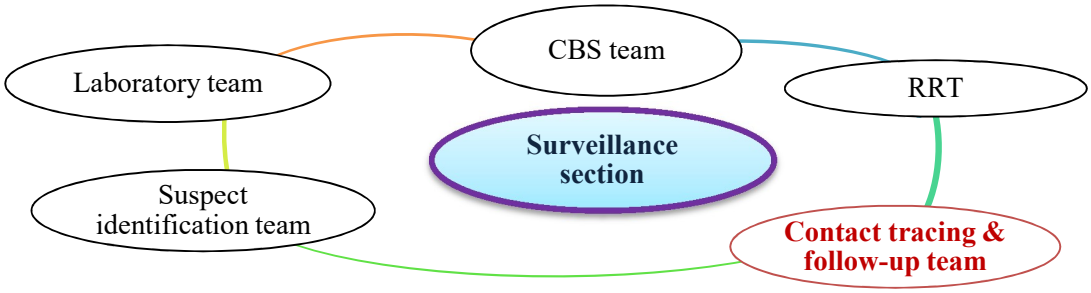

Figure 77: Oromia Region COVID-19 Prevention and Control Surveillance Section Organography

8.1.3 Objective

- To identify all social, familial, work and health care worker contacts who have had contact with a confirmed case from 2 days prior to symptom onset of the case and up to 14 days after their symptom onset
- To enable early detection of cases through active monitoring of peoples exposed to possible risks and rapidly contains the outbreak.

8.1.4 Methods of Reporting

This report is compiled in Oromia Region from March 15, 2020 to September 30, 2020. Based on developed standardized reporting format contact tracing and follow-up; each zone and town is expected to report the contacts as soon as case was identified and contacts were traced. The regional contact tracing and follow-up team compiles, analyse, interpret, take action and report to the federal EOC, regional incident management operation unit and the surveillance section. Feedback and correction measures were informed to zone and towns. The reporting formats, dash board, email, telephone, and other Social Medias were used as a tool of communication.

8.1.5 Main Activities Performed

In Oromia region from March to September 2020 totally 39, 449 contacts were traced for 2,886 cases (24.6%); in average 14 contacts per case were traced. Among 11,715 cases; for 8,829 (75.4%) cases, contacts were not traced due to different challenges.

8.1.5.1 Distribution of Contacts

A. By Place

Among all contacts 18,042 of them were reported from zone and 21,047 of them were from town administrations. Relatively, town administrations were more able to trace (29.6%) contacts for their respective cases than zone (20.9%) administrations and in contrast to; zone were traced

more (15 contacts/case) number of contacts per case than town administrations (13 contacts/ case) (Table 35&36). Among the zones, Borena has more (75%) able to trace contacts and North Shewa zone is the least (2%) able to trace contacts of their positive case. West Guji has traced more contacts per case (71contacts/case) and Kelem Wollega has traced least contacts per case (7contacts/case).

Table 50: Oromia COVID-19 Contact Investigation by Zones, September 2020

Name of Zone	Total no of Cases	No of Cases with contacts traced	%	Total no of Contacts Traced	Contacts/Case Ratio
Arsi	421	77	18.3	1856	24
Bale	157	44	28.0	1018	23
Borena	169	127	75.1	1804	14
Buno Bedele	70	3	4.3	74	25
East Bale	95	29	30.5	301	10
East Hararge	391	73	18.7	1415	19
East Shewa	1227	144	11.7	1393	10
East Wollega	207	58	28.0	437	8
FSOSZ	478	255	53.3	2473	10
Guji	272	29	10.7	737	25
Horo Wollega	101	4	4.0	113	28
Ilu Ababor	136	18	13.2	1027	57
Jimma Zone	132	71	53.8	1091	15
Kelem Wollega	289	91	31.5	670	7
North Shewa	211	4	1.9	145	36
South West Shewa	72	2	2.8	56	28
West Arsi	247	28	11.3	585	21
West Guji	128	6	4.7	427	71
West Hararge	160	24	15.0	765	32
West Shewa	274	81	29.6	1372	17
West Wollega	469	25	5.3	283	11
Sub total	**5,706**	**1,193**	**20.9**	**18,042**	**15**

From towns; Batu has more (80%) able to trace contacts and Gelan town is the least (3%) able to trace contacts of their positive case. Dukem town has traced more contacts per case (25contacts/case) and Mojo and Nekemte towns have traced least contacts per case (6contacts/case).

Table 51: Oromia COVID-19 contact investigation by Towns, September 2020

Name of Town	Total no of Cases	No of Cases with contacts traced	%	Total no of Contacts Traced	Contacts per Case
Adama Town	607	173	28.5	1405	8
Ambo Town	126	25	19.8	250	10
Asella Town	223	34	15.2	456	13
Batu Town	56	45	80.4	575	13
Bishan G. Town	22	1	4.5	15	15
Bishoftu Town	869	473	54.4	4436	9
Burayu Town	649	151	23.3	1452	10
Dukem Town	773	186	24.1	4868	26
Galan Town	140	4	2.9	26	7
Holota Town	130	48	36.9	496	10
Jimma Town	524	26	5.0	592	23
L. Tafo LD Town	178	19	10.7	240	13
Mojo Town	243	38	15.6	234	6
Nekemte Town	368	108	29.3	694	6
Robe Town	45	7	15.6	122	17
Sabata Town	418	191	45.7	4151	22
Shashemene T	171	33	19.3	347	11
Sululta Town	151	118	78.1	857	7
Woliso Town	31	13	41.9	191	15
Sub total	**5,724**	**1,693**	**29.6**	**21,407**	**13**
Addis Ababa	177*				
Unknown	106*				
Benshangul Gumuz	1*				
Gambela	1*				
Grand Total	**11,715**	**28,86**	**24.6**	**39,449**	**14**

**Residents of other region identified and admitted by Oromia region*

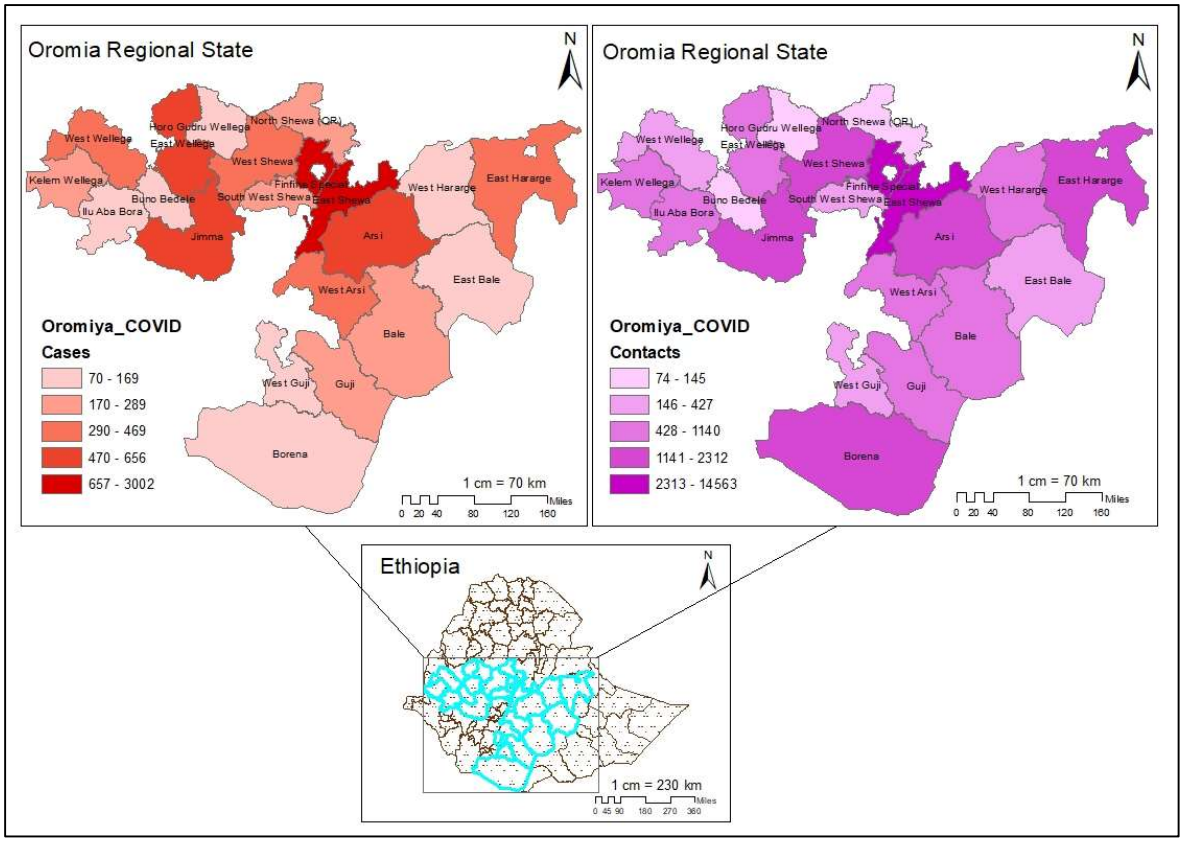

Figure 78 COVID-19 Cases & Contacts Spatial Distribution in Oromia, Ethiopia, 2020

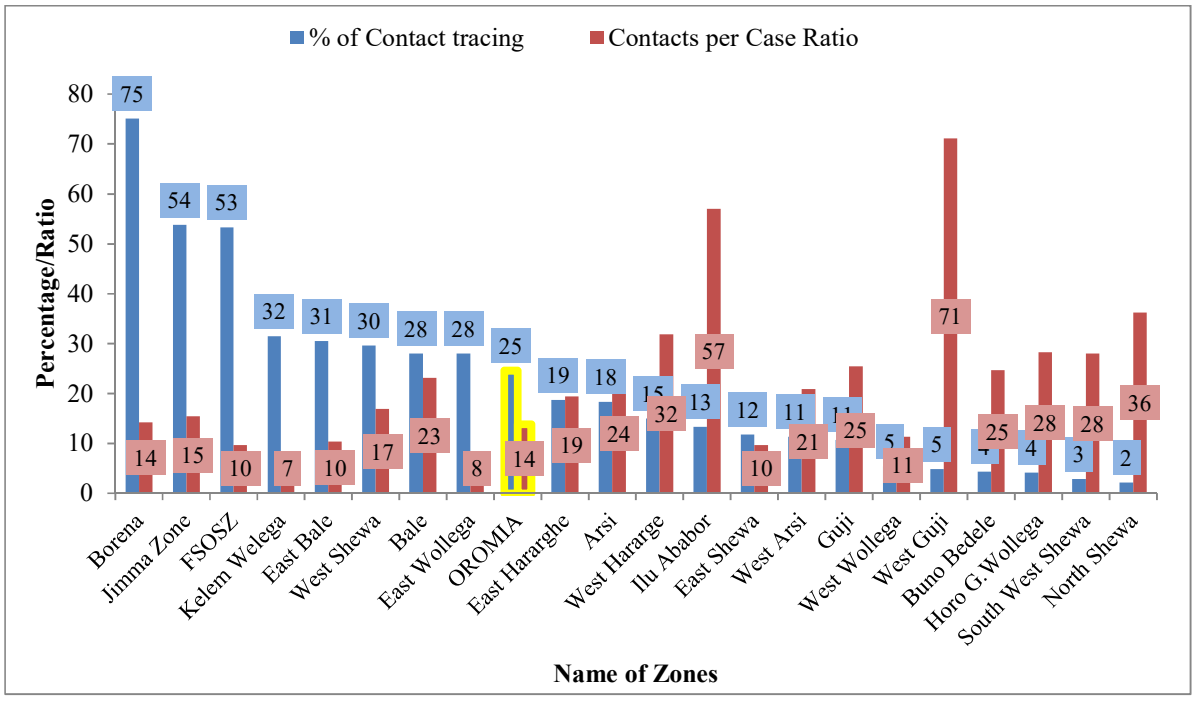

Figure 79: COVID-19 Contact Investigation Progress by Zones, October 2020

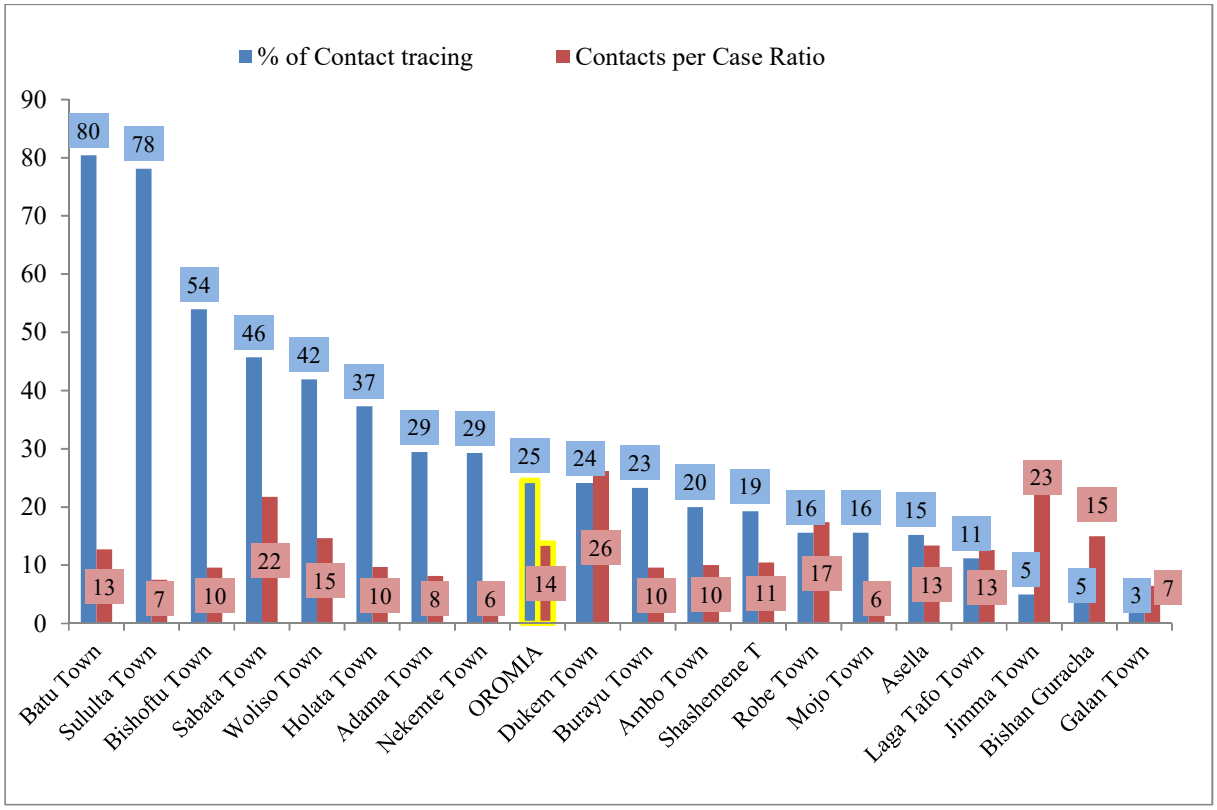

Figure 80: Oromia COVID-19 Contact Investigation by Towns, September 2020

B. By Person

Among all 39,449 (100%) contacts traced 22,898 (58%) of contacts were male and 16,551 (42%) of contacts were female (Figure 81).

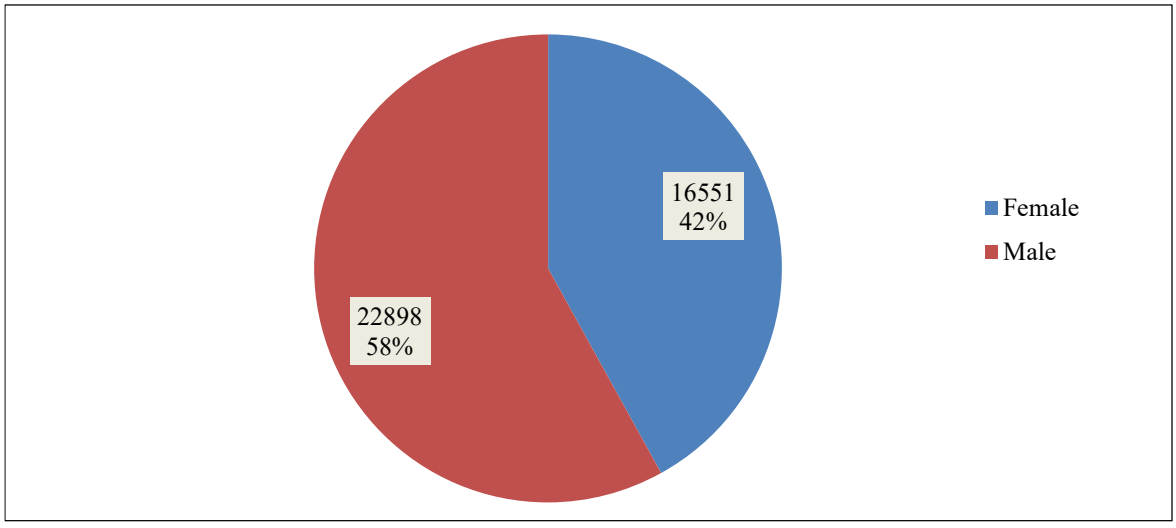

Figure 81 Oromia Region Covid-19 Contacts Traced by Sex, September 2020

Regarding their age group 25 – 34 were 33.2% of all contacts and they are more exposed to cases and age group > 60 were 1.6% of all contacts and less exposed to COVID-19 cases (Figure 69).

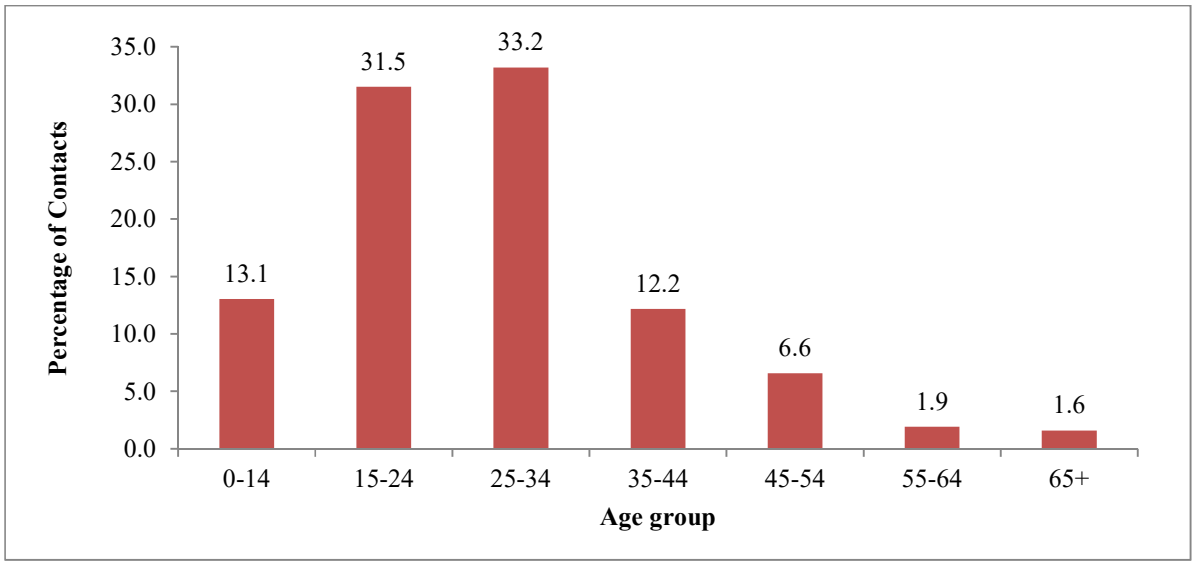

Figure 82: Oromia Region Covid-19 Contacts Traced by Sex, September 2020

C. By Time

Among 39,449 contacts traced maximum number of contacts were traced during week 35 during campaign of testing (6257 contacts) and minimum number of contacts were traced in week 13 (7 contacts).

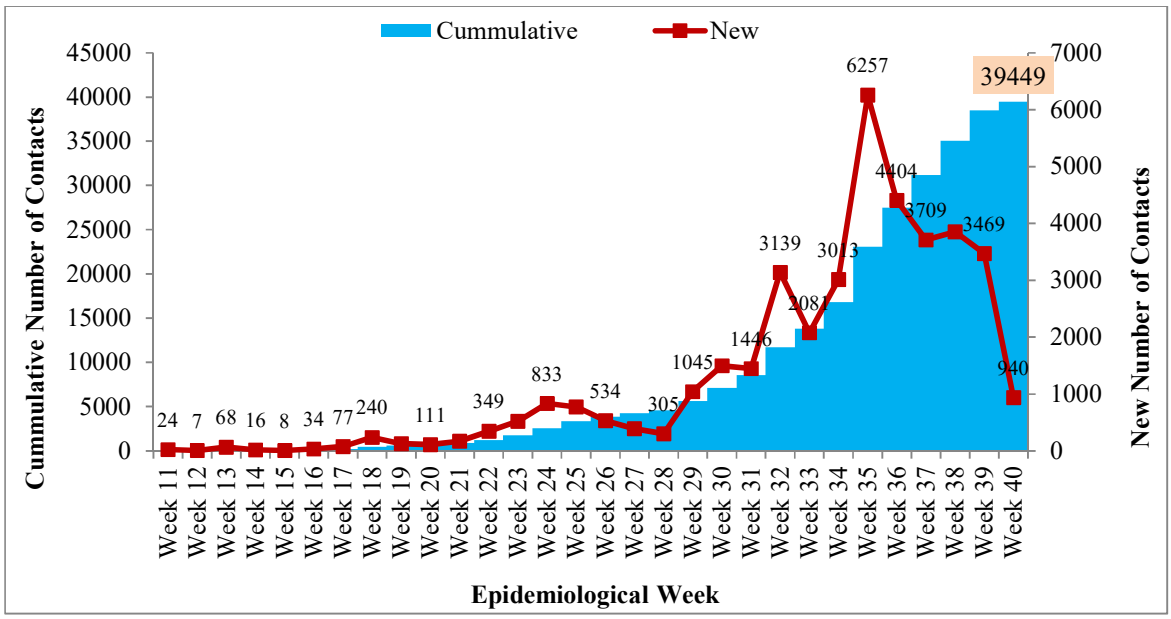

Figure 83: COVID-19 Weekly Trend of Contacts Tracing, Oromia, September 2020

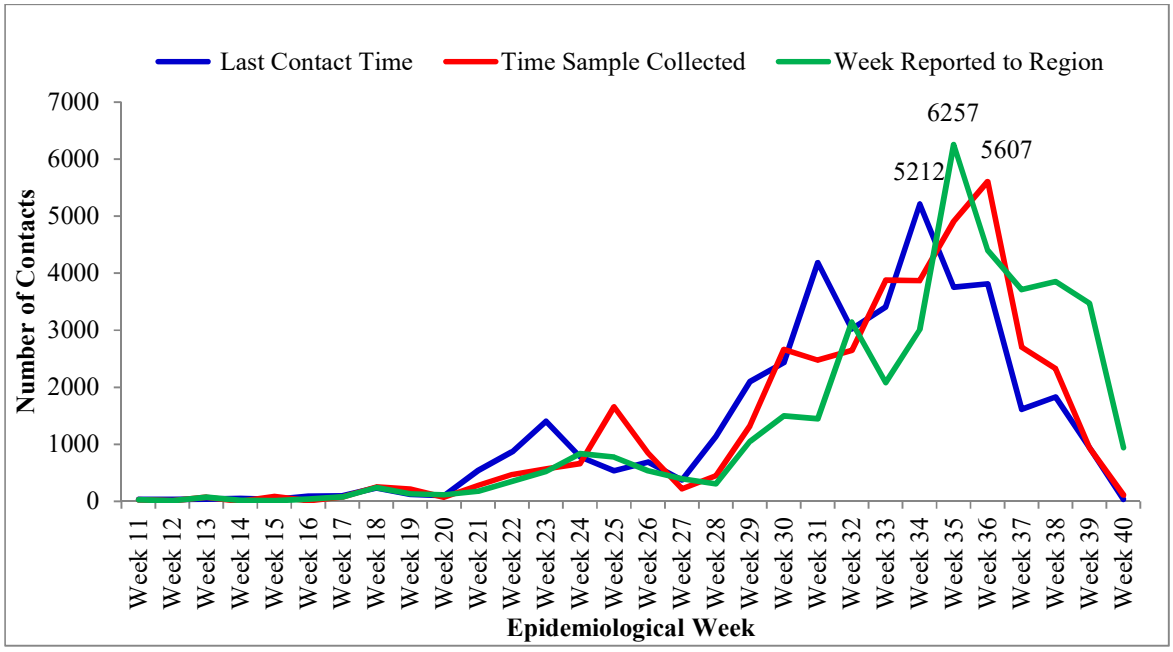

Figure 84: COVID-19 Weekly Trends of Contact Tracing by dates, September 2020

8.1.5.2 Contact Category, Isolation and Laboratory Status

Among the traced contacts 32,070 (81.3%) of them were close contacts. Of all contacts traced 86% of them were isolate and 14% of them were not isolated and among the isolated contacts 83.5% of them were home based and 16.5% of them were isolated in different facilities. Specimens for laboratory investigation were taken from 99.8% of all contacts and the result among the specimen collections were 96.3% negative and 3.7% were positive for COVID-19. The specimens were tested in different laboratory sites (Table 52).

Table 52: COVOD-19 Contacts Isolation and Lab Result Status, September 2020

Variables	Categories	Frequency	Percent
Contact Category	Close Contact	32,070	81.3
	Casual Contacts	7,379	18.7
Isolation Status	Not Isolated	5,537	14.0
	Isolated	33,912	86.0
Place of Isolation	Home-Based	28,301	83.5
(N=33,912)	Facility-Based	5,611	16.5
Specimen Collection	Not Collected	81	.2
	Collected	39,368	99.8
Laboratory Result	Negative	37,902	96.3
(N=39,368)	Positive	1,466	3.7
Place of Specimen Tasting	Adama Regional Lab	14,458	36.7

(N=39,368)	NAHDIC	3,792	9.6
	Bishoftu Veterinary Lab	2,786	7.1
	Arsi University	2,710	6.9
	Yabalo Veterinary Lab	2,705	6.9
	Nekemte Regional Lab	2,468	6.3
	Salale University	1,626	4.1
	Jimma University	1,523	3.9
	Ambo University	1,466	3.7
	Haramaya University	1,432	3.6
	Mada Walabu University	1,195	3
	Holota Laboratory	1,121	2.8
	Metu University	1,020	2.6
	EPHI	841	2.1
	Wollega University	225	0.6

The attack rate among the contacts was 372/10,000. The data shows from all 1466 positive tests 1,377 (94%) of them were among the close contacts and only 89 (6%) of them were from casual contacts (Figure 85).

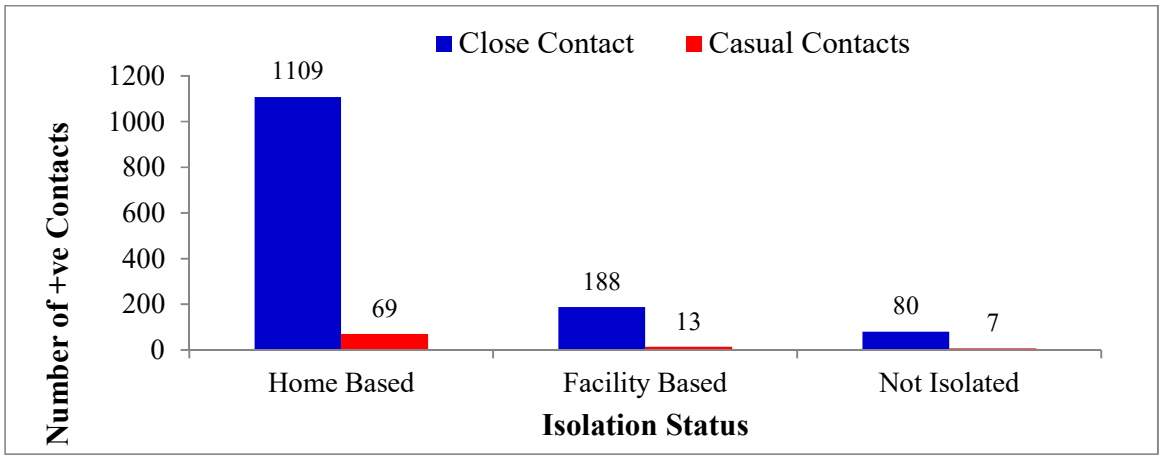

Figure 85: COVID-19 positive Contacts with their isolation status & contact category

8.1.6 Challenges

- Insignificant knowledge to the characteristics of COVID-19 in order to plan and implement strategies of combating the disease
- Psycho-social and socio-economic disturbances
- Political instability and existence of conflicts
- Misunderstanding towards ways of transmission and prevention mechanisms
- Scarcity of resources
- Unfavourable climatic condition for control of the virus

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4. **CDC**. Center for Disease Prevention and Control. *CDC.* [Online] CDC, 29 April 2020. [Cited: 30 September 2020.] https://www.cdc.gov/coronavirus/2019-ncov/php/principles-contact-tracing.html.

8.2 Narrative Summery of Internally Displaced Population in Nejo District, West Wollega, Oromia, Ethiopia, August 2019

8.2.1 Introduction

The ethnic conflict erupted in Ethiopia between the peoples of West Wollega Oromo and Benishangul Gumuz leaving peoples killed and thousands displaced in the area. In April 2019 there were 103,485 population in West Wollega Zone and 32, 637 population in Nejo displaced from their home leaving everything what they had. Following the conflict and displacements of thousands of persons; results in conditions for exposure to health and health related hazards including outbreaks of diseases, sexual and gender based violence and trauma. Addressing specific health needs – such as treatment for survivors of gender-based violence, maternal and new born care, promoting optimal nutrition, access to clean water and sanitation, and mental health and psychosocial support – is critical during response.

Internal displacement response needs; coordinated response and strong team linkage between stakeholders. Displaced populations are susceptible to: malnutrition, infectious disease outbreaks and psychological exhaustion. EPHI has deployed field epidemiology training program resident to this site as well as other IDP sites in the country to enhance coordinated IDP response and recovery by working together with relevant stakeholders on the nutrition, WaSH and health services at IDP sites and to provide technical support and strengthen link between the IDP harboring sites and EPHI.

8.2.2 Objective

- To improve access to quality primary health care
- To prevent or decrease communicable diseases
- To improve childhood survival
- To ensure and strengthen medical supplies provision and proper utilization

8.2.3 General Information

In Nejo district IDP sites there are 32637 internally displaced populations from Kamashi zone of Benishangul Gumuz regional state. Among these 16971 are male and 15666 female. In these

displaced population; there are 5352 under 5 children, 1132 pregnant women and 75 lactating mothers. In the site there are 6956 displaced households, among these male head of household are 5007 and female 1949. In this district there are 10 IDP sites and among these 3 sites are located at access to all weather road and 7 sites are accessible for dry weather road only.

Total health facilities serving these IDP site are 12, and from these; 1 hospital, 2 health centres, 9 health posts and 1 mobile clinic. In these health facilities there are more than 44 health workers are assigned and serving the population. In addition to government there are 3 partners participating in service provision for these IDP sites.

8.2.4 Main Activities Performed During the Deployment

8.2.4.1 Creation of Inter Sectorial Collaboration

The primary duty performed was; calling for all delegates of stakeholders to identify strengths and gaps of task force and technical committee at zonal and District level with coordination of administration and health office heads. Based on the delegates report of each stockholders; we tried to sharing suggestive ideas related to duties and responsibilities of each government officials and partners as well as fix weekly review meeting of task forces the district. In addition to conducting weekly regular meeting with task forces; we are incidentally communicating for urgent subjects.

8.2.4.2 Capacity Building and Orientation

Re orienting IDP and PHEM focal persons of districts at zonal level for one day on management of IDP sites, areas to be focused, frequency of communication, contents of daily reporting format. On these orientation 21 district PHEM focal persons, 21 district MCH coordinators and 10 zonal health department; totally 52 attendants were participated.

8.2.4.3 Follow up of Health Care Services Provision

Following creation of inter-sectorial collaboration and capacity building follow up of routine service provision is a key area of activity. Starting from displacement up to May 30th 2019: IDP site public health surveillance, Environmental health, Nutrition, Maternal and Child Care, Mental Health Psycho-Social Service, Human Resource Management, health facility resources and restoration, HIV, logistic and risk communication activities were implemented and reported to zone, region and national level. Some activity performances were summarized in the table below.

Table 53 Nejo IDP sites selected services at end of May 2019, Oromia, Ethiopia

Type of activity		Served Population
Children >2yrs dewormed		1214
Children 6-59 supplemented Vit A		1323
OPV 1,2,3 immunization		95
Penta 3		59
PCV 3		54
Rota 1 & 2 immunization		69
Measles		365
Delivery attended by skilled person		44
ANC service		216
Total children 6-59m screened	Total children screened	2885
	MAM	97
	SAM	19
PLW Screened	PLW Screened	512
	MAM	57
	SAM	0
MAM Children received treatment		97
SAM Children received treatment		19
MAM PLW received treatment		57
SAM PLW received treatment		0
Trauma cases attended		124
AFI treated		894
Malaria treated		362
Diarrhea treated	Dysentery	142
	Non bloody	707
Total no of OPD attendants		8368
Total no of <5 OPD/IPD attendants		1895
No of other cases treated		6520
Health Education provided		17953
HE for Pregnant Women		132
HE for Lactating Mothers		352
Screening for TB		21
No of all forms of new TB patients		3
No of HCT		106
No of new HIV +ve		2

Drugs and other medical equipment were supplied by integration of ORHB, MISMDO, UNICEF, CRC, ICRC and EPSA-Nekemte Branch.

8.2.4.4 Daily Communication and Reporting

Using appropriate and accessible means of communication updated report was collected daily from all IDP sites. After reviewing the report of each IDP site, immediate feedback was provided to each site manager, PHEM focal person and district stakeholders. Daily updated activities are reported to the concerned body (West Wollega zonal health department, Oromia Regional Health Bureau and EPHI) using objectively prepared reporting format. Additionally; identifying of any incident related to the IDPs were reported to zonal, regional and national level by e-mail and/or telephone as soon as the incident identified.

8.2.5 Nejo IDP Status as of May 2019

At the end of May 2019 in all sites of Nejo district there are 1590 displaced households, 1920 displaced male, and 3962 displaced female remain at the sites (Figure 86).

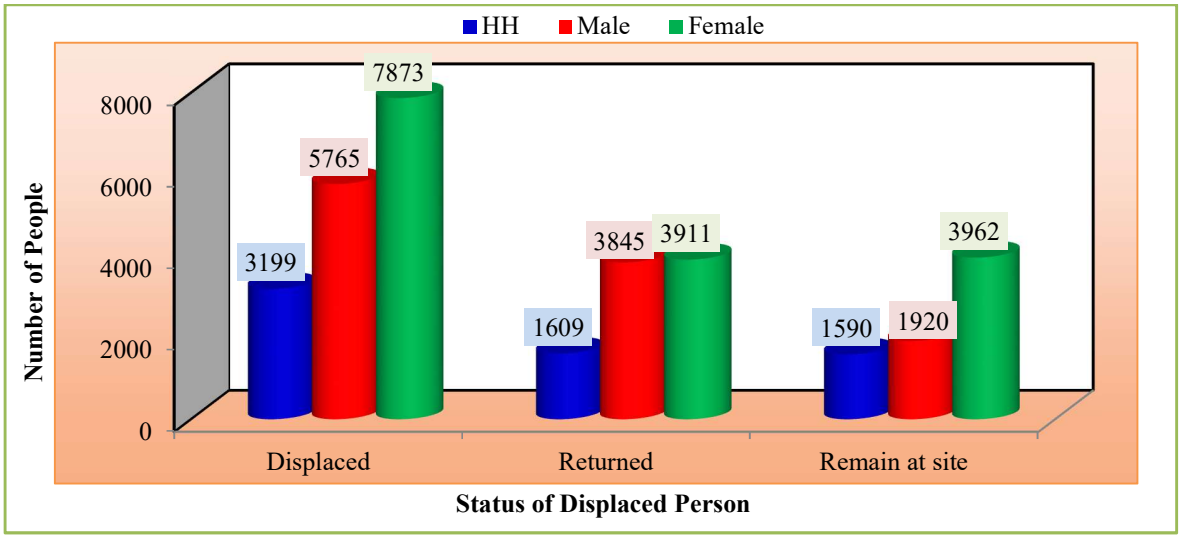

Figure 86: IDP status of Nejo Sites, Oromia, Ethiopia May 2019

8.2.6 Challenges

- Security problem to visit each IDP sites
- Due to absence of enough shelter and other services most of displaced population were dispersed in host community and this leads to difficulty of discussion as well as getting pure data of displaced populations.
- Lack of commitment government officials for monitoring and supporting
- High turnover of office delegates without handover of activities.
- Lack of transportation for logistic mobilization

- Poor coordination of IDP camps services
- Mismatching of needs and supply of IDP

8.2.7 Conclusion

- The central and regional governments give due attention to the issue; since the local government officials are not stable to manage the disaster
- For effective management of the disaster clear and consistent data should be recorded and informed to concerned bodies
- Strict follow up of the returned population is mandatory for recovery and to protect these populations from further harassment.
- Continues provision of IDP services for those not returned and considering the rainy season is critical risk factors for most epidemic prone disease especially for those dwelling in temporary shelters.

Annexes:

1 **Questionnaire for Data Collection on Outbreak Investigation of VL in Borena Zone, Oromia Ethiopia October 2019**
2 **Questionnaire for public Health Surveillance System Evaluation**
3 **Questionnaire for Data Collection of Walamara Health Profile Description 2019**
4 **Questionnaire for assessment of Prevalence of U5 diarrhoea and Associated Factors in ODF and OD Kebeles of Walmara District, Finfine SOS Zone, Oromia Ethiopia**
5 **Declaration form**

Annexes

1. Questionnaire for Data Collection of VL Outbreak Investigation, October 2019

Consent Form:

The study will be conducted by Oromia Regional Health Bureau PHEM Directorate in collaboration with Addis Ababa University in Borena Zone as part of on-going Leishmaniasis outbreak response.

All personal information collected through this study will be handled confidentially. The study is being conducted to improve prevention and control measure of Leishmaniasis and your response has a great value for recommendation of leishmaniasis prevention strategies. You can withdraw at any time if you not interested to the interview.

Do you agree to respond? 1. Yes 2. No *(If Yes proceed the interview)*

_____

Signature of the interviewer for voluntariness of the response

Kala-azar Case Definition

There is no definition for a suspected case of VL, given the low specificity of the symptoms.

Probable VL Case: A person living in or having travelled to VL endemic areas showing clinical signs and symptoms of VL (mainly irregular fever lasting more than two weeks and splenomegaly and/or weight loss).

Confirmed VL Cases:

- **Laboratory – Confirmed VL Cases:** A probable VL case with laboratory confirmation, either serological (RDT, DAT, ELISA, IFAT) and/or parasitological (smear, culture) and/or positive by PCR or related techniques.

  OR
- **Clinically – Confirmed VL Case:** A probable VL case that has not been confirmed by any laboratory test(s) is not done or negative) but is assessed by a clinician to be a confirmed VL case based on clinical grounds.

Id Number _____

1. Date of interview: Day____ Month ____ Year_____ 1a. Interviewer _____
2. Village 3. Kebele
4. Case/control name
5. Case/control age __.__ years
7. Case/control sex 1 = Male 2 = Female
8. Name of head of household
9. Person interviewed: 1 = subject 2 = subject's father 3 = subject's mother 8 = other
10. Status: : 1 = Case 2 = Control

11-12. Illness Of Kala_Azar Case (For Control, List Dates For Matched Case)

11. Onset Date (Month/Year Kala-azar Illness Started) month _____ year _____
12a. Month/year treatment started: month _____ year _____
12b. Case type: 1 = treated case 2 = under treatment now 3 = new case
13. How many members in your family? (those who eat from same pot) _____

Does your family have any animals of this type? How many? (If none, put 0).

	1 = yes	2 = no	99 = unknown	How many?
14. Dogs	1	2	99	
15. Cows	1	2	99	
16. Calves	1	2	99	
17. Bull/Oxen	1	2	99	
18. Donkeys	1	2	99	
19. Goats/sheep	1	2	99	
Osole	1	2	99	

Where do the cattle usually spend the night during the dry season? During the rainy season?

	Inside house	Separate shed	Outside	Other	Unknown
20.Dry season	1	2	3	8	99
21. Rainy season	1	2	3	8	99

22-25. If your household has dogs, where do they stay at night? *(circle the number in the table for each dog)*

Dog #	Inside house	Outside close to house	Outside with the cattle	Roams around	Other	Unknown
1	1	2	3	4	8	99
2	1	2	3	4	8	99
3	1	2	3	4	8	99
4	1	2	3	4	8	99

	1 = yes	2 = no	99 = unknown
26. Does your household have a radio?	1	2	99
27. Does your household have a latrine?	1	2	99
28. Does your house have a bed net? (if NO, skip to 40)	1	2	99

29. How many bed nets? *(fill in number)*

30-34. How did you get your bed net?

Net	bought it	gift from organization	gift from friends	Other	unknown
1	1	2	3	8	99
2	1	2	3	8	99
3	1	2	3	8	99

35. In what month/year did you get your first bed net? month _____ year _____

36. Did you have a net before case onset date (Q 11)? 1=yes 2=no (skip to 40) 99 = UK

37. IF YES, how frequently did you sleep under a bed net in each season?

	Always	Sometimes	Never	Not applicable
38. Dry season	1	2	3	7
39. Rainy season	1	2	3	7

Questions 40 – 46 refer to the year before the case onset date.

40. Where did you sleep most of the time?
1 inside room in the house
2 outside of the house
8 Other

41. What did you sleep on most of the time?
1 on bed or cot
2 cowhide, mat, sack on ground
3 directly on ground

42. Did you ever sleep outside the house? 1 = yes 2 = no (skip to 45)

In what season and how frequently did you sleep outside?	Always	Sometimes	Never
43. Dry season	1	2	3
43. Rainy season	1	2	3

44. When sleeping outside, where did you usually sleep?
1 bed/cot attached to the house
2 bed/cot away from the house
3 (cowhide on) ground near the house
4 (cowhide on) ground near cattle herd
5 (cowhide on) ground near fields/ away from house (not with cattle)
8 other

45. Did you ever sleep under an acacia tree at night? 1 Yes 2 No 99 = UK
46. Did you ever sleep under an acacia tree during the day? 1 Yes 2 No 99 = UK

Have you travelled to any of the following places in the past 2 years?

47	Guji Zone	1 = yes	2 = no	99 = unknown
48	SNNP Region	1 = yes	2 = no	99 = unknown
49	Somali Region	1 = yes	2 = no	99 = unknown
50	Other Kenya border area	1 = yes	2 = no	99 = unknown

51. If the answer is yes, how many months did you stay there (total)? Months _____
52. Was this before case onset date (Qⁿ 11)? 1 = yes 2 = no 99 = unknown

What are the predominant materials of which the house is constructed? .

53. Walls	1 = Earth	2 = Tin	3 = Brick	8 = Other	99 = UK
54. Roof	1 = Thatch	2 = Iron sheet	3 = Tin-thatch	8 = other	99 = UK
55. Floor	1 = Earthen	2 = Concrete		8 = other	99 = UK

56. Has your house ever been sprayed with insecticide? 1 = Yes 2 = No 99 = UK
57. How many years ago your house was last sprayed? _____Years
58. Total number of rooms in house where you now live _____ Rooms
59. What is the occupation of the head of household? *Circle corresponding number*
1 = Farmer
2 = Labourer
3 = small business
8 = other
60. Does your household own land? 1 = Yes 2 = No 99 = UK
61. How many hectares land does your household own? _____ Hectares
62. What is the total monthly expenditure of your household? _____ Birr
63. Can the head of household write his name? 1 = Yes 2 = No
64. Can the head of HH read (book, newspaper, and letter)? 1 = Yes 2 = No
65. Up to what class did head of HH study? *Circle correct number*
1 None
2 Adult education
3 Primary (1-8)
4 Grade 9 - 12
5 More than grade 12

Thank you!

2. Questionnaire for public Health Surveillance System Evaluation

ZONAL LEVEL QUESTIONNAIRE

Identifier

Assessment team	**Zone**
Date	**Region**
Interviewer	**Country**
Respondent	**Surveillance system**

General Information

I. Availability of a National Surveillance Manual

1. Is there a national manual for surveillance? 1. Yes 2. No 3. Not applicable 4. Unknown
2. ***If yes***, describe (last update, diseases included, case definitions, surveillance and control, integrated or different for each disease): _____

II. Case Detection and Registration

1. Do you have standard case definitions for Measles?
   1. Yes 2. No 3. Unknown 4Not applicable
2. Obs [1 to all priority diseases] Observed the standard case definition for (each priority disease) 1. Yes 2. No 3. Unknown 4. Not applicable

III. *Data reporting:*

Percent of recommended reporting forms in the country at all times over the past 6 months___

1. Is the central level responsible for providing surveillance forms to the health facilities? 1.Yes 2.No 3.Unknown 4.Not applicable
2. If yes, have you lacked appropriate surveillance forms at any time during the last 6 months? 1. Yes 2. No 3. Unknown 4. Not applicable
3. What are the reporting entities for the Meningitis surveillance system?
   a. Public health facilities
   b. NGO health facilities
   c. Military health facilities
   d. Private health facilities
   e. Others_____
4. Percent of district reports (either directly or through an intermediate level) received each reporting period at the central level during the past 3 months: Number of reports in the last 3 months compared to expected number
   Weekly: _____/12 times the number of districts
   Immediately: /_____/times the number of districts
   On time (use national deadlines)
   Number of weekly reports received on time: _____/12 times the number of districts
5. Was there any report of the immediately reportable diseases in the past 1 month? Yes/ No
6. If yes, with in what time is the report received after detection of the case/ diseases?
7. Less than 1 b. hour c. 2-24 hour d .1- 2 days d.3- 7 e. days f. After 1 week
8. Percent of districts that have means for reporting to next level by e-mail, telephone, fax or radio----------
9. Capacity to report to next level by e-mail, telephone, fax or radio:
10. How do you report? a. Mail b. Fax c. Telephone d. Radio e. Electronic f. Other _____

IV. Data analysis

Does the zonal level:

1. Describe data by person (case based, outbreaks, and sentinel)? Observed description of data by age and sex: 1.Yes 2. No 3. Unknown 4.Not applicable
2. Describe data by place? Observed description of data by district (tables, maps): 1.Yes 2.No 3. Unknown 4. Not applicable
3. Describe data by time? Observed description of data by time: 1. Yes 2.No 3. Unknown 4.Not applicable
4. Perform trend analysis? Observed line graph of cases by time 1.Yes 2. No 3. Unknown 4. Not applicable
5. List disease(s) for which line graph is observed _____
6. Have an action threshold defined for each priority disease? Do you have an action threshold defined for AWD, Measles, AFP (polio), and malaria? 1. Yes 2. No 3. Unknown 4.Not applicable
7. Who is responsible for the analysis of the collected data? _____
8. How often do you analyse the collected data? a. Daily b. Weekly c. Every 2 weeks d. Monthly e Quarterly f. As needed…….
9. Have appropriate denominators? Observed presence of demographic data (E.g. population by district and hard to reach groups) 1. Yes 2.No 3. Unknown 4.Not Applicable

***V. Outbreak Investigation*: Percent of suspected outbreaks that were investigated in the past 6 months**

1. Number of outbreaks suspected in the past year :_____
2. List the diseases: _____
3. Of those, number investigated: _____ (Observe reports and take copies if possible) Of the investigated outbreaks in the past 1 year, Percent in which risk factors were looked for:
4. Number of outbreaks in which risk factors were looked for_____ Of the investigated outbreaks in the past 1 year, Percent in which findings were used for action
5. Number of outbreaks in which findings were used for action_____ **Observe report**
6. Of districts that investigated an outbreak, Percent that looked for risk factors Number of districts that looked for risk factors [observe in reports] _____
7. Of districts that investigated an outbreak, Percent that used the data for action (action include containing outbreak, improving surveillance, community actions): Number of districts that used the data for action [**observe in final report]** _____

VI. Epidemic preparedness (relevant for epidemic prone diseases)

1. Existence of a Zonal plan for epidemic preparedness and response: Observed a written plan of epidemic preparedness and response: 1. Yes 2.No 3. Unknown 4. Not applicable
2. Existence of emergency stocks of drugs, vaccines, and supplies at all times in past 1 year: Has the region had emergency stocks of drugs, vaccines, and supplies at all times in past 1 year? 1. Yes 2.No 3.Unknown 4. Not applicable
3. Experience of a shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak). Has the country experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)? 1. Yes 2. No 3. Unknown 4.Not applicable
4. Existence of a standard case management protocol for, measles: Observed the existence of a written case management protocol for at least 1 priority disease
5. ***If yes***, list:_____
6. **Presence of a budget line for epidemic response:** Is there a budget line for epidemic response? 1.Yes 2.No 3.Unknown 4.Not applicable
7. **Existence of a regional epidemic management committee:** Observed minutes (or report) of meetings of epidemic management committee. 1. Yes 2. No 3. Unknown 4. Not applicable
8. **Existence of a regional rapid response team for epidemics:** Does the country have a rapid response team for epidemic? 1. Yes 2. No 3.Unknown 4. Not applicable

VII. Response to epidemics

1. Ability of the regional level to respond within 48 hours of notification of most recently reported outbreak: Obs Observed that the central level responded within 48 hours of notification of most recently reported outbreak (from written reports with trend and intervention) 1. Yes 2.No 3.Unknown 4.Not applicable
2. Ability of the regional epidemic management committee to evaluate its preparedness and response activities: (Obs) has epidemic management committee evaluated its preparedness and response activities during the past year (Observe written report to confirm)? 1. Yes 2.No 3. Unknown 4.Not applicable

VIII. Feedback

1. Existence of a report or bulletin that is regularly produced to disseminate surveillance data: How many feedback bulletin or reports has the regional level produced in the last year? _____
   Obs: Observed the presence of a report or bulletin that is regularly produced to disseminate surveillance data 1.Yes 2. No 3.Unknown 4.Not applicable

IX. ***Supervision***

1. Percent of supervisors that made the required number of supervisory visits in the past 6 months_____ how many supervisory visits have you made in the last 6 months? _____ Obtained required number of visits from regional level _____
2. The most usual reasons for not making all required supervisory visits. (Text) _____

X. Training

1. Percent of health personnel trained in disease surveillance_____ What Percent of your subordinate personnel have been trained in surveillance? _____
2. Have you been trained in disease surveillance? 1.Yes 2.No 3.Unknown 4.Not applicable
3. ***If yes,*** specify when, where, how long, by whom? _____
4. Percent of health personnel that have received post-basic training in epidemic management: Have you received any post-basic training in epidemic management? 1. Yes 2.No 3. Unknown 4.Not applicable
5. ***If yes,*** specify when, where, how long, by whom? _____
6. Obtain and analyse the content of the surveillance and epidemic management training
   Strengths_____
   Weaknesses _____
   Opportunities _____
   Threats _____

***XI. Resources* Percent of sites that have:**

1. **Data management:** a. Computer b Printer c. Photocopier d. Data manager e .Statistical package
2. **Communications:** a. Telephone service b. Fax c. Radio call d. Satellite phone e. Computers with modems
3. **Budget line** _____
4. **Logistics** _____

XII. Surveillance:

1. Have a functional computerized surveillance network
2. Do you have a computerized surveillance network at this level? 1.Yes 2.No 3.Unknown 4.Not applicable
3. **Budget for surveillance** _____
4. Is there a budget line for surveillance in the Zonal Health Department budget? 1. Yes 2.No 3. Unknown 4. Not applicable
5. ***If yes***, what is the proportion (%)____Opportunities for strengthening surveillance
6. How could surveillance be improved? _____

Questionnaire for Attributes and level of Usefulness:

1. Total population under surveillance_____
2. What is the incidence / Prevalence of -------in your Zone
   - AWD _____cases _____Deaths _____
   - Malaria _____cases _____Deaths _____

- AFP(polio) _____cases _____Deaths _____
- **Measles _____cases _____Deaths _____**

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

Does the surveillance system help?

1. To detect outbreaks of these selected priority diseases early? 1.Yes 2.No
2. To estimate the magnitude of morbidity and mortality related to these diseases, including identification of factors associated with these diseases? 1. Yes 2. No
3. Permit assessment of the effect of prevention and control programs? 1. Yes 2. No
4. Interventions and diseases trends analyzed ____Available //Not available

II. Describe Each System Attributes:

i. Simplicity:

1. Is the case definition of AWD, malaria, AFP (polio), and measles easy for case detection by all level health professionals? 1. Yes 2. No
   a) What are the organizations which need to receive reports of the surveillance data
   b) Do you feel that additional data collected on a case are time consuming? Yes/No
   c) How long it takes to fill the format? a, <5 Minute b-10-15minuts c- >15 minutes
   d) How long does it take to have laboratory confirmation of
      A. AWD_____ B. Measles_____ C. AFP (Polio)_____ D. Malaria_____

ii. Flexibility:

1. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? 1. Yes 2. No
2. Do you think that any change in the existing procedure of case detection, reporting, and formats will be difficult to implement1.Yes 2. No **Comment: _____**

iii. Data Quality:(Completeness of the reporting forms/& validity of the recorded data)

1. Are the data collection formats for these priority diseases clear and easy to fill for all the data collectors/ reporting sites? 1. Yes 2. No
   a) Are the reporting site / data collectors trained/ supervised regularly? Yes/No
   b) **Observe:** Review the last months report of these diseases : Average number of ***unknown or blank responses*** to variables in each of the reported forms _____
   c) Percent of reports which are complete(that is with no blank or unknown responses) from the total reports _____

iv. Acceptability:

1. Do you think all the reporting agents accept and well engaged to the surveillance activities? Yes/No
2. If yes, how many are active participants (of the expected to)? _____
3. If No, what is the reason for their poor participation in the surveillance activity?
   a) Lack of understanding of the relevance of the data to be collected
   b) No feedback / or recognition given by the higher bodies for their contribution; i.e. no dissemination of the analysis data back to reporting facilities
   c) Reporting formats are difficult to understand
   d) Report formats are time consuming. Other: _____

v. Representativeness:

1. What is the health service coverage of the district/ zone? _____%
2. Do you think, the popn under surveillance have good health seeking behavior for these diseases? 1. Yes 2. No
3. Who do you think is well represented by the surveillance data? 1.Rurban 2 Rural

vi. Timeliness: 1. _____ 2. _____

vii. Stability:

1. Was BPR restructuring affect the procedures & activities of the surveillance of these diseases? 1. Yes 2. No
2. Was there lack of resources that interrupt the surveillance system? 1. Yes 2. No

DISTRICT level QUESTIONNAIRE

Identifiers	
Assessment team	*District*
Date	*Region*
Interviewer	*Country*
Respondent	*Surveillance system*

1. Is there a national manual for surveillance at this site? Observation: Observe national surveillance manual: 1. Yes 2. No 3. Unknown 4. Not Applicable

I. Case confirmation _____

1. Percent of districts that have the capacity to transport specimens to a higher-level lab _____
2. Does the district have the capacity to transport specimens to a higher-level lab? 1. Yes 2. No 3. Unknown 4. Not Applicable. Percent of districts with guideline for specimen collection, handling and transportation to next level_____
3. Does the district have guidelines for specimen collection, handling and transportation to the next level? 1. Yes 2. No 3. Unknown 4. Not Applicable

II. Data reporting

1. Percent of sites that have forms recommended for the country for that site at all times over the past 6 months_____
2. Have you lacked forms recommended for the country at any time during the last 6 months? 1. Yes 2. No 3. Unknown 4. Not Applicable
3. Percent of HF that reported each reporting period to the district level during the past 3 months: _____
4. 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
5. Number of weekly reports submitted on time: ____/12 times the number of health facilities
6. Number of immediately reports submitted on time: _____/3 times the number of health facilities
7. Percent of districts that 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
8. Strengthening reporting: How can reporting be improved? _____

III. Data analysis Percent of sites that:

1. Describe data by person (case based, outbreaks, and sentinel) _____
   Observation: Observed description of data by age and sex 1. Yes 2. No 3. Unknown 4. Not Applicable
2. Describe data by place _____
   Observation: Observed description of data by place (locality, work site etc.) 1. Yes 2. No 3. Unknown 4. Not Applicable
3. Describe data by time: _____
   Observation: Observed description of data by time 1. Yes 2. No 3. Unknown 4. Not applicable
4. Perform trend analysis:_____
   Observation: Observed line graph of cases by time 1. Yes 2. No 3. Unknown 4. Not applicable
5. List: _____
6. Have an action threshold for each priority diseases 1. Yes 2. No 3. Unknown 4. Not applicable
7. Do you have an action threshold for any of the country priority diseases? 1. Yes 2. No 3. Unknown 4. Not applicable
8. If yes, what is it? _____cases _____% increase_____ rate (Ask for the priority diseases) _____
9. Have appropriate denominators Observed presence of demographic data at site (E.g. population <5 yr., population by village, total population) 1. Yes 2. No 3. Unknown 4. Not applicable

10. Who is responsible for data analysis? _____
11. How often do you analyse the collected data? a. Daily b. Weekly c. Every 2 weeks d. Monthly e. Quarterly f. As needed

IV. Outbreak investigation

1. Percent of suspected outbreaks that were investigated in the past 6moths:_____ Number of outbreaks suspected in the past year 6 months: _____ Observation: Of those, number investigated (Observe reports and take copies if possible): _____
2. Percent of districts that have ever conducted an outbreak investigation (Number of districts assessed that have ever conducted an outbreak investigation, Number of districts assessed to obtain indicator] has your district ever investigated an outbreak? 1. Yes 2. No 3. Unknown 4. Not applicable

V. Epidemic preparedness

1. Percent of districts that have a plan for epidemic preparedness and response: Observation: Observed a written plan of epidemic preparedness and response 1.Yes 2. No 3. Unknown 4. Not applicable
2. Percent of districts that have emergency stocks of drugs and supplies at all times in past 1 years has the district had emergency stocks of drugs and supplies at all times in past 1 year? Observation: Observed the stocks of drugs and supplies at time of assessment: 1.Yes 2. No 3. Unknown 4. Not Applicable
3. Percent of districts that experienced a shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak). Has the district experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)? 1. Yes 2. No 3. Unknown 4. Not Applicable
4. Presence of a budget line for epidemic response or access to funds for epidemic response. Is there a budget line or access to funds for epidemic response? 1. Yes 2. No 3. Unknown 4. Not Applicable
5. Percent of districts that have an epidemic management committee _____ Observation: Observed minutes (or report) of meetings of epidemic management committee: 1. Yes 2. No 3. Unknown 4. Not Applicable
6. Percent of districts that have rapid response team for epidemics_____
7. Does the district have a rapid response team for epidemics?
8. Percent of sites that implemented prevention and control measures based on local data for at least one reportable disease or syndrome_____
9. Has the district implemented prevention and control measures based on local data for at least one reportable disease or syndrome? 1. Yes 2. No 3. Unknown 4. Not Applicable
10. Percent of districts that responded within 48 hours of notification of most recently reported outbreak. Observation: Observed that the district responded within 48 hours of notification of most recently reported outbreak (from written reports) 1. Yes 2. No 3. Unknown 4. Not Applicable
11. Percent of districts that achieved acceptable case fatality rates (e.g. 10% for Meningococcal CSM 1% for Cholera) during the most recent outbreak: Observation: Observed that the district achieved an acceptable case fatality rate for most recent outbreak (Observe from outbreak report) 1. Yes 2. No 3. Unknown 4. Not Applicable
12. Percent of epidemic management committees that have evaluated their preparedness and response activities during the past year_____. Obs Has epidemic management committee evaluated their preparedness and response activities during the past year? (Observe written report to confirm).1. Yes 2. No 3. Unknown 4. Not Applicable

VI. Feedback

1. Percent of sites that have written report that is regularly produced to disseminate surveillance data. How many feedbacks written reports has the district produced in the last year? **Obs**: Observed the presence of a written report that is regularly produced to disseminate surveillance data (district and higher) 1. Yes 2. No 3. Unknown 4. Not Applicable
2. Percent of sites that have received a report or bulletin from a higher level during the past year on the data they have provided_____

3. How many feedback bulletin or reports has the district received in the last year? Observation: Observed at least 1 report or bulletin at district from a higher level during the past year on the data they have provided 1. Yes 2. No 3. Unknown 4. Not Applicable

VII. Supervision

1. Percent of individuals supervised in the past 6 months: How many times have you been supervised in the last 6 months? Observation: Observed supervision report or any evidence of supervision in last 6 months 1.Yes 2. No 3. Unknown 4. Not Applicable
2. Of those supervised in the previous 6 months, Percent of individuals for which the supervisor from the next higher-level reviewed surveillance practices appropriate to their level. Obs Observed supervision report or any evidence for appropriate review of surveillance practices. 1. Yes 2. No 3. Unknown 4. Not Applicable
3. Percent of supervisors that made the required number of supervisory visits in the past 6 months. How many supervisory visits have you made in the last 6 months? _____ (Obtain required number of visits from central levels) _____
4. The most usual reasons for not making all required supervisory visits. (Text)
   Reason 1_____
   Reason 2_____
   Reason 3_____

VIII. Training

1. Percent of health personnel (in position of responsibility) trained in disease surveillance_____ Have you been trained in disease surveillance? 1. Yes 2. No 3. Unknown 4. Not Applicable
2. If yes, specify when, where, how long, by whom? _____
3. Proportion of districts with staff trained in surveillance and epidemic management: What Percent of your personnel in the district have been trained in surveillance and epidemic management? _____

IX. Resources

1. Percent of sites that have: Logistics a. Electricity___ b. Bicycles___ c. Motor cycles____ d. Vehicles____
2. Data management: a. Stationery____ b. Calculator ____c. Computer____ d. Printer____ e. Statistical package___
3. Communication: a. Telephone service_____ b. Fax_____ c. radio _____d. Computers that have modems_____
4. 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:
5. Hygiene and sanitation materials: a. Spray pump_____ b. Disinfectant_____

X. Surveillance co-ordination

1. Existence of a surveillance co-ordination focal unit or person at district level: Is there a surveillance co-ordination focal point within the district epidemic management committee

XI. Satisfaction with surveillance system

1. Satisfaction with the surveillance system; Are you satisfied with the surveillance system? 1. Yes 2. No 3. Unknown 4. Not Applicable
2. If no, how can the surveillance system be improved
3. Opportunities for integration: What opportunities are there for integration of surveillance activities and functions (core activities, training, supervision, guidelines, resources etc.) _____ _____?

HEALTH FACILITY QUESTIONNAIRE

Identifiers	
Assessment team	*Type of health facility*
Date	*District*
Interviewer	*Region/province*
Respondent	*Country*
Name of health facility	*Surveillance system*

1. Percent of health facilities with national surveillance manual_____. Is there a national manual for surveillance at this site? Obs Observe national surveillance manual:

I. Case detection and registration

1. Percent of health facilities that have a clinical register_____ **Observation:** Observed the existence of a clinical register 1.Yes 2. No 3. Unknown 4. Not Applicable
2. Percent of health facilities that correctly register cases _____ **Obs: Observed** the correct filling of the clinical register during the previous 30 days: 1.Yes 2. No 3. Unknown 4. Not Applicable
3. Percent of health facilities that have standardized case definitions for the country's priority diseases. Do you have a standard case definition for: (each priority disease) AWD, AFP (polio), measles, malaria? 1. Yes 2. No 3. Unknown 4. Not Applicable Obs Observed the standard case definition for: (each priority disease) 1.Yes 2. No 3. Unknown 4. Not Applicable
4. Percent of health facilities that use standardized case definitions for the country's priority diseases. Obs observed the respondent correctly diagnosing one of the country's priority diseases using a standard case definition. 1. Yes 2. No 3. Unknown 4. Not Applicable (Select one of the priority diseases in the facility's clinical register and ask how they diagnosed it — interviewer should have the standard case definition from MOH)

II. Case confirmation

9 Presence of health facilities that have the capacity to collect specimens (sputum stool, blood/serum and CSF)

Are you able to collect sputum	1.Y	2. N	3.U	4.N/A
Are you able to collect Stool	1.Y	2. N	3.U	4.N/A
Are you able to collect Blood	1.Y	2. N	3.U	4.N/A
Are you able to collect CSF at this facility?	1.Y	2. N	3.U	4.N/A

10 Observation: Observed the presence of materials required to collect

Stool	1.Y	2. N	3.U	4.N/A
Blood/serum	1.Y	2. N	3.U	4.N/A
CSF	1.Y	2. N	3.U	4.N/A

11 Percent of health facilities that have the capacity to handle specimens until shipment: Do you have the capacity to handle sputum, stool, blood/serum and CSF until shipment at this facility? 1. Yes 2. No 3. Unknown 4. Not Applicable

12 Observation: Observed presence of functional cold chain at health facility 1.Yes 2. No 3. Unknown 4. Not Applicable

13 Percent of health facilities that have the capacity to ship specimens to a higher-level lab_____

14 **Observation**: Observed presence of transport media for stool at health facility 1. Yes 2. No 3. Unknown 4. Not Applicable

15 Observation: Observed presence of packing materials for shipment of specimens at health facility 1.Yes 2. No 3. Unknown 4. Not Applicable

III. Data reporting

1. Percent of sites that have appropriate surveillance forms for that site at all times over the past 6 months. Have you lacked appropriate surveillance forms at any time during the last 6 months? 1. Yes 2. No 3. Unknown 4. Not Applicable
2. Percent of sites that reported accurately cases from the registry into the summary report to go to higher level._____
3. 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])

Observe Measles	1.Y	2. N	3.U	4.N/A
Observe Malaria	1.Y	2. N	3.U	4.N/A
Observe AFP (polio)	1.Y	2. N	3.U	4.N/A
Observe AWD	1.Y	2. N	3.U	4.N/A

4. Percent of sites that 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: Observation: Weekly: _____ /12 times the number of sites: Obs immediately: _____/-- times the number of sites
5. On time (use national deadlines): Observation: Number of weekly reports submitted on time: -_____ /12 times the number of sites: Observation: Number of immediately reports submitted on time: ___/-- times the number of sites
6. Percent of HF that have means for reporting to next level by e-mail, telephone, fax or radio: How do you report? a. Mail b. Fax telephone d. Radio e. Electronic f. Other
7. Strengthening reporting: How can reporting be improved? _____
   Data analysis, Percent of sites that:
8. Describe data by person (outbreaks, sentinel) Observed description of data by age and sex 1. Yes 2. No 3. Unknown 4. Not applicable
9. Describe data by place: Observation: Observed description of data by place (locality, village, work site etc.) 1.Yes 2. No 3. Unknown 4. Not applicable
10. Describe data by time: Observation: Observed description of data by time 1. Yes 2. No 3. Unknown 4. Not applicable:
11. Perform trend analysis: Observation: Observed line graph of cases by time 1. Yes 2. No 3. Unknown 4. Not applicable
12. Have an action threshold for each priority disease Do you have an action threshold for any of the Country priority diseases? 1. Yes 2. No 3. Unknown 4. Not applicable
13. If yes, what is it (Ask for 2 priority diseases)? _____cases ___ % increase _____rate
14. Who is responsible for data analysis? _____
15. How often do you analyse the collected data? a. Daily b. Weekly c. Every 2 weeks d. Monthly e. Quarterly f. As needed…….
16. Have appropriate denominators: Obs Observed presence of demographic data at site (E.g. population <5 yr., population by village, total population) 1. Yes 2. No 3. Unknown 4. Not applicable

IV. Epidemic preparedness

1. Percent of HF that have a standard case mgt protocol for epidemic prone diseases. Observed the existence of a written case mgt protocol for 1 epidemic prone disease 1. Yes 2. No 3. Unknown 4. Not applicable
2. **Epidemic response**: Percent of sites that implemented prevention and control measures based on local data for at least one epidemic prone disease. Has the health facility implemented prevention and control measures based on local data for at least one epidemic prone disease? 1.Yes 2. No 3. Unknown 4. Not applicable
3. Percent of sites that achieved acceptable case fatality rates_____ *(e.g. 10% for Meningococcal CSM 1% for Cholera) during the most recent outbreak:* **Observation**: Observed that the health facility achieved an acceptable case fatality rate for most recent outbreak 1. Yes 2. No 3. Unknown 4. Not applicable

V. Feedback

1. Percent of sites that have received a report or bulletin from a higher level during the past year on the data they have provided. How many feedback bulletin or reports has the health facility received in the last year? _____ Observed at least 1 report or bulletin at the health facility from a higher level during the past year on the data they have provided 1. Yes 2. No 3. Unknown 4. Not applicable
2. Percent of health facilities that conducted at least semi-annual meetings with community members to discuss results of surveillance or investigation data. How many meetings has this health facility 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 1. Yes 2.No 3.Unknown 4. Not applicable

VI. Supervision:

1. Percent of individuals supervised in the past 6 months. How many times have you been supervised in the last 6 months? _____ Observation: Observed supervision report or any evidence of supervision in last 6 months 1.Yes 2.No 3. Unknown 4. Not applicable
2. Of those supervised in the previous 6 MThs, % of indvls 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 1. Yes 2. No 3. Unknown 4. Not applicable

VII. Training

1. Presence of health personnel trained in disease surveillance and epidemic management. Have you been trained in disease surveillance and epidemic management? 1. Yes 2. No 3. Unknown 4. Not applicable
2. If yes, specify when, where, how long, by whom? _____

VIII. Resources Presentence of sites that have:

1. Logistics a. Electricity _____b. Bicycles ____c. Motor cycles _____d. Vehicles_____
2. Data management: a. Stationery_____ b. Calculator_____ c. Computer_____ d. Software _____ e. Printer_____ f. Statistical package_____
3. Communications: a. Telephone service ____b. Fax _____c. Radio call___ d. Computers that have modems_____
4. 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: ___
5. Hygiene and sanitation materials: a. Spray pump_____ disinfectant_____
6. Protection materials (list) _____
7. Satisfaction with the surveillance system. Are you satisfied with the surveillance system? 1.Yes 2. No 3. Unknown 4.Not applicable
8. If no, how can the surveillance system are improved? _____ _____
9. Opportunities for integration: What opportunities are there for integration of surveillance activities and functions (core activities, training, supervision, guidelines, resources etc.) _____ _____

Health Post Level Questionnaire

Identifiers

Assessment team	*Type of health Post 1.Rura 2.Urban*
Date	*District*
Interviewer	*Region/province*
Respondent	*Country*
Name of health Post	*Surveillance system*

1. Percent of health facilities with national surveillance manual _____. Is there a national manual for surveillance at this site? Observe national surveillance manual: 1Yes 2. No 3. Unknown 4.Not applicable

I. Case detection and registration

1. **Percent of health facilities that have a clinical register**: Observed the existence of a clinical register 1.Yes 2. No 3. Unknown 4. Not applicable
2. Percent of health facilities that correctly register cases: Observed the correct filling of the clinical register during the previous 30 days 1. Yes 2. No 3. Unknown 4.Not applicable
3. Percent of health facilities that have standardized case definitions for the country's priority diseases._____
4. Do you have a standard case definition for: (each priority disease) AWD, AFP (polio), measles, malaria? 1. Yes 2. No 3. Unknown 4. Not applicable. Observed the standard case definition for: (each priority disease): 1.Yes 2. No 3. Unknown 4.Not applicable
5. Percent of HF that use standardized case definitions for the country's priority diseases._____ Observed the respondent correctly dx 1 of the country's priority diseases using a standard case definition 1.Yes 2. No 3. Unknown 4.Not applicable. (Select one of the priority diseases in the facility's clinical register and ask how they diagnosed it — interviewer should have the standard case definition from MOH)

II. Data reporting

1. % of sites having appropriate forms for that site at all times over the past 6 mnths: Have you lacked appropriate surveillance forms at any time during the last 6 months? 1. Yes 2. No 3. Unknown 4.Not applicable
2. Percent of sites that 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])

Observe Measles	*1. Yes 2. No 3. Unknown 4. N/A*
Observe Malaria	*1. Yes 2. No 3. Unknown 4. N/A*
Observe AFP (polio)	*1. Yes 2. No 3. Unknown 4. N/A*
Observe AWD	*1. Yes 2. No 3. Unknown 4. N/A*

3. Percent of sites that 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: Weekly: _____/12 times the number of sites: **I**mmediately: _____/-- times the number of sites
4. **On time (use national deadlines):** Number of weekly reports submitted on time:-_____ /12 times the number of sites: Number of immediately reports submitted on time: ___/-- times the number of sites
5. Percent of HF that 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
6. **Strengthening reporting:** How can reporting be improved? _____

III.Data analysis

1. Percent of sites that: Describe data by person (outbreaks, sentinel): Observed description of data by age and sex 1.Yes 2. No 3. Unknown 4. Not applicable

2. **Describe data by place: Observed** description of data by place (locality, village, work site etc.) 1.Yes 2. No 3.Unknown 4.Not applicable
3. **Describe data by time:** Observed description of data by time 1.Yes 2. No 3.Unknown 4.Not applicable
4. **Perform trend analysis:** Observed line graph of cases by time1.Yes 2. No 3. Unknown 4.Not applicable

IV. Epidemic response

1. Percent of sites that implemented prevention and control measures based on local data for at least one epidemic prone disease_____
2. Has the health facility implemented prevention and control measures based on local data for at least one epidemic prone disease? 1. Yes 2. No 3.Unknown 4. Not applicable

V. Feedback

1. Percent of sites that have received a report or bulletin from a higher level during the past year on the data they have provided. _____
2. How many feedback bulletin or reports has the health facility received in the last year? _____ Observed at least 1 report or bulletin at the health facility from a higher level during the past year on the data they have provided 1.Yes 2. No 3.Unknown 4.Not applicable
3. Percent of health facilities that conducted at least semi-annual meetings with community members to discuss results of surveillance or investigation data_____
4. How many meetings has this health facility 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 1.Yes 2. No3.Unknown 4.Not applicable

VI. Supervision:

1. Percent of individuals supervised in the past 6 months_____
2. How many times have you been supervised in the last 6 months? _____ Observed supervision report or any evidence of supervision in last 6 months: 1.Yes 2. No 3. Unknown 4. Not applicable
3. Of those supervised in the previous 6 months, % of individuals for which the supervisor from the next higher reviewed surveillance practices appropriate to their level. Observed supervision report or any evidence for appropriate review of surveillance practices: 1. Yes 2. No 3. Unknown 4. Not applicable

VII. Training

1. Percent of health personnel trained in disease surveillance and epidemic management: Have you been trained in disease surveillance and epidemic management? 1.Yes 2. No 3. Unknown 4. Not applicable
2. ***If yes,*** specify when, where, how long, by whom?_____

VIII. Resources

1. Percent of sites that have:_____ Logistic a. Electricity b. Bicycles c. Motor cycles d . Vehicles
2. **Data management:** a. Stationery b. Calculator c. Computer d. Software e. Printer f. Statistical package
3. Communications a. Telephone service b Fax c. Radio call d. Computers that have modems
4. 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) g. Other:
5. Hygiene and sanitation materials a. Spray pump b. Disinfectant

IX. Protection materials (list) : _____

X. Satisfaction with surveillance system:

1. Satisfaction with the surveillance system. Are you satisfied with the surveillance system? 1.Yes 2. No 3.Unknown 4.Not applicable

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

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

3. Questionnaire for Data Collection of Walamara Health Profile Description 2019

Historical aspects of the district:

1 **Geographical location and climate** (including map, altitudes, agro ecological zones etc…)

Boundaries _____
Distance from Zone capital _____KM, from national capital _____ KM
Altitude: Maximum _____ M, Minimum _____ M, Longitude _____
Annual rain fall _____ mm Climatic zones: High land ____ mid land _____ low land _____
Ethnic composition _____ _____ _____ _____
Language composition _____ _____ _____
Religion composition _____ _____ _____
Any other additional culture, values and norms of the district society _____
_____
Problems and challenges related to culture and tourism of the district _____
_____

Political and Administrative Organization:# of Kebeles _____ urban _____ rural ____

S.N	Name of Kebele	Total Population		Total	Ratio M:F	Total HH	S from district town	Remark
		Male	Female					
Total								

List of sectors with their respective number of workers by sex

S. N	Name of sector	Type (GO, NGO, Others)	Address (Kebele, telephone)	# of employees		Remark
				M	F	
Total						

Kebeles with Infrastructures:
Urban: Electric _____ solar _____ All Weather Road: Kebele _____ KM _____
Rural: Electric _____ solar _____ All Weather Road: Kebele _____ KM _____

2 Population structures:

Age group by year	Number of Population		
	Male	Female	Total
<01			
01-04			
05-09			
90-94			
95+			

Main problems in this district: _____

Any additional information: _____

3 Drinking water Sources: HH having safe drinking water supply coverage
Urban: #_____ %_____ Rural: #_____ %_____ Total: #_____ %_____

S.N	Types of water sources	# of Schemes	# of HHs served with	Remark
1	Protected spring			
2	Un protected spring			
3	Protected well			
4	Unprotected well			
5	Stand pipe (Bono)			
6	Pipe line to HH			
Total				

Power supply: What are potential sources of energy in the district?_____
Of HH having hydroelectric power supply _____ using solar energy _____ Minerals found in the district _____
Any other information related to water resources, sources of energy and natural resources __ _____
Problems related to water and other natural resources _____

Economy:
Annual budget of the district

Ethiopian Fiscal Year	Total Budget of district of different sources (ETB)				Budget for health sector		Remark
	Gov't	Donors	Public	Total	ETB	%	
2006 (2013/14)							
2007 (2014/15)							
2008 (2015/16)							
2009 (2016/17)							
2010 (2017/18)							
2011 (2018/19)							

Average HH income/months _____
Main crops _____, _____, _____, _____
Domestic animals _____, _____, _____, _____
# of Farmers _____, Gov't employee _____, Private employee _____
Daily labourer _____, Different business _____ Unemployed _____

Annual income of the District (Revenue and Custom Authority)

Source of income	2013/14	2014/15	2015/16	2016/17	2017/18

Different type of industries in the District(List large scale industries with their detail information)

S.N	Type of industries	# of industries	Remarks

Total			

Main problems and challenges related to budget _____

_____

Any other additional information related to economy of the district _____

_____

7. Number of Education institution in district

Numbers and categories			Type of schools					Total
			KG	1-4	5-8	9-10	11-12	
# of schools								
Owner of schools		Gov't						
		NGO						
		Private						
Number of teachers	TTI	M						
		F						
	Diploma	M						
		F						
	1st Degree	M						
		F						
	2nd Degree	M						
		F						
	Total	M						
		F						
# of students		M						
		F						
		Total						

Different infrastructures of schools

Types Of Schools	Total number	Water supply	%	Toilet	%	Electric	%	Telephone	%	Transportation	%
KG											
1-4											
5-8											
9-10											
11-12											
Total											

School enrolment and dropouts by Kebele

S.N.	Name of Kebeles	Total School Age Children	Total enrolled to school	%	Drop Out	%

Total					

Total School Age Children (target) _____ Total enrolled to school _____
Dropout in the previous year _____
If there is school dropout, what is/are main reason/s _____
_____
Main problems related to education _____
_____
Any other additional information _____
_____

8. District Infrastructures

8.1. Transport: Accessibility to main road: Yes ___ No _____

All weather road _____ KM, Dry weather road _____ KM

No of Kebeles accessible to all weather road ___ dry weather road ____ no _____

Average flow of car per day: heavy trucks ___public transport _____ light vehicles _____

Is there functional bus station? Yes ___ No ____

if "yes" capacity of the station_____

Any other additional information related to transportation _____

_____

Main problems and challenges _____

_____

8.2. Telecommunication:

HH accessible to fixed telephone _____ Individuals accessible to mobile phone _____

# of Kebeles accessible to mobile phone network _____ average users of internet per day _____

Any other additional information _____

_____

Main problems and challenges _____

_____

9. Disaster Status in the area

Was there any disaster in the district in the last one year? Yes _____ No _____

If yes what type of disaster? _____

_____

District DCPP committee status and duties _____

Average annual budget for disaster _____

Any additional information on disaster _____

_____

Main problems and challenges _____

_____

10. Vital Statistics and Health Indicators

Number of still birth _____
Infant Mortality Rate_____
Child Mortality Rate_____
Crude Birth Rate_____
Crude Death Rate_____
Maternal Mortality Rate_____
Contraceptive Prevalence rate_____
Contraceptive acceptance rate _____
ANC 1 _____
ANC 4 _____
Delivery by skilled attendant's _____
Delivery attended by HEW _____
Average family size _____

9. District Health Services(Hierarchy of district health office)

9.1. Health staff manpower

Physician _____ IESO ____ Health officers _____ BSc Nurses ____ Clinical Nurse ____
Medical lab ____ Pharmacist _____ Druggist _____ Environmental health _____
Midwifery: BSc____ Diploma __ HE and Promotion ___ Supportive Staffs: Degree _
Diploma _____ Certificate _____ Health extension workers: Rural _____
Town _____ Others (specify) _____ Health professional to population ratio: _____

9.2. Health Facility

Government Facilities: Total Hospital _____ HC _____ HP _____
Hospital: accessible to water ___ Telephone ___ Electric ___ Transport ___ Toilets ____
H Center accessible to water ___ Telephone __ Electric ___ Transport ____ Toilets ____
H Post: accessible to water ___ Telephone ___ Electric ____ Transport ___ Toilet ____
Private facilities:
Primary Clinics _____ Medium Clinics _____Specialty Clinics _____
RDV _____ Drug Store _____Pharmacy _____Others (specify) _____
Health institution to population ratio: _____

9.3. Health service coverage

Top leading causes of: morbidity, admission and mortality_____

9.4. Annual health budget:

Total budget allocated for the district_____ Total budget allocated for health Office _____ (____ %) Different Funds from NGO _____ Total _____

10. Community Health Services:

Services provided by community health workers namely:
TBAs_____
CHWs_____
HEWs_____
Other_____

11. Health Care Components

MCH and FP

ANC_1 target _____ achieved _____ANC_4target _____ achieved _____
Delivery attended in Health facilities: Hospital target _____ achieved _____
HC target _____ achieved _____
Delivery attended by: HEWs _____ TBA _____ PNC_1target ____ achieved ___
Total FP Coverage ____ (___ %) Long act FP ____ (___ %) Short FP ____ (___ %)

Immunization Coverage:

BCG target _____ achieved _____ OPV-0 target _____ achieved _____
OPV-1 target _____ achieved _____ OPV-3 target _____ achieved _____
Penta-1 target _____ achieved _____ Penta-3 target _____ achieved _____
PCV-1 target _____ achieved _____PCV-3 target _____ achieved _____
Measles target _____ achieved _____ F. immunized target _____ achieved _____
PWTT2+ target _____ achieved _____ NPWTT2+ target _____ achieved _____
Health Education _____

Nutrition: Total OTP sites_____, Total admissions to OTP/yr. ____ Total SC sites _____
Total admissions to SC/yr. _____

Is there TSF (Targeted Supplementary Feeding) program in the district? ____ If yes children no. in the program, _____ Is there CBN program_____ If yes # of children in the program, _____ growth monitoring _____

Endemic diseases:

Malaria: Total malarias Kebeles _____ Pop at risk_____
Total Suspected cases _____ Confirmed cases _____ ITNs distributed and used ____
Chemical sprayed _____ Health education given _____ Environmental sanitation ____
TB: Total TB cases_____ PTB negative_____ PTB +ve____ Extra PTB _____
TB detection rate _____ TB treatment success rate _____TB cure rate_____
TB defaulter _____ Death on Treatment _____ Total Leprosy cases_____
HIV/AIDS: Total screened for HIV _____HIV/AIDS prevalence _____
VCT_____ Total PLWHA_____ PMTCT_____ On Pre-ART_____
ON ART_____ Viral load _____ Suppressed (VL<1000 copies) _____

Environmental Health:

list of facilities to be inspected _____
No of HH accessing potable water supply (>20LDI) _____
No of HH with improved latrine _____ unimproved latrine _____ SW disposal method _____
Utilization coverage of latrine _____
# of OD village _____ # of OD Kebeles _____
Essential drugs: _____
# of HH joined community based health insurance _____ % _____
# of Ambulances _____
Main problems and challenges of the district _____

_____

4. Questionnaire for data collection of Prevalence of U5 diarrhoea

Addis Ababa University College of Health Sciences
School of Public Health

INFORMED CONSENT FORM

Good morning/afternoon, my name is _____ and I am one of the data collectors for the study being conducted by Addis Ababa University, College of Health Sciences, School of Public Health on assessment of diarrhoea in under five children in open defecation and open defecation free Kebeles in Walmara district. Your participation is very important and highly appreciated.

Confidentiality and consent

Your answers are completely confidential and participation is voluntary. No one will be told what you respond in connection to your name. You don't have to answer any question if you do not want to and you can stop the interview at any time.

However your honest answer to these questions will help us to better understand the situation and will contribute to improve the health status of the community by identifying willingness to join for CBHI and presenting to the policy makers so as to adjust the schemes with the local context.

I would like to appreciate your participation in this study, would you be voluntary to participate?

Yes, Proceed

No, good bye; thank you for your cooperation!

_____

Signature of the interviewer if the respondent is voluntary to respond

Questionnaire Identification Code _____

Interviewer's Name_____

Supervisor's Name_____

Date of interview: dd _____ mm _____ yyyy_____

Kebele`s Name_____

ODF Status_____

Part I. Background of the Respondent, mother and child

101.Relation of the respondent to child 1. Mother 2. Father 3. Caregiver 4. Other (specify) _____
102.Sex of the respondent: 1. Male 2. Female
103.Age of the respondent: _____ (years)
104.Education status of respondent: 1. Illiterate 2. Read and write 3. Higher education
105.Education status of mother: 1. Illiterate 2. Read and write 3. Higher education
106.Education status of father: 1. Illiterate 2. Read and write 3. Higher education
107.Is there any educated son/daughter/caregiver in the HH? 0. No 1. Yes
108.If Q 107 'Yes' the educational status is: 1. Read and write 2. $1^{o}/2^{o}$ 3. Higher education
109.Family size: _____
110.Number of under-five children in the HH: _____
111.Respondent's marital status: 1. Married 2. Single 3. Divorced 4. Windowed
112.Occupation of mother: 1. Housemaid 2. Farmer 3. Private 4. Other (specify) _____
113.Occupation of father: 1. Housemaid 2. Farmer 3. Private 4. Other (specify) _____
114.Average annual income of family in _____
115.Age of the child: _____ months
116.Is the child immunized? 0. No 1. Yes
117.If Q. 116 'yes'; type: 1. BCG 2. PCV 3. OPV 4. Pentavalent 5. Measles 6. Other _____
118.Did you gave the child other food rather than breast milk before six month? 0. Yes 1. No

Part II. Environmental Health Related Information

201. Source of water supply for the HH: 1. Safe 2. Unsafe
202. Average distance of water source from HH: _____ meters
203. Average daily collected water by the HH: _____litter
204. When did you wash your hands? List the critical times _____
205. With what did you wash your hands? _____
206. HH level drinking water treatment: 0. No 1. Yes
207. If Q.204 'yes' how often? 1. Always 2. Usually 3. Sometimes
208. Method of treatment for Q.205: 1. Boiling 2. Using Chemicals 3. Filtration 4. Other (specify) ___
209. Type container for water storage: 1. Jerry cans 2. Open pots 3. Other (specify) _____
210. Presence of latrine for the HH: 0. No 1. Yes
211. If Q 210 'yes' type: 1. traditional pit latrine 2. Compost latrine 3. Shared latrine 4. Others _____
212. Disposal method of solid waste: 1. Open field 2. Private disposal pit 3. Communal site 4 Other
213. Sanitation facility type: 0. Unimproved 1. Improved
214. Presence of faeces in the compound: 0. Yes 1. No
215. How did you dispose children's faeces? _____
216. Did you feed your child bottle milk? 0. Yes 2. No

Part III. Diarrhoea History in the Family

301. How many days does this diarrhoea persisted on the child? _____ days
302. Is there any family member had diarrhoea in the past 15 days? 0. Yes 1. No
303. Would you mention your perception on how one get diarrhoeal disease? 1. by contaminated water 2. By contaminated food 3. By contaminated utensils 4. Others (specify) _____
304. Who give care for the child? 1. Mother 2. Sister 3. Caregiver 4. Other (specify) _____
305. How do you prevent diarrhoea from your child? 1. No thing 2. Prepare clean food 3. Give attention for hygiene of child 4. Give attention for hygiene of family
306. Would you mention methods for diarrhoeal disease prevention? 1. using of latrine 2. Disposing child faeces 3. Using clean water 4. Treat water 5. Washing hands using soap 6. Environmental sanitation

Thank you!

5. Declaration

I, the under signed, declare that this is my original work and has never been presented by another person in this or any other University and that all the source materials and references used for this the thesis has been duly acknowledged.

Name **Belay Regassa**

Signature _____

Place _____

Date of submission _____

This thesis has been submitted for examination with my approval as a University advisor

Name of Mentor **Dr Negussie Deyessa**

Signature _____

Date of submission _____