ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES,

SCHOOL OF PUBLIC HEALTH

Ethiopian Field Epidemiology Training Program (EFETP)

Compiled Body of Works in Field Epidemiology

By: Ababu Fayisa Aboma (RN, BSc Nurse)

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

March 2021

Addis Ababa, Ethiopia

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Mentors

1. Prof. Ahmed Ali
2. Mr. Sefonias Getachew

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Approval by Examining Board

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Chairman, School Graduate Committee

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Advisor

_____ _____

Examiner

_____ _____

Examiner

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Abbreviations and Acronyms

AAU--Addis Ababa University

AFP--Acute Flaccid Paralysis

AIDS--Acquired Immunodeficiency Syndrome

ANC --Antenatal Care

AOR--Adjusted Odd Ratio

ART--Antiretroviral Therapy

ARTI--Acute Respiratory Tract Infections

AWD--Acute Watery Diarrhea

BCG--Bacillus Calmette Guerin

BF--Blood Film

BMI--Body Mass Index

BP--Blood Pressure

BPR--Business Process Re-engineering

CC--Community Conversation

CDC--Center for Disease Control

CFR--Case Fatality Rate

CI--Confidence Interval

CMNN --Communicable, Maternal, Neonatal and Nutrition

CMR--Child Mortality Rate

CPZ--Chlorpromazine

CVD--Cardio-vascular Disease

DALYs--Disability Adjusted Life Years

DPC--Disease Prevention and Control

EDHS--Ethiopia Demographic and Health Survey

EFETP--Ethiopian Field Epidemiology Training Program

EFY--Ethiopian Fiscal Year

EOPD--Emergency Outpatient Department

EPHI--Ethiopian Public Health Institute

FBOs --Faith-based Organizations

FMOH--Federal Ministry of Health

FV--Fully Vaccinated

GBD--Global Burden of Disease

HC--Health center

HDA--Health Development Army

HEWs--Health Extension Workers

HFs--Health Facilities

HHs--Households

HIV--Human Immunodeficiency Virus

HMT--Health Management Team

HO--Health Officer

HP--Health Post

ICU--Intensive Care Unit

IDSR--Integrated disease surveillance and response

IgM--Immunoglobulin M

IMR--Infant Mortality Rate

IPD--Inpatient Department

IPV--Inactivated Polio Vaccine

IRS--Indoor Residual Spray

IUD--Intra Uterine Device

Kg--Kilogram

Km--Kilometer

LAFP--Long Acting Family Planning

LLITNs—Long-Lasting Insecticide Treated Nets

MAM--Moderate Acute Malnutrition

MARPs--Mostly At Risk Peoples

MCV--Measles Containing Vaccine

MD--Medical Doctor

MDR--Multi Drug Resistance

MDSR--Maternal Death Surveillance Report

MeV--Measles Virus

MMWR--Morbidity and mortality weekly report

MNR--Medical Record Number

MNTE--Maternal and neonatal Tetanus elimination

NA--Not Applicable

NCD--Non-communicable Disease

NFIs--None-Food Items

NGOs--Nongovernmental Organizations

NICU--Neonatal Intensive Care Unit

NNT--Neonatal Tetanus

OBI--Outbreak investigation

OC--Oral Contraceptive

ODF--Open Defecation Free

OPD--Out Patient Department

OPV--Oral Polio Virus

OR--Odd Ratio

ORS --Oral Rehydration Salt

OTP--Out Patient Therapeutic program

PAB--Protected At Birth

PCV--Pneumococcal Conjugate Vaccine

PF--Plasmodium Falciparum

PHCU--Primary Health Care Unit

PHEM-- Public Health Emergency Management

PICT--Provider Initiated Counselling and Testing

PLWHA--People Living With HIV/AIDS

PMTCT--Prevention of Mother to Child Transmission

PNC --Postnatal Care

PTB --Pulmonary Tuberculosis

PV--Plasmodium Vivax

RDT--Rapid Diagnostic Test

RHB--Regional Health Bureau

RNA--Ribonucleic Acid

RRT--Rapid Response Team

SAFP--Short Acting Family Planning

SAM--Sever Acute Malnutrition

SARS--Severe Acute Respiratory Syndrome

SBA--Skilled Birth Attendant

SC--Stabilization Center

SMS--Short Message Service

SNNPR--Southern Nations, Nationalities and People's Region

STD--Sexually Transmitted Disease

TAT--Tetanus Anti-toxin

TBA--Traditional Birth Attendant

TBL--Tuberculosis and Leprosy

TTCV--Tetanus-Toxoid Containing Vaccine

UNICEF--United Nation International Children's Emergency Fund

VCT--Voluntary Counselling and Testing

VHF--Viral Hemorrhagic Fever

WHO--World Health Organization

WHR--Waist-to-Hip Ratio

YF--Yellow Fever

ZHD--Zonal Health Department

Executive summary

This document constitutes two years Field Epidemiology Training Program outputs, submitted to graduate school of public health for partial fulfillment of master degree in Field Epidemiology. Compiled Body of work comprises outputs like; case outbreak investigations, public health surveillance data analysis, surveillance system evaluation, health profile description, narrative summary of disaster situation report, scientific manuscript, abstracts, protocol/proposal for epidemiologic research project and others like Public Health Emergency Management (PHEM) weekly bulletin and Supportive supervision report. The document is organized in nine chapters as below:-

Chapter one- outbreak investigations on Scabies and Measles in Kenna District of Konso Zone and Mareko District of Gurage Zone in Southern Nations, Nationalities and Peoples Regional state Ethiopia respectively. Both investigations were conducted using a case control study design. Each outbreak investigation reports contain abstracts, introduction, methods and materials, results, discussions, conclusion and recommendations.

Chapter two- surveillance data analysis for the last consecutive five years (2014 to 2018) on Dysentery surveillance data in Southern Nations, Nationalities and Peoples Regional Health Bureau. Dysentery case in this Region was continuously reported and followed using weekly trends.

Chapter three- surveillance system evaluation on Neonatal Tetanus (NNT) in Hawassa City Administration in the preceding two EFY (2010 &2011). This evaluation was conducted as per the national protocol for NNT surveillance system evaluation. It addressed PHEM surveillance system attributes like simplicity, flexibility, stability, acceptability, representativeness, sensitivity and positive predictive value, timeliness and data quality.

Chapter four- Health Profile assessment/description in Gorche District of Sidama Zone, SNNPR Ethiopia. In this chapter, health and health related data of the District were presented which is very imperative for prioritizing high priority problems based on the data of 2017/2018.

Chapter five- This chapter comprises of scientific manuscripts for peer reviewed journals on measles outbreak investigation in Mareko District

Chapter Six- This chapter includes abstracts of dysentery surveillance data analysis in SNNPR, outbreak investigations of scabies in Kenna District in Konso Zone and narrative summary of disaster situation following flooding and land slid in Konta special district were presented.

Chapter Seven-Is on narrative summary of disaster situation visited following flooding and landslide in Konta special district of SNNPR. In this situation, there were loss in human life and resources.

Chapter Eight-A research protocol/proposal was developed for the study of the magnitude of hypertension and its associated factors among adults in Burayu Town of Finfine special zone, Oromia Regional State, Ethiopia.

Chapter nine-In this chapter other outputs were presented. Those included PHEM weekly bulletin prepared during residency and Supportive supervision done on Malaria epidemic situation response in Wolayita and Hadiya Zones of SNNP Regional State. Also, there is COVID-19 pandemic response activity report that was done in Kirkos Sub-city of Addis Ababa City Administration.

Chapter One- Outbreak Investigation

1.1. Outbreak one-Scabies Outbreak Investigation at Kenna District in Konso Zone, SNNP Regional State, 2019

Abstract

Introduction-Scabies affects about 200 million people worldwide each year with incidences increase during natural and manmade disasters and can affect all age groups, both sexes, all races, and all social classes. It is usually spread by direct, prolonged, skin-to-skin contact with a person who has scabies infestation. This study is aimed to investigate the scabies suspected outbreak and risk factors in Kenna District.

Objectives: To investigate the suspected scabies outbreak and risk factors in Kenna District of Konso Zone, Southern Nations, Nationalities and Peoples' Region December 2019.

Methods: A community based unmatched case-control (1:1) study design was conducted. Data were collected from 100 cases and 100 controls using a face-to-face interview with a semi-structured questionnaire and analyzed using Epi-Info version 7.2 and MS Excel 2013.

Result: Kenna District Health Office received a few numbers of scabies cases from villages on October 15, 2019, and then 705 scabies suspected cases line-listed. In unmatched bivariate analysis, some variables were statistically significant. In multivariate logistic analysis Contact history with scabies patient AOR=25.458(95%CI: 2.262-286.527,P=0.009), Travel history outside village AOR=6.287(95%CI:1.261-31.333,P=0.025) and age <15years with OR=6.240(95%CI: 1.862-20.910,p=0.003) were significantly associated with scabies outbreak.

Conclusion: Scabies outbreak occurred in Kenna District was verified. Age group less than 15years is a significant risk factor for the disease transmission. In addition, contact history within the past two months and travel history were independent risk factors for the scabies.

Keywords: Scabies outbreak, case-control, risk factors, Kenna District.

1.1.1. Introduction

Scabies is a skin disease caused by infestation with the mite, *Sarcoptes scabiei var. hominis*. The female mite, measuring less than 0.5 mm, burrows into the skin, where antigens on the exoskeleton of the mite, along with its saliva, excreta, and eggs, elicit a hypersensitivity reaction [1]. The resulting skin lesions most commonly affect hands, wrists, ankles, and feet. In the vast majority of cases of common scabies (also known variably as ordinary, classical, or typical scabies), there is a low number of mites on the patient's body (5 to 15). Crusted scabies is a rare form of the disease, characterized by hyper infestation with thousands to millions of mites and hyperkeratosis 'crusted' skin [2]. The burden of scabies is greater in tropical regions, especially in children, adolescents, and elderly people [3].

The study conducted in Kachabira district in Kembata Tembaro Zone of Southern Nations, Nationalities and People's Regional State in 2018 shows the overall prevalence of scabies was 2.5 and attack rate was 20.5 per 1000 population [4].

Sign and symptoms usually begin four to six weeks after primary infestation [1]. A tiny scabies mite burrows into the epidermis of the skin where it lives and lays its eggs. The most common symptoms of scabies are severe itching especially at night and a popular skin rash that may affect much of the body or be limited to common sites, like inter-digital space, flexor of the wrist, elbow, armpit, penis, nipple and buttocks [5].

Scabies is spread by close personal contact between host and frequently seen within the families through contaminated clothes and bed linen, sexual partners, amongst school-age children, and institutional people [5]. The risk of transmission of scabies increases with higher levels of population density, reflected by the high endemicity observed in communities living in poverty, with associated crowded housing conditions, and by outbreaks in residential facilities, prisons, schools, and refugee camps. Patients with underlying immunodeficiency from any cause, such as human immunodeficiency virus, human T-lymphotropic virus type 1 or corticosteroid treatment, or those with neurological conditions, are at an increased risk of crusted [2], [6]. Scabies is one of the common, but neglected parasitic diseases and major public health problem globally and in resource-limited countries particularly.

Scabies occurs at all age groups, sexes, all races and at all social classes. The scabies mite usually spread by direct, prolonged, skin-to-skin contact with a person who has scabies. It can also be spread easily to sexual partners and household members. Scabies sometimes can spread indirectly by sharing articles, such as clothing, towels, or bedding used by infected individuals [7], [8].

Many secondary bacterial infections are caused by group A streptococci and Staphylococcus aurous, which lead to nephritis, rheumatic fever, glomerulonephritis, chronic renal diseases, rheumatic heart diseases and sepsis, especially in developing countries [9].

An outbreak of scabies could happen when cases are left untreated, and delayed diagnosis is linked with a secondary bacterial infection, which may lead to cellulitis, folliculitis, boils, impetigo, or lymphangitis and may exacerbate another preexisting dermatosis, such as eczema and psoriasis[5]. The best drug for mass treatment is Ivermectin since it is easily administered to cases and not messy [10].

Recommended treatments-Permethrin OR Ivermectin OR Benzyl benzoate lotion. As alternative treatments- Malathion 0.5% aqueous lotion OR Ivermectin 1% lotion OR Sulfur 6-33% as cream, ointment or lotion OR Synergized pyrethrums foam. Crusted scabies a topical scabicide AND Ivermectin. Topical treatment should be applied to all skin regions at night and left in place for 8-12 hours. Clothing, bedding, towels and other items should be machine washed, dry-cleaned, or sealed in a plastic bag for one week [6].

The core process of Public Health Emergency Management (PHEM) of Konso Zonal Health Department recognized rumor about scabies outbreak on December 04, 2019. The Zonal Coordinator of PHEM notified the Region about the occurrence of the outbreak through phone call soon after establishing the existence of an outbreak on the same day. After this notification, the Regional Health Bureau (PHEM core process) started activities, such as forming a team for outbreak investigation and response, communicating partners for logistics and medication support, preparing outbreak investigation questionnaire and mobilizing the resources to the site. On December 9, 2019, the case investigation in Kenna District was started by house-to-house visit, using a semi-structured questionnaire. This investigation was designed to investigate the scabies outbreak, identify the risk factors and suggest practical prevention and control measures to alleviate the disease burden.

1.1.2. Objective

1.1.2.1. General Objective

To investigate the suspected scabies outbreak and risk factors in Kenna District of Konso Zone, SNNP Region December 2019

1.1.2.2. Specific objectives

- To describe the scabies outbreak in terms of person, place and time
- To identify main risk factors for the scabies outbreak in the District
- To take possible intervention measures based on findings

1.1.3. Methods and Materials

1.1.3.1. Study Area and Population

The study was conducted in Kenna District, which is one of the four Districts of Konso Zones newly in Southern Nations, Nationalities and People's Regional State. Administratively, the District has 10 rural and one urban villages. The District's Town Fasha is located at 30 km from the Zonal Town Karat in the western direction, 395km from Hawassa City.

The district has five Health Centers (HCs) and eleven health posts (HPs), no hospital in the District. The District's Altitude is 1,500 to 2,000 meters above sea level and temperature ranging from 15 °C to 32 °C. There are two rainy seasons: the main rainy seasons are concentrated from March to August and the minor rains fall from/around September to November.

The economy of the Kenna people rests on exceptionally intensive agriculture involving irrigation and terracing of mountain slopes.

As this year (2019/2020) population projection shows in the District 82,485 of which 40,418 are males and 42,067 females as well as 16834 households.

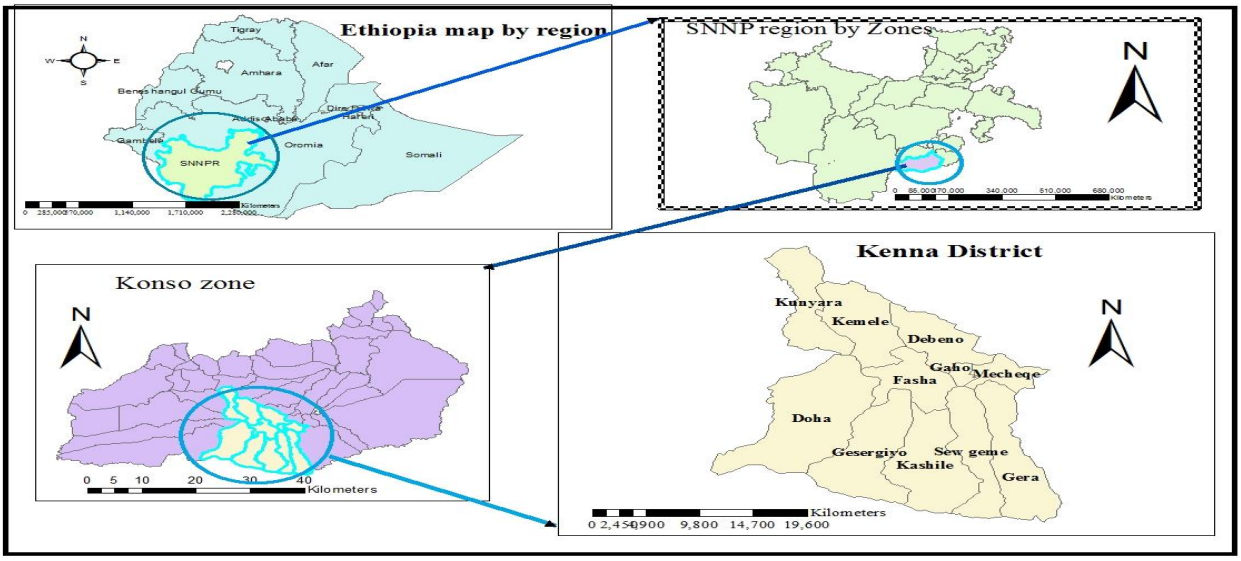

Figure 1:-Map of Kenna District in Konso Zone, SNNP Regional State, Ethiopia 2019

1.1.3.2. Study Design and Period

The case investigation was conducted from December 9 to 19/2019 by community based unmatched case-control (1:1) study design.

1.1.3.3. Target Population

All population in scabies outbreak affected District (Kenna)

1.1.3.4. Study population

All cases and controls selected from the affected population of Kenna District. Cases were residents of villages of case outbreak in Kenna District with sign and symptoms (itching, rash, etc) of scabies and agreed to participate in the study was assigned as a case. Controls were residents of villages of cases in the District without any sign and symptoms of scabies.

1.1.3.5. Sample size and sampling procedure

The sample size was calculated using double population formula by Epi-info version 7 software with a confidence level of 95%, power of 80%, the ratio of control to case 1:1, assuming percent of controls exposed 73% OR 3.12 and percent of cases with exposure 89% for a contact of scabies patient[11]. This gave me a maximum sample size of 100 cases and 100 controls (Fleiss W/CC).

Convenient sampling method was used to select cases and controls from the community in affected kebeles.

1.1.3.6. Data Collection and Analysis

Data were collected from the community through face-to-face interview with individual respondents using a semi-structured questionnaire. The data were analyzed using Epi Info version 7.2 and Microsoft office excel 2013.

1.1.3.7. Permission for the Study

Letter of the permission was obtained from SNNP Regional Health Bureau, PHEM core process to Konso Zonal Health Department (ZHD) and then Konso Zonal Health Department wrote letters to Kenna District Health Office. Verbal informed consent was received from all respondents before the interview.

1.1.3.8. Case Definition

Suspected case: - Presence of itching with typical lesions on hands, inter-digital, and/or genitalia and/or itching and close contact with an individual who has itching or typical lesions in a typical distribution.

Confirmed case: - A person who has a skin scraping in which mites, mite eggs or mite faeces have been identified by a trained health care professional

Contact: - A contact is a person who does not fulfil the clinical criteria for infestation with scabies (above). OR a person without signs and symptoms consistent with scabies, who has had direct contact (particularly prolonged, direct, skin-to-skin contact) with a suspected or confirmed case in the two months preceding the onset of scabies signs and symptoms in the index case[12].

1.1.4. Results

1.1.4.1. Descriptive Epidemiology

The Scabies cases were reported from Kenna District starting from November 18 to December 22, 2019. Totally, 705-suspected scabies cases were line listed from four villages/kebeles. The overall attack rate (AR) of the affected villages was 2.24% (22 cases per 1,000 populations) with no

scabies related death (CFR=0). However, as the District, the overall attack rate was 8.5 per 1000 population.

1.1.4.1.1. Descriptive Epidemiology of Scabies Cases by Person

Out of 705 total suspected scabies cases line-listed, 327(46%) of them were males and 378(54%) were females (Figure 2). The mean age was 17 years with ranges from <1 to 80 years.

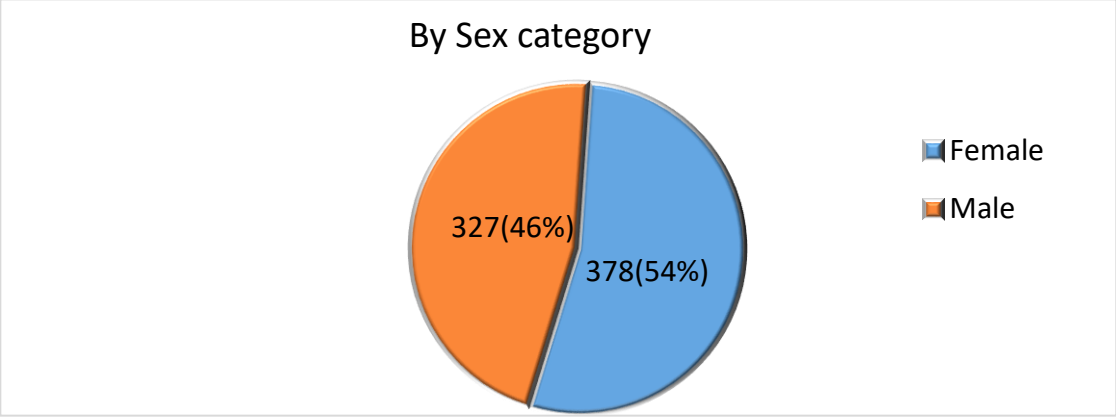

Figure 2:-The proportions of scabies cases by sex, Kenna District, in Konso Zone, SNNP Region, Ethiopia 2019

As per the cases listed from four villages in the District, the most affected age group were 5-14 years with an AR of 34.50-per 1000 population (Table 1). Under five years and above 15 years age groups were 27.17-per 1000 population and 13.64-per 1000 population respectively (Table 1).

Table1:-Attack rate of scabies cases in affected villages of Kenna District of Konso Zone in SNNPR 2019

Age group	Age group population	Number of cases	Attack rate(per 1000)
0-4	4896	133	27.17
5 to 14	10117	349	34.50
15+	16349	223	13.64
Total in affected villages	31362	705	22.47
Total in the District	82485	705	8.54

Among the line-listed cases, most of them show signs of secondary infections, and 123(17%) children aged 7 to 15 years (primary school age-group) developed secondary infections (Fig. 3).

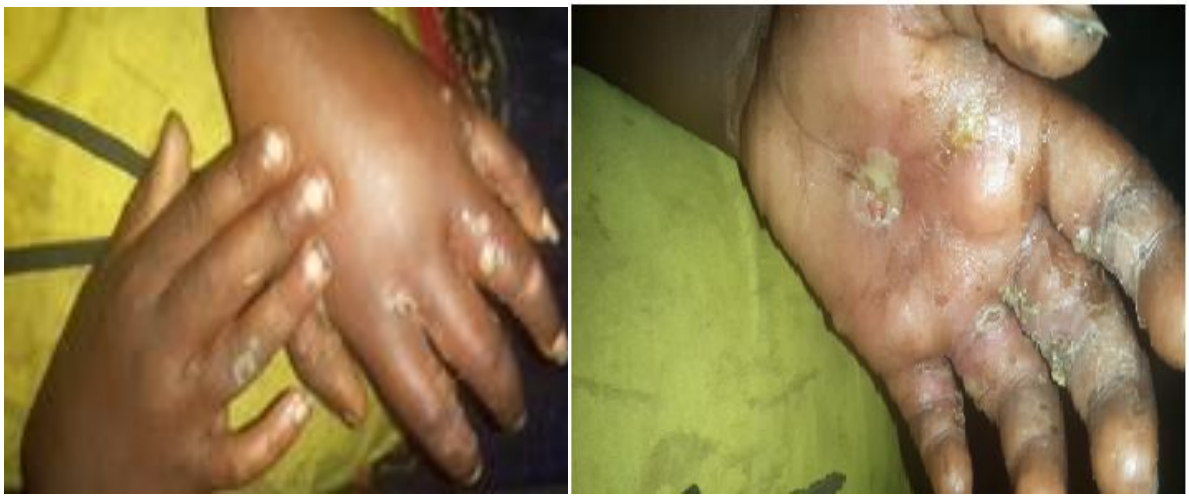

Figure 3:-Picture of Scabies cases in Kenna District Konso Zone, SNNPR, 2019

The sites of rash on the patient's body from the investigation done(interviewed cases) in the community shows that 97% cases had in their inter-digital spaces, 88% on their inter-gluteal clefts, 84% on their buttock and 74% on their anterior axillary folds (fig 4).

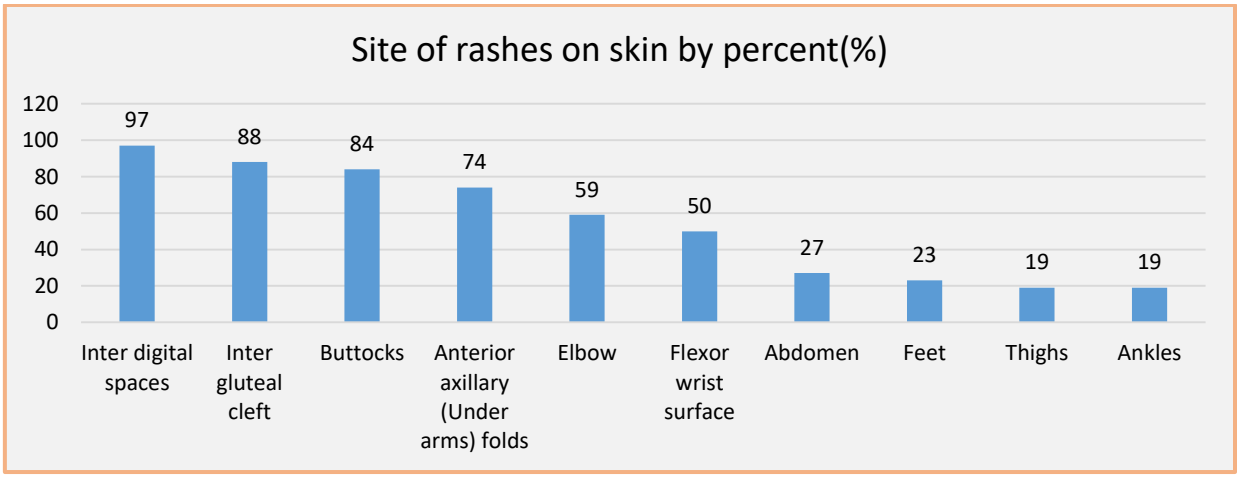

Figure 4:- Site of rash on the patient's body in Kenna District Konso Zone, SNNPR 2019

1.1.4.1.2. Descriptive Epidemiology of Scabies Cases by Time

The Kenna District Health Office received few cases of scabies from villages on 15 October 2019 and reported to Konso Zonal Health Department. Then, the Zonal Health Department notified the

situation to the Regional Health Bureau on 23 October 2019, but it does not considered as outbreak regionally. According to the Epidemic curve, the initial cases developed the signs and symptoms on 15 October 2019 (Figure 5). Besides that, the Epidemic curve shows peaked on 08 December 2019 (Figure 5).

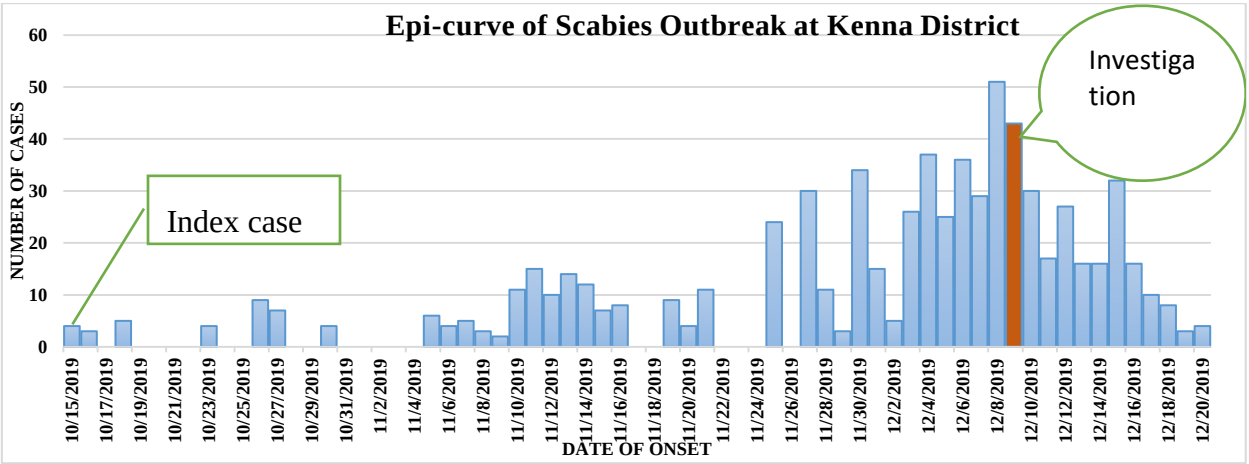

Figure 5:- Epi-curve of scabies outbreak in Kenna District in Konso Zone, SNNPR, 2019

1.1.4.1.3. Descriptive Epidemiology of Scabies Cases by Place

Near to half of all cases registered 283(40%) were from Fasha village and 271(38%) from Sewgeme village. Others were from Gaho and Doha villages having 91(13%) and 60(9%) respectively (Figure 6).

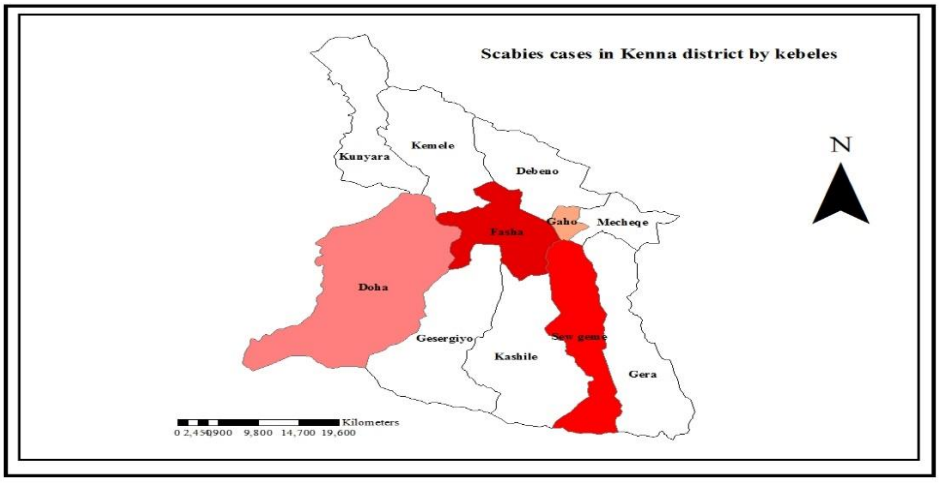

Figure 6:- Scabies cases distribution by villages in Kenna District at Konso Zone, SNNPR, 2019

1.1.4.2. Analysis of Case Control Study (Analytical Epidemiology)

Among 100 cases, 59 were Males and 41 Females. The dominant age group in this study was 10 to 20 accounting 40.5% (Table 2). Participants' educational status less than secondary school were 76% and 24% higher level (Table 2). A family having a person infested with rash and itching among Cases were 94% and 74% among control (Table 2). All cases had a history of rash and itching, and 13(13%) of them had a sign of secondary infection. Among the total 100 controls, 54(54%) males and 46(46%) females (Table 2). Regarding the age, it ranged from 3 to 65 years with a mean of 22 years for cases and from 8 years to 80 years with a mean of 27 years for controls (Table 2).

Table 2:- Socio-demographic characteristics of the cases and controls, Kenna District, Konso Zone, SNNP Regional State of Ethiopia, 2019

SN	Indicator	Description	Case		Control		Total	
			count	%	count	%	count	%
1	Age by group	<10	7	7%	1	1%	8	4%
		10 - 20	46	46%	35	35%	81	40.5%
		20 - 30	27	27%	36	36%	63	31.5%
		30 - 40	13	13%	11	11%	24	12%
		40 - 50	3	3%	7	7%	10	5%
		50 +	4	4%	10	10%	14	7%
2	Sex	Male	59	59%	54	54%	113	56.5%
		Female	41	41%	46	46%	87	43.5%
3	Religion	Orthodox	42	42%	34	34%	76	38%
		Protestant	52	52%	56	56%	108	54%
		Others	6	6%	10	10%	16	8%
4	Occupation	Farmer	49	49%	60	60%	109	54.5%
		Merchant	2	2%	1	1%	3	1.5%
		Employed	2	2%	3	3%	5	2.5%
		Student	41	41%	36	36%	77	38.5%
		Daily laborer	1	1%	0	0	1	0.5%
		NA	4	4%	0	0	4	2%
		Others	1	1%	0	0	1	0.5%

5	Educational status	Illiterate	6	6%	25	25%	31	15.5%
		Read and write only	5	5%	11	11%	16	8%
		Primary	73	73%	52	52%	125	62.5%
		Secondary	10	10%	9	9%	19	9.5%
		Tertiary	2	2%	3	3%	5	2.5%
		NA	4	4%	0	0%	4	2%
6	Marital status	Single	17	17%	16	16%	33	16.5%
		Married	44	44%	60	60%	104	52%
		Divorced	1	1%	0	0%	1	0.5%
		NA	38	38%	24	24%	62	31%
7	Family size	<=6	41	41%	52	52%	93	46.5%
		>6	59	59%	48	48%	107	53.5%
8	Any infested person in family	Yes	94	94%	74	74%	168	84%
		No	6	6%	26	26%	32	16%

Concerning knowledge, of the total 200 (cases and controls), 35(17.5%) know what is the scabies and 120(60%) of them did not know the scabies whether it is preventable diseases or not. Among them, 21 (10.5%) of them had travel history to scabies affected area.

1.1.4.2.1. Bivariate and multivariate logistic analysis

In bivariate analysis those are statistically significant are contact history with in the last two months with scabies patient OR=183.222(95%CI;51.282-654.521,P<0.001) and Sharing clothes with others OR=176.000(95%CI;23.540-1315.845,P<0.001). Also sleeping with others OR=137.842(95%CI;39.378-482.512,P<0.001), age<15years OR=2.041(95%CI;1.023-4.071,P=0.040), presence of a person with scabies in the family OR=5.504(95%CI;2.153-14.070,P<0.001) and travel history outside of village OR=2.764(95%CI;1.026-7.449,P=0.037) were statistically significant risk factors. Regular hand washing with OR=0.043 [95% CI=0.005-0.328, p<0.001] as protective factor.

However, on multivariate analysis only age <15 years, contact history with scabies patient within the last two months and travel history are risk factors (Table 3).

Table 3: Summary of Bivariate and Multivariate analysis of independent variables of Scabies outbreak in Kenna District of Konso Zone SNNPR, 2019

Variables	Study subjects		Bivariate		Multivariate	
	Cases	Controls	COR (95%C.I)	P-Value	AOR (95%C.I)	P-Value
1.Age group						
<15 years	28(28%)	16(16%)	2.04 (1.023-4.071)	0.04	6.240(1.862-20.910)	0.003
>15 years	72(72%)	84(84%)				
2.Contact a person who has been infested with scabies						
Yes	85(85%)	3(3%)	183.222(51.282-654.621)	<0.001	25.458(2.262-286.527)	0.009
No	15(15%)	97(97%)				
3.Travel outside of village						
Yes	15(15%)	6(6%)	2.55(1.026-7.449)	0.037	6.287(1.261-31.333)	0.025
No	85(85%)	94(94%)				

1.1.4.3. Interventions Done

Permethrin treatment for all scabies cases and contacts within the affected areas was conducted by mass drug administration. This drug was distributed after the case investigation was conducted. Before investigation started antibiotics and anti-pain, as well as soap for shower and clothes, were transported and distributed for cases with secondary infections and people with low socio-economic status families with cases.

1.1.5. Discussion

We investigated that scabies outbreak occurred in Kenna District of Konso Zone, Southern Nations, Nationalities and People's Regional State, Ethiopia. All suspected scabies cases were line-listed from four villages during the investigation period. The overall prevalence is relatively similar to the study done in Kechabira in Kembata Tembaro Zone of SNNPR[4]. More than half of the cases were females and about one-third of the cases were from those less than 18 years of age group, including pre-school and school age groups. This result was in agreement with results

of the investigation done on a Scabies Outbreak in Drought-Affected Areas in Ethiopia in 2015 [13].

Concerning the sites of rash, inter-digital spaces, inter-gluteal clefts, buttocks and anterior axillary folds were the main sites affected by the infestation. This is also nearly similar to the study conducted at Kechabira District[4]**.**

Regarding associated risk factors, having contact in the past two months with a person infested with scabies was the highest risk factors for the case transmission. This finding is in agreement with the study conducted in 2018 in Dabat of Amhara Region [8] and the study in Damboya in Kembata Zone SNNPR [11]. In addition, children with age group less than 15 years and travel history outside the village were significantly associated with a scabies infestation. This agrees with the study done in East Badewacho District Halaba Zone 2016[14]**.**

1.1.6. Conclusion

Scabies outbreak occurred in Kenna District was verified. Age group less than 15years is a significant risk factor for the disease transmission. In addition, contact history within the past two months and travel history were independent risk factors for the scabies.

1.1.7. Recommendations

For Kenna District Health Office

- Continuous health education on the case should be provided for the whole community.
- Social mobilization and advocacy on scabies outbreak and prevention and control method should be continued until the case transmission stopped from the community.
- Encourage safe and adequate water supply, personal, environmental hygiene and sanitation.

For Konso Zonal Health Department

- Continuous monitoring and evaluation of case surveillance activities at the district level.
- Giving feedback based on supportive supervision conducted to strengthen community-based active case surveillance.

- Timely identify the drug shortage and make the necessary provision.

For the Regional Health Bureau

- Availing all the necessary drugs and logistics like Permethrin, antibiotics, anti-pain, laundry soap and other supplies on time.
- Advocate the decision-makers like partners and other government sectors about scabies outbreak control and management for budget support.

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Annex-1-Questionnaire for scabies Outbreak Investigation in Kenna District, Konso Zone, SNNPR, Ethiopia, 2019

A. Identification

Interviewer's name_____ Phone number _____ Date of Data collection: _____
Region_____ Zone_____ District_____ village_____ Got _____
Status of respondent: 1. Case 2. Control

B. Socio-demographic information

1. Age in years_____ or in month _____
2. Sex 1. Male 2. Female
3. Ethnicity 1.Konso 2. Burji 3. Gamo 4. Derashe 4. Other/specify_____
4. Religion 1. Orthodox 2. Muslim 3. Protestant 4. other/specify_____
5. Occupation 1. Farmer 2. Merchant 3. Unemployed 4. Employed 5. Student 6. Daily laborer 7. NA 8. Other/specify _____
6. Educational status
   1. Illiterate 2. Read and write only 3. Primary 4. Secondary 5. Tertiary 6. NA
7. Parents of case/control educational status if the respondent is a child (< 7 years of age)
   Mother-1. Illiterate 2. Read and write only 3.Primary 4.Secondary 5. Tertiary
   Father- 1.Illiterate 2. Read and write only 3.Primary 4.Secondary 5. Tertiary
8. Marital Status 1. Single 2. Married 3. Divorced 4. Widowed 5. NA
9. How many Family members residing with you: _____
10. Is there any person infested with Itching skin rash and Crusts on the skin in your house?1.yes 2.No
11. If Yes to Q10, number of sick person_____

C. Questions related to knowledge of respondents about the disease

12. Do you know what scabies is? 1. Yes 2.No
13. What do you think of the cause of scabies? 1. Parasites 2. Consequence of curse 3. Witchcraft 4. other/specify_____
14. How do you think scabies is transmitted? (You can pick more than one response). 1. By direct skin to skin contact with ill person 2. By sharing clothes of ill person 3. Hugging (hold in your arms) 4. Other/specify _____
15. Do you think that scabies is a preventable diseases? 1. Yes 2. No 3. Don't know

16. If yes for Q15, How can it be prevented?
    1. Personal hygiene& sanitation 2. Avoid contact with Scabies patient(s) 3. Don't know 4. Other/specify _____
17. Who do you think can be affected more by Scabies?
    1. Children less than 5 years old 2. Children between 5-18 years 3. People over 18 years old 4.People of any age group 5. don't know
18. Where did you go first when you get Scabies?
    1. Health Facility 2. Traditional Healers 3. Holy Water 4. Stayed at home 5.other/Specify____
19. How do you think Scabies can be cured?
    1. Using modern medicine 2. Using traditional Medicine 3. Holly water 4. by feeding nutritious foods 5. Keeping the sick person in door 6. Other (Specify) _____

D. Clinical features & management of the disease*(for cases ONLY)*

20. What are the signs &symptoms of the disease?

A. skin rash: 1. Yes 2. No D. relentless itching: 1. Yes 2. No

B. red bumps and blisters: 1. Yes 2. No E. Crusts on the skin 1. Yes 2. No

C. tiny red burrows: 1. Yes 2. No F. Sign of secondary infection (observe) 1. Yes 2. No

21. Site of rash on the body (you can select as more responses as possible)
    1. Flexor wrist surface 2.inter digital spaces 3. Abdomen 4. Inter gluteal cleft 5.Buttocks 6.Highs 7. Elbow 8.Feet 9.Ankles 10. Anterior axillary (under arm) folds. 11. Other/specify_____
22. Date of rash onset ____/_____/_____(dd.mm. yy)
23. How long have you had a rash? (Duration of rash) _____days/months
24. Did you visit health facility for this illness? 1. Yes 2. No
25. If yes, date went to facility____/____/_____)
26. Treatment given 1.Yes 2. No
27. If yes, type of treatment
    1. 5% Permethrin cream 2. 25% benzyl benzoate lotion (BBL) 3. 10%Sulfur ointment 4. Ivermectine
28. Status of the patient after treatment has given
    1. Patient cured 2. Partially cured / Improved 3. Re-infected 4. Other/specify_____
29. How long were you ill before visiting the health facility? _____ days/hours

E. Questions related to risk factors

30. Did you travel outside of your village _____? 1. Yes 2. No
31. If the answer is Yes for Q30, where have you been?
    District _____ village_____ Got_____
32. Did you contact a person who has been infested with scabies within the past 2 months? 1. Yes 2. No
33. If yes, for Q32 what is the type of contact?
    1. Sleeping together 2.playing together 3. Sharing clothes 4. Other/specify_____
34. What is the source of water for your personal hygiene, drinking and cooking purposes? 1. Pipe water 2. Spring 3. Hand dug well 4. Deep well 5. Pond 6. River 7. Other/ specify _____

35. What is the amount of water usually found in the house for drinking, cooking & personal hygiene in a daily bases?
    1. Less than 20 liters 2. 21-40 liters 3. 41-60 liters 4. 61-80 liters 5. more than 81 liters
36. In order to fetch water, what is the walking distance from your house to the water source?
    1. Less than 500 m 2. 500-1000 m 3. 1-5 km 4. 5-10 km 5. More than 10km
37. What is queuing time at a water point/source?
□ Less than 30 minutes □ 31-60 minutes □ 1-2hours □ more than 2 hours
38. Do you have soap for personal hygiene & washing clothes whenever there is a need? 1.Yes 2.No
39. If yes, for Q38 how often do you wash your clothes?
    1. Two times per week 2. Once in a week 3. Once per 2 weeks 4. Once in a month 5. Other/specify_____
40. How often do you take shower?
    1. Two times per week 2. Once in a week 3. Once per 2 weeks 4. Once in a month 5.Other/specify_____
41. If your answer for Q38 is no, what is the reason? _____
42. How often do you change your clothes/wears?
    1. Two times per week 2. Once in a week 3. Once per 2 weeks 4. Once in a month 5. Other/specify_____
43. Do you wash your hand regularly? 1. Yes 2. No
44. What is the area of the house where the respondent is living (in meter square)? _____
45. Are you living in an area/ villages affected by flood or any disaster? 1. Yes 2. No
46. If yes, was your home affected by the flood or any disaster? 1. Yes 2. No
47. What was the damage in your livelihood that was caused by the flood or disaster? _____

1.2. Outbreak two-Measles Outbreak Investigation at Mareko District in Gurage Zone, SNNP Regional State, 2020

Abstract

Introduction-Measles virus is an aerosol and one of the most contagious pathogenic viruses. It is one of the communicable diseases, causing vaccine preventable morbidity and mortality. Measles outbreaks are still occurring despite significantly increasing vaccination rates with a majority of adolescents and young adults being affected. This study is aimed to investigate the measles outbreak and risk factors in Mareko District.

Objective: To investigate Measles outbreak and associated risk factors in the Mareko District of Gurage Zone, Southern Nations, Nationalities and Peoples' Region 2020.

Methods: The investigation was conducted by community based unmatched case-control(1:3) study design. Data were collected from 17cases and 51controls using face-to-face interview with semi-structured questionnaire. The collected data were analyzed using Epi-Info and MS-Excel 2013.

Results- The overall attack rate of affected villages was seven cases per 1,000 populations with no measles related death. On unmatched bivariate analysis, some variables were significant factors. However, in multivariate analysis those remained significantly associated for contracting measles were being age less than 15 years AOR=23.261(95%CI;2.686-201.450,P=0.004) and family size greater than five AOR=8.170(95%CI;1.022-65.328,P=0.048). Previous having measles infection AOR=0.048(95%CI;0.006-0.399,P=0.005) was protective factor.

Conclusion: females were more affected than males. Being less than fifteen years old and larger family sizes greater than five were risky for acquiring the disease than others. However, having a previous history of measles infection was a protective factor. More than half of cases were vaccinated for first dose, but no for the second.

Keywords: Measles outbreak, case-control, risk factors, Mareko District

1.2.1. Introduction

Measles outbreak in the Mareko District was reported to the Southern Nations, Nationalities and People's Regional Health Bureau on 12/27/2019 with nine cases for the first time. Then, after confirmation on December 31, 2019, the case investigation for further case identification and control was established at the Regional Health Bureau. On January 1, 2020, case investigation in Mareko District was started by house-to-house visit using a semi-structured questionnaire.

Measles virus (MeV) is an aerosol-borne and one of the most contagious pathogenic viruses known [1]. It is caused by an RNA virus of the paramyxoviridae family, which belongs to the genus morbillivirus [2]. Measles is one of the communicable diseases, causing preventable morbidity and mortality. It is a highly contagious viral disease, which affects susceptible individuals of all ages and remains to be the leading cause of death among young children globally[3]. Measles outbreaks are still occurring despite significantly increasing vaccination rates with a majority of adolescents and young adults (up to 40 years of age) being affected, who were mainly not vaccinated against measles or had received only one dose[1]. According to the WHO update, many countries around the world are experiencing measles outbreak [3].

Measles is transmitted through droplets from the nose, mouth, or throat of infected persons. The incubation period for measles is about 10 days to fever onset and 14 days to rash onset [4]. This period may be shorter in infants and longer (up to 3 weeks) in adults [4]. Following rash and high fever, the following will be runny nose, conjunctivitis and cough [3, 4]. Measles virus is transmitted primarily by respiratory droplets over short distances and, less commonly, by small-particle aerosols that remain suspended in the air for long periods [4].]. Infants and young children, although susceptible if not protected by vaccination, are not exposed to measles virus at a rate sufficient to cause a large disease burden in this age group [4]. In the absence of vaccination, every child in an area where measles virus is circulating would be exposed to have the measles [5].]. Measles case is spread through living in overcrowded, large family size, travel patterns, and types and locations of social interactions (for example, market-places)[5]. In temperate climates, annual measles outbreaks typically occur in the late winter and early spring [4].]. Annual outbreaks are probably attributable to social networks facilitating transmission (e.g., congregation

of children at school) and environmental factors favoring the viability and transmission of measles virus [4].

Cases in the community are sources for disease spread and challenge outbreak control. Also, cases that stay without treatment are at higher risk of developing complications related to measles infection [6]. Complications, such as otitis media and pneumonia occur in about six to seven per cent of reported cases [7].

According to the WHO report in 35th of WHO epidemic week 2019, 8201 suspected measles cases were reported from Ethiopia [3]. Children aged less than five years are the most affected, accounting for 50.2% of the total cases, followed by age group 15-44 years (25.5%). Seventy-two per cent of the reported measles cases were not previously vaccinated [3].

In Ethiopia, measles epidemics are the common causes of morbidity and mortality due to low coverage of measles vaccination. According to the UNICEF Report on 16 July 2019, Ethiopia is the fifth country in the World by a large number of unimmunized children [8]. In 2018, children not immunized with the first dose of measles were 1,215,724 [8]. Also, in SNNPR measles outbreaks occurred in the past years in different zones and Districts. Mareko District is one of the measles epidemic occurring Districts repeatedly. Therefore, case investigation is mandatory for outbreak controlling and prevention. Therefore, this case investigation aimed to identify the measles outbreak cases and risk factors in Mareko District for interventions towards case-control and prevention.

1.2.2. Objective

1.2.2.1. General Objective

To investigate the Measles outbreak and risk factors in Mareko District of Gurage Zone, SNNP Region January 2020.

1.2.2.2. Specific objectives

- To describe the Measles outbreak in terms of person, place and time
- To identify main risk factors for the Measles outbreak in the District

- To take possible prevention and control measures based on findings

1.2.3. Methods and Materials

1.1.2.3.1. Study Area and Population

The study was conducted in Mareko District, which is one of the 13 Districts of Gurage Zone in Southern Nations, Nationalities and People's Regional State. Administratively, the District has 25 rural and one urban villages, having 88,718 population and 18,102 households. The District's Town Koshe is located at 114Km from the Zonal Town Wolkite in the eastern direction and 142 Km from Regional City, Hawassa. Mareko is bordered with Oromia in eastern and northern, Meskan District of Gurage Zone in the western and Site Zone in the south.

The District has three health centers and 25 health posts, no hospital in the District. The District's altitude is 1,700 to 2,000 meters above sea level and temperature ranging from 16 °C to 31 °C. There are two rainy seasons: the main rainy season is from May to September and the minor rainfall is from October to November. The economy of the Mareko people rests on mixed farming and known by Chili pepper (Berbere).

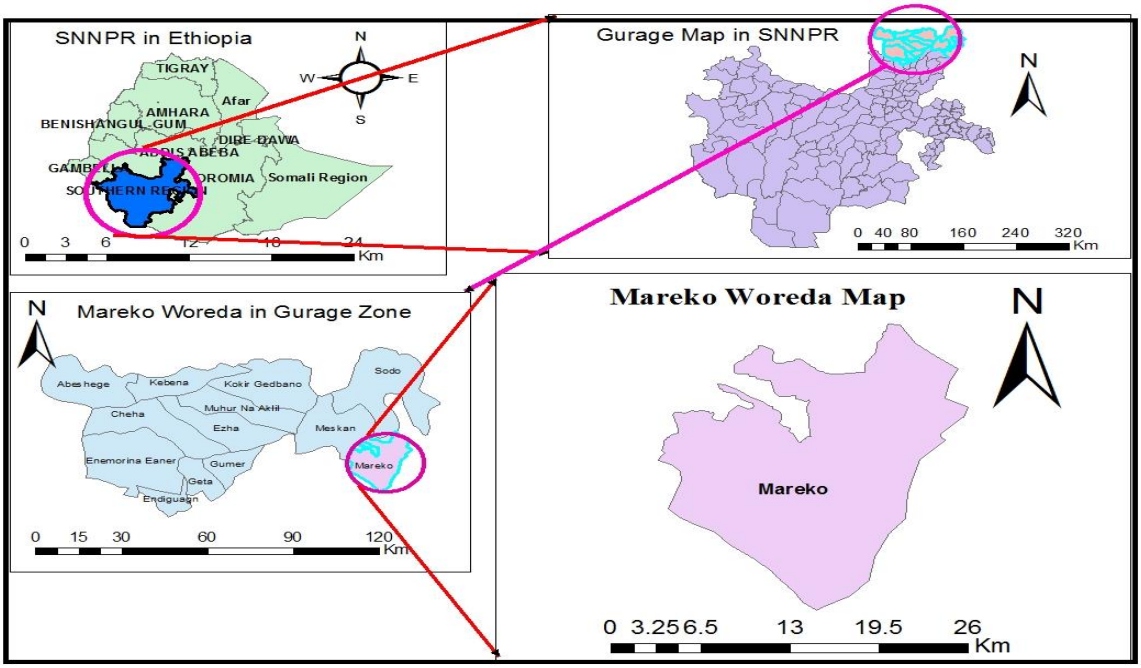

Figure 7:-Map of Mareko District in Gurage Zone, SNNP Regional State, Ethiopia 2020

1.1.2.3.2. Study Design and Period

The case investigation was conducted by Community Based Unmatched Case-Control (1:3) study design from January 1 to 10/2020.

1.1.2.3.3. Sample size determination and sampling technique

All cases found during data collection were included in this study. Therefore, 17cases and 51 controls were included for this study.

Controls were selected conveniently from the villages where cases were present.

Cases were any residents of villages in Mareko District with sign and symptoms of measles (Maculo-papular rash, Conjunctivitis, Fever, etc) and agreed to participate in the study. Since controls were any residents of villages in Mareko District without any sign and symptoms of Measles, but neighbors to the selected cases and agreed to participate in the study.

1.1.2.3.4. Data Collection and Analysis

The data were collected from the community through face-to-face interview with individual respondents using a semi-structured questionnaire. After data were collected, cleaned and entered analyzed using Epi Info version 7.2 and Microsoft office excel 2013.

1.1.2.3.5. Permission for the Study

Verbal informed consents were taken from all participants before interviewing them. Besides, photos were taken based on the willingness of participants.

1.1.2.3.6. Case Definition

Suspected cases-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

[9].

Confirmed cases- A suspected case with laboratory confirmation (positive IgM antibody) or epidemiological link to confirmed cases in an epidemic [9].

1.2.4. Results

1.2.4.1. Descriptive Epidemiology

Totally, 102 confirmed measles cases (four laboratory-confirmed) were line listed from five villages in health facilities and it was found in District health office. However, only 17 cases were found during the investigation period. The overall (Crude) attack rate (AR) of affected villages was one case per 1,000 populations, with no measles-related death (CFR=0).

1.2.4.1.1. Descriptive Epidemiology of Measles Cases by Person

From 17 total cases interviewed 11(65%) were females and six (35%) were males (Figure 8).

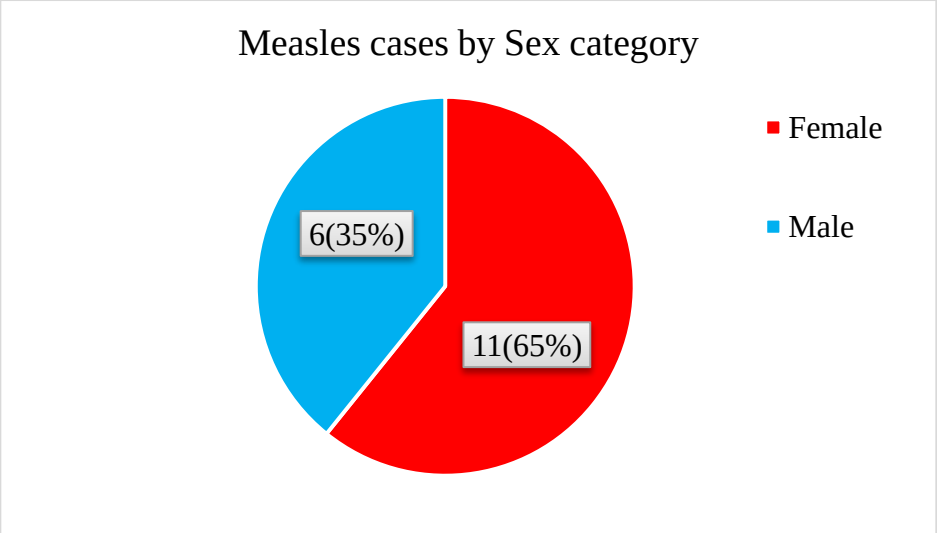

Figure 8:-The proportions of Measles cases by sex, Mareko District, in Gurage Zone, SNNP Region, Ethiopia, 2020

As per cases interviewed cases from five villages in the District, the most affected age groups were under five years, accounting for about 5 per 1000 (Table 4). Overall, less than 15 aged children were the dominantly affected age group being about 12(71%). The mean age was eight years, with ranges from one to 31 years.

Table 4:-Attack rate of Measles cases in the affected villages of the Mareko District of Gurage Zone in SNNPR, 2020

Age groups	Total population of age group	Measles cases	AR(per 1000)
0-4	2230	11	4.93
5 to 14	4608	1	0.22
15+	7447	5	0.67
Totally in affected villages	14285	17	1.19

Out of 17 cases interviewed during case investigation, 16(94%) cases had at least one sign of the complication of measles. Among signs and symptoms, pneumonia and conjunctivitis were the leading as shown on figure-9 below.

Figure 9:-Pictures of Measles cases in the Mareko District, Gurage Zone, SNNPR, 2020

1.2.4.1.2. Descriptive Epidemiology of Measles Cases by Time

Mareko District reported Measles cases starting from 28 December to 12 January 2020, through weekly surveillance report. There was no measles case report after 12 January 2020, from this District. According to the Epidemic curve on figure-10 below, the initial case developed the sign and symptoms of measles on 22 December 2019. Besides that, the Epidemic curve shows that cases peaked on 29 December 2020 (Fig. 10). The average duration of rash was 10 days, ranging from seven to 14 days.

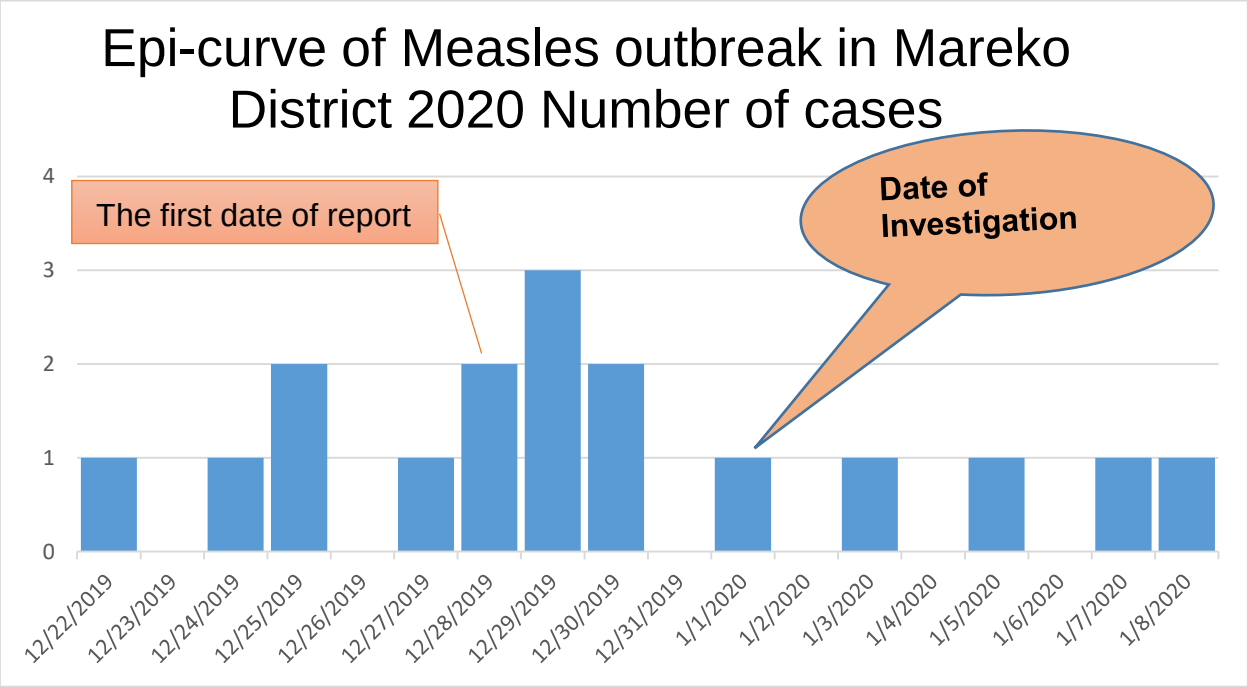

Figure 10:-Epi-curve of Measles outbreak of the Mareko District in Gurage Zone, SNNPR, 2020

1.2.4.1.3. Descriptive Epidemiology of Measles Cases by Place

More than half of all cases interviewed, 9(53%) were from Shirinto 1st village (Table -5). Three (17%) from Shirinto 3rd and others were from Shirinto 2nd, Udasa Wesh Wera and Goto Mandifa villages (Table-5). From cases interviewed 16(94%) were more than five kilometers away from the health center.

Table 5:- Distribution of Measles cases by villages in the Mareko District at Gurage Zone, SNNPR, 2020

Villages	Number of Measles cases	Percent
Goto mandifa	1	6%
Shirinto 1	9	53%
Shirinto 2	2	12%
Shirinto 3	3	17%
U/W/Wera	2	12%
Grand Total	17	100%

1.2.4.2. Analysis of Case Control Study (Analytical Epidemiology)

For the case-control study, we recruited 17 cases with a median age of four years ranging from one to 31 years, and 51 controls with a median age of 28 years ranging from 11 to 48 years. Sex distribution; 11 (65%) of cases and 26(51%) of controls were females (Table-6). Age groups that were highly affected by this case were those less than fifteen years of age (Table-6). The major occupation of cases and controls was farming 41(60%). All cases and controls (68(100%)) were Muslim religion followers. Concerning the ethnicity of the cases and controls, 62(91%) were Mareko and six (9%) Silti (Table-6). The families of cases and controls who had greater than five family members were eight (47%) and eight (16%) respectively (Table-6). Families having a sick person in their house were six (9%) (Table-6).

Table 6:- Socio-demographic characteristics of the cases and controls in the Mareko District, Gurage Zone, SNNP Regional State of Ethiopia, 2020

Variables	Cases		Control	
	Frequency	Percent	Frequency	Percent
Sex category				
Male	6	35.29%	25	49.02%
Female	11	64.71%	26	50.98%
Total	17	100.00%	51	100.00%
Age category				
<15	12	71%	8	16%

>15	5	29%	43	84%
Total	17	100%	51	100%
Occupation of the patients / respondents				
Farmer	5	29.41%	36	70.59%
House wife	0	0	10	19.61%
Student	1	5.88%	5	9.80%
NA	11	64.71%	0	0.00%
Total	17	100.00%	51	100.00%
Ethnic group				
Mareko	17	100.00%	45	88.24%
Silti	0	0.00%	6	11.76%
Total	17	100.00%	51	100.00%
Family size group				
<5	9	53%	43	84%
>=5	8	47%	8	16%
Total	17	100.00%	51	100.00%
Educational level of the family				
Illiterate	16	94.12%	49	96.08%
Elementary	1	5.88%	0	0
Read and write	0	0.00%	2	3.92%
Total	17	100.00%	51	100.00%
Marital status of patents				
Single	1	5.88%	2	3.92%
Married	16	94.12%	49	96.08%
Total	17	100.00%	51	100.00%
Sick person with rash, fever, running rose/conjunctivitis in the family				
Yes	6	35.29%	0	0.00%
No	11	64.71%	51	100.00%
Total	17	100.00%	51	100.00%

1.2.4.2.1. Bivariate and multivariate analysis

On unmatched bivariate logistic analysis, the statistically significant risk factors were history of contact with a person infected with Measles in the past two to three weeks, being age less than 15 years old, a distance greater than five kilometers from the health center and family size greater than five (Table-7). However, the previous history of measles infection was a protective significant factor associated with measles (Table-7). Other independent variables were not statistically significant.

However, in multivariate logistic analysis, independent factors those remained significantly associated with contracting measles outbreak in Mareko District were being aged less than 15 years and family size greater than five (Table-7). Previously having measles infection was a protective factor for measles during the outbreak (Table-7).

Table 7: -Summary of Bivariate and Multivariate analysis of independent variables for measles in Mareko District, SNNP Region, Ethiopia 2020

Variables		Cases	Controls	Bivariate analysis			Multivariate analysis		
				COR	95%CI	P.Value	AOR	95%CI	P.Value
Age category	<15	12(71%)	8(16%)	12.900	3.560-46.751	<0.001	23.261	2.686-201.450	0.004
	>=15	5(29%)	43(84%)						
Family size	>=5	8(47%)	8(16%)	4.778	1.417-16.105	0.012	8.170	1.022-65.328	0.048
	<5	9(53%)	43(84%)						
History of Measles infection	Yes	3(18%)	38(75%)	0.073	0.018-0.296	<0.001	0.048	0.006-0.399	0.005
	No	14(82%)	13(25%)						

Vaccination history and knowledge of prevention and control methods

From all cases and controls, there was no one who had a second dose, vaccinated for MCV. More than half of cases interviewed 10(59%) had measles first dose vaccination. However, from all cases and controls interviewed 39(57%) had no measles vaccine. The reasons for this problem

were lack of knowledge about vaccination campaign, unknown site of vaccination and distance of health facility. Vaccination cards were not found for those vaccinated and the date of vaccination was unknown.

Regarding their knowledge on prevention and control, 67(99%) knew how measles case could be transmitted and prevented. Also, all cases and controls 68(100%) believed that modern treatment can cure the disease and its complications.

1.2.4.3. Interventions Done

All identified cases were provided with supportive treatment with vitamin "A", tetracycline ointment and oral rehydrating salts (ORS). Severely ill patients were taken to the nearest health centers for better supportive treatment and follow up. Among those got treatment 16(94%) were recovered from the pain and the left one case was partially improved. After cases identified, the measles vaccine was given for those greater than six months and under five years aged children living in the area of the outbreak. MCV2 vaccination was provided for all under two years children in all villages of the District.

1.2.5. Discussion

Measles outbreak in Mareko District was verified based on the laboratory test confirmed. From all cases, more than half were from Shirinto 1st village, which is more than five kilometres far from the HC. This might be the cause of delay to get treatment. The overall attack rate (AR) of measles cases in the District was relatively agrees with the study done in Jarar Zone of Somali Region, eastern Ethiopia[10]. Females were affected more than males, as outbreak investigation conducted in Artuma Fursi District of Oromia Special Zone in the Amhara Regional State, Ethiopia 2018[11]. However, there were no deaths related measles in the District, which may be due to early diagnosis and supportive treatments given from the nearby health center.

Families with greater than five family members had five times higher risk of acquiring measles than other families. This is relatively similar to the outbreak in Gedeb District in Gedeo zone of SNNPR in 2014[12]. But, this finding is different from the study done in South West Ethiopia, which was insignificant [13]. This might be due to sampling size difference, which is small in this

particular study. Few families had sick persons in their houses. In this study, the most associated risk factor was being less than 15 years, which had thirteen times higher risk of acquiring measles than those above 15years. This is also in agreement with the study conducted in Jarar Zone of Ethiopia, Somali Regional State in 2016[10] and in nine Districts of Guji Zone of Oromia Regional State in 2017[14]. Even though it was not statistically significant, the most affected age group was under-five children accounting higher attack rate than other age groups. This finding is similar to the study conducted in Jarar Zone of Ethiopia Somali Regional State in 2016[10]. The previous history of measles infection was the most significant factor regarding prevention for the measles outbreak, which is in agreement with the investigation done in Basso Liben District, Amhara Region[15].

Most of the cases developed signs and symptoms of measles complication which was higher than the study done in Sekota Zuria Rural District of Ethiopia[16]. This might be due to the size of cases in that investigation. Among signs and symptoms of complications, pneumonia and conjunctivitis were the leading signs and symptoms.

More than half of cases were vaccinated for MCV1 on routine vaccination period within their lifetime, especially in their first year of birth. However, there was no second dose of MCV in the locality. These were almost similar to the study conducted in Bassona Worena District, Amhara Region, Ethiopia, 2018[17] and in Southern Nations, Nationalities and People's Regional State in 2018[18]. Vaccination cards were not found for all participants vaccinated and the date of vaccination was not known. Lack of knowledge and information regarding the site of vaccination were the main reasons for not taking measles vaccination. This finding is in agreement with the study done in Bassona Worena District in Amhara Region[17]**.**

All cases took treatment at the nearby health center with appropriate conservative treatments and almost all of them recovered. Regarding knowledge, the study participants knew how measles can be transmitted and prevented which was relatively similar to the study conducted in Sekota Zuria Rural District of Ethiopia[16]. Also, almost all participants believed that modern treatment can cure the disease. This was again in line with the study conducted in Jarar Zone of Ethiopia, Somali Regional State in 2016 [10]

Limitations of the study

- Incomplete line-list from District Health Office
- Absence of child immunization card at household level poses difficulty to get the exact date of vaccination and other relevant information.
- Lack of immunization coverage data by villages.
- Cases/controls respondents forget the exact events about their own or their Children health condition (Recall bias).

1.2.6. Conclusion

In this outbreak, females were more affected than males. Being less than fifteen years old was risky for acquiring the disease than above fifteen years. Larger family size was also significantly associated risk factor for a measles outbreak. However, having a previous history of measles infection was a protective factor. More than half of cases were vaccinated for MCV1 on routine vaccination period within their lifetime, especially in their first year of birth. All identified cases were provided with a supportive treatment with appropriate supplies and severely ill patients were taken to the nearest health centers for better supportive treatment and follow up.

1.2.7. Recommendations

For Mareko District Health Office

- Should implement the second dose of the measles vaccine (MCV2) and strengthen routine immunization in villages where the caseload is high
- Community based continuous and strong active case surveillance should be strengthened
- Continuous health education on prevention and control measles should be provided for the whole community
- Social mobilization and advocacy on measles vaccination, outbreak control and preventing methods of transmission should be undertaken.

For the Regional Health Bureau

- Availing all additional needed drugs like antibiotics, anti-pain, vaccination, vitamin A and other supplies on time for the District Health Office
- Supporting District Health Office by budget for vaccination campaign and other training

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Annex-2-Checklist for measles outbreak investigation in Mareko District January 2020

Status of Respondent: 1. Case 2. Control

Patient/Respondent Name_____ Date of Data collection_____

Region _____ Zone _____ District_____

Village _____ Got _____ Phone_____

Respondent Status Case_____ Mother ____ Father_____ Other_____

I. Socio-demographic Characteristics

S. No	Questions	Alternatives
1.1	Sex	1. Male 2. Female
1.2	Age	years_____ Months_____
1.3	Occupation of the patient/respondent	1.Farmer 2.Housewife 3.Student 4.Unemployed 5. Daily laborer 6. Merchant 7.Gov’t 8.NA (for under 5 child) 9.Other (specify)_____
1.4	Family Occupation(HH head)	1.Farmer 2.Housewife 3.Student 4.Unemployed 5.Daily laborer 6.Merchant 7.Gov’t 8.Other (specify)_____
1.5	Religion	1.Orthodox 2.Protestant 3.Muslim 4.Catholic 5.Other (specify)_____

1.6	Ethnic group	1.Mareko 2.Gurage 3.Silti 4.Hadiya 5.Other (specify)___
1.7	Educational level of the patient /respondent	1.Illiterate 2.Read and write 3.Elementary 4.Secondary 5 Above secondary 6.N/A
1.8	Educational level of the family	1.Illiterate 2.Read and write 3.Elementary 4.Secondary 5.Above secondary
1.9	Marital status of parent	1.Single 2.Married 3.Divorced 4.Widowed 5.Separated, 6 N/A
1.10	Family size	_____
1.11	Is there any sick person with rash, fever, running nose/conductivities (illness) in the family?	1.Yes 2.No
1.12	If yes, number of sick person	_____
1.13	Age(s) of sick person(s)	

II**. Clinical History of Diseases:* for the case only**

2.1	What was the symptom?	1. Fever 2.Rash 3.cough, 4.coryza (runny nose), 5. Conjunctivitis (red eyes) 7. Ear discharge 8. Pneumonia 9. Vomiting 10. Others_____
2.2	Ask ONLY if complication	Pneumonia: 1.yes 2. No Cornea: 1. yes 2.no Blindness: 1. yes 2. no Convolution 1.Yes 2.No Otitis media (ear discharge): 1.Yes 2.No Diarrhea: 1. yes 2. no Feeding problem 1.Yes2.No Encephalitis 1. Yes 2. No
2.3	Date of rash on set	____/ ___ / ____Duration of rash_____

2.4	Where the rash was started (location)?	District _____ villages _____ Got_____ HDA leader _____
2.5	Have you (has she/he) Visited health facilities?	yes2. no,
2.6	If yes, who told to go health facility?	1.Neighbors 2.HDA leader 3.HCW 4.HEW 5. Village leaders 6.FBOs 7.Others (specify) _____
2.7	Type of Health Facility visited	1.Hospital 2.Health center 3.Health post 4.Private Clinic 5.Local Drug Holder 6.Drug retailer 7.others_____
2.8	Date seen at health facility	__ / _ /
2.9	Illness duration before visiting the health facility	_____ in days/hours
2.10	Did you (he/she) take treatment?	1.Yes 2.No
2.11	If yes, treatment taken	1.ORS 2.Antibiotics 3.Vitamin A 4.Supplementary food 5.TTC ointment 6.Antipyretics 7.Others given_____
2.12	Did you (she/he) recovered after the treatment?	1. Recovered / cure 2.partially improved 3. Referred to next level HF 4.disabled after illness 5.death

III. Questions related to Risk factors for measles illness

3.1	Did you have (she/he has) been vaccinated for measles?	1.Yes 2.No …… skip to Q3.5 3.Unknow 4.Not applicable
3.2	If yes, last vaccination date	1.parent recall_____ 2.Vaccination card_____ /____/_____
3.3	Number of vaccine doses received	1.One dose 2.Two dose 3.three and above 4. Not know
3.4	At what age you (she/he) vaccinated first dose of measles vaccination?	_____
3.5	If not, why?	1. Health facility far apart

		2.lack of knowledge about vaccination campaign, 3.absence during vaccination campaign, 4. Site of vaccination unknown 5. Fear of Pain of vaccination 6. No need of measles vaccination for child 7. She/he took other vaccine differ from measles 8. other, specify .
3.6	Did you have any travel history 7-18 days to areas with active measles cases before onset of symptoms?	1.Yes 2.No If Yes where _____
3.7	Did you contact with a person with measles symptoms within the last 2-3 weeks?	1.Yes 2.No If yes, where_____
3.8	Do you have any travel history four days before and after rash onset	1.Yes 2.No If yes where _____
3.9	Do you have any contact history with someone else four days before and after rash onset	1.yes 2.No If yes with whom_____
3.10	If Yes to question 3.5 place of travel	1.School 2.Neighbor 3.Market 4.Other_____
3.11	Do you know modes of transmission for measles?	1.Yes 2.No If yes specify_____
3.12	Did you ever have measles infection?	1.Yes 2.No 3.Don't know
3.13	Nutritional status of the cases (use MUAC and weight for <5 children)	1.Normal 2.Moderate 3.Severely malnourished
3.14	What is the estimated area of the house in sq. m?	_____
3.15	Is your house well ventilated?	1.Yes 2.No
3.16	Distance from house to HC	<1km 2. Between 1 – 5km 3. >5km

3.17	Where did you go first when you get ill?	1.Health Facility 2.Traditional Healers 3.Holy Water 4.Stayed at home 5.Other :(Specify)_____
3.18	How do you think people get measles?	1.Contact with a virus from ill person 2.From God 3.Bad attitude of other people 4.Bad weather condition 5.Other(Specify)
3.19	How could you (she/he) suffer from Measles?	1.Contact with a virus from ill person 2.From God 3.Bad attitude of other people 4.Other(Specify)
3.20	Do you know how could spread /infection of measles be stopped?	1.By vaccination 2.By modern treatment 3.By isolation of infected ones /minimizing contact with infected person 4.By doing traditional practice 5.By pray /spraying holy water/ 6.By keeping infected one in dark place in the house 7.Others specify
3.21	Do you know measles is vaccine preventable?	1.Yes 2.No 3.I don't Know

3.22	Who do you think can be affected by measles?	1.Children of aged less than 5 years 2.Children of aged less than 18 years 3.Women of any ages 4.Any age groups of both male and women 5.Other (specify):_____
3.23	How do you think measles can be cured?	1.Using modern medicine 2.Using traditional Medicine 3.Holly water 4.By feeding nutritious foods 5.Keeping the sick person indoor 6.Other(Specify)_____

Chapter Two-Surveillance Data Analysis report

2.1. Surveillance Data Analysis on Dysentery in Southern Nations, Nationalities and People's Regional Health Bureau, Public Health Emergency Management Department, 2019

Abstract

Background- Analysis of surveillance data is important for detecting outbreaks and unexpected increases or decreases in disease occurrence, monitoring disease trends and evaluating the effectiveness of disease control programs and policies. Dysentery (Bloody diarrhoea), which typically occurs in cases of shigellosis, is one of the notifiable diseases in our county as well as in the Southern Nations, Nationalities and People's Region. The aim of this data analysis was to describe the disease epidemiology of the disease in the study area.

Objective- To describe the epidemiology of dysentery cases reported in this Regional State from 2014 to 2018.

Methods- A 5-years(from 2014 to 2018) surveillance data of Dysentery cases analyzed using descriptive study design in Southern Nations, Nationalities and People's Regional Health Bureau in Public Health Emergency Management's department. This data analysis was conducted using MS-Excel.

Results- The report on Dysentery in the last five years showed that there were 15 deaths and 216,181(1,145 per 100,000) cases. This means that there were 1:10,000 deaths to cases ratio in the five years. Among those cases, about half 102,500(47%) occurred within March, April, May and June months (dry season) throughout the five years. By incidence rate the top five zones were Hawassa Town, Basketo, Gurage, Segen and Benchi Maji from first to fifth ranks respectively. The analysis showed that the prevalence of cases was gradually increasing over the years.

Conclusion- Dysentery case was increasing in Southern Nations, Nationalities and People's Regional State. As these data analysis showed the case was higher in dry seasons, which may be related to the shortage of water. Though the cases were high in number, there was a low case fatality rate.

Key works- Data analysis, Dysentery, number of cases, Deaths, Diarrhoea, prevalence

2.1. Introduction

2.1.1. Background

Bloody diarrhoea (also known as dysentery), which typically occurs in cases of shigellosis and amoebiasis is one of the notifiable diseases in Ethiopia. The first bacterium to be discovered, Shigella dysenteriae, was named after Kiyoshi Shiga, a Japanese scientist who discovered it in 1896 as investigating a large epidemic of dysentery in Japan. The bacterium was also referred to a genus of generally as the dysentery bacillus (the word "bacillus referring to a class of Gram-negative, rod-shaped bacteria of which Shigella is a member)[1][2].

Shigella is worldwide major human-specific pathogens which cause shigellosis or bacillary dysentery, a colonic infection that may present as a benign short-lasting watery diarrhoea or the aggressive acute inflammatory bowel disease characterized by mucopurulent bloody diarrhoea and extra-intestinal complications [3].

Shigella is a Gram-negative, non-motile bacillus belonging to the Enterobacteriaceae family. There are four species of Shigella: S. dysenteriae, S. flexneri, S. boydii and S. sonnei (designated as serogroups A, B, C and D respectively)[4].

In 2013, the average annual incidence of shigellosis in the United States was 4.82 cases per 100,000 individuals [5]. State public health laboratories reported 7746 laboratory-confirmed Shigella infections to the CDC in 2012[1]. Of the 7746 laboratory-confirmed isolates, 6867 were identified to species level. Distribution by species was similar to previous years, with S.sonnei accounting for the largest percentage of infections (75%), followed by S.flexneri (12%), S.boydii (0.8%), and S. dysenteriae (0.3%)[1]. The reporting jurisdictions with the highest incidence rates were Nebraska (13.2 %), New Jersey (7.6%), and Minnesota (7.1%). The highest incidence per 100,000 populations for shigellosis (27.77 cases) was among children younger than 5 year [5].

Illness typically begins 0.5–4 days after exposure and the symptoms of shigellosis typically last 4–7 days starting from the beginning day of illness [1]. Disease severity varies according to species; serotype S. dysenteriae serotype 1 (Sd1) is the agent of epidemic dysentery, while S. sonnei commonly causes milder, non-dysenteric diarrheal illness [1]. However, Shigella of any species can cause severe illness among people with compromised immune systems [1].

Because only humans and higher primates carry Shigella, transmission occurs via the faecal-oral route, including through direct person-to-person or sexual contact or indirectly through contaminated food, water, or fomites. Since as few as 10 organisms can cause infection, the disease is easily transmitted [1].

2.1.2. Statement of the problem

Worldwide over 1,400 young children die each day or nearly 1.34 million deaths a year, most deaths from diarrhoea occurring among children less than 2 years of age living in South Asia and sub-Saharan Africa[1]. Over half of the fatality occurs in just five countries: India, Nigeria, Afghanistan, Pakistan and Ethiopia [1]. So foodborne diseases are a public health problem in developed and developing countries like Ethiopia [6].

The illness in our country is most commonly seen in child-care settings and schools [7]. Shigellosis is a cause of traveller's diarrhoea, from contaminated food and water in developing countries. Foods most often associated with Shigella outbreaks are salads and sandwiches that involve a lot of hand contact in their preparation, and raw vegetables contaminated in the field [7].

Therefore, assessing and analyzing the surveillance data of dysentery in SNNP-RHB is useful to give evidence-based information for prioritizing and instituting appropriate public health interventions in the Regional State.

2.1.3. Significance of the study

Ethiopia is one of the developing countries with a high burden of dysentery disease. Since dysentery is among the major widespread diseases affecting both young children and young adults as a result of many interrelated factors, such as inadequate facilities for processing human wastes, water and sanitation. Morbidity associated with illness due to dysentery continues to be present in the community. It is difficult to evaluate the dysentery case burden because of the very limited scope of studies and the lack of rapid stool culture test for confirmation of the diagnosis. Ongoing analysis of surveillance data is important for detecting outbreaks and unexpected increases or decreases in disease occurrence, monitoring disease trends and evaluating the effectiveness of disease control programs and policies. Therefore, surveillance data analysis was carried out to describe the disease epidemiology, the disease burden and trend retrospectively from 2014 to 2018, to improve public health actions against the disease and focus of the study on the disease in the study area.

2.2. Literature review

According to CDC report Worldwide, Shigella is estimated to cause 80–165 million cases of the disease and 600,000 deaths annually [5]. Shigella spp. are endemic in temperate and tropical climates. Transmission of Shigella spp. is most likely when hygiene and sanitation are insufficient. Shigellosis is predominantly caused by S. sonnei in industrialized countries, whereas S. flexneri prevails in the developing world. Infections caused by S. boydii and S.dysenteriae are less common globally but can make up a substantial proportion of Shigella spp isolated in sub-Saharan Africa and South Asia [5].

As per the study conducted in Addis Ababa University on students cafeteria, out of a total of 172 food handlers 78 (45.3%) of them were found to be positive for different intestinal parasites. The most abundant parasites being Entamoeba histolytica /dispar 68(70.8%), followed by Giardia lamblia 18(18.8%), Taenia species 5 (5.2%), Ascaris lumbricoides 2 (2.1%), hookworm 2 (2.1%) and Trichuris trichiura 1 (1.1%), which may as well cause dysentery [6]. Also according to the study conducted at Haramaya University, the prevalence of shigellosis was 1.4%[7].

From the study done in Arba Minch General Hospital, Sikela HC and Secha HC on 167 children in March to May 2017 showed that the prevalence of Shigella was 4.8%[8]. In 2012, the study done on isolation and antimicrobial susceptibility profile of Shigella and salmonella species from children with diarrhoea in Mekele Hospital and Semen HC, there were 260 children with acute diarrhoea involved. Among those children, 18(6.9%) had shigella species[9]. Prevalence of Shigella, salmonella and campylobacter species and their susceptibility patterns among under-five years children with diarrhoea in Hawasa Adare Hospital and Millennium Health center in 2011 on 158 children with diarrhoea was conducted. Among those children, 11(7%) had Shigella case [10].

2.3. Objectives

2.3.1 General objective

To analyze the epidemiology of dysentery cases reported to SNNP Regional State from 2014 to 2018.

2.3.2. Specific objectives

- To describe the magnitude of dysentery cases in SNNP Region
- To describe the distribution of dysentery cases and deaths by time, person and place in SNNP Region

2.4. Materials and Methods

2.4.1. Study area

SNNP Regional State is one of the nine Ethiopian Regional States with a total population of 18,719,008 in 2018 and with a total area of 112,323.19sq.km and located in the Southern part of the Country. It is bordered with the Oromia Regional State in the north and east, Kenya in the south, Sudan in the southwest and Gambella Regional State in the west. Most of the population of the Region depends on agriculture.

Figure 11: Map of SNNP Regional State, 2018

2.4.2. Study period

Secondary data were collected from Southern Nations, Nationalities and Peoples Regional Health Bureau PHEM department staffs analyzed and interpreted surveillance data of Dysentery report in the last five years (From 2014 to 2018) from 31/01/2019 to 28/02/2019.

2.4.3. Study Design

The retrospective descriptive study design was used to analyze the surveillance data

2.4.4 .Data collection methods

Secondary surveillance data of dysentery for the last consecutive five years (2014-2018) were collected from SNNP-Regional Health Bureau PHEM department and reviewed.

2.4.5. Data analysis

The five years of surveillance data of dysentery cases and deaths were analyzed after the data were cleaned using Microsoft Office Excel.

2.4.6. Dissemination of results

Report or results of this surveillance data analysis will be submitted to Addis Ababa University Department of Public Health and SNNP-RHB PHEM department by hard and soft copies.

2.4.7. Case definition

Suspected case-Any person with diarrhoea and visible blood in the stool

Probable case-A clinically compatible case that is epidemiologically linked (It is a contact of a confirmed case or a member of a risk group defined by public health authorities during an outbreak).

Confirmed case-Suspected case with stool culture positive for Shigella dysenteriae type 1[11].

2.4.8. Permission for data utilization

An official letter was obtained from Addis Ababa University, College of Health Sciences, and School of public health to SNNP Regional Health Bureau. So, the 5-years SNNP Regional State surveillance data were accepted by the permission of the Bureau head. The data received were kept insecure to not transfer to another person without the permission of the office head.

2.5. Results

The completeness in the last five years (2014 to 2018) on average 90%. The highest was in 2017 which was 94% and the least was in 2015 and 2016, which was 89%.

The report of surveillance data in SNNP Regional health bureau on Dysentery within the last five years from 2014 to 2018 showed that 216,181(1145 per 100,000) cases and 15 deaths were reported (table-9). This means less than 1:100,000 deaths to cases ratio all over five years. Deaths reported seven deaths (46.7%) from Yem and from Benchi Maji five deaths (33%), and others 3(20%) were from different zones (Konta 1, Wolayita 1 and Dawuro 1) of the region.

As indicated in table-9 below, the case fatality rate of 15 deaths were 0.07 per 1000 and the highest deaths were seven (46.7%) reported in July 2014. Four deaths were reported in November 2016

and others 4(26.7%) were reported in different months and years. From all of the deaths, there were more than half (53%) reported in 2014 and one-third (33%) were reported in 2016.

Table 8:- Magnitude of Dysentery Cases and deaths detected by Zones in SNNP from 2014 to 2018.

S/N	Zone	Total Dysentery Deaths	Total Dysentery In Patient Cases	Total Dysentery Out Patient Cases	Total cases	Admission rate
1	Basketo	0	34	2305	2339	1.45
2	Bench maji	5	31	14885	14916	0.21
3	Dawuro	1	39	5591	5630	0.69
4	Gamo Gofa	0	65	13081	13146	0.49
5	Gedeo	0	189	3977	4166	4.54
6	Gurage	0	58	31986	32044	0.18
7	Hadiya	0	2	8834	8836	0.02
8	Halaba	0	19	4301	4320	0.44
9	Hawassa Town	0	30	13321	13351	0.22
10	Kefa	0	9	5957	5966	0.15
11	Kembata Tembaro	0	208	6215	6423	3.24
12	Konta	1	15	1654	1669	0.90
13	Segen	0	158	13334	13492	1.17
14	Sheka	0	10	1207	1217	0.82
15	Sidama	0	318	53657	53975	0.59
16	Silte	0	17	14987	15004	0.11
17	South Omo	0	38	12799	12837	0.30
18	Wolayita	1	117	5464	5581	2.10
19	Yem	7	4	1265	1269	0.32
	Grand Total	15	1361	214820	216181	0.63

Among the cases about half 102,500(47%) were reported in March, April, May and June months throughout the five years as indicated in figure-12 below. These cases were low in the rainy season in the region.

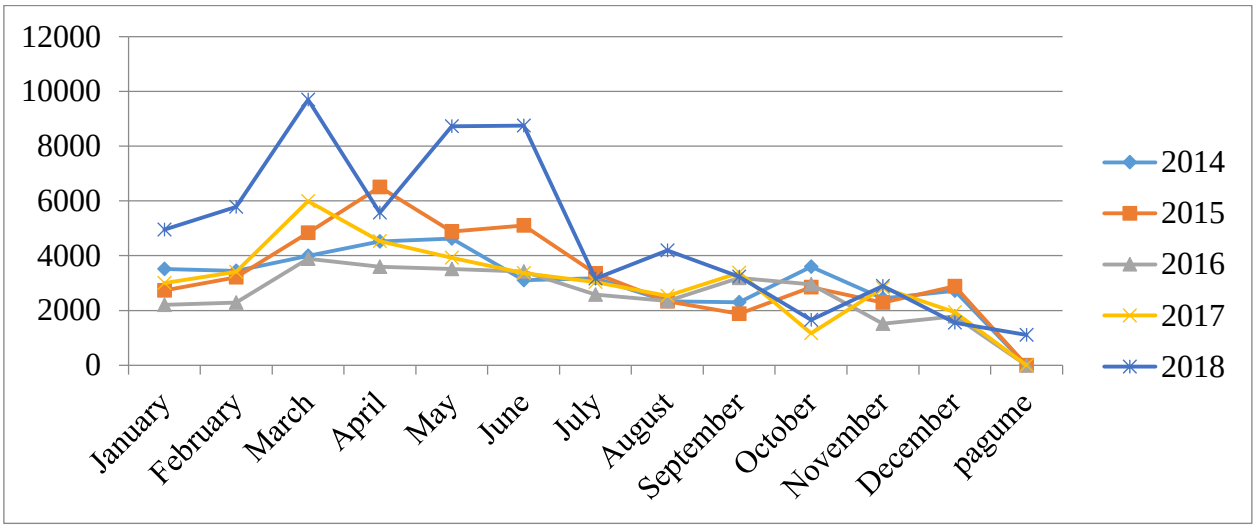

Figure 12: Number of cases by months in SNNP Regional State, 2014-2018

The report revealed that the incidence rate (per 10,000) of the case was increasing from 2014 to 2018 as shown below in figure-13. In this figure-13 the highest and the least incidence rate was in 2018(312/10,000) and 2016(178/10,000) respectively.

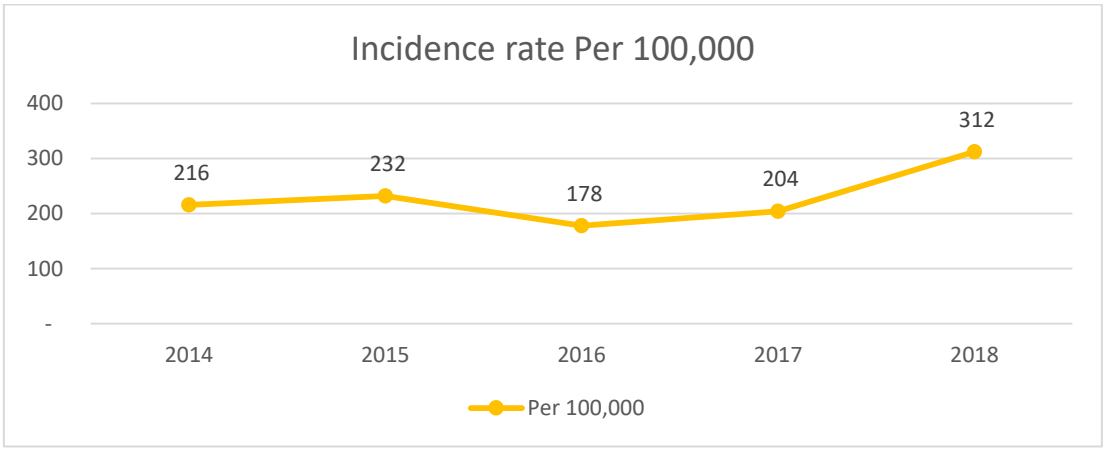

Figure 13: Incidence rate (per 10,000) of dysentery cases by year of report in SNNP Regional State, 2014-2018

As figure-14 below showed, the deaths indicated by line graph very low compared to cases detected within 2014 to 2018. In 2014 eight deaths from 39,758 cases (CFR=0.02%), in 2016 five deaths per 33,262 (CFR=0.015%), in 2017 one deaths per 39,075 (CFR=0.0025%), in 2015 one deaths per 42,827(CFR=0.002%) and in 2018 no death.

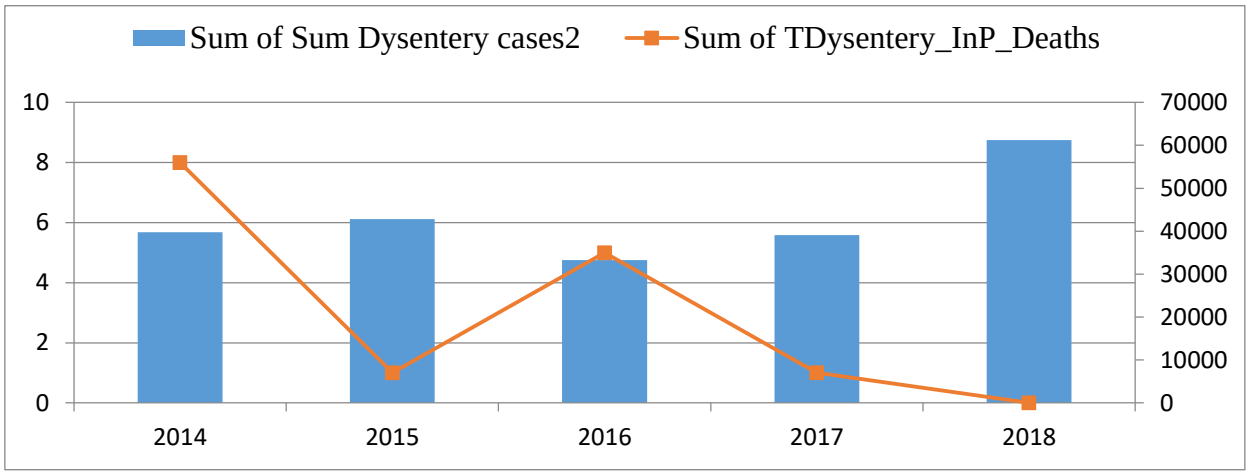

Figure 14: Dysentery deaths and cases report comparison in SNNP Regional State, 2014-2018

As indicated in table-10 below, from all cases reported the highest 53,975 (25%) were from Sidama zone, the next highest cases 32,044(15%) from Gurage zone and the least cases reported were from Sheka 1217(0.56%). The incidence rate (per 100,000 population) of the top five zones were Hawassa Town 4277, Basketo 3297, Gurage 1980, Segen 1845 and Benchi Maji 1808 from first to fifth respectively.

Table 9:-Incidence rate and CFR of Dysentery cases in SNNP Regional State, 2014-2018

S/N	Zones	Year of the report					Total	Per 100,000	Deaths	CFR
		2014	2015	2016	2017	2018				
1	Hawassa Town	654	918	798	1466	2587	6423	4277	0	0.00
2	Basketo	10889	12403	9572	8534	12577	53975	3297	0	0
3	Gurage	1565	1682	1725	2803	5062	12837	1980	0	0.00
4	Segen	1364	1047	1195	856	1168	5630	1845	0	0.00
5	Bench maji	5202	6393	4556	5989	9904	32044	1808	5	0.16

6	South Omo	405	376	243	289	356	1669	1772	0	0.00
7	Silte	211	271	1037	417	403	2339	1579	0	0.00
8	Sidama	894	1416	559	508	789	4166	1458	0	0.00
9	Konta	2244	2637	1292	949	1714	8836	1448	1	0.11
10	Halaba	2487	2859	1950	2251	5369	14916	1372	0	0.00
11	Yem	154	34	216	235	578	1217	1268	7	5.75
12	Dawuro	2333	3278	2851	3489	3053	15004	911	1	0.07
13	Kembata Tembaro	1620	1157	648	985	1171	5581	741	0	0.00
14	Gamo Gofa	1879	1888	1017	3007	5701	13492	655	0	0.00
15	Hadiya	2572	2752	1919	2431	3472	13146	559	0	0.00
16	Kefa	1245	915	993	1165	1648	5966	545	0	0.00
17	Sheka	376	1014	808	615	1507	4320	477	0	0.00
18	Gedeo	3481	1610	1632	2848	3780	13351	382	0	0.00
19	Wolayita	183	177	251	238	420	1269	294	1	0.79
	Grand Total	39758	42827	33262	39075	61259	216181	1145	15	0.007

2.6. Discussions

From the last five years, the surveillance data on Dysentery cases has been increasing as reported from all zones of the SNNP region. Report completeness on average was equal to the expected over the five years, which was acceptable. However, the case was increased during the first rainy season (from March to June) throughout the five years. This finding agrees with the report of Ethiopian FMOH in 2014 [2]. This may be due to water supply shortage and poor hygiene and sanitation in the Region.

Even if the cases report was very high in the figure there were a very little number of deaths from the case, which is less than one death from ten thousand cases reported. From all deaths reported there were about half from Yem and one-third of them were from Benchi Maji. This may be due to lack of treatment or misdiagnosis of the deaths. Others were from different zones (Konta, Wolayita and Dawuro) of the region.

The number of cases reported within the last five years from all zones was high but the prevalence was relatively lower than the study done is Haramaya University [7]. This may be due to sanitation and hygiene improvement from the former life of the community and this study was done in a high-risk population.

As this data analysis finding indicated the prevalence of Dysentery was lower than the study done in Arba Minch General Hospital, Sikela HC and Secha HC on children [8]. The difference with this surveillance data analysis may be due to the sample size difference done up on that means their sample size was children with diarrhoea (mostly targeted) and this surveillance data analysis was on the mid total population.

The case fatality rate of this analysis was also lower than the 2014 National report [2]. This may be due to the source of data used

Limitations

There was no rapid stool culture test for the case diagnosis to specify it.

There were no sex and age variables from the report collected throughout the five years of surveillance.

2.7. Conclusion

Dysentery case in Southern Nations, Nationalities and People's Regional State was increasing on case monitoring. The prevalence of the cases was high in Hawassa Town and Basketo Special District compared to other Zones of the Region. The data analysis showed that the cases were higher in the first rainy season, which might be due to shortage of water and poor hygiene and sanitation. However, the case was high in number there was a low case fatality rate.

2.8. Recommendations

For SNNP-RHB, PHEM Department

- Conduct strong supportive supervision on dysentery specific and related cases in Zones of the highest prevalence of dysenteries like Sidama and Gurage.

- Social mobilization on dysentery case prevention methods like improvement of sanitation and hygiene.
- Work on safe water supply and household utilization activities

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Chapter Three- Surveillance System Evaluation

3.1. Surveillance System Evaluation on Neonatal Tetanus in Hawassa City, SNNP Regional State, 2019

Summary

Background- Tetanus is an acute infectious disease caused by toxigenic strains of the bacterium *Clostridium tetani*. Ethiopia achieved Maternal and Neonatal Tetanus Elimination(MNTE) in 2017. There was lower reporting of case and deaths, which may reflect the weakness of the surveillance system rather than the true burden of the disease. That is why monitoring and evaluations of the surveillance system were needed.

Objective: To evaluate Neonatal Tetanus reporting practices to strengthen its surveillance system at different levels of reporting in Hawassa City in Southern Nations, Nationalities and People's Region 2019.

Methods: The evaluation was conducted in Hawassa City Administration. At each of the selected health facilities, the interview of key informants, as well as registers and patient medical records, were reviewed using a semi-structured questionnaire. The period of the surveillance system evaluation was the last 8-July 2017 to 7-July 2019.

Result: The evaluation was in two hospitals and one Health Center of Hawassa City. There were poor timeliness and completeness of case-based reporting from these health facilities. Among three cases identified from the register and medical record review, only one case was reported on weekly aggregate. But the system was flexible and simple to accomplish as the informants' response.

Conclusion and recommendation: The surveillance system of Neonatal Tetanus is flexible and simple, and it is very useful for the sustainability of Maternal and Neonatal Tetanus Elimination. But, there was poor report completeness and timeliness on case-based reporting and case notification to the next level of the surveillance system. Therefore, all health administration levels had to contribute their efforts to solve these gabs.

Keywords-Surveillance, Neonatal Tetanus, Evaluation, Death

3.1. Introduction

3.1.1. Background

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health [1]. The main objective of integrated disease surveillance and response (IDSR) is improving the use of information to detect changes in time in order to conduct a rapid response to suspect epidemics and outbreaks; monitor the impact of interventions: for example, declining incidence, spread, case fatality, and to facilitate evidence-based response to public health events; health policy design; planning; and management.

The collection of data are achieved through health facilities, including Private Health Sectors starting from the community level to the national level using standardized reporting formats. Decisions can be made at each level of the health system according to the availability of the expertise and resources in that particular level. Including health and health-related events in the list of conditions that should be under surveillance depends on many factors, such as; public health importance of a disease/event, epidemic potential and resources available to monitor the health event. That is why monitoring and evaluation of the surveillance system are needed.

Tetanus is a life-threatening but vaccine-preventable disease caused by a potent neurotoxin produced by toxigenic strains of the bacterium called *Clostridium tetani*. The organism is a ubiquitous, spore-forming, motile Gram-positive bacillus found in high concentration in soil and animal excrement. The disease occurs when non-immunized persons are exposed to *C.tetani* spores through skin or tissue injuries, resulting in exposure to the bacterial neurotoxin tetanospasmin. Direct person-to-person transmission of *C.tetani* does not occur. The incubation period from injury to symptom onset varies from 3 to 21 days (median: 7 days), with extremes of one day to several months. The incubation period depends on the severity and site of the wound. Shorter incubation periods are associated with more severe disease and a poorer prognosis; longer incubation periods are associated with injuries furthest from the central nervous system [2].

The main sign and symptoms are developed when *C.tetani* vegetate and produce tetanospasmin blocks inhibitory neurotransmitters in the central nervous system, causing muscular rigidity and

spasms, commonly presenting as lockjaw, risus-sardonicus, and opisthotonus. In the absence of medical treatment, case fatality for tetanus approaches 100% [3]. Tetanus cases are typically birth-associated, particularly in low-income countries among insufficiently vaccinated mothers and their newborns due to unclean deliveries and poor cord care practices. Among countries that have reduced burden of Maternal and Neonatal Tetanus (MNT) through vaccination, most tetanus cases occur following injuries in children and adults [4]. Effective and safe vaccines against tetanus toxin have been available for many decades and three doses of Tetanus-Toxoid Containing Vaccine (TTCV) have been shown to induce protective immunity in almost 100% of those vaccinated, however, immunity wanes over time [3].

To induce immunity, the World Health Organization (WHO) recommends individuals to receive a three-dose primary series of TTCV in infancy, followed by three booster doses, the first administered between 12–23 months of age, the second at school entry (4–7 years), and the third at 9–15 years of age [3]. For prevention of MNT, W.H.O recommends vaccinating pregnant women with at least two doses of TTCV and following specific delivery practices, such as clean umbilical cord care. Due to the ubiquitous nature of C.tetani spores, tetanus cannot be eradicated, but it can be eliminated through active immunization of children and women of reproductive age and improved obstetric care. Since 1989, the World Health Assembly has called for global MNT elimination (MNTE; defined as less than one Neonatal Tetanus [NT] case among newborns aged ≤ 28 days per 1000 live births per District per year [5].

Despite significant progress towards this goal, to date 182 out of 196 countries (93%) have achieved MNTE, the disease remains an important public health issue in many low-income countries [5]. Tetanus surveillance is an important component of sustaining MNTE but is also critical for describing tetanus burden in the general population and informing tetanus vaccination policy by highlighting immunization gaps [4]. For example, tetanus cases identified among men who underwent voluntary medical male circumcision in Uganda highlighted the need for tetanus booster doses among males [6]. Furthermore, in 2018, WHO published revised guidelines for NT surveillance, with minimal standards of national case-based surveillance, and the first-ever guidelines for non-NT (defined as tetanus among individuals aged >28 days) surveillance, with

minimal standards of aggregate reporting of inpatient cases and investigation of unusual clusters of cases [7].

Globally, even though the burden of disease has dropped significantly, MNT remains a significant public health problem, especially in developing countries. Intense progress in elimination has been slow and the African Region and missed its target by end-2015, due to slow implementation of recommendations of the elimination strategy by WHO. As of the end of 2016, ten of the remaining 18 countries where NT remains a public health problem (Angola, Chad, Central African Republic, DRC, Ethiopia, Guinea, Kenya, Mali, Nigeria and South Sudan) were in the African Region [4]. However, Ethiopia achieved MNTE in 2011 for all its Regions except for Somali Region, which achieved elimination in 2017 [8]. The elimination of Neonatal Tetanus (NT) – defined as a rate of less than one NT case/1000 live births in every District in a Country [9].

In 2018, a Regional PHEM report shows that 84 cases and 11 deaths of NT and in 2019, 25 cases and 8 deaths were reported through the surveillance system, with 17.43% case fatality [10]. Cases were reported from 14 Zones and three Special Districts. However, from Hawassa City two cases and zero deaths were reported to the Region in 2018 on a weekly aggregate and have 11th rank in the Region by case number reported [10]. In the absence of medical treatment, tetanus case fatality approaches to 100% [3]. Absence of case and deaths report from other Zones and Special Districts may reflect the weakness of reporting rather than the true burden of the disease.

WHO recommends that NT surveillance systems should be evaluated annually for the following indicators: completeness of reporting, timeliness of reporting, completeness of investigation, timeliness of investigation, adequacy of investigation, achievement and maintenance of MNTE, and adequate case response [7]. World Health Organization (WHO) also recommends an annual retrospective review of facility registers be conducted in hospitals and large health facilities to identify previously unreported NT cases. Additionally, WHO recommends that evaluation should be conducted every five years, which incorporates triangulation of aggregate and case-based NT reports as well as a review of facility records for missed cases [11]. As the department recommended in SNNPR as well as in Hawassa City, the NT surveillance system has not been recently reviewed for several years.

Sustaining MNTE is dependent upon countries having a high quality of NT surveillance system. Periodic reviews, such as this surveillance system evaluation, is essential to ensure the system is meeting the minimal surveillance indicators and to help the City Health Administration as well as the health facilities to identify areas where the system is functioning or not.

3.1.2. Rationale of the evaluation

Neonatal Tetanus surveillance in Ethiopia serves to guide the planning, implementation and evaluation of tetanus public health programs to prevent and control NT. It is composed of case-based and weekly aggregate reporting systems. Health facilities report all suspect NT cases to PHEM Officers at the District Public Health Offices immediately, usually via direct phone call or text. Furthermore, PHEM officers may conduct active case finding to identify unreported NT cases, as is done for measles and acute flaccid paralysis cases. Active case finding incorporates register and medical record review at health facilities and may include household visits in areas where patients are unlikely to seek medical care and where there are rumours of a neonatal death compatible with tetanus [12]. Once they have received the report, PHEM officers verify and investigate the reported cases with health facility officers and WHO Officers as part of a rapid response team and complete two forms – the case investigation form and the detailed investigation form. Copies of the completed forms are kept at each level - the District Health Offices, the Zonal Health Department, the Regional Health Bureau, and the National Public Health Emergency Management department at EPHI. Thus, the evaluation was conducted an in-depth assessment of the tetanus surveillance system at both a City Administration and health facility level. Therefore, this contributes to a more thorough understanding of Tetanus surveillance in Hawassa City Administration, identify the main challenges and strengths of the systems, and support the sustainability of MNTE.

3.2. Objectives of the evaluation

3.2.1. General objective

To evaluate Neonatal Tetanus reporting practices and to strengthen its surveillance system at different levels of reporting in Hawassa City, SNNPR, from 8 July 2017 to 7 July 2019.

3.2.2. Specific objectives

- To describe NT disease reporting practices both by case-based reporting forms and weekly aggregate at selected health facilities
- To assess attributes of NT surveillance system-Usefulness of system, flexibility, simplicity, data quality, acceptability, representativeness, timeliness, sensitivity and positive predictive value of NT case reporting at selected health facilities through review of facility registers and patient medical records

3.3. Methods

3.3.1. Area and period of evaluation

Hawassa City Administration is one of the SNNP Regional State's Administration levels and has eight sub-cities, 21 urban and 11 rural villages in 2019/2020. However, these are administered by one administration offices. Hawella Tula is independent of Hawassa City administration. The City has 679 health workers in 2018/2019, including supporting staffs. The period of the surveillance system evaluation was the last 8 July 2017 to 7 July 2019.

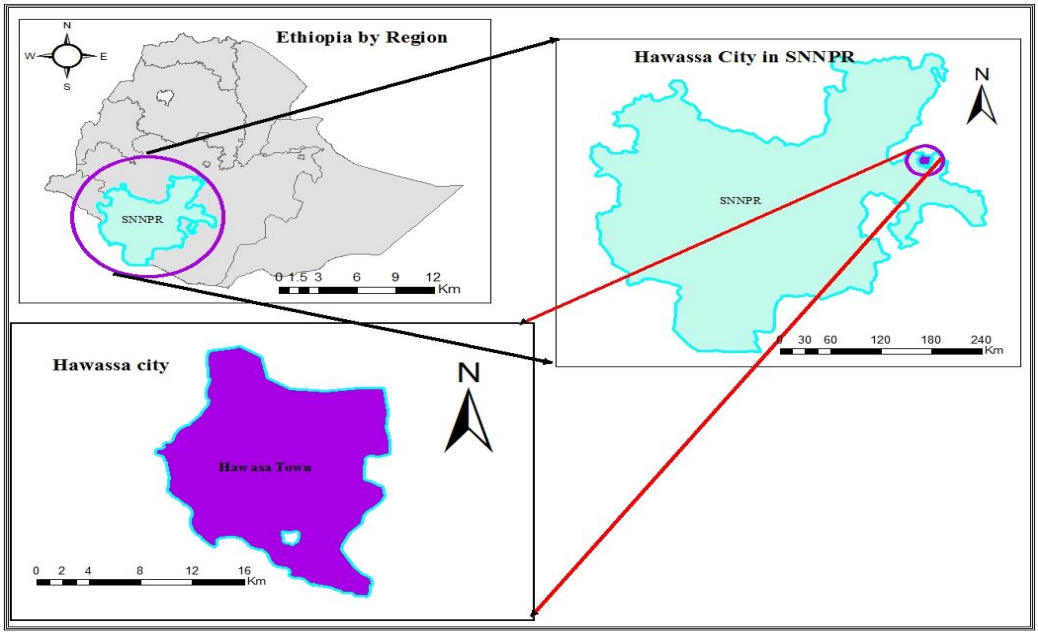

Figure 15:- Map of Hawassa City Administration in SNNPR, Ethiopia 2019

Table 10:-Health Facilities available in Hawassa City Administration, SNNPR, 2019

S.N	Types of HF	Government	Non-Government	Private	Total HF
1	Hospital	3	0	5	8
2	Health Center	11	1	0	12
3	Health Post	19	0	0	19
4	Higher Clinic	0	0	6	6
5	Medium Clinic	0	4	30	34
6	Lower Clinic	2	0	0	2
7	Special Clinic	0	0	9	9
8	Laboratory	0	0	11	11
9	Pharmacy	0	0	12	12
10	Drug Sore	0	0	46	46
11	Rural Drug Vender	0	0	4	4
	Total	35	5	123	163

3.3.2. The design of evaluation

This surveillance system evaluation was conducted by descriptive study design.

3.3.3. Data Collection Methods

The two higher-level government hospitals (Hawassa Referral Hospital and Adare General Hospital) and one health center (Alamura) were conveniently selected for this evaluation since those facilities have high customer services. This selection was due to these health facilities except Alamura health center were nationally selected and I was involved in data collection.

For this evaluation, tools were adapted from a National Tetanus Surveillance System Evaluation that was conducted in Ethiopia in 2019. The evaluation comprised of two levels; the first at the City Administration level, using PHEM reporting systems (case-based and weekly aggregate) and the second at selected health facilities. Data were collected by interviewing and reviewing documents using a semi-structured questionnaire. Both primary and secondary data were collected from concerned bodies at each level.

Eligibility criteria

Focal person	Criteria for selection
Health administrator	Eligibility criteria include the primary person who oversees the day-to-day administrative operations of the selected hospital or health facility.
Clinicians	Eligibility criteria include healthcare staff at one of the health facilities selected, with experience of treating Tetanus cases.
Medical records officer	Eligibility criteria include person whose primary job duties include collecting patient information, filing medical records, and processing patient admissions and discharge papers
PHEM surveillance focal points	Eligibility criteria include the primary person (focal person) responsible for reporting Tetanus cases and others to the PHEM surveillance system.

3.3.4. Case definition

All suspected NT cases should be investigated. The basis for case classification was entirely clinical and it does not depend on laboratory confirmation.

Suspected case definition for case finding

A suspected case for NT is a case that meets either of those two criteria:

any neonate who could suck and cry normally during the first two days of life and developed Tetanus-like illness or death between 3 and 28 days of age OR

Any neonate who died of an unknown cause during the first month of life.

Confirmed case. A confirmed case is any suspected NT case found during case investigation to have all three of the following:

normal ability to suck and cry during the first two days of life AND

Could not suck normally between 3 and 28 days of age AND

Developed muscle stiffness and/or spasms (jerking).

Discarded case. A discarded case is one that has been investigated and does not satisfy the clinical criteria for confirmation or has an alternate diagnosis.

Not investigated. Any suspected case not investigated, or without information available on age and symptoms to confirm the case, should receive the final classification of not investigated [11].

3.3.5. Letter for permission and ethical consideration

A letter for the NT surveillance system was written from SNNP Region Health Bureau to Hawassa City Administration Health Office and then Hawassa City Administration wrote a letter to health facilities. Written consent was taken from all the evaluation interviewees.

3.3.6. Operational definition

Acceptability: Is the willingness of persons and organizations to participate in the surveillance system.

Completeness: - Proportion of all expected data reports actually submitted to the public health surveillance scheme**.**

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

Flexibility: - Is the ability of the system to adapt to changing needs such as the addition of a new disease, the collection of additional data, and change in case definition.

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

Simplicity: - The simplicity of a public health surveillance system refers to both its structure and ease of operation.

Sensitivity: - Sensitivity is the capacity of the system to detect the highest proportion of true cases

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

Timeliness: - Is the ability of the system to trigger appropriate action in time.

Usefulness: - Refers to the relevance of the system in terms of feeding information for action.

3.4. Results

3.4.1. Health system for reporting and communication in Hawassa City Administration

The Hawassa City Administration Health Office report weekly aggregate through mail to the Regional Health Bureau and health facilities report by phone call and SMS to the City Administration Health Office. All health facilities have surveillance focal persons by formally giving formal letter as an additional job. All health facilities report directly to Hawassa City Administration Health Office.

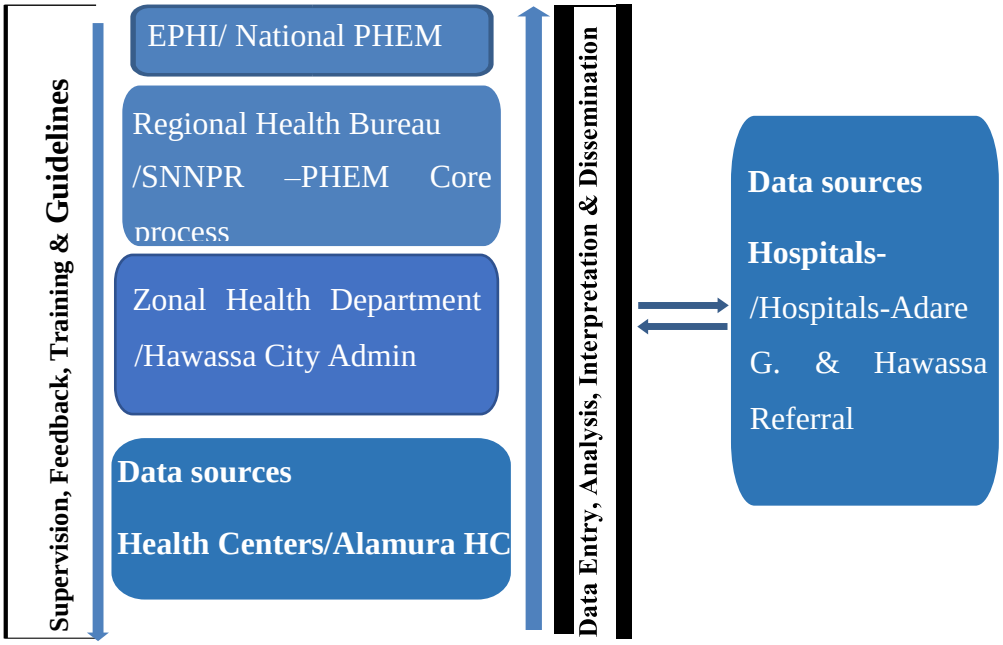

Figure 16:-Structure of the actual flow of information in NT surveillance system, Hawassa City, SNNPR, 2019

3.4.2. Assessment of availability of surveillance documentation, Registers and Forms

At all levels visited, case-based reporting formats and detailed case-based reporting formats were available. But, one register from Hawassa Referral Hospital in under five emergency outpatient ward was missed. Except, that there were no missed registers and medical records in all visited health facilities.

3.4.3. Usefulness of the surveillance system

Although this case was not reported according to the standard, since our country is in MNTE sustainability period the surveillance system is very useful. In absence of early treatment, the Case Fatality Rate of MNT is 100%. Since the case diagnosis method has no laboratory for confirmation, cases were missed at the visited health facilities as the health facilities' PHEM focal person response as a challenge. All neonates diagnosed for NT at both hospitals were delivered at home without the assistance of health worker and but the one from Hawassa Referral Hospital was attended by the traditional birth attendant as recorded on medical records of the patient. Among these neonates, only one (33%) was born from vaccinated mother for TT as the record shows.

The main challenge on NT surveillance was poor attention given by the higher level. Therefore, the lower level of the health system needs to be asked for this case investigation to actively do on it.

3.4.4. Status of surveillance system attributes

Simplicity

Even though case-based and detailed reporting formats are easy to fill, all interviewees said that they have not filled the format in the last two years at all levels. There was the case-based and detailed case-based format at all health facilities visited.

Flexibility

All registers, medical records, case-based reporting formats, and PHEM weekly reporting formats were flexible to fill health events, except NT detailed reporting formats, which were developed for NT case reporting only. There is a space that says "Other/specify" on Case-based reporting format and PHEM weekly reporting format since surveillance uses standardized reporting format.

Data quality

There was no filled case-based investigation forms in the medical record as well as weekly aggregate report file in the two hospitals evaluated. Two cases each found on register review and medical record abstraction in Adare General Hospital and Hawassa Referral Hospital were not reported to the Hawassa City Administration Health Office. Therefore, reported cases to the City and those found in the health facility were not equal. Surveillance focal person did not regularly do at least once weekly register review on NT before zero reporting on the weekly aggregate report.

Acceptability

All health facilities included in this evaluation accepted the current system of public health surveillance and they were engaged in the surveillance activities. However, surveillance of NT has no attention as much as other immediately reportable diseases, like Cholera, measles, AFP, etc. The facility surveillance focal person routinely collects data from health facilities and send it to the City Administration Health Office on weekly basis by phone.

Representativeness

The surveillance system is relatively representative of the population residing in urban areas compared to the population living in rural areas. The reason is all people residing in urban areas tend to utilize health services in governmental and private as well as NGO health facilities, which are covered by the system nearly 100%. Therefore, the urban population is well benefited than the rural population by the surveillance system. The surveillance-reporting format enables to include a limited number of socio-demographic variables- Personal characteristics, such as age, sex and risk factors for the occurrence of a disease like vaccination history of the mother, ANC status and health status of the mother were contained within the case-based and detailed reporting format.

Timeliness

Although NT case or death is an immediately reportable disease, the reporting timetable for weekly reportable diseases is every Friday from health posts to health centers and on Monday from Sub-city/Hospitals to city administration's health office. Of three cases diagnosed in the

last two years, only one had been reported immediately (33%) which was found from the City Administration Health Office.

Sensitivity

Because of the lack of laboratory test for diagnosis the sensitivity may be seen by case definition asking the relevant questions. Out of five clinicians interviewed only two (40%) clinicians respond properly as the standard case definition. Therefore, the sensitivity for the case identification and treatment was as low as their knowledge of case definition. From sign and symptoms of case definition, the main symptom found in three neonates diagnosed is a failure to suck after three days of birth. However, one case has additional muscle rigidity, frequent muscle spasm and abnormal body posture. So two cases were NT suspect and one was confirmed case. Although Adare General Hospital can diagnose the case absence of NICU ward and a separate room for neonatal Tetanus treatment were the main challenges.

Stability

The surveillance system of Hawassa City was stable and continuous over the whole time of the last two years. There was no interrupting weekly and immediately surveillance report and other work activities of PHEM. Although there were some instabilities in the City last years, the surveillance was not interrupted.

3.5. Discussions

Tetanus is a communicable disease and known cause of great morbidity and mortality among high-risk groups, like neonates from unvaccinated mother, unvaccinated person contaminated by *C.tetani* bacilli [13]. If the case does not get medical treatment, the fatality rate is very high among all age groups, especially in neonates. The reporting practice of health workers in NICU and other wards of hospital visited was poor since the finding in this evaluation shows that more than half of cases were not reported both by case-based and weekly aggregate reports. As per WHO standards, the minimum recommended standard for NT surveillance is case-based surveillance, meaning that every suspected NT case should be investigated and classified as confirmed or discarded [11].

The City level, to sustain MNTE, the NT surveillance system is very necessary since there were cases from hospitals diagnosed, but not reported. This may be due to a lack of awareness about MNTE sustainability. Also, there may be the probability of missed cases, due to low awareness on the case definition of key informants interviewed. Within the surveillance system, the case identification, registration and confirmation are crucial elements among core functions of the surveillance system. Since this case has no laboratory test, the use of standardized case definition must be necessary to confirm the case [11].

The surveillance system is measured by its attributes like simplicity, flexibility, acceptability, data quality, acceptability, representativeness, timeliness, etc. Therefore, those and other attributes have been assessed in this evaluation in selected health facilities. The simplicity of the system was obviously known because the system does not need any expenses for case identification and filling formats from index cases at health facilities. Concerning to flexibility of the system, it has good flexibility since it is easy to add new variables in the reporting format, except detailed case-based reporting format, which is specific to NT.

3.6. Conclusion

The surveillance system of NT is flexible and simple, which is very useful to sustain the MNTE. But there was poor report completeness based on case-based reporting and poor timeliness on case notification to the next level of the surveillance system. Since NT is an immediately reportable disease, the case investigation is necessary to evaluate the attribute of the surveillance system. Standard case definition was not used as expected in health facilities evaluated.

3.7. Recommendations

For Hawassa City Administration Health Office

- Capacity building activities such as continuous training and active case surveillance should be conducted at all levels.
- To increase report completeness and timeliness by case-based reporting and detailed case-based reporting, the health office should support the health facilities of focal persons.

- Engaging the clinicians during case-based investigation can strengthen the case identification and report.

For Hospitals

- Standardized Case definitions must be posted in all wards related to neonatal caring and treatment in addition to creating awareness on it.
- The coordination between wards and surveillance focal persons of the health facility should be re-established as favourable for immediate notified of such cases.

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Annex-3-Questionnaire for Evaluation of Tetanus Surveillance Systems in Hawassa City Administration, SNNPR, 2019

Informed consent for key informants

Evaluation of Tetanus Surveillance Systems in Hawassa City Administration, SNNPR, 2019

Principal Investigators**:** Ababu Fayisa

Organization**:** AAU

You are invited to take part in this evaluation because of your role at this facility/office. Before you decide, it is important for you to understand why the evaluation is being done and what it will involve.

The **objective** of this evaluation is to understand and describe Tetanus reporting practices in Hawassa City Administration and provide recommendations to strengthen Tetanus surveillance at different levels of reporting.

If you choose to talk with us, the interview will take around 30 minutes. I will ask you questions about your current understanding of how Tetanus is identified, managed, reported, and investigated at your health facility/office.

You are unlikely to experience any risks from participating in this project. This is not a test of your knowledge or job performance. Your name or other facts of you will not appear on any presentations of the findings. There are no direct benefits or compensation for participating in this study. However, the answers you and others provide may help improve Tetanus surveillance in Hawassa City.

_____ _____

Sign and name of participant Sign and name of person taking the consent

FORM1. – Health Facility Background Information

Date of interview (G.C) (DD/MM/YYYY): ___ ___/___ ___/___ ___ ___ ___

Name of interviewer: _____

Title of interviewee: _____

Name of Health Facility: _____

Health Facility Region:_____

Type of Health Facility: Teaching and/or Referral Hospital General Hospital NGO Hospital Private Hospital Primary Hospital Health Center

1. Does this facility have an adult ICU? A. Yes B. No

2. Does this facility have a NICU? A. Yes B. No

3. Does this facility have an EOPD? A. Yes B. No

4. Does this facility have an isolation treatment room for treating Tetanus? A. Yes B. No

a. If yes, is the room for treating Neonatal Tetanus? A. Yes B. No

If yes, is this room for treating Non-Neonatal Tetanus? A. Yes B. No

FORM 2. Health Care Worker Questionnaire

Date of interview (Gregorian calendar) (DD/MM/YYYY): ___ ___/___ ___/___ ___ ___ ___

Name of interviewer: _____

Title of interviewee: _____

Name of Health Facility: _____

1 Have you ever treated a Tetanus patient? (If no, consider finding another healthcare worker to interview) A. Yes B. No

2 What ward or department do you primarily work in? A.NICU B. Adult ICU C.EOPD D. Pediatrics

2. Does this facility admit or have the capacity to admit Tetanus patients? a. Yes b. No

a. If YES, which types of patients? (*check all that apply*)

b. A. Neonatal (0-28days) B. Pediatric(29days-18years)

3 Where the Tetanus patients treated in this health facility? (*check all that apply*) a. Male IPD b. Female IPD c. Pediatric IPD d. Emergency Department e. NICU f. Adult ICU g. Other:_____

4 Have you diagnosed and or treated a Tetanus patient in this health facility in the last two years? A. Yes B. No

5 If YES, how many Tetanus patients did you see? (enter specific number of cases): _____

If YES, do you remember in which ward? _____

If YES, do you remember when (Ethiopian calendar) (MM/YYYY)? _____

If YES, do you remember the name of the patients? If yes, name: _____

e. If NO, stop the interview

The following questions are specific to Neonatal Tetanus and should only be asked if interviewing a clinician who primarily treats Neonatal patients:

6 What symptoms do most Neonatal (0-28 days old) Tetanus patients present with? (*do not read options aloud and check all the responses the clinician answers*)

a. Cannot suck/feed normally b. Stiffness of neck or other c. Spasms/muscle jerking d. crying e. Other: _____

7 If you identify a Neonatal Tetanus, do you report the case to anyone? A. Yes B. No

a. If YES: Who do you report it to? (title):_____
b. If Yes how soon after identifying the case do you report it? Immediately Before the end of your shift within 24 hours Other:_____
c. If Yes do you notify the health facility surveillance officer or equivalent? A. Yes B. No
d. If Yes do they investigate the case? A. Yes B. No
i. If No does someone else notify the surveillance officer? If Yes specify (job title) _____

8. Have you participated in a case investigation for Neonatal Tetanus cases? A. Yes B. No

9. What challenges do you experience identifying and reporting cases of Neonatal Tetanus?

_____

FORM 3. Health Facility Surveillance Focal Point (PHEM) Questionnaire

Date of interview (Gregorian calendar) (DD/MM/YYYY): ___ ___/___ ___/___ ___ ___ ___

Name of interviewer: _____

Title of interviewee: _____

Name of Health Facility: _____

Respondent: *To be given to person responsible for reporting Neonatal Tetanus cases to PHEM* Instructions: *Before administering this questionnaire, review the oral consent process*

1. Is this surveillance department notified if there are Neonatal Tetanus cases or deaths? A. Yes B. No

a. If yes, who reports the case or death to this department:_____

b. If yes, how is the case reported? (describe): _____

2. Have you reported any Neonatal Tetanus cases in the last 12 months from this health facility? A. Yes B. No

3. Does this health facility report Neonatal Tetanus cases for immediate report (within 30 minutes) A. Yes B. No

Does this health facility report Neonatal Tetanus cases for Weekly Aggregate Report?

a. If 'Immediate Report" to which administrative unit do you report Neonatal Tetanus cases? (select all that apply) District Zonal Regional National Other: _____

b. If 'Weekly Aggregate Report' is selected, to which administrative unit is the report sent? (select all that apply) District Zonal Regional National Other: _____

4. Do you do review registries to identify Neonatal Tetanus cases? A. Yes B. No

a. If yes, in which wards do you review registries: _____

b. If yes, How often: Daily Weekly Monthly Quarterly

5. Do you participate in case investigations for Neonatal Tetanus cases? A. Yes B. No

a. If yes, what forms do you use to complete the case investigation? (tick all that apply

A. Case based reporting form B. Detailed case investigation form C. Other_____

6. Who is responsible for leading case investigations for Neonatal Tetanus cases at your health facility? (just select one)

A. Health facility surveillance officer B. Medical Staff C. District Surveillance Officer D. WHO Surveillance Officer E . Zonal Surveillance Officer F. Regional Surveillance Officer G. Other: _____

7. Which personnel assist with Neonatal Tetanus case investigations at your health facility? (select all that apply)

A. Health facility surveillance officer B. Health facility clinician C. District Surveillance Officer D. HO Surveillance Officer E. Zonal Surveillance Officer F. Regional Surveillance Officer G. Health extension worker H. Other: _____

8. Who is responsible for submitting the completed case investigation form to the next administrative level? (just select one)

A. Health facility surveillance officer B. Medical staff C. District Surveillance Officer

D.WHO Surveillance Officer E. Zonal Surveillance Officer F. Regional Surveillance Officer G. Other: _____

9. What challenges do you experience with Neonatal Tetanus reporting and surveillance? ____

10. Finally, please ask for a copy of any completed case investigation forms? (check if they have provided you with completed case investigation forms)

FORM 4. – NEONATAL TETANUS MEDICAL RECORD ABSTRACTION FORM (0-28 DAYS)

N1. Date of abstraction (Gregorian calendar) (DD/MM/YYYY): ____/____/____

N2. Unique ID: _____ N3. Name of abstractor: _____N4. Name of Health Facility: _____ N5. Health Facility Region: _____N6. Type of Health Facility: Teaching and/or Referral Hospital Private Hospital Primary Hospital Health Center

Section 1. Patient ID and Demographics	
1. How was the case identified?	interview with health care worker registry review
2. Patient's MRN # recorded? Yes No	2a. If YES, MRN:_____
3. Date of birth of patient recorded? Yes No	3a. If YES, Date (dd/mm/yyyy):___/__/___
4. Age of patient recorded? Yes No	4a. If YES, Age:_____ (in days)
5. Sex recorded? Yes No	5a. If YES, select one: 1. Male 2.Female
6. District of residence recorded? Yes No	6a. If YES, District:_____
7. Region of residence recorded? Yes No	7a. If YES, Region:_____
Section 2. Patient History	
8. Was the patient admitted to the hospital? Yes Not recorded a. If YES, Date of admission (Ethiopian calendar) (dd/mm/yyyy):___/____/_____ Not recorded	
9. What signs/symptoms (Tetanus, lockjaw, spasms and rigidity) are recorded? (list all symptoms recorded)_____	
Section 3.Patient treatment	
10. Were any of the following treatments recorded? Tetanus anti-toxin (TAT) a. Yes b. No Was antibiotic treatment given (Metronidazole, Ampicillin) a. Yes b. No Were any agents given to control muscle spasm (Diazepam, general anesthesia, CPZ) a. Yes b. No 11. Was the patient managed in dark room? A. Yes B. Room not available	

Section 4: Patient outcome
12. Was final outcome of the patient recorded? a. Yes b. No If Yes what was the outcome a. dead b. alive c. transferred If dead, is date of death recorded? a. Yes b. No If Yes date _____ If Alive was patient discharged? a. Yes b. No a. If Yes, i, Improved ii. Self-discharge iii. Date of discharge _____/_____/_____ iv. Not recorded
13. Is the final surveillance classification recorded? a. Yes b. No If Yes check the option that applies: a. Confirmed b. Probable c. Discarded
14. Where was the patient treated during this visit? (circle that apply) A. Emergency OPD B. Separated room in the IPD C. Pediatric IPD D. Adult ICU E. NICU F. Not recorded G. other
15. Did patient present to another health facility or the community for wound/stump care or with any symptoms compared with Tetanus before this visit? A. Yes B. Not recorded
16. Was a case investigation form completed for this patient? a. Yes b. No a. If Yes, where was the case investigation form found? _____ b. If Yes, was the diagnosis of Neonatal Tetanus confirmed? a. Yes b. No c. Not recorded c. If Yes, how was the case investigated?
17. Was an extended case investigation form completed for this patient? Yes No
18. Is infant's place of birth recorded? Yes No a. If YES, where? Home Health facility Other:_____ i. If HOME, who attended the birth? (check all that apply): A. Skilled birth attendant (SBA) B. Traditional birth attendant (TBA) C. No trained attendant D. Not recorded E. Other:_____
19. Is number of live births delivered by the infant's mother recorded (including the most recent one)? a. Yes b. No a. If YES, how many:_____ b. If YES, did the mother receive antenatal care during her previous pregnancy: a. Yes b. No c. Not recorded

20. Is mother's Tetanus vaccination history documented? a. Yes b. No If YES, are the numbers of total doses of tetanus vaccine received recorded? a. Yes b. No If YES, total number of Tetanus vaccine doses received? _____ If NO, Is there any mention of the mother's vaccination status? a. Yes b. No If YES, please select: a. Tetanus vaccination "up to date" b. Any prior Tetanus vaccination c. Not vaccinated
21. Did the infant have a history of infected umbilical cord stump? a. Yes b. No c. Not recorded
22. Did the infant have a history of another wound (excluding stump)? a. Yes b. No c. Not recorded a. If YES, describe details recorded:_____
23 Were any substances applied to the umbilical cord of the infant? a. Yes b. No c. Not recorded a. If YES, What substances were applied? _____
24. Is the mother's outcome recorded? a. Yes b. No a. If YES, select outcome: a. Dead b. Alive c. Other i. If DEAD, was cause of death tetanus? a. Yes b. No

FORM 5. District or Zonal Surveillance Focal Point (PHEM) Questionnaire

Date of interview (Gregorian calendar) (DD/MM/YYYY): ___ ___/___ ___/___ ___ ___ ___

Name of interviewer: _____

Title of interviewee: _____

Region/Zone/District: _____

Interview conducted at what level (select one): District Zone

1. Do health facilities in this District/Zone submit weekly aggregate reports directly to this office? a. Yes b. No

a. If YES, Who does this office send the report or copies of the weekly aggregate reports to? (just select one) i. Send to Zone HD ii. Send to Regional HB iii. Send to EPHI
iv.Other:_____

b. If YES, How does this office send the summarized report or copies of the weekly aggregate reports to the next level of the system? (just select one) SMS Paper form Phone call Email Into a database Other: _____

3. Is this office informed 'immediately' about any notifiable diseases (perinatal death, rabies, etc.), by clinicians, health facility surveillance personnel, or District surveillance personnel directly? a. Yes b. No

4. Has this office been informed 'immediately' about a neonatal tetanus case by clinicians, health facility surveillance personnel, or District surveillance personnel directly in the last 12 months? a. Yes b. No

a. If YES, what actions did this office take when you received the Neonatal Tetanus case report? *(Probe if they initiate case investigation and if they participate in case investigation)*

_____

a. Does or would this office initiate a case investigation for Neonatal Tetanus? a. Yes b. No

b. If NO, who is responsible for initiating a case investigation for Neonatal Tetanus?

_____

5. Does or would this office participate in case investigations for Neonatal Tetanus cases? a. Yes b. No

6. Who would lead the Neonatal Tetanus case investigation if a case was reported?

A. District Surveillance Officer B. Zonal/Regional Surveillance Officer C. Clinician (from Health facility) D. WHO Surveillance Officer E. Other:_____

7. Which personnel would assist with neonatal tetanus case investigations? (select all that apply)

A. Health facility surveillance officer B. Health facility clinician C. District Surveillance Officer D.WHO Surveillance Officer E. Zonal Surveillance Officer F. Regional Surveillance Officer G. HEWs E. Other:

_____

8. What does/would this office do with completed Neonatal Tetanus case investigation forms? (select all that apply)

A.File in District health office B. send to zone HO C. send to regional HB D. send to EPHI E. Send to WHO surveillance officer F. other

9. Who is responsible for submitting the completed case investigation form to the next administrative level? (just select one)

A. Health facility surveillance officer B. Health facility medical staff C. District Surveillance officer D. WHO Surveillance Officer E. Zonal Surveillance Officer F. Regional Surveillance Officer G. Other: _____

10. Do you keep copies of completed Neonatal Tetanus case investigation forms at this office?

a. Yes b. No

11. Do you review registries at health facilities to look for Neonatal Tetanus cases?

a. If YES, what wards do you review registries: _____

b. If YES, how often (just select one): i. Daily ii. Weekly iii. Monthly iv. Quarterly v. annually

12. What challenges do you experience with Neonatal Tetanus reporting and surveillance?

_____

13. What are your priority notifiable disease? _____

14. If Tetanus is not listed as a priority notifiable disease, ask them to describe why not:

_____

15. Finally, ask for copies of completed case investigation forms for health facilities of interest:

A.Copies of completed case investigation forms were provided B. Unable to provide copies

Table 1A: Reported Neonatal Tetanus cases										
HF	Year (EFY)	No. of Tetanus cases in hospital weekly aggregate	No. of Tetanus patients identified in hospital registers	Wards visited to find Tetanus patients	No. of missing ward registers	No. of Tetanus patients identified in medical records	No. of missing medical records	No. of case based reporting forms found	No. of extended case investigation forms found	Comments
	2010									
	2011									
	2010									
	2011									
	2010									
	2011									

Chapter Four- Health Profile Assessment

4.1. Health Profile Assessment in Gorche District, Sidama Zone Southern Nations, Nationalities and People's Regional State, 2019

Summary

Background: Health Profile assessment is a systematic collection, organization and documentation of health and health-related data of specific areas. It provides a lively, scientifically based account of health in the District; it can identify a target for the future and monitoring progress and set out strategy and program of the intervention to improve health in the community. This study is aimed to describe health and health-related data and to identify problems for priority setting of Gorche District, 2019

Methods: Retrospective Descriptive study design on health profile assessment on last year (2017/2018) was conducted in Sidama Zone Gorche District and data were analyzed using Microsoft excel.

Result: Among 27,914 households, 5442(19.5%) have improved latrine, but no clear data on the utilization of latrine. No villages' declared open defecation free until 2018. Top ten causes of morbidity in adults, the 1st leading diseases were all respiratory diseases by 13.75% and the top cause of morbidity in under five was pneumonia 15.40%. A total of 222(78.45%) Tuberculosis patients were identified and started on anti-TB drugs. Death on tuberculosis treatment was two (1.27%) and the cure rate was 71(95.95%). Totally, 222(100%) tuberculosis patients were screened for HIV and all patients were negative. Total people screened for HIV were 6849, among those, four (0.06%) were confirmed as positive. Man-made disasters happened in 2017/18 and two households were affected. Totally, 46,777 students' were enrolled and Female student's enrollment showed 20,476(43.77%).

Conclusions: Pneumonia is the leading cause of under-five children and second on adults. Diarrhoea, Typhoid fever and Helminthiasis were in ten top causes of morbidity in the District. This might be due to poor hygiene, latrine utilization and poor feeding practices. Tuberculosis burden was high; but the cure rate was high, which might be due to the absence of HIV co-infection.

Key words-Gorche district, Health profile, health problems, prioritization of problems, health service,

4.1. Introduction

4.1. 1.Background

Health Profile assessment is a systematic collection, organization and documentation of health and health-related data of specific areas. Health profile of a district is a comprehensive document that contains information about the history and location of the district, its accessibility, its cultural value, political and administrative setup, demographic characteristics of its population, general health status, health indicators, education and socioeconomic status.

Good health service delivery is a vital element of any care system and is a fundamental input to improve the health status of the people of Ethiopia. Its attributes include comprehensiveness, accessibility, coverage, continuity, responsiveness and coordination. This is done through organizing and strengthening community empowerment and health professionals' engagement in healthcare reforms. Accountability for results in all health facilities and the Health Development Army (HDA) at the community level that enables communities to practice and manage their own health; implementing the second generation health extension program; strengthening primary health care units and the clinical governance of hospital services [1].

The recently implemented BPR of the health sector has introduced a three-tier health care delivery system. This is characterized by the first level of a District health system, comprising a primary hospital (with population coverage of 60,000-100,000 people), health centers (1/15,000-25,000 population) and their satellite Health Posts (1/3,000-5,000 population) that are connected by a referral system. A Primary Hospital, Health center and health posts form a Primary health care unit (PHCU) with each health center having five satellite health posts. The second level in the tier is a General Hospital with population coverage of 1-1.5 million people, and the third a Specialized Hospital that covers a population of 3.5-5 million [1].

The Ethiopian Health care System is augmented by the rapid expansion of the private for-profit and NGOs sector playing a significant role in boosting the health service coverage and utilization thus enhancing the public/private/NGOs partnership in the delivery of health care services in the country. Offices at different levels of the health sector from the Federal Ministry of Health to Regional Health Bureaus and District Health Offices share decision-making processes, decision

powers, duties and responsibilities. The FMOH and the RHBs focus more on policy matters and technical support, while District Health Offices have basic roles in managing and coordinating the operation of a district health system under their jurisdiction. Regions and districts have Regional Health Bureaus (RHB) and District Health Offices, respectively for the management of public health services at their levels. The devolution of power to regional governments has resulted in the shifting of decision making for public service deliveries from the center to largely under the authority of the regions and down to the district level [1].

The 14 Zones, 136 Districts, 22 Town Administrations, one City Administration and four Special Districts of the Southern Nations, Nationalities and Peoples' Regional State (SNNPR) occupy most of southwest Ethiopia. The Region contains up to one-fifth of the country's population, with above 20million based on 2018/19 population projection. SNNPR is the region of the country with by far the greatest number of ethnic and language groups, including Gurage, Hadiya, Kambata, Wolayita, Sidama, Gamo, Goffa, Ari, Sheko, and the pastoral/agro-pastoral Hamar and Surma of the Omo River area and beyond to the west [2].

Summarizing the public health data of the District is important for public health officials and stakeholders to use it for policy development, planning, implementation and evaluation of public health programs. Moreover, describing the health profile of a particular District is vital to describe and communicate health status and simply determine diseases burden and can be used as an entry point for operational research. Hence, collecting, compiling and documenting of the health profile of a District is critically important for countries like Ethiopia where data management and information system is poor, especially at District level. Hence, this data will be a valuable asset for the health offices found in this District.

4.1. 2.Rationale of the description

Assessing health profile is crucial for prioritizing health and health-related problems of the community at any level, especially detail assessment of the current health status of priority diseases. The planning and management of health services in developing countries often proceed within an environment of inadequate information about the health status of the population served and the occurrence of important determinants of health.

Due to these problems, information like on socio-demographic, education, infrastructure, health system, public health emergency and health &health related issues should be availed in an organized and well-documented manner for prioritizing the problem and proper planning. Therefore, describing the health profile of the District is helpful to give evidence-based information for prioritizing and instituting appropriate public health interventions in the District.

4.1. 2.Significance of the assessment

District health profile provides a snapshot of the overall health status of the local community and highlights potential health problems through comparison of basic indicators with other areas as well as with the national average. However, in developing countries like Ethiopia, such information especially at the district level is usually not complete and comprehensive. This study aimed to generate data on Gorche District health information status that helps the District and other stakeholders working in the District to improve public health problems. Therefore, this health profile assessment compiled health and health-related information of the Gorche District for planning, prioritizing health and health-related problems.

4.2. Objective

4.2.1. General Objective

To describe health and health-related data and to identify problems for priority setting of Gorche District, SNNP Regional State, Ethiopia 2019

4.2.2. Specific Objectives

- To summarize health and health-related data of the District
- To assess health service status of the District
- To identify major health problems of District

4.3. Methods and Materials

4.3.1. Study Area and Period

Health Profile description was conducted in Gorche District of SNNP, Ethiopia. The District was separated from Shebedino District in 2007. Gorche District is one of the thirty-six districts of Sidama Zone and located to the eastern from Hawassa City, capital of SNNPR and Sidama Zone. The 2017/2018 data of the District was collected, analyzed and interpreted from 21/03/2019-31/03/2019.

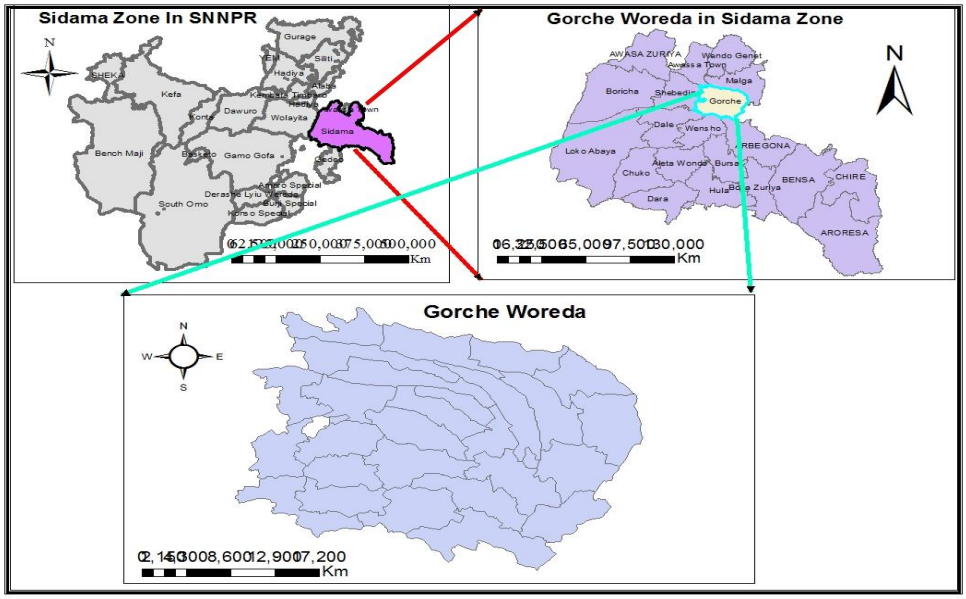

Figure 17:-Map of Gorche **District** in 2017/18 (From SNNPR Shapefile 2013)

4.3.2. Study Design

To assess the District profile, the retrospective descriptive study design was used

4.3.3. Data Collection Tools and Methods

A structured questionnaire was used to collect primary and secondary data form Gorche District. Interviews and discussions with concerned health office heads, experts and professionals were conducted. In addition, reviewing records and personal observation about the area were used as additional sources of data.

4.3.4. Data Analysis

The collected data were compiled and cleaned before analysis and then analyzed using Microsoft Excel.

4.3.5. Letter of Permission

The official permission letter was taken from SNNP-RHB to Sidama Zonal Health Office. Sidama Zonal Health Office has again written to the District to access data of Gorche District health office, health center and other relevant offices (sectors) to accept the legality of the assessment.

4.3. 6. Dissemination of Results

This report of this District Health Profile assessment could be submitted timely to the Addis Ababa University School of Public Health, SNNP-RHB PHEM Department and Gorche District Health Office by hard and soft copies.

4.4. Results

4.4.1. Historical aspects of the District

Gorche is one of the Districts in the Southern Nations, Nationalities, and Peoples' Region of Ethiopia. Part of the Sidama Zone located in the Great Rift Valley. As the information is given from the District‘s Culture and Tourism office, the name was taken from the ancient name of a resident. This District is unique from the neighboring Districts by its topography, which is very irregular. Gorche District population is known by Fiche Chembelala cultural festival.

4.4.2. Geography and Climate

Gorche District is one the Sidama Zone Districts in SNNP Regional State and located 61KM from the Regional Capital Hawassa in the southeast direction. Gorche is bordered on the southwest by Wensho, on the west by Shebedino, on the north by Malga, on the east by the Oromia Region, and on the southeast by Arbegona. The total surface area of this district is 189.14KM2, which accounts for 2.75% of the total area of Sidama Zone.

The altitude of the District is between 1900-2950m above sea level. The annual rainfall ranges from 900ml to 1500ml and temperature was between 120c -270c. The climate condition in general Dega (highlands) accounts for 86.5% and Woinadega accounting 13.5%.

The agricultural products of the District are Enset, wheat and Burley as the main food source. Vegetables and bean/pea are also produced widely in the District. Khat is the major cash crop produced in the District.

4.4.3. Political and Administrative Organization

Gorche District has 19 rural and three urban villages. The administrative center for the District is Gorche town, which is approximately center for all villages. This District has its own council and representative from the federal parliament. All government sectors are well established and working for the community concerning their missions and visions.

4.4.4. Population and Population Structure

Demographic Data

Based on the national and regional population projection in 2017/18(2010EFY) the total population was 136,779 of those 68157(49.83%) were males and 68622(50.17%) were females. This shows that the male to female ratio was about 1:1. From the total population in the District 25784(18.45%) population live in urban.

As indicated in table-11 below the estimated households in Gorche District in 2017/18 were 27,914. Expected pregnancy in 2017/18 in District were 4733 and 21351 under-five children were estimated in the District. From the table (Table-11) there were estimated live births 4733, surviving infants 4363, under 15 years children were 65,476 and non-pregnant women in fertile age were 27,137.

Table 11:-Demographic indicators of Gorche District in 2017/2018

S.N.	Demographic indicators	% from total population	Population
1	Estimated households size	4.9	27914
2	Estimated live births	3.46%	4733
3	Total number of surviving infants at 1 year of age	3.19%	4363
4	Under 5 year child population	15.61%	21351
5	<3 year age group	8.31%	11366
6	6 – 59 months age group	13.94%	19067
7	24 – 59 months age group	10.43%	14266
8	<15 year age group	47.87%	65476
9	15-24 age group	19.27%	26357
10	15-59 age group	48.27%	66023
11	Women in reproductive age (15 -49 years)	23.30%	31870
12	Total number of estimated pregnancies / Births	3.46%	4733
13	Estimated deliveries	3.46%	4733
14	Non-pregnant women in fertile age	19.84%	27137

As the national especially SNNP regional state the Population pyramid of Gorche District was wide base and very narrow head as showed in figure-18 below.

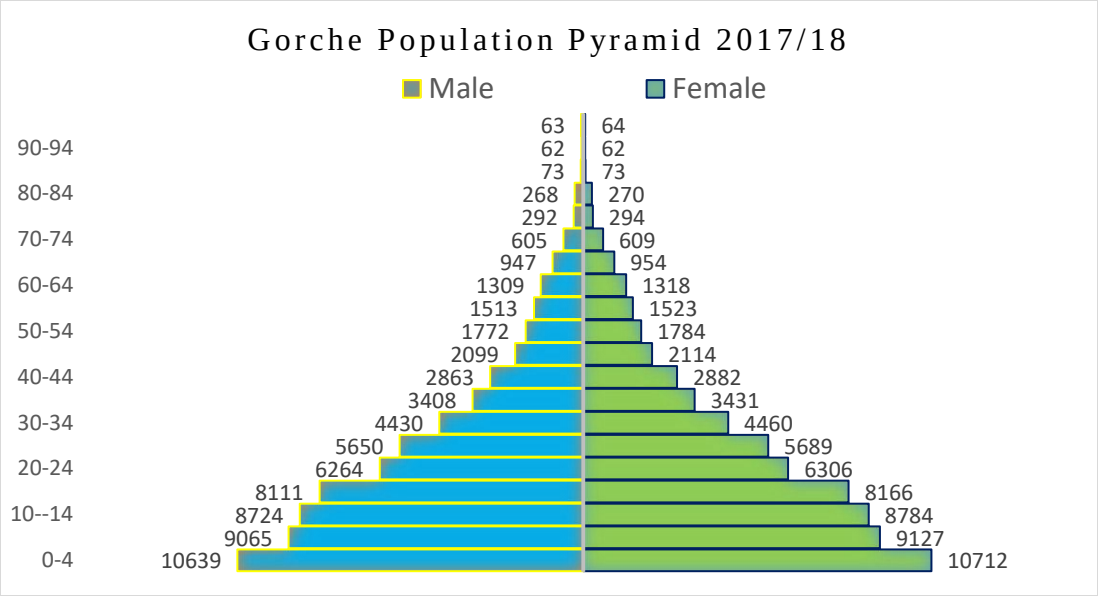

Figure 18:-Population pyramid of Gorche District in Sidama Zone, SNNPR of Ethiopia 2017/18

Ethnic/Language

In this District, although the number of other ethnic groups than Sidama was very little, different ethnic groups are living with each other, such as Oromo, Gurage, Wolayita, Amhara, etc. However, the number was not well documented in the District.

Religion

The religion most widely followed in Gorche District is Protestant, accounting for 107,371(78.5%), Muslim accounting for 8891(6.5%), Orthodox 13,678(10%) and others (Catholic and traditional religion) accounting for 6839(5%).

4.4.5. Economy (mainstay of the economy, average income levels, etc)

As table-12 below showed, Gorche District administration income for government budget is more depends on government employment (68.05%) and other business like projects, house rents, etc accounting 22.86%. The District collected 80.72% from their plan of the year.

However, the population income is more depends on agriculture products for food like Enset, Wheat and Burley. Also, cash products like Khat and vegetable such as Cabbage, Greenleaf, Banana, Lemon, Orange, etc. Overall, the District population is mixed farmers.

Table 12:-Gorche District financial for administration budget main income sources in 2017/2018

SN	Main income sources	Plan	Achievement	%	% of total income	Remark
1	Government employment	8058000	8227008.74	102.10	68.05	
2	Agriculture	1500200	509288.5	33.95	4.21	
3	NGO employment	0	0	0.00	0.00	
4	Tourism	0	0	0.00	0.00	
5	Trade	650000	589957.43	90.76	4.88	
6	Other business	4769800	2764211.64	57.95	22.86	Projects, Houserents, etc
Total		14978000	12090466.31	80.72	100.00	

4.4.6. Education and School Health

The District had 52 schools and all were government-owned. There is no private and NGO school in the District. There are 31 primary schools (grade 1-4), 18 mid-level schools (grade 5-8) and 3 secondary schools (grade 9-10). There are no preparatory and other higher educational institutes in the District. A total of 46,777 students' were enrolled in schools in 2017/2018. From total students enrolled, 38,088 students were in primary schools (Grade 1- 4), 7,137 Mid-level schools (Grade 5- 8) and 1,552 students were in secondary schools (Grade 9-10). As information obtained from the District Education Office, female students were 20,476(43.77%) and male students 26,301(56.23%) as indicated on figure-19 below disaggregating in schools.

In the District dropout rate was 597(1.57%) were in primary schools (Grade 1- 4), 362(5.07%) Mid-level schools (Grade 5- 8) and 125(8.05%) students were in secondary schools (Grade 9-12). In the District dropout rate is high in secondary school than to primary. On the other hand male students, 635(2.41%) were relatively dropping their class than female students 449(2.19%). Schools with water supply were 36(69%), functional latrines 52 (100%), with male and female separate latrines 26(50%) and with HIV/ADIS and other Health clubs 44(85%).

The District provides primary education (Grade 1- 8) and secondary school (9-10) by 1052 teachers and teachers to students' ratio was 1:44. From total teachers in the District, 264 teachers have a certificate, 694 teachers have a diploma and 94 teachers have a degree.

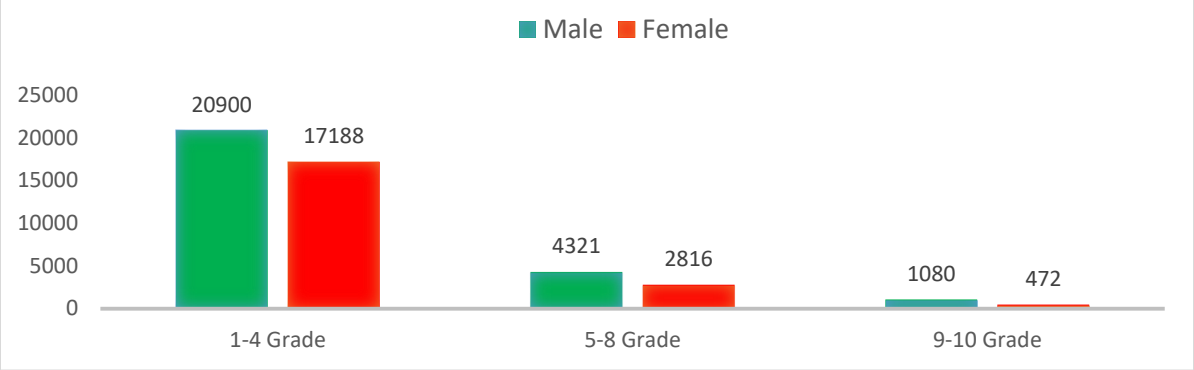

Figure 19:-Students enrolled to school in Gorche District in Sidama zone, SNNP, Ethiopia, 2017/18

4.4.7. Infrastructure and Facility

From those 22 villages, 18 villages had transportation road access. Four rural villages, M/Geso, W/Bunamo, L/Bongodo and H/Mekana had no road access until 2017/18.

A total of the District villages were accessed with Mobile telephone and there was no access with cable-based telephone services in District.

Only four villages have 24 hours electric power supply. On the other hand, the District Town, Gorche has 24 hours of electric supply and mobile telecommunication system, Omo microfinance, Bank (Commercial Bank of Ethiopian) and postal services. In the District, different kinds of energy sources were used, such as electricity, solar energy, wood charcoal and firewood, etc. In rural and urban areas the dominant sources of energy for cooking and other purposes are still firewood.

4.4.8. District Health System

District Health Office Structures

The District Health Office has implemented a new organizational structure in 2017/2018. The District had six core working process and five supportive working processes (Figure-20). However, 76.5% (39/51) of job positions are occupied in the District Health Office until the

compilation of this report. Rapid Response Team and Health Management Team are well organized and fully functional with regular bases. However, other functional activities are not well implemented as organizational structured designed. There were two NGOs (Health communication and Save the children) and UN organization (UNICEF) supporting this District by financial, training and monitoring and evaluation.

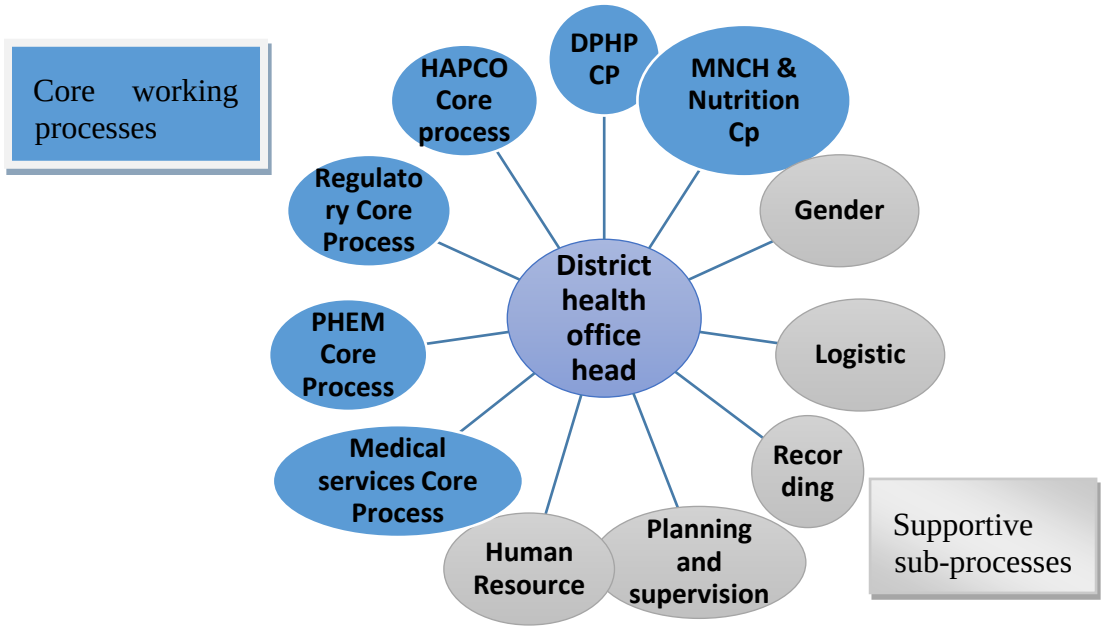

Figure 20:-Structure of the Health Office in Gorche District, Sidama Zone SNNPR, Ethiopia 2017/18.

Health Infrastructure and Facility

The numbers of health institutions administered under the District Health office that directly provide services to people of the District were 27 governmental and seven private. The District had six government health centers and 21 health posts (Table-13). All health center and health posts were functional and there were six rural drug vendors and one private primary clinic in District (Table-13). In Ethiopian the recently implemented Business Possessing Re-engineering (BPR) of the health sector has introduced a three-tier health care delivery system, level one is district health system comprised a primary hospital to cover 100,000 people, health centers to cover 25,000 and health posts to cover 5,000 population connected by a referral system.

Table 13:-Health facilities serving the population in Gorche District, Sidama Zone, SNNP, Ethiopia, 2017/18

S.N.	Type of health facility	Number				Remark
		Governmental	NGOs	Private	Total	
1	Hospital	0	0	0	0	
2	Health Center	6	0	0	6	1:22,797
3	Health posts	21	0	0	21	1:6,513
4	Pharmacy	0	0	0	0	
5	Drug stores	0	0	0	0	
6	Rural drug venders	0	0	6	6	
7	Primary Clinics	0	0	1	1	
	Total	27	0	7	34	

Health Sector Human Resource

In 2017/18, a total of 127 health professionals and 95 supportive staffs were employed and working at different levels of the health system (Table-14). In addition to that, 667-health development army and 3300 one to five network leaders support health activity. Information regarding health professionals and other administrative staffs is presented in Table-14 below.

Table 14:-Human resource in Gorche District in Sidama Zone, SNNP, Ethiopian, 2017/18

SN	Types of H/Professionals	Numbers				To population Ratio
		Government	NGO	Private	Total	
1	HO	12	0	0	12	1:11662
2	All types of Nurses	41	0	2	43	1:3255
3	All Types of Mid wives	14	0	0	14	1:9996
4	Medical lab.	7	0	0	7	1:19992
5	Pharmacies and druggists	6	0	5	11	1:12722
6	HEW rural	40	0	0	40	1:3499
Total		120		7	127	

Health Budget Allocation

The total budget for the District was 119,159,770 Birr. From that, the allocated budget for District Heath Office was 17,206,682 Birr in 2017/18. In the District Save the Children, UNICEF and Health Communication support the District Health Office for the implementation of different programs. The District gradual rise in budget /allocation in health sector each year since 2015/2016-2017/2018, but related to total District budget proportion in 2010EFY health budget was decreased as shown in Figure-21 below.

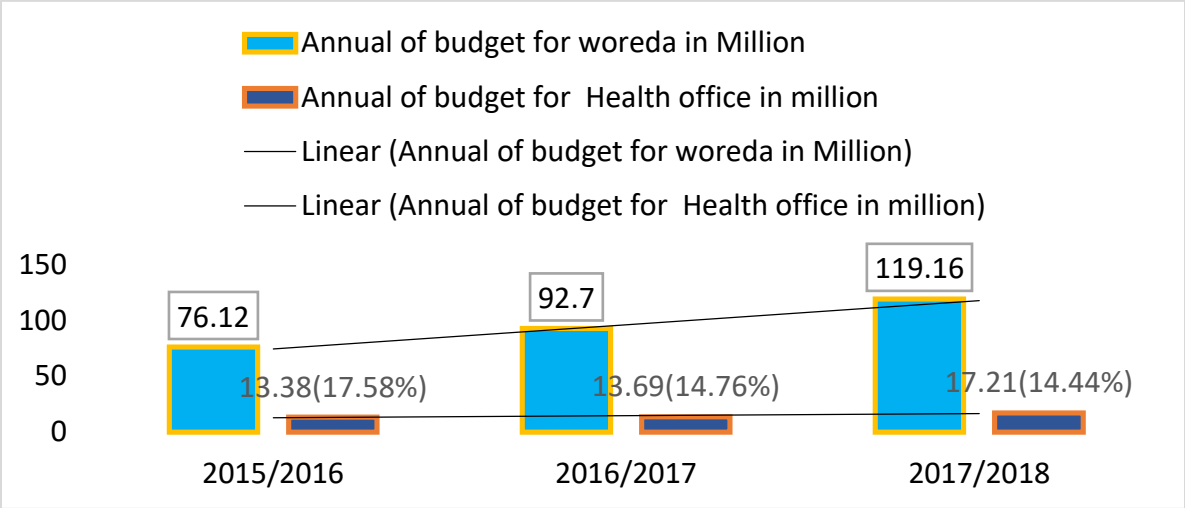

Figure 21:-Comparison of Total District Budgets with Health Sector Budget in Gorche District, Sidama Zone, Ethiopian, from 2015/2016 to 2017/2018

Essential drugs and other supplies

According to the District Health Office, in 2017/2018 from 17,206,682 Birr of the health budget, 1,272,046 Birr has been allocated for drug and medical supplies. The District Health Office reported that there was no shortage of essential drug supply and diagnostics kits in the District.

4.4.9. Vital Statistics and Health Indicators

As the information from vital statistics core process in Peace and Security Office of Gorche District. There was no data concerning IMR, CMR, Crude Birth Rate and Maternal Mortality Rate specifically. Because of the report format, they have no data disaggregated by age. But there was a crude death rate for the last three years by sex disaggregation (Table-15).

Table 15:-Crude death rate over last three years in Gorche District, Sidama Zone of SNNPR 2019

Year	Sex				Total	
	Male		Female			
	Count	Per 1000	Count	Per 1000	Count	Per 1000
2015/16	31	0.48	11	0.17	44	0.34
2016/17	102	1.53	97	1.45	199	1.49
2017/18	67	0.98	53	0.77	120	0.88

MNCH (Maternal, Neonatal and Child health) Service

There was less increment of SBA from 2015/2016r to 2017/2018 compared to ANC 1st and ANC 4th (Figure-22). Family planning by LAFP in 2015/16 is 63%, in 2016/17 is 55% and in 2017/18 is 57%. Short-acting family planning in 2015/16 is 95%, in 2016/17 is 87% and in 2017/18 is 85%.

ANC 1st was decreased from 2015/16 to 2017/18 and other indicators were increased slightly as the graph below showed (Figure-22).

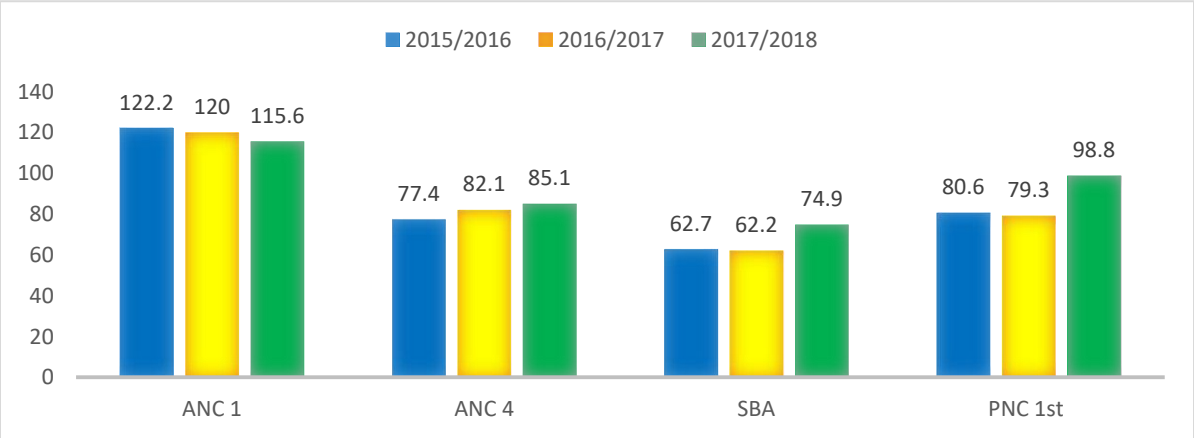

Figure 22:-Comparison of basic maternal, neonatal and child health in Gorche District in Sidama SNNP, Ethiopia, 2017/18

Measles dropout rate throughout the last three years (6.83%, 12.63% and 6.8% respectively) and Penta dropout rate in 2017/18 which was 10.27 %(504) (Table-16). Also, FV and Measles vaccine

coverage within the last three years become decreasing from 108.8% to 94.3% and from 109.1% to 95.5% respectively (Table-16).

Table 16:-Maternal, neonatal and child health in Gorche District in Sidama Zone, SNNP, Ethiopia, 2017/18.

SN	Variable	2015/2016			2016/2017			2017/2018		
		plan	Number	%	Plan	Number	%	plan	Number	%
1	BCG	4512	4905	108.7	4621	3725	80.6	4836	4594	95
2	OPV-1	4160	4697	112.9	4261	4891	114.8	4459	4905	110
3	OPV-3	4160	4697	112.9	4261	4670	109.6	4459	4401	98.7
4	Penta-1	4160	4871	117.1	4261	4892	114.8	4459	4905	110
5	Penta-3	4160	4697	112.9	4261	4670	109.6	4459	4401	98.7
6	PCV-1	4160	4863	116.9	4261	4670	109.6	4459	4905	110
7	PCV-3	4160	4697	112.9	4261	4670	109.6	4459	4401	98.7
8	Rota-1	4160	4821	115.9	4261	4892	114.8	4459	4316	96.8
9	Rota-2	4160	4622	111.1	4261	4696	110.2	4459	4321	96.9
10	IPV-1	4160	4871	117.1	4261	4892	114.8	4459	4593	103
11	Measles	4160	4539	109.1	4261	4274	100.3	4459	4258	95.5
12	FV	4160	4526	108.8	4261	4112	96.5	4459	4205	94.3
13	PAB	4160	4185	100.6	4261	4892	114.8	4459	4905	110
14	Malnutrition screened	18180	15999	88	18618	16757	90	19485	17342	89

15	SAM	345	59	17	354	50	14	370	73	19.73
16	MAM	5145	1080	21	5269	527	10	5514	827	15
17	ANC 1	4512	5514	122.2	4621	5545	120	4836	5590	115.6
18	ANC 4	4512	3492	77.4	4621	3794	82.1	4836	4115	85.1
19	Syphilis test	4512	3492	77.4	4621	3794	82.1	4836	4115	85.1
20	SBA	4512	2829	62.7	4621	2874	62.2	4836	3622	74.9
21	PNC 1	4512	3637	80.6	4621	3664	79.3	4836	4778	98.8

Nutrition and Food Shortage

In the District, there were 21 Outpatient Programs (OTP) and 1 Stabilization Center (SC) sites and malnutrition screening was made which accounts 17,342(89%) in 2017/18 as showed in table-16 above. From these screening 73, SAM and 827 MAM were identified among 6-59months. The total number of children with SAM admitted to OTP were 73 and SC was zero in the year 2017/2018. From the total people admitted to OTP all of them recovered.

4.4.10. Ten Top Causes of Morbidity and Mortality in Adults and Under Five 2017/18

In the District top, ten cause of morbidity in adults seen at outpatient department showed all respiratory diseases leading which accounts for 13.75% and the other top 10 causes of morbidity were specified in Table-17 below. As indicated on this table from all causes of diseases in the District more than 70% were ten top causes of diseases.

Table 17:-Ten top causes of morbidity among adults in Gorche District in Sidama SNNP, Ethiopia, 2017/18

No	Diseases	Number	%
1	All Respiratory diseases(unspecified)	3,516	13.75
2	Pneumonia	2,511	9.82
3	Trauma (injury, fracture etc.)	1,880	7.35
4	Diarrhea (non-bloody)	1,810	7.08
5	Acute febrile illness (AFI)	1,670	6.53
6	Helminthiasis	1,656	6.48

7	Urinary tract infection	1,533	6.00
8	Infections of the skin and Subcutaneous tissue	1,290	5.05
9	Typhoid fever (AFI)	1,263	4.94
10	Dyspepsia	904	3.54
	Sub-total	18,033	70.53
	Grand total	25,567	100

Five top causes of morbidity in under five was pneumonia leading which accounts 15.40% out of all cases seen at under five OPD and the other top five causes of morbidity were specified in Table-18 below. Deaths by case through HMIS from health facility were no reported.

Table 18:-Five top causes of morbidity among under five children in Gorche District in Sidama Zone, SNNP, Ethiopia, 2017/18

No	Diseases	Number	%
1	Pneumonia	1,009	15.40
2	Diarrhea (non-bloody)	989	15.10
3	All Respiratory diseases	732	11.18
4	Acute febrile illness (AFI)	502	7.66
5	Infections of the skin and Subcutaneous tissue	459	7.01
	Sub-total	3,691	56.35
	Grand total	6550	100

4.4.11. Hygiene and Environmental Health Services

Among 27,914 households, 16,864 (62.14%) has pit latrine and 5442(19.5%) of them has improved latrine in 2017/18. There is no clear data on the utilization of latrine in the District. No village in the District was declared open defecation free (ODF) village until 2017/2018. Safe water supply coverage in the District was 52%.

4.4.12. Endemic Diseases

Tuberculosis and Leprosy

In 2017/18, 222(78.45%) Tuberculosis (TB) patients were identified and started on anti-TB drugs, but there was no any Multidrug-Resistant Tuberculosis (MDR TB) (Table-19). Deaths from

tuberculosis treatment were two (1.27%) and the cure rate was 71(95.95%) (Table-19). One (12.5%) Leprosy patient was registered (Table-19). On the other hand, 222(100%) TB patients were screened for Human Immunodeficiency Virus (HIV) and no patients were positive for HIV (Table-19).

Table 19:-Tuberculosis activities in Gorche District in Sidama Zone SNNP, Ethiopia, 2017/18

Types activities	2015/2016			2016/2017			2017/2018		
	Plan	Achi	%	Plan	Achi	%	Plan	Achi	%
All form of TB	292	175	60	287	158	55	283	222	78.45
PTB +Ve	130	62	48	134	74	55	137	73	53
PTB-Ve	81	63	77.78	77	44	57.14	73	69	94.52
Extra PTB	81	50	61.73	76	40	52.63	73	80	109.59
TB Rx completion rate	112	128	114.29	113	109	96.46	84	85	101.19
TB cure rate	95	73	76.84	62	62	100	74	71	95.95
TB Defaulter	0	3		0	1		0	0	0
TB Rx success rate	207	201	97	175	173	98.86	158	156	98.73
Death on TB Rx	0	2		0	1		0	2	0
Total TB patients screened for HIV	175	175	100	158	158	100	184	222	100
Positive for HIV	0	0	0	0	0	0	0	0	0
Total Leprosy cases detected	8	2	25	8	1	12.5	8	1	12.5
Leprosy case treated	1	1	100	2	2	100	1	1	100

HIV/AIDS Prevention and Control

According to 2017/18 of the District Health Office Report, the total number of people screened for HIV were 6849(49%) (Table-20). From those, 938 got Voluntary Counseling and Testing (VCT) service and others were provided with Provider Initiated Counseling Testing (PICT), like Prevention Mother to Child Transmission (PMTCT), TBL, STDs, etc. Among those clients tested, 4(0.06%) of them were confirmed as a positive result. The HIV prevalence and Incidence rates were 47(0.034%) and four(3.17%) respectively. Total Peoples Living with HIV/AIDS (PLWHA)

were 47, on Anti-Retroviral Therapy (ART) 47 and pre-ART were 0 (Table-20). One health center was providing ART service in the District.

The priority intervention area in the District concerning HIV/AIDS to date were Information Education and Communication/Behavioral Change Communication (IEC/BCC), condom promotion and distribution, management of Sexually Transmitted Infections (STIs), management of opportunistic infections, infection prevention/universal precaution, care and support to the infected and affected. There were 667 HDAs in the District and 365(54.72%) HDAs were functional/made regular CC on HIV/AIDS in 2017/18 (Table-20).

Malaria is not endemic in this District and the cases came from other neighbour Districts. So, there were no malaria prevention methods implemented.

Table 20:- HIV/AIDS prevention and control activities in Gorche District from 2015/16 to 2017/18.

SN	Types activities	2015/2016			2016/2017			2017/2018		
		Plan	Achi	%	Plan	Achi	%	Plan	Achi	%
1	Total MARPs screened for HIV	13042	9782	75	13356	9349	70	13978	6849	49
2	HIV prevalence	648	43	6.64	664	48	7.23	667	47	7.05
3	HIV Incidence (new cases/yr.	117	3	2.56	120	5	4.17	126	4	3.17
4	Total PLWHA	160	43	26.88	163	48	29.45	174	47	27.01
5	Current ON ART	160	43	26.88	163	48	29.45	174	47	27.01
6	Pre-ART	117	3	2.56	120	5	4.17	126	4	3.17
7	CC Preformed on HIV/AIDS by HDAs	656	312	47.56	662	333	50.30	667	365	54.72

4.4.13. Outbreak Investigation under Surveillance System

In this District, there was no outbreak situation declared in last years. But, there were 1263 cases of Typhoid fever, 236 Dysentery, 73 SAM, 44 Epidemic Typhus and 12 malaria reported by weekly bases in 2017/18. There was no death reported (Table-21).

Table 21:- The Gorche District Integrated disease surveillance and Report in 2017/2018

SN	PHEM reportable disease	Case	Death
1	Cholera	0	0
2	Measles	0	0
3	NNT	0	0
4	AFP	0	0
5	Anthrax	0	0
6	SARS	0	0
7	Smallpox	0	0
8	VHF	0	0
9	YF	0	0
10	RABIES	0	0
11	Dracunculiasis/Guinea worm	0	0
12	Pandemic Influenza	0	0
13	Malaria	12	0
14	Meningitis	0	0
15	Dysentery	236	0
16	RF	0	0
17	Typhoid Fever	1263	0
18	Epidemic Typhus	44	0
19	SAM	73	0
20	MPDSR	0	0
21	Scabies	0	0

4.4.14. Disaster Situation in the District

In 2017/18 there was man-made disaster situation which was firing the home in the District. This was two households' home were destroyed by fire which was made by another person. There were many properties like animals and all home properties were destroyed. So, to rehabilitate the affected households the District RRT worked very well and collected 300Kg Barley, 150Kg bean, 200Kg wheat and 78,000 birrs for support. Also, the community helped them with different methods to withstand the situation. Other than that disaster, there was no disaster situation in the District.

4.5. Discussion

There was no hospital in the District, but, at least one hospital was required as the current standard of a three-tier health care delivery system comprising of one primary hospital with population coverage of up to 100,000 populations [1]. This might show the need for construction of one hospital.

More than 14 per cent of the total District budget was allocated for the District Health Sector in 2017/18 and budget was allocated for Public Health Emergency Management this might be due to good attention given by leaders.

All respiratory diseases a constituted public health problem of first-order leading to the total diseases reported at adults outpatients visited followed by all respiratory diseases. Even though Pneumonia and Typhoid fever are among ten top diseases in the district, there was no death reported due to those diseases in the past one year. That might be due to poor data quality, expansion of health service to the community levels by Health Extension Program (HEP) in addition to health workers and improved clinical diagnosis.

In under five years children, pneumonia is the leading cause of morbidity in the District, the second leading cause of morbidity being Diarrhea (non-bloody)of outpatient visits and similarly, it was the 2nd and 1st place in top ten diseases list of 2013 at the national level[1]. The cause of pneumonia and Diarrhea might be due to poor hygiene & sanitation and poor child feeding practice.

The vital statistics core process in Peace and Security Office of Gorche District had no data on IMR, CMR, Crude Birth Rate and Maternal Mortality Rate. Since the process sent, the report format to zone and they have no data disaggregated by age. There was a crude death rate for the last three years by sex disaggregation. The total crude death rate was increasing from 2015/2016 to 2017/2018. But this data was not fully representative of the District since all villages in District were not working on this vital statistics equally.

The expanded immunization program is one of preventions and control measures program performed under child health department. In Gorche District, the overall Extended Program on Immunization (EPI) performance was higher than the Ethiopia Demographic and Health Survey

(EDHS) set EPI coverage for control of vaccine-preventable diseases. Penta 3 coverage was much higher than regional and national EDHS report 2016 [3]. Besides, measles and fully immunization coverage together was also higher than Regional and National coverage [3]. The District immunization activity over achievement might be due to good performance or poor data quality. On the other hand, the dropout rate of Penta 1 to Penta 3 and Penta 1 to fully vaccinated were greater than expected and it was in the unacceptable range.

Antenatal Care (ANC) and skill birth attendant services are higher than the Regional and National EDHS 2016 report [4]. The dropout rate of ANC 1st to ANC 4th and ANC 4th to Skill Birth Attendant (SBA) were more than 26% and it is in the unacceptable range.

There was poor latrine utilization data, data discrepancy about latrine coverage and low hygiene and sanitation coverage in the District. Besides, drinking water safety coverage for the District was not good and strong water quality monitoring was not conducted. Among ten top causes of morbidity in adult outpatient last year, diarrhoea, Helminthiasis and typhoid fever may be related to the drinking water quality.

Malaria cases were not known in the District. TB and HIV are the first two selected priority problems than the rest three problems. New cases of TB detection rate is lower than the Ethiopian Federal Ministry of Health target, 83% [1]. Still compared to the World Health Organization (WHO) case detection rate standard or target, it was lower than 85% [5]. TB patients' cure rate in the District was lower than HSTP targeted to be cured which is 84% and also treatment success rate in the District was higher than HSTP target of 95% [1]. On the other hand, the HIV prevalence of the District based on the indicator of HIV/AIDS in health facility data, such as VCT, PMTCT and PICT in the District people were screened for HIV from these four (0.06%) people were positives in 2017/18. The District Health Office more focused on TB and HIV/ADIS prevention and control activities.

On education, the District profile shows us accesses to education and the engagement of female students were good, but on high school (9-10) there was a decline in number compared to males, unlike to the primary school and this should be given attention to correct. In the District 2017/18 dropout rate is high in secondary school than primary and on the other hand, female students were more dropping their class than male students. This might be due to the absence of preparatory

school because the student from a low-income family cannot continue preparatory school at neighboring District (Hawassa).

Limitations

- ✓ There was no completed vital statistics (mortality and birth) report at health facilities as well as in District vital statistical registration core process under peace and security office.
- ✓ All health centers did not provide and report inpatient service; data for top leading causes of admissions and mortality was not found
- ✓ Incompleteness and inconsistency of some data (latrine, TB, HIV/ADIS, etc.)

4.6. Conclusion

Respiratory diseases are among the leading top ten of the total diseases reported at adult age group in outpatients visited. In under five years, children pneumonia and diarrhoea were the first and second leading cause of morbidity in the District. Diarrhoea might be due to poor hygiene and sanitation and poor child feeding practices. There was a shortage of clean drinking water, poor sanitation supplemented by low public awareness of environmental health and personal hygiene practices. Safe drinking water access is low in the District. In Gorche District maternal and child health utilization was very good and increased like immunization and maternal health activity. The District TB case detection rate was low, which does not mean the burden of TB in the District low. However, TB cured rate was greater than the national target and it might be due to no HIV co-infection. HIV is another major health problem in the District. Presence of new HIV infections from very low HIV screening in 2017/18. To minimize the burden of TB and HIV/ADIS infection the District Health Office should give attention to controlling and preventing infection through community involvement. Documentation of data in District Health Office was very poor due to different reasons.

4.7. Recommendation

For Gorche District

- Prevention and control measures should be strengthened to reduce the morbidity from the ten top communicable and other priority diseases

- The coverage and accessibility of safe drinking water should be improved and there should be a strong water quality monitoring system.
- Data quality management should be strengthened in the District Health Office and vital statistical registration core process in Peace and Security Office.
- Community based health activities should be well monitored by the District Health Office core and sub-processes. Especially the HSTP agendas like ODF villages and District, information revolution, quality and equity of health care.
- TB and HIV/AIDS prevention and control method should get attention before other health problems.
- District Education Office must give attention to preparatory school to support economically poor students.

4.8. References

[1] Federal Democratic Republic of Ethiopia Ministry of Health, "Health Sector Transformation Plan 2015/16-2019/20(2008-2012EFY)," 2015.

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[5] R. Chatora and P. Tumusiime, "Planning and Implementation of Implementation of," *Dist. Heal. Manag. Team Train. Modul.*, pp. 1–64, 2004.

Annex-4-Cheklist for Health Profile Description at Gorche District in Sidama Zone SNNP region, 2019

1. Historical Aspects of the District

Name of the District _____When the District was established _____

How & why the name given _____ Any other historical aspect_____

2. Geography and Climate (including map, altitudes, agro ecological zones etc.)

District map _____Location (distance from Regional city_____
Direction_____ Surface Area _____square kilometer

District boundaries:-North, _____ South, _____East _____ West _____Southeast_____

3. Political and Administrative Organization

Total no. of villages _____ Rural_____ Urban_____

4. Population and Population structures

A. Demographic data:-Total Population ____ Male _____Female _____ sex ratio male/female _____ Urban Population_____ Male_____ Female_____ Sex ratio male/Female_____

Rural Population____ Male_____ Female_____ Sex ratio male/Female_____

Population under 1yrs ____ Population under five yrs.____Population < 15 years ____Population 15-24years ___ Population 15-59 ____ Women 15_49 years of age _____

Total number of estimated pregnancies / Births_____ Estimated deliveries_____

Non-pregnant women in fertile age_____ Total population of >=64 years_____

Average household size _____

B. Ethnic/language:-Sidama__(__%), Oromo ___(__%), Wolayita___(__%), Others___(__%)

C. Religion:-Muslim ___(__%), Orthodox __(__%), Protestant___(__%), Other __(__%)

5. Economy (mainstay of the economy, average income levels etc.)

 Main Income Sources

SN	Main income sources	Plan	Achievement	%	Remark
1	Government employment				
2	Agriculture				

3	NGO employment				
4	Tourism				
5	Trade				
6	Other business				
Total					

6. Education and school Health

A. Number of educational institution

K.G ____Primarily and Secondary School ___Preparatory __College/ University___TVET___

Number of educational institution and students enrolled by 2010EFY

SN	Level of the school	# of schools	Students enrolled to the school								
			Male			Female			Total		
			Plan	Achi	%	Plan	Achi	%	Plan	Achi	%
1	1-4 Grade										
2	5-8 Grade										
3	9-10 Grade										
	Total										

B. Total School Age Children (target) _____

Total Enrolment _____Male _____ Female _____ School dropout in 6 months or year _____

School dropout in 6months or year

SN	Level of school	Male	Female	Total
1	1-4 Grade			
2	5-8 Grade			
3	9-10 Grade			
Total				

If there is school dropout, why._____

C. Educational status of the community:-Non-educated people __ Male ___ Female ___

D. **Number of teacher in the District** _____Male _____Female _____

# of teachers in the District

	Educational Level of teachers	Male	Female	Total
1	Certificate			

2	Diploma			
3	Degree			
Total				

7. Facilities

A. Transport

Road network with respect to health facility_____ How many villages have access to transportation _____

B. Telecommunication

How many people have access to fixed telephone? _____ How many people have access to mobile phone? (coverage) _____

C. Power supply:-How many house hold get power supply _____ (_____%)

D. Water:-Total safe water coverage __ House hold __Safe water supply coverage by village _

- Main source of water supply _____ Population getting safe water _____

8. District Health system

- The general health system structure of the District health center (flow chart) _____
- Is there rapid response team (RRT) at District level? Yes/No
- If yes, describe the HMT in detail (composition and function) _____
- Do you have NGOs working on health and health related issues? Yes /No
- List the NGOs and their work in related to health._____

9. **Vital Statistics and Health Indicators**

Infant Mortality Rate (IMR) (total <1 yr. deaths):2008 E.C ___2009 E.C ___2010 E.C __
CMR(this year's total <15 yr. Deaths):-2008 E.C____2009 E.C ____2010 E.C ____
Crude Birth Rate(Total birth):2008 E.C _____2009 E.C _____2010 E.C _____
Crude Death Rate(total deaths) 2008 E.C_____2009 E.C _____2010 E.C _____
Maternal Mortality Rate(total maternal deaths):-2008 E.C ___2009 E.C ___2010 E.C ___
ANC rate 2008 E.C ____2009 E.C ____2010 E.C _____
ANC rate: 2008 E.C _____2009 E.C _____2010 E.C _____
Percentage of SBA:2008 E.C _____2009 E.C _____2010 E.C _____
PNC 1ST 24Hrs:- 2008 E.C _____2009 E.C _____2010 E.C_____

Immunization Coverage (for children and Women);

VARIABLE	2008 E.C			2009E.C			2010E.C		
	plan	Number	%	Plan	Number	%	plan	Number	%

BCG									
OPV-1									
OPV-3									
Penta-1									
Penta-3									
PCV-1									
PCV-3									
Rota-1									
Rota-2									
IPV-1									
Measles									
FV									
PAB									
Malnutrition screened									
SAM									
MAM									
ANC 1st									
ANC 4th									
SBA									
PNC 1st									

B. **Type and Number of health professionals**

Types of H/Professionals	**Numbers**				**Population Ratio**
	Government	NGO	Private	Total	
MD					
HO					
All types of Nurses					
All Types of Mid wives					
Medical lab.					
Pharmacies and druggists					
HEW					

C. Ten Top causes of morbidity and mortality in adults in 2010 E.C

No	Diseases	Number	%

1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

D. Five Top causes of morbidity and mortality of under 5 in 2010 E.C?

No	Diseases	Number	%
1			
2			
3			
4			
5			

E. Health budget allocation and Utilization

Source of Budget	Budget allocation and Utilization	2008 E.C			2009 E.C			2010 E.C		
		Plan	Achi	%	Plan	Achi	%	Plan	Achi	%
Government	Annual of budget allocated for the Zone/ District									
	Annual of budget allocated for the Zone/ District Health office									
	Utilization of health budget									
Fund/NGO	Budget allocated for health service									
	Budget utilization for health service									
For drug and medical supply purpose										

F. Core Activities of Primary Health Coverage and SDG

Activities	**Types**	**2008E.C**			**2009E.C**			**2010E.C**		
		Plan	**Achi**	**%**	**Plan**	**Achi**	**%**	**Plan**	**Achi**	**%**

Family Planning	LAFP(IUD+Imp)										
	SAFP(Depo+OC										
Hygiene & sanitation	Improved latrine										
	Solid waste Management										
	Liquid waste Management										
	ODF Coverage										
TB/Leprosy	All form of TB										
	PTB +Ve										
	PTB-Ve										
	Extra PTB										
	TB Rx completion rate										
	TB cure rate										
	TB Defaulter										
	TB Rx success rate										
	Death on TB Rx										
	Total TB patients screened for HIV										
	Positive for HIV										
	Total Leprosy cases detected										
	Leprosy case treated										
HIV/AIDS	Total MARPs screened for HIV										
	HIV prevalence										
	HIV Incidence (new cases/yr.										
	Total PLWHA										
	Current ON ART										
	Pre-ART										
	CC Preformed on HIV/AIDS										
Malaria	Confirmed(BF/RDT)	PF									
		PV									
		Others									
	Clinical										
	Malaria deaths										
	INT utilization										

	IRS(Unit Structure)									
	Environmental management									

Was there shortage of Essential drugs for the last one year? Yes/No

Essential Drug _____
_____
_____

The District Integrated disease surveillance and Report in 2010 E.C

PHEM reportable disease	**Case**	**Death**
Cholera		
Measle		
NNT		
AFP		
Anthrax		
SARS		
Smallpox		
VHF		
YF		
Rabies		
Dracunculiasis/Guinea worm		
Pandemic Influenza		
Malaria		
Meningitis		
Dysentery		
Relapsing Fever		
Typhoid Fever		
Epidemic Typhus		
SAM		
MDSR		

11. Disaster situation in the District

- Was there any disaster (natural or manmade) in the District in the last one year? Yes/No If yes what type _____
- Was any recent disease outbreak/other public health emergency Yes/No, If yes cases _____ and deaths _____

Chapter Five-Scientific Manuscripts for Peer reviewed Journals

5.1. Measles Outbreak Investigation at Mareko District in Gurage Zone, SNNP Regional State

Authors-Ababu Fayisa MPH*, Ahmed Ali, PHD, Prof.[1,] Sefonias Getachew, MPH[2],
***-** School Public Health, College of Health Sciences, Addis Ababa University**,** 1- School Public Health, College of Health Sciences, Addis Ababa University, 2- School Public Health, College of Health Sciences, Addis Ababa University

Abstract

Introduction-Measles virus is an aerosol-borne and one of the most contagious pathogenic viruses. It is one of the communicable diseases, causing vaccine preventable morbidity and mortality. Measles outbreaks are still occurring despite significantly increasing vaccination rates with a majority of adolescents and young adults being affected. This study is aimed to investigate the measles outbreak and risk factors in Mareko District.

Objective: To investigate Measles outbreak and associated risk factors in the Mareko District of Gurage Zone, Southern Nations, Nationalities and Peoples' Region 2020.

Methods: The investigation was conducted by community based unmatched case-control(1:3) study design. Data were collected from 17cases and 51controls using face-to-face interview with semi-structured questionnaire. The collected data were analyzed using Epi-Info and MS-Excel 2013.

Results- The overall attack rate of affected villages was seven cases per 1,000 populations with no measles related death. On unmatched bivariate analysis, some variables were significant factors. However, in multivariate analysis those remained significantly associated for contracting measles were being age less than 15 years AOR=23.261(95%CI;2.686-201.450,P=0.004) and family size greater than five AOR=8.170(95%CI;1.022-65.328,P=0.048). Previous having measles infection AOR=0.048(95%CI;0.006-0.399,P=0.005) was protective factor.

Conclusion: females were more affected than males. Being less than fifteen years old and larger family sizes greater than five were risky for acquiring the disease than others. However, having a previous history of measles infection was a protective factor. More than half of cases were vaccinated for first dose, but no for the second.

Keywords: Measles outbreak, case-control, risk factors, Mareko District

Introduction

Measles virus (MeV) is an aerosol-borne and one of the most contagious pathogenic viruses known [1]. It is caused by an RNA virus of the paramyxoviridae family, which belongs to the genus morbillivirus [2]. Measles is one of the communicable diseases, causing preventable morbidity and mortality. It is a highly contagious viral disease, which affects susceptible individuals of all ages and remains to be the leading cause of death among young children globally [3]. Measles outbreaks are still occurring despite significantly increasing vaccination rates with a majority of adolescents and young adults (up to 40 years of age) being affected, who were mainly not vaccinated against measles or had received only one dose [1].

According to the WHO update, many countries around the world are experiencing measles outbreak [3]. Measles virus is transmitted through droplets from the nose, mouth, or throat of infected persons. The incubation period for measles is about 10 days to fever onset and 14 days to rash onset [4]. This period may be shorter in infants and longer (up to 3 weeks) in adults [4]. Following rash and high fever, the following will be runny nose, conjunctivitis and cough [3, 4]. Measles virus is transmitted primarily by respiratory droplets over short distances and, less commonly, by small-particle aerosols that remain suspended in the air for long periods [4]. Infants and young children, although susceptible if not protected by vaccination, are not exposed to measles virus at a rate sufficient to cause a large disease burden in this age group [4]. In the absence of vaccination, every child in an area where measles virus is circulating would be exposed to have a contract measles cases through living in overcrowded, large family size, travel patterns, and types and locations of social interactions (for example, market-places)[5].

In temperate climates, annual measles outbreaks typically occur in the late winter and early spring [4]. These annual outbreaks are probably attributable to social networks facilitating transmission (e.g., congregation of children at school) and environmental factors favouring the viability and transmission of measles virus [4]. Cases in the community are sources for disease spread and challenge outbreak control. Also, cases that stay without treatment are at higher risk of developing complications related to measles infection [6]. Complications, such as otitis media and pneumonia occur in about six to seven per cent of reported cases [7]. According to the WHO report in 35th of WHO epidemic week 2019, 8201 suspected measles cases were reported from Ethiopia [3]. Children aged less than five years are the most affected accounting for 50.2% of the total cases, followed by age group 15-44 years (25.5%). Seventy-two per cent of the reported measles cases were not previously vaccinated [3].

In Ethiopia, measles epidemics are the common causes of morbidity and mortality due to low coverage of measles vaccination. According to the UNICEF Report on 16 July 2019, Ethiopia is the fifth country in the World by a large number of unimmunized children [8]. In 2018, children not immunized with the first dose of measles were 1,215,724 [8]. Besides, in SNNPR measles outbreaks occurred in the past years in different zones and Districts. Mareko District is one of the measles epidemic occurring Districts repeatedly. Therefore, this case investigation aimed to identify the measles outbreak cases and risk factors in Mareko District for interventions towards case-control and prevention. We investigated the Measles outbreak, described its magnitude in terms of person, place and time, and identified the associated risk factors to take possible prevention and control measures.

Methods and Materials

Study Area and Population

District, which is one of the 13 Districts of Gurage Zone in Southern Nations, Nationalities and People's Regional State. Administratively, the District has 25 rural and one urban village, having 88,718 population and 18,102 households. It is located at 114Km from the Zonal Town Wolkite and 142 Km from Regional City, Hawassa. Mareko is bordered with Oromia region in eastern and northern, Meskan District in western and Site Zone in the south. The District has three health centers and 25 health posts, there was no hospital.

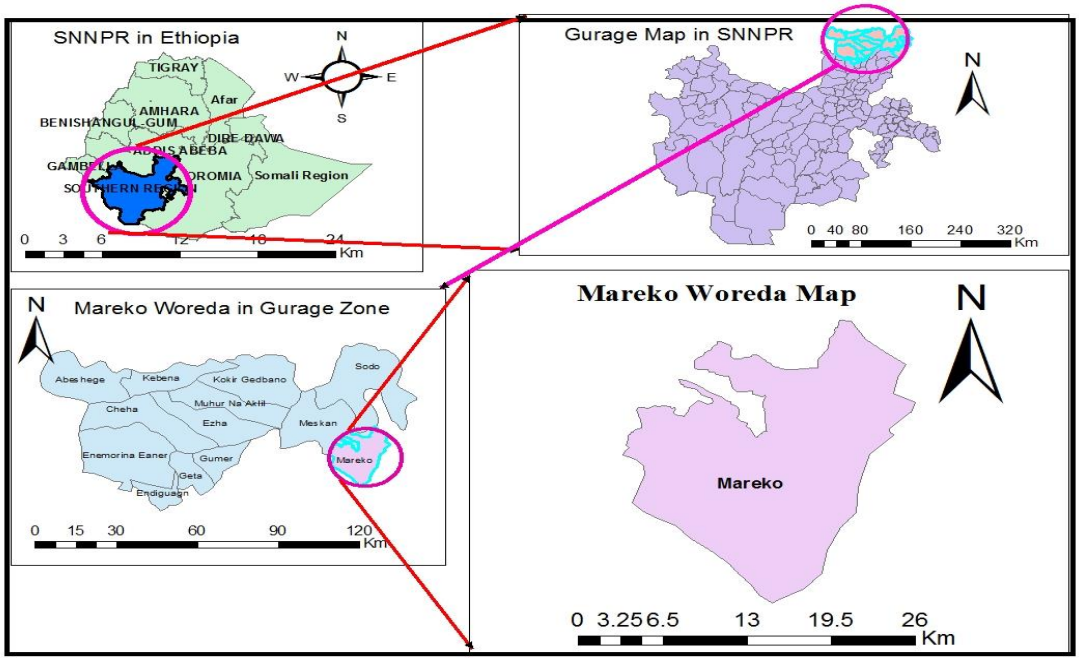

Figure 23:-Map of Mareko District in Gurage Zone, SNNP Regional State, Ethiopia 2020

ArcGIS Version 10.2 constructed the map from Ethiopian shape file of 2013.

Study Design and Period

We conducted this investigation by Community Based Unmatched Case-Control (1:3) study design from January 1 to 10/2020.

Sample size determination and sampling procedure

All cases found during data collection were included in this study. Therefore, 17cases and 51 controls were included for this study.

Controls were selected conveniently from the villages where cases were present.

Cases were any residents of villages in Mareko District with sign and symptoms of measles (Maculo-papular rash, Conjunctivitis, Fever, etc) and agreed to participate in the study. Since controls were any residents of villages in Mareko District without any sign and symptoms of Measles, but neighbors to the selected cases and agreed to participate in the study.

Data Collection and Analysis

The data were collected from the community through face-to-face interview with individual respondents using a semi-structured questionnaire. After we collected, entered and cleaned data, it was analyzed using Epi Info version 7.2 and Microsoft office excel 2013.

Ethical issues

Verbal informed consents were taken from all participants before interviewing them. Also, photos were taken based on the willingness of participants. The participant's name or other facts were kept confidential.

Case Definition

Suspected cases- 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 [9].

Confirmed cases- A suspected case with laboratory confirmation (positive IgM antibody) or epidemiological link to confirmed cases in an epidemic [9].

Results

Descriptive Epidemiology

Totally, 102 confirmed measles cases (four laboratory-confirmed) were line listed from five villages in health facilities and it was found in District health office. However, only 17 cases were found during the investigation period. The overall (Crude) attack rate (AR) of affected villages was one case per 1,000 populations, with no measles-related death (CFR=0).

Descriptive Epidemiology of Measles Cases by Person

From 17 total cases interviewed 11(65%) were females and six(35%) were males (Fig-24).

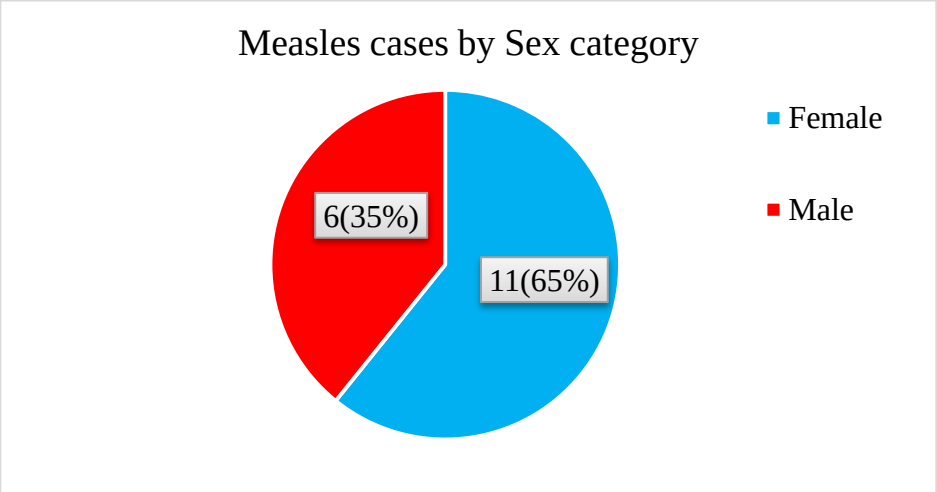

Figure 24:-The proportions of Measles cases by sex, Mareko District, in Gurage Zone, SNNP Region, Ethiopia 2020

As per cases interviewed from five villages in the District, the most affected age groups were under five years, accounting for about 5 per 1000 (Table-22). Overall, less than 15 aged children were the dominantly affected age group being about 12(71%) (Table 22). The mean age was eight years, with ranges from less one to 35 years.

Table 22:- Attack rate of Measles cases in the affected Villages of the Mareko District of Gurage Zone in SNNPR 2020

Age groups	Population	Measles cases	AR(per 1000)
0-4	2230	11	4.93
5 to 14	4608	1	0.22
15+	7447	5	0.67
Totally in affected villages	14285	17	1.19

Data were collected from cases in District Health Office of Mareko District, 2020

Out of 17 cases interviewed, 16(94%) cases had at least one sign of the complication of measles. Among signs and symptoms, pneumonia and conjunctivitis were the leading as shown on figure-25 below.

Figure-25:-Pictures of Measles cases in the Mareko District, Gurage Zone, SNNPR, 2020

Image was taken during case investigation in Mareko District

Descriptive Epidemiology of Measles Cases by Time

Mareko District reported Measles cases starting from December 28 to January 12, 2020, through weekly surveillance report (Fig-26). There was no measles case after January 12, 2020, from this District. According to the Epidemic curve on figure-26 below, the initial case developed the sign and symptoms of measles on December 22, 2019. Besides that, the Epidemic curve shows that cases peaked on December 29, 2020 (Fig. 26). The average duration of rash was 10 days, ranging from seven to 14 days.

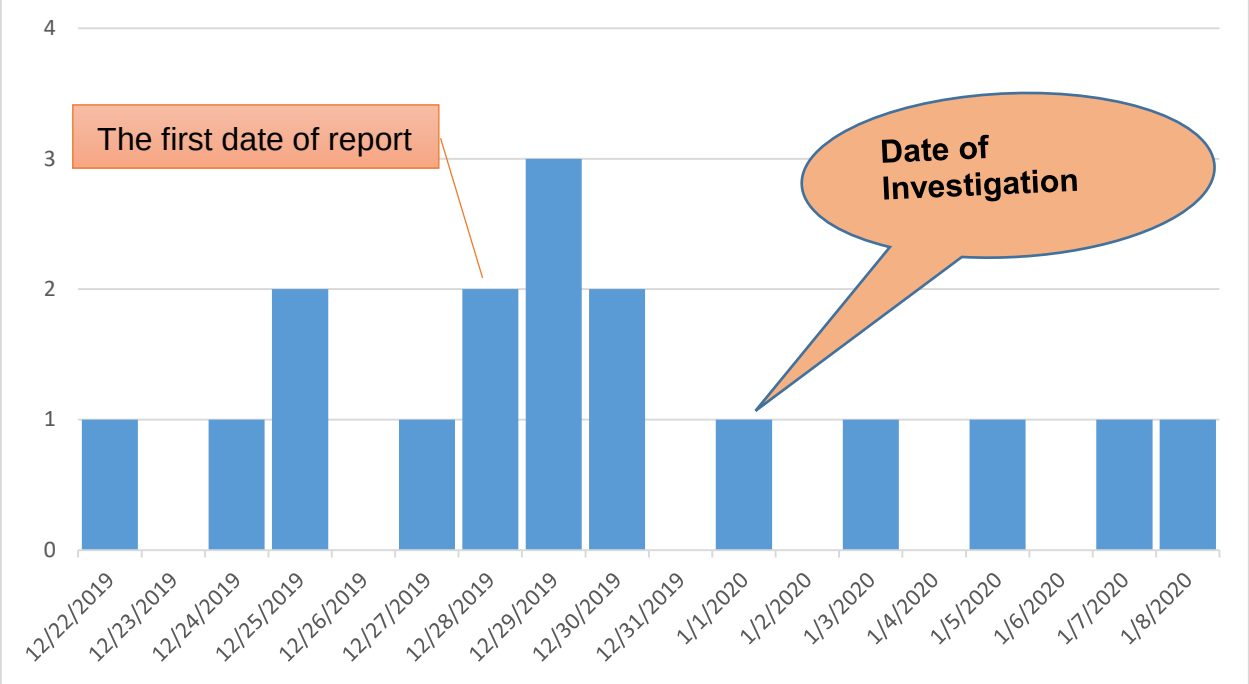

Figure 26:- Epi-curve of Measles outbreak in Mareko District in Gurage Zone, SNNPR, 2020

Descriptive Epidemiology of Measles Cases by Place

More than half of all cases interviewed, nine (53%) were from Shirinto 1st village (Table -23). Three (17%) from Shirinto 3rd and others were from Shirinto 2nd, Udasa Wesh Wera and Goto Mandifa villages (Table-23). From cases interviewed 16(94%) were more than five kilometers away from the health center.

Table 23:-Distribution of Measles cases by villages in the Mareko District at Gurage Zone, SNNPR, 2020

Villages	Number of Measles cases	Percent
Goto mandifa	1	6%
Shirinto 1	9	53%
Shirinto 2	2	12%
Shirinto 3	3	17%
U/W/Wera	2	12%
Grand Total	17	100%

The data of measles outbreak case in Mareko District January 2020.

Analysis of Case Control Study (Analytical Epidemiology)

For the case-control study, we recruited 17 cases with a median age of four years ranging from one to 31 years, and 51 controls with a median age of 28 years ranging from 11 to 48 years. Sex distribution 11 (65%) of cases and 26(51%) of controls were females (Table-24). Age groups that were highly affected by this case were those less than fifteen years of age (Table-24). The major occupation of cases and controls was farming 41(60%). All cases and controls (68(100%)) were Muslim religion followers. Concerning the ethnicity of the cases and controls, 62(91%) were Mareko and six (9%) Silti (Table-24). The families of cases and controls who had greater than five family members were eight (47%) and eight (16%) respectively (Table-24). Families having a sick person in their house were six (9%) (Table-24).

Table 24:- Socio-demographic characteristics of the cases and controls in the Mareko District, Gurage Zone, SNNP Regional State of Ethiopia, 2020

Variables	Cases		Control	
	Frequency	Percent	Frequency	Percent
Sex category				
Male	6	35.29%	25	49.02%
Female	11	64.71%	26	50.98%
Total	17	100.00%	51	100.00%
Age category				
<15	12	71%	8	16%
>15	5	29%	43	84%
Total	17	100%	51	100%
Occupation of the patients / respondents				
Farmer	5	29.41%	36	70.59%
House wife	0	0	10	19.61%
Student	1	5.88%	5	9.80%
NA	11	64.71%	0	0.00%
Total	17	100.00%	51	100.00%
Ethnic group				
Mareko	17	100.00%	45	88.24%
Silti	0	0.00%	6	11.76%
Total	17	100.00%	51	100.00%

Family size group				
<5	9	53%	43	84%
>=5	8	47%	8	16%
Total	17	100.00%	51	100.00%
Educational level of the family				
Illiterate	16	94.12%	49	96.08%
Elementary	1	5.88%	0	0
Read and write	0	0.00%	2	3.92%
Total	17	100.00%	51	100.00%
Marital status of patents				
Single	1	5.88%	2	3.92%
Married	16	94.12%	49	96.08%
Total	17	100.00%	51	100.00%
Sick person with rash, fever, running rose/conjunctivitis in the family				
Yes	6	35.29%	0	0.00%
No	11	64.71%	51	100.00%
Total	17	100.00%	51	100.00%

From data collected from cases and controls interviewed during outbreak investigation in Mareko District January 2020.

Bivariate and multivariate analysis

On unmatched bivariate logistic analysis, the statistically significant risk factors were history of contact with a person infected with Measles in the past two to three weeks, being age less than 15 years old, a distance greater than five kilometres from the health center and family size greater than five (Table-25). However, the previous history of measles infection was a protective significant factor associated with measles (Table-25). Other independent variables were not statistically significant.

However, in multivariate logistic analysis, independent factors those remained significantly associated with contracting measles outbreak in Mareko District were being aged less than 15 years and family size greater than five (Table-25). But, previously having measles infection was a protective factor for measles during the outbreak (Table-25).

Table 25:- Summary of Bivariate and Multivariate analysis for measles in Mareko District, SNNP Region, Ethiopia 2020

Variables		Cases	Controls	Bivariate analysis			Multivariate analysis		
				COR	95%CI	P-Value	AOR	95%CI	P-Value
Age category	<15	12(71%)	8(16%)	12.900	3.560-46.751	<0.001	23.261	2.686-201.450	0.004
	>=15	5(29%)	43(84%)						
Family size	>=5	8(47%)	8(16%)	4.778	1.417-16.105	0.012	8.170	1.022-65.328	0.048
	<5	9(53%)	43(84%)						
History of Measles infection	Yes	3(18%)	38(75%)	0.073	0.018-0.296	<0.001	0.048	0.006-0.399	0.005
	No	14(82%)	13(25%)						

Data of Measles outbreak analyzed by Epi-Info Version 7.2.2 of Mareko District January 2020

Vaccination history and knowledge towards prevention and control methods

From all cases and controls, no one had a second dose, vaccinated for MCV. More than half of cases interviewed 10(59%) had measles first dose vaccination within their first year of birth. However, from all cases and controls interviewed 39(57%) had no measles vaccine. The reason for this problem was due to lack of knowledge about vaccination campaign, unknown site of vaccination, health facility being far among other reasons. Vaccination cards were not found for those vaccinated and the date of vaccination was unknown. Regarding their knowledge on prevention and control, 67(99%) knew how the measles case could be transmitted and prevented. Also, all cases and controls 68(100%) believe that modern treatment can cure the disease.

Interventions done during investigation

All identified cases were provided with supportive treatment, with vitamin "A", tetracycline ointment, and oral rehydrating salts. Severely ill patients were taken to the nearest health centers for better supportive treatment and follow up. Among those got treatment 16(94%) were recovered from the pain and the left one case was partially improved. After cases identified, the measles vaccine was given for

those greater than six months and under five years aged children living in the area of the outbreak. MCV2 vaccination was provided for all under two years children in all Villages of the District.

Discussion

Measles outbreak in Mareko District was verified based on the laboratory test confirmed. From all cases, more than half were from Shirinto 1st village, which is more than five kilometres far from the HC. This might be the cause of delay to get treatment. The overall attack rate (AR) of measles cases in the District was relatively agrees with the study done in Jarar Zone of Somali Region, eastern Ethiopia[10]. Females were affected more than males, as outbreak investigation conducted in Artuma Fursi District of Oromia Special Zone in the Amhara Regional State, Ethiopia 2018[11]. However, there were no deaths related measles in the District, which may be due to early diagnosis and supportive treatments given from the nearby health center.

Families with greater than five family members had five times higher risk of acquiring measles than other families. This is relatively similar to the outbreak in Gedeb District in Gedeo zone of SNNPR in 2014[12]. But, this finding is different from the study done in South West Ethiopia, which was insignificant [13]. This might be due to sampling size difference, which is small in this particular study. Few families had sick persons in their houses. In this study, the most associated risk factor was being less than 15 years, which had thirteen times higher risk of acquiring measles than those above 15years. This is also in agreement with the study conducted in Jarar Zone of Ethiopia, Somali Regional State in 2016[10] and in nine Districts of Guji Zone of Oromia Regional State in 2017[14]. Even though it was not statistically significant, the most affected age group was under-five children accounting higher attack rate than other age groups. This finding is similar to the study conducted in Jarar Zone of Ethiopia Somali Regional State in 2016[10]. The previous history of measles infection was the most significant factor regarding prevention for the measles outbreak, which is in agreement with the investigation done in Basso Liben District, Amhara Region[15].

Most of the cases developed signs and symptoms of measles complication which was higher than the study done in Sekota Zuria Rural District of Ethiopia[16]. This might be due to the size of cases in that investigation. Among signs and symptoms of complications, pneumonia and conjunctivitis were the leading signs and symptoms.

More than half of cases were vaccinated for MCV1 on routine vaccination period within their lifetime, especially in their first year of birth. However, there was no second dose of MCV in the locality. These

were almost similar to the study conducted in Bassona Worena District, Amhara Region, Ethiopia, 2018[17] and in Southern Nations, Nationalities and People's Regional State in 2018[18]. Vaccination cards were not found for all participants vaccinated and the date of vaccination was not known. Lack of knowledge and information regarding the site of vaccination were the main reasons for not taking measles vaccination. This finding is in agreement with the study done in Bassona Worena District in Amhara Region[17]**.**

All cases took treatment at the nearby health center with appropriate conservative treatments and almost all of them recovered. Regarding knowledge, the study participants knew how measles can be transmitted and prevented which was relatively similar to the study conducted in Sekota Zuria Rural District of Ethiopia[16]. Also, almost all participants believed that modern treatment can cure the disease. This was again in line with the study conducted in Jarar Zone of Ethiopia, Somali Regional State in 2016 [10]**.**

Limitations of the study

- Incomplete line-list from District Health Office
- Absence of child immunization card at household level poses difficulty to get the exact date of vaccination and other relevant information.
- Lack of immunization coverage data by villages.
- Cases/controls respondents forget the exact events about their own or their Children health condition (Recall bias).

Conclusion

In this outbreak, females were more affected than males. Being less than fifteen years old was risky for acquiring the disease than above fifteen years. Larger family size was also significantly associated risk factor for a measles outbreak. However, having a previous history of measles infection was a protective factor. More than half of cases were vaccinated for MCV1 on routine vaccination period within their lifetime, especially in their first year of birth. All identified cases were provided with a supportive treatment with appropriate supplies and severely ill patients were taken to the nearest health centers for better supportive treatment and follow up.

Recommendations

The concerned bodies should strengthen the prevention and control methods of outbreak especially on routine vaccination, health education and service provision for the affected community.

Acknowledgements

We would like to forward our gratitude to School of Public Health, College of Health Sciences, Addis Ababa University for his assistance in this study completion and all staff of the SNNP-RHB Public Health Emergency Management for their kindness to share their information and facilitating this study process. Also, we would like to thank the Mareko District Health Office for their support during the investigation period.

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Chapter Six- Abstracts for Scientific Presentation

6.1. Surveillance Data Analysis on *Dysentery* in Southern Nations, Nationalities and People's Regional Health Bureau, Public Health Emergency Management Department 2019

Author-Ababu Fayisa Aboma, From- Addis Ababa University

Co-authors-Professor Ahmed Ali, Mr. Sefonias Getachew

Abstract

Background- Dysentery/Bloody diarrhoea, which typically occurs in cases of shigellosis, is one of the notifiable diseases in Ethiopia as well as in the Southern Nations, Nationalities and People's Region(SNNPR). Therefore, this data analysis aimed to describe the disease epidemiology of the disease in the study area.

Objective- To describe the epidemiology of dysentery cases reported in this Regional State from 2014 to 2018.

Methods-We analyzed a five-years from 2014 to 2018 surveillance data of Dysentery cases using descriptive study design in Southern Nations, Nationalities and Peoples' Regional Health Bureau. Then, a description of the epidemiology of the disease and its overall burden was made. This data analysis was conducted using MS-Excel.

Results-In this Region the report on Dysentery case from 2014-to-2018 show 15 deaths and 216181cases. The attack rate is 1.1-per1000, and 0.07-per-1000 case fatality rate. From all cases reported, 102,500(47%) occurred from March-to-June throughout the five years. Also, the highest, 53975(25%) were from Sidama Zone and the least cases were from Sheka 1217(1%).

Conclusion-Dysentery cases in SNNPR showed a reducing trend. Cases were higher in dry seasons, which might be related to the shortage of water. However, there was a lower case fatality rate. SNNPR Health Bureau should strengthen the prevention activities of Dysentery cases from the regional level to the health facility levels.

Keywords-Data analysis, Dysentery, number of cases, Deaths, Diarrhea

6.2. Scabies outbreak investigation in Kenna District Konso Zone in Southern Nations, Nationalities and People's Region, 2019

Author-Ababu Fayisa Aboma, from- Addis Ababa University

Co-authors-Prof. Ahmed Ali-Addis Ababa University, Mr. Sefonias Getachew- Addis Ababa University

Abstract

Introduction-Scabies affects about 200 million people worldwide each year with incidences increase during natural and manmade disasters and can affect all age groups, both sexes, all races, and all social classes. It is usually spread by direct, prolonged, skin-to-skin contact with a person who has scabies infestation. This study is aimed to investigate the Scabies suspected outbreak and risk factors in Kenna District.

Objectives: To investigate the suspected Scabies outbreak and risk factors in Kenna District of Konso Zone, Southern Nations, Nationalities and People's Region December 2019.

Methods: A community based unmatched case-control (1:1) study design was conducted. Data were collected from 100 cases and 100 controls using a face-to-face interview with a semi-structured questionnaire and analyzed using Epi-Info version 7.2 and MS-Excel 2013.

Result: Kenna District Health Office received a few numbers of scabies cases from villages on October 15, 2019, and then 705 scabies suspected cases line-listed. In unmatched bivariate analysis, some variables were statistically significant. In multivariate logistic analysis Contact history with scabies patient AOR=25.458(95%CI: 2.262-286.527,P=0.009), Travel history outside village AOR=6.287(95%CI:1.261-31.333,P=0.025) and age <15years with OR=6.240(95%CI: 1.862-20.910,p=0.003) were significantly associated with scabies outbreak.

Conclusion: Scabies outbreak occurred in Kenna District was verified. Age group less than 15years is a significant risk factor for the disease transmission. In addition, contact history within the past two months and travel history were independent risk factors for the scabies.

Keywords: Scabies outbreak, case-control, risk factors, Kenna District

6.3. Narrative Summary of Disaster Situation (land slide) Visited at Konta Special District, SNNP Regional State, 2019

Author-Ababu Fayisa Aboma, from- Addis Ababa University

Co-authors-Professor. Ahmed Ali, Mr. Sefonias Getachew

Abstract

Background- Amaya Town of Konta Special District is located on 302 KMs from Hawassa City. Flooding and landslide are natural hazards. We notified the disaster by Konta Special District's PHEM Officer on October 14, 2019 morning before conducting this study. So this study is aimed to assess the health and health-related humanitarian emergencies and recommend to the concerned bodies.

Objective- To assess the health and health-related humanitarian emergencies of the affected populations for taking action at Konta Special District, SNNPR, 2019.

Methods-We collected data by observing the affected area and by interviewing randomly selected displaced people and District Health Office using the semi-structured checklist at Amaya Town on October 15-17/2019.

Results- Flooding and landslide in Amaya Town of Konta Special District was happened following fall of heavy rain and resulted in 25 deaths of persons. This happens on August 10, 2019 and October 13, 2019, with deaths of three and 22 respectively. There was as well the considerable loss of resources. Of those deaths, 11 males and 14 females; four <5years and 21 adults; one pregnant woman and four lactating women. It also caused 481 households with 770 people displaced due to damage of 115 houses.

Conclusion- Konta Special District is affected by flooding and landslide disaster resulting in deaths. Children and mothers were affected by this disaster. Many households were also displaced following this situation. The district should continue working with different partners to minimize the effects of this disaster and to rehabilitate the affected community.

Keywords-Disaster, deaths, Flooding and landslide, health service, Amaya Town

Chapter Seven-Narrative Summary of Disaster Situation Visited

7.1. Flooding and land sliding at Konta Special District, SNNP Regional State, 2019

Abstract

Background- Amaya Town of Konta Special District is located on 302 KMs from Hawassa City. Flooding and landslide are natural hazards. We notified the disaster by Konta Special District's PHEM Officer on October 14, 2019 morning before conducting this study. So this study is aimed to assess the health and health-related humanitarian emergencies and recommend to the concerned bodies.

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Conclusion- Konta Special District is affected by flooding and landslide disaster resulting in deaths. Children and mothers were affected by this disaster. Many households were also displaced following this situation. The district should continue working with different partners to minimize the effects of this disaster and to rehabilitate the affected community.

Keywords-Disaster, deaths, Flooding and landslide, health service, Amaya Town

7.1. Introduction

Background

The visited disaster site was Konta Special District, which is located in Southern Nations Nationalities and People's Regional State (SNNPR) at western Part of the Country. Oromia Region on North, Dawuro Zone on East, Keffa Zone on West, South Omo on South and Gamo Gofa on Southeast border it. Administratively, the Special District has 42 rural villages and four town administrations. It has about 124,932 people of which 60,842 are males and 64,090 are females, with 25,496 households. Most people reside in rural areas 112,432(90%) and the remaining 12,500(10%) live in urban. The climatic condition of Konta Special District is categorized as Midland 40%, highland 54% and lowland 6%. The main rainy season of the Special District is from June to September and the minor rainy season is October, December and May. The landslides mostly occurred in 16 villages with minor problems in 30 villages.

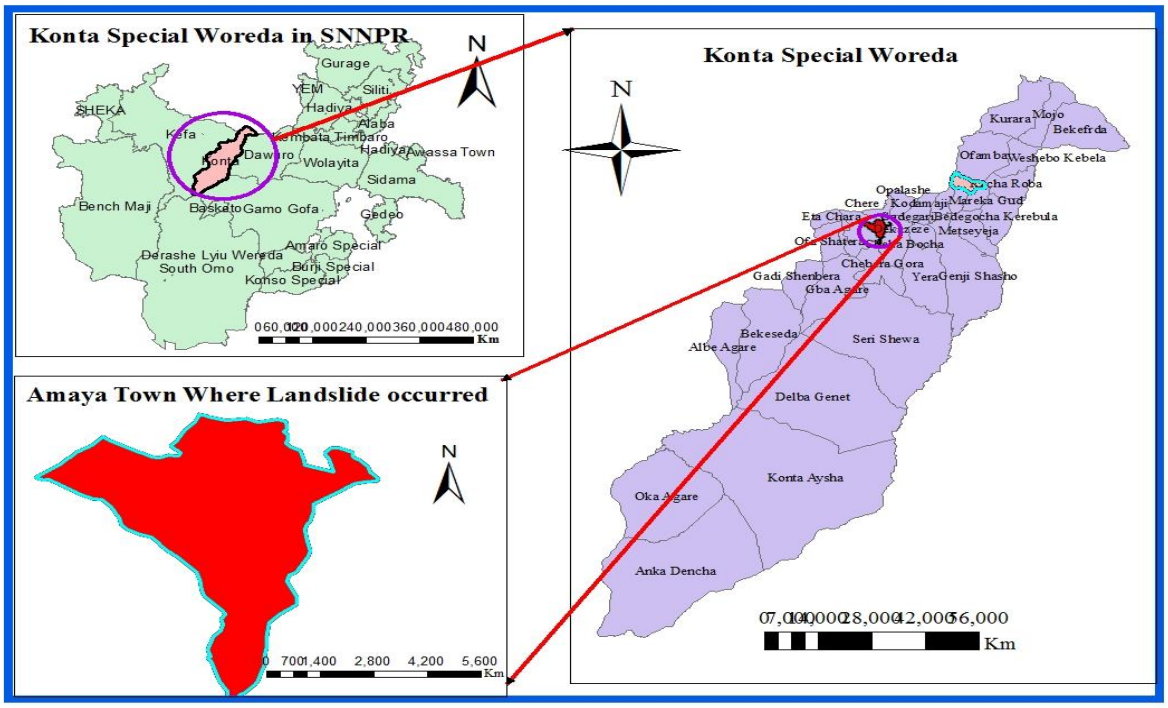

Figure 27: Map of Amaya Town in Konta Special **District**, SNNPR 2019 (From SNNPR Shape file 2013)

Flooding and landslide are natural hazards that can be caused by many different events, including land overwhelming and overflowing of natural or manmade bodies of land and water, surface water, tidal

water, rainwater runoff, rising ground force and water, sewer back-up, or from blocked yard and roof drainage systems [1].

Land Slide and Flooding pose a greater threat in low-lying areas and crackling of lands, or downstream of land and dams [1][2]. Even the smallest streams, creek beds, ditches, culverts, or drains can overflow and create flooding [1]. Some floods develop slowly over a period of days, but flash floods can develop within a few minutes to a few hours and possibly without any visible signs of rain [3]. In Ethiopia, Landslide and flood are the second natural disaster next to drought. They have been occurring more frequently and affecting the country and Southern Nations and Nationalities Peoples' Regional State almost every year causing loss of life and damages that need urgent actions and long last activities.

Table 26: Summary of risk of communicable diseases in landslide and flood-affected populations[4]

Communicable disease	Of immediate concern following floods	Of concern in weeks to months following floods
Cholera/Typhoid/Shigellosis	+++	-
Acute respiratory tract infections	+++	-
Sever acute malnutrition (SAM)	++	+++
Hepatitis A & E	++	-
Measles	++	-
Malaria	++	+++
Tuberculosis	++	++
Meningitis	++	++
HIV/AIDS	++	++
Key: ++ = moderate risk +++ = high risk		

On this situation, the Team visiting the affected area got the information on October 14, 2019 morning from the District PHEM Focal Person by phone and arranged the journey vehicle and materials needed for an emergency as directed by Regional Health Bureau. The Team was composed of Regional Health Bureau residents (two) representing the office, Regional Emergency Situation Management Bureau (one), Red Cross Society SNNPR branch (five) and SNNP Regional Music Association (three).

7.2. Objective

General objective

To assess the health and health-related humanitarian emergencies for affected populations and recommend concerned agencies on risk situations at Konta Special District, SNNPR, 2019.

Specific objectives

- To assess the health and health-related humanitarian emergencies
- To provide emergence drugs and materials to affected populations.
- To reassure the community by encouraging to maintain their health
- To promote hygiene behavior at the temporary camps for displaced people

7.3. Methods

We collected data by observing the affected area and by interviewing randomly selected displaced people and District Health Office using the semi-structured checklist at Amaya Town on October 15-17/2019. Discussing with District Administration and District Health Office staffs about health and health-related causes and health impacts of disaster emergencies.

7.4. Findings during visiting

Flooding and Landslide Effect on Konta Special District Peoples

Flooding and landslide in Konta Special District started following fall of heavy rain on August 10, 2019, resulting in three death of persons. Then, on October 13, 2019, from five households 25 overall deaths happened due to this disaster. There was as well the considerable loss of resources. Of those deaths, by sex 11 were males and 14 females (Figure-28), by age 4 under-five and 21 adults, as well as one pregnant woman and 4 lactating women.

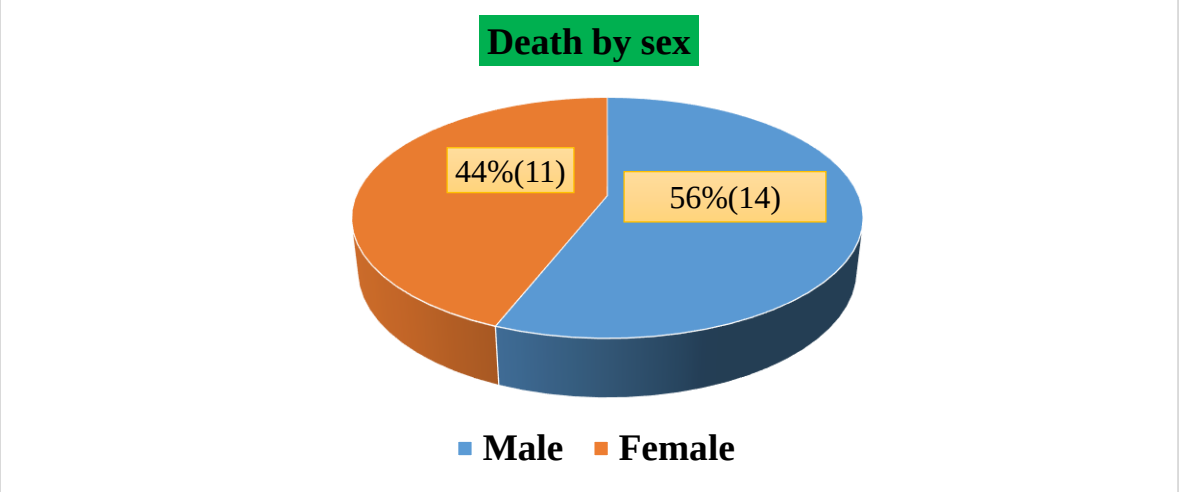

Figure 28: Death by sex at Konta Special District, SNNPR 2019

There was the difficulty of extracting dead bodies from the flooded and landslide for four days with human power and machines ("Excavator" and "Dozer" machines) (Figure-29). So, within four days the 22 dead bodies have been found and the funeral held.

Figure 29: Searching the dead bodies of flood and landslide affected persons in Amaya 03 Konta Special District, 2019

Flooding in this District caused 481 households with 770 people to be displaced from their original place and damage of 115 houses with their properties, 31 cattle, 62 goat and sheep, six horses, 60 hens and 252 hectares of farm totally with the approximation of 27,000,000 economic loss (Figure-30).

Figure 30: Homes destroyed by flooding in Amaya o1 village Konta Special District, SNNPR 2019

Post-disaster need assessment was done by the District Health Office, but not well organized and given for the concerned bodies. As need assessment was done on few households showed, many problems are encountering the displaced population due to flooding and landslide at their temporal place. From those problems, the absence of latrine and lack of safe water is the most important at the place. Also, there is no food support by the government or NGOs, which can lead to acute malnutrition problem. Their placement (shelter) was not adequate for temporal life with their family now they are in the community and others are in teachers' home (Figure-31).

The displaced population are predisposed for overcrowding, poor access to safe water, inadequate sanitation facilities (mainly latrine facilities), poor hygiene, inadequate and unsafe food that are common risk factors for communicable and non-communicable diseases. The usual water sources can become unsafe for drinking for several reasons like the invasion of floodwaters, faecal contamination caused by the overflow of latrines and inadequate sanitation, contamination by dead animals, and upstream contamination if water sources are interconnected. Malaria outbreak is one of the emergency conditions following the landslide and flood as many mosquito breeding sites could be created.

Figure 31: Temporal residencies of displaced population in Amaya 01 village Konta Special District, SNNPR 2019

Immediate Suspected Public Health Risks

The main suspected public health threats in those landslide and flooding hazards are related to communicable diseases and non-communicable diseases listed below. These are interruption of safe water and sanitation supplies, population displacement with overcrowding, vector breeding area, poor access to quality health services, malnutrition and related diseases, mental health disorders and psychosocial problems and reproductive health.

Interruption of Safe Water and Sanitation Supplies

The populations displaced by landslide and flooding are at immediate and high risk of outbreaks of waterborne and foodborne diseases, such as Cholera.

Population Displacement with Overcrowding

Populations in the affected areas have been displaced into teachers' home under construction and host communities that are immediate and high risk for transmission of measles, meningitis, scabies and increased incidence of acute respiratory infections (ARI), especially pneumonia in children under 5 years.

Vector Breeding

Flooding can result in the proliferation of vector breeding sites, increasing the medium-term (weeks to months) risk of malaria.

Poor Access to Quality Health Services

These are immediate concerns, as the health infrastructure would have been overwhelmed.

Malnutrition and Related Diseases

If the situation is prolonged and there is a lack of access to appropriate and adequate food, including complimentary foods, risk of malnutrition could increase for vulnerable groups, such as children, pregnant and lactating women and older persons. The risk is also likely to increase if there is a lack of inadequate support for, mothers or caretakers to exclusively breastfeed for six months and to continue breastfeeding up to two years, with appropriate and safe complementary feeding.

Mental Health Disorders and Psychosocial Problems

Many people in the affected areas are likely to be burdened by a wide range of symptoms of distress caused by continuing danger, loss, trauma, and changed or uncertain social conditions. Health services need to differentiate between normal psychological distress and moderate or severe mental disorders. Normal psychological distress may be reduced through psychological first aid and other non-clinical psychosocial interventions. However, moderate or severe mental disorders require clinical treatment in addition to psychosocial support. Continued access to care should be assured for people with severe mental disorders.

Reproductive Health

During a crisis, some aspects of maternal and newborn health must be addressed at the initial phase to reduce mortality and morbidity among pregnant women and newborn infants. Issues of concern include complications related to pregnancy, delivery and postpartum, other conditions, which can complicate pregnancy and childbirth, such as malaria and anaemia, as well as health problems in the newborn. Besides, pregnant women in the affected population are delivering in unsafe environments without skilled attendants, with inadequate referral systems and poor access to emergency obstetric care.

7.5. Conclusion

Konta Special District is affected by landslide disaster effect resulting in the death of families at one night. Mothers and Children were affected by this disaster situation. Many households were also displaced following this situation. This community is at risk for communicable diseases since they are

overcrowded, mosquito breeding sites, inadequate water supply, poor hygiene and sanitation and poor access to quality health service. There is inadequate food that is the risk of malnutrition, which is non-communicable.

7.6. Recommendations and Priority for Interventions

Recommendations and Priority Interventions for Health Sectors

- Multi-sectorial assessments to identify needs, gaps and priorities
- Restore access to basic and secondary health care services, including the provision of temporary mobile health services with relevant medicines and supplies to increase access to care
- Ensure appropriate triage and referral systems for emergency medical, surgical and obstetric care
- Provide adequate sanitation and hygiene facilities
- Prevent disease outbreaks and ensure capacity for early detection and rapid response to public health emergencies by strengthening surveillance and ensuring outbreak preparedness and prepositioning
- Support adequate maternal and newborn health services, ensuring privacy and cultural sensitivity, with registration in camps, early detection of and referral for complications of pregnancy and childbirth, safe delivery, and provision of relevant commodities
- Support appropriate infant and young child feeding, supplementation for pregnant and lactating mothers, and management of malnutrition, including building health worker capacity and supporting referral and hospital care for the management of severe malnutrition
- Intensify community social mobilization, including health risk communication to promote safe and adequate water supply, sanitation and hygiene practices
- Assess the early recovery needs of the affected population and prioritize recovery interventions

Recommendations and Priority Intervention for Disaster Risk Management and Food Security Coordination Office and other Relevant Agencies

- Multi-sectorial assessments to identify needs, gaps and priorities
- Ensure adequately sized and ventilated shelter
- Provide adequate and safe water supply specific to water and energy agency
- Provide blankets and non-food items(NFIs) in schools and host communities
- Provide safe food, including complimentary food for children less than two years of age
- Evacuation of communities from risk area with concerned bodies

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Annex-5- Post Disaster need assessment checklist

Name of respondent:_____ Pre-disaster address: _____

Post-disaster address:_____

I. Disaster
A. Type of Disaster: (Circle one) Cyclone Earthquake Flood Landslide Drought Tsunami Volcanic eruption Chemical explosion or spill Other (specify)
When did the disaster event occur? _____ _
Briefly describe the disaster (attach additional sheets if necessary _____
Precise geographic areas and locations affected (districts, states, towns?) _____ _____

II. Disaster Impacts/Effects
How many people are affected and what percentage of the overall population is this number? _____ _____
How many deaths have been attributed to this disaster? If possible, specify the gender and age composition of those affected. _____
How many injuries have been attributed to this disaster? If possible, specify the gender and age composition of those affected, and the cause of their injuries _____
How many people are displaced or evacuated? Also identify where they have gone and if possible, specify the gender, age and family composition of those affected. _____
How many families are affected? If possible, specify the gender and age composition of those affected. _____
How many households or dwellings have been completely destroyed? _____
How many households or dwellings have been partially damaged but not completely destroyed? _____

What is the physical and/or financial damage to other property, buildings and infrastructure in the affected area? _____
What is the physical and/or financial damage to crops and livestock? _____
What are the expected financial damages and costs to businesses in the affected area? _____
III. Local Financial, Material and Human Resources
What resources and capacities do the local population have for responding to this disaster, and how might these resources be used?

Local capacity or resource	Suggestions for use

What transport and storage facilities (commercial, government & NGO) are available locally for immediate use? _____
What is the availability, location and condition of roads, airports, ports and railways? _____
What is the capacity of the local and national government for dealing with this disaster? _____
IV. Immediate Needs
Provide the most complete and up-to-date answers as you can to these questions:
Has a detailed needs assessment been carried out? _____
Who carried out the needs assessment? _____
What is needed immediately and who will supply it? _____

V. Questions for a Survey of Family Needs at Konta special District

1. Family composition (indicate number)
   a. Head of household ___ b. Spouse_____
   c. Number of teenagers (ages 13-18) living at home _____
   d. Number of children (ages 1-12) living at home _____
   e. Others living at pre-disaster address
   f. Total people living at pre-disaster address
2. Casualties (write in number) a. Number with minor injuries (first aid required?)
   b. Number with broken bones or seen by doctor (non hospitalized) _____
   c. Number hospitalized _____d. Number killed _____
3. Have all survivors been located? Yes No
4. If no, how many are missing? _____
5. Prior to the disaster, where did households obtain drinking water (circle all that apply)?

   A. Water line to house B. Well on property C. Public water faucets D. Public well E. River or stream F. Lake or reservoir G. Other_____
6. Where do you get your water now?

A. Same place as noted in question 5 _____
B. Water tank truck provided by _____
C. Temporary water tank serviced by _____ D. Other_____

7. Does this water appear to be dirty? Yes No
8. Is your normal water supply working now?

A. Yes, full-time B. Intermittently C. No, not at all

9. If paying for emergency water supply, how much are you paying and to whom?

A. Amount_____ per___litre B. Paid to_____

10. since the disaster, has anyone in the family had

A. Severe diarrhoea? Yes No B. Vomiting? Yes No

11. Was the family able to recover food from their house? Yes No
12. If yes, how long will it last?

A. One to two days B. Three to seven days C. more than one week

13. Can you purchase adequate food from local markets? Yes No
14. If no, how much food/ration do you estimate that you will need? A. 1week B. 2week C. >2-week
15. Was any member of the family receiving food from any of the following before the disaster?

A. Government B. Church/Church C. Red Cross/Red Crescent National Society D. Other? ____

16. Remembering that many people need help, does the family require any of the following?

Type of goods Quantity

a. Blankets_____ b. Bedding_____ c. Plastic Tarp_____ d.Flashlights/lanterns_____

e. Storage boxes _____f.Clothing for adults___ g.Clothing for children___ h.others ___

Fuel

17. What type of cooking and heating fuel did you use before the disaster (circle all that apply)?

A. Gas supplied by gas line B. Bottled gas C. Kerosene D. Firewood E. Other__

18. If (a) or (b), is any gas leaking now? Yes No
19. If (a), has gas service been restored to your line? Yes No
20. What type of sanitary facilities did you have before the disaster (circle all that apply)?

A. Flush toilet in dwelling B. Communal flush toilet in building C. Access to public toilets D.Pit latrine (earthen) E.Other ____

21. If (a) or (b), is the toilet working now? Yes No
22. Will the family require assistance for any of the following (circle all that apply)

a. Temporary shelter b. Building materials/tools for shelter

c. Building materials/tools for housing repair

Chapter Eight- Protocol/Proposal for Epidemiologic Research Project

8.1. Study of the Magnitude of Hypertension and its Associated Factors among Adults in Burayu Town Oromia Regional State of Ethiopia, 2020

Summary

Background- Blood pressure (BP) is a force of blood pushing against walls of the arteries that carry blood from the heart to other parts of the body. However, high blood pressure is also called hypertension. It is defined as a systolic blood pressure >140 mmHg and/or diastolic blood pressure >90 mmHg. Ischemic heart disease and stroke are the world's biggest killers, accounting for a combined 15.2 million deaths in 2016. Hypertension is responsible for at least 45% of deaths due to heart disease and 51% of deaths due to stroke. Globally, in 2015, 1.13 billion people worldwide had hypertension, two-third of them were living in low and middle-income countries. In 2016, sub-Saharan Africa had the highest burden of raised blood pressure compared with countries with the highest income. Ethiopia is the second-most populous country in Africa, the estimate from the meta-analysis showed that the overall prevalence of hypertension is 19.6% and 23.7% in rural and urban area respectively.

Objectives- To assess the prevalence of Hypertension among adults and its associated factors in Burayu town, Ethiopia 2020.

Methods-Community based cross-sectional study will be conducted in Burayu Town in 2020. For sampling the samples, multi-stage sampling method will be used. The data collected will be analyzed by using Epi Info for data entry and Micro-soft Excel. Data will be collected by interviewing the clients using a structured and semi-structured questionnaire. Blood Pressure will be measured using standard blood pressure measuring tool with WHO steps of measuring blood pressure. The expected outcome of the study is to identify the representative magnitude of hypertension in the Town.

Budget-To complete the research at least 37,202Ethiopian Birr

Keywords- Hypertension, Non-communicable diseases, Smoking, Alcohol consumption, Physical exercise, Family history

8.1. Introduction

8.1.1. Background

Blood pressure (BP) is the force of blood pushing against walls of arteries that carry blood from the heart to other parts of the body. It normally rises and falls throughout the day, but it can damage the heart and causes health problems if it stays high for a long time [1]. But, high blood pressure is also called hypertension [1]. Hypertension is a condition in which blood pressure in arteries or veins is abnormally high. It is a state of elevated systemic blood pressure, which is commonly asymptomatic [2]. Hypertension is defined as systolic blood pressure equal to or above 140 mmHg and/or diastolic blood pressure equal to or above 90 mmHg [2].

Globally, non-communicable diseases (NCDs) cause 71% of deaths, ranging from 37% in low-income countries to 88% in high-income countries [3]. All, but one of the 10 leading causes of death in high-income countries are NCDs [3]. In terms of an absolute number of deaths, however, 78% of global NCD deaths occurred in low- and middle-income countries [3]. Ischemic heart disease and stroke are the world's biggest killers, accounting for a combined 15.2 million deaths in 2016 [3]. These diseases have remained the leading causes of death globally in the last 15 years [3]. Hypertension is responsible for at least 45% of deaths, due to heart disease (total ischemic heart disease mortality) and 51% of deaths due to stroke [4].

Globally, cardiovascular diseases account for approximately 17 million deaths a year, nearly one-third of the total [4]. Of those, complications of hypertension account for 9.4 million deaths worldwide every year [4]. Globally, 59•9% of deaths and 45•2% of DALYs could be attributed to the risk factors assessed in GBD 2016 [4].

Hypertension is associated with overweight/obesity and more common in women, those in the lowest wealth quintile and heavy alcohol consumers [5]. Smokers and alcohol consumers, low physical activity had a high risk of having hypertension compared to non-smokers, non-consumers of alcohol and no low physical activity [6]. For deaths, non-communicable diseases (NCDs) show the largest proportion attributable to measured risk factors, at 64.4%, with communicable, maternal, neonatal, and nutritional (CMNN) causes at 57.9%, and injuries at 25.8% [7]. Although hypertension is a preventable and modifiable risk factor of CVD, the prevention and control of hypertension have not yet received due attention in many developing countries [4].

Hypertension awareness, treatment, and control are recommended to assess the impact of efforts to reduce uncontrolled BP in populations [8]. Hypertension awareness assesses the effectiveness of health care organizations and community programs to diagnose hypertension [8]. Hypertension treatment and control rates assess primarily the effectiveness of the health care system to provide antihypertensive drugs to people with hypertension and to control hypertension, and the effectiveness of population health interventions (example- dietary salt reduction policies) [8].

Ethiopia is one of the lower-income countries that has been affected by double burden diseases. A cross-sectional study in Ethiopia reported that hypertension contributes to cardiac cases [9]. Different studies in Ethiopia revealed that increased risk of hypertension is associated with age [10], having a family history of hypertension [9], lack of aerobic physical activities [11], obesity [10], ever smoking [12] and being unemployed [10].

So, this study plans to identify the magnitude and associated risk factors of hypertension in Burayu Town.

8.1.2. Statement of the problem

Globally in 2015, 1.13 billion people worldwide had hypertension, most (two third) of them were living in low and middle income countries [13]. In 2016, it contributed to about 781.8 million (737·1 to 830·1 million) disability-adjusted life years (DALYS) [7]. The mean blood pressure is increasing in low- and middle-income countries, while declining or remaining unchanged in developed countries during period of 1975 to 2015[13]. In 2016, Sub-Saharan Africa had the highest burden of raised blood pressure, compared to countries with the highest income [7]. During the past four decades, the highest worldwide blood pressure levels have shifted from high-income countries to low-income countries in south Asia and Sub-Saharan Africa due to opposite trends, while blood pressure has been persistently high in central and eastern Europe [7].

Ethiopia is the second-most populous country in Africa, the estimate from the meta-analysis showed that the overall prevalence of hypertension was 19.6% and 23.7% in rural and urban area respectively [14]. However, community-based studies revealed that moderately high prevalence of hypertension was observed among adults and risk factors, such as socio-demography, economy, biological, and behavioural characteristics were found to be significantly associated with hypertension [10].

Primary prevention is a key activity to control the burden of non-communicable diseases, including hypertension. Identification of major risk factors is also important to determine public health priorities

[4]. Therefore, knowledge about risk factors should be applied to understand the relative effects of socio-demographic, lifestyle, and physiological risk factors comprehensively to integrate intervention efforts across these factors functioning at a different level of causation [4].

These evidences show that the prevalence of hypertension and determinants vary from study to study. So, this study aims to assess the prevalence of hypertension and identify its risk factors at the town level by using the collected data from villages.

8.1.3. Significance of the study

Although many studies were conducted in our country on Hypertension, the case remains a major public health issue. Studies in different towns and rural areas revealed different magnitudes of hypertension and associated risk factors. Therefore, this study will assess the magnitude and relative effects of socioeconomic, lifestyle, and physiological risk factors of elevated blood pressure in the designated study area.

8.2. Literature review

Hypertension is a major cardiovascular risk factor that is linked to fatal complications and is an overwhelming global challenge. High blood pressure is defined as systolic blood pressure at or above 140 mmHg and/or diastolic blood pressure at or above 90 mmHg [2]. High blood pressure causes the heart to have to work harder to push blood throughout the body [2].

8.2.1. Prevalence of hypertension

In Africa, hypertension contributes to the burden of heart disease, stroke, kidney failure and premature mortality and disability [2]. From cardiovascular disorders, complications of hypertension account for 9.4 million deaths worldwide every year [4]. Hypertension is responsible for at least 45% of deaths due to heart disease and 51% of deaths due to stroke [4]. It is mostly detected incidentally when they are admitted to hospitals [4].

Also as the study conducted in Dire Dawa City in 2017, the prevalence of hypertension was 24.43 [10]. More than half (51.64%) of adults with hypertension were not aware of their status of hypertension [10]. The study from Hossana Town revealed that the overall prevalence of hypertension was 30% among the study participants [11]. Out of those hypertensive cases, only 24.6% knew their hypertensive status [11]. High prevalence and increased risks for hypertension were noted among the study participants in the study area.

According to the study conducted in Nekemte Town in 2015, the overall prevalence of hypertension was 34.9% among the adult population [15]. Of them, only 52.7% know their status, and 22.4% were on antihypertensive medication Also, the study conducted in Bedele Town in 2011 showed that the prevalence of hypertension was 16.9% [16]. It was found to be 24.8% among women and 13.1% among men with a significant difference [16].

8.2.2. Risk factors associated with Hypertension

A study conducted in Dire Dawa showed, from 872 participants responding, 74 (8.49%) were lifetime smokers [10]. Two hundred four (23.39%) consumed alcohol over the last 30 days preceding the time of data collection [10]. Three hundred twenty-five (37.27%) participants ate fruits two or fewer days a week [10]. Two hundred seventy-eight (31.88%) participants (38.3%) ate vegetables for two or fewer days during regular weekdays. Three hundred ninety (44.72%) adults did not have adequate physical activities [10]. The study in Hossana Town showed that the experiences of aerobic physical activities were reported only in 22.9% of the study participants [11].

Slightly, higher prevalence of hypertension was observed in male, 73(25.53%) and it appeared to increases with age in both sex [10]. The prevalence was lowest, (7.33%) among adults 25-29years-old and the highest, (40.53%) was observed among those 55-64years-old. The analysis showed that the prevalence of hypertension was increased with age in both males and females [10]. The odds of being hypertensive is significantly higher among males when compared to females and married participants as compared to their unmarried counterparts [11].

The prevalence of hypertension was higher among lifetime smokers 74 (32.40%), current alcohol consumers 61 (29.90%), physically inactive 104 (26.67%), those having abdominal obesity 127 (31.44%), and diabetic 98 (33.67%), and the prevalence was the highest in adults with BMI≥25 kg/m2 107(31.94%) [10]. The prevalence of hypertension was higher among the older aged, Obese and over-weighted, Khat chewers in the past year and with higher formal education (college and above) than their respective counterparts [15].

As the study conducted in Chiro Town on old age group showed that, the probability of hypertension increased with advancing age [9]. The overall prevalence of old age hypertension was 41.9%[9]. As this study, low intake of fruits, overweight/obese and family history of hypertension were significantly associated risk factors of hypertension [9]. Also as the study in Nekemte showed age, BMI, educational status and Khat chewing were associated with the prevalence of hypertension [15].

8.3. Objective of the study

8.3.1. General objective

To assess the prevalence of Hypertension among adults and its associated factors in Burayu town, Oromia Regional State of Ethiopia, 2020.

8.3.2. Specific objectives

- To measure prevalence of hypertension
- To identify the major associated factors for hypertension
- To assess the participants' dietary practices

8.4. Methods and materials

8.4.1. Study design and settings

The community-based cross-sectional study design will be conducted in Burayu Town. Burayu Town is found in Finfine Zuria Zone of Oromia Regional State in Ethiopia at the western direction from Addis Ababa. It is bordered by Addis Ababa City in eastern, by Wolmera District in western and northern and by Sebata Town in southern direction. Has three Health centers and one Health Post. It has six villages with 103130 total population and 21485 households (HHS). This study will be conducted from March to May 2020.

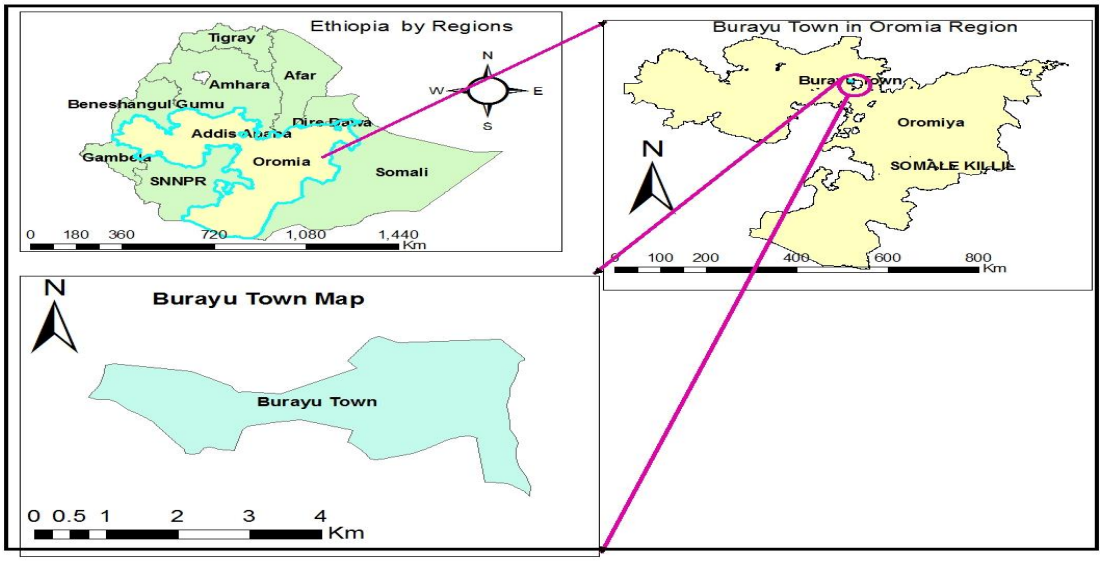

Figure 32:-Map of Burayu Town in Oromia Regional State of Ethiopia, 2020

8.4.2. Sample size determination and sampling procedure

The desired sample size for the study will be estimated by taking prevalence of hypertension (24.43%) from previous study [10], 95% confidence level, 5% margin of error and design effect of 1.5. Consequently, the final sample size will be determined to be 420 participants. The sample size is calculated using the formula;

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

$$n = (1.96)^2\ 0.24(1 - 0.24) / (0.05)^2$$

n= 3.8416*0.1824/0.0025

n= 280

n= 280*1.5= **420**

For the study sampling, multistage sampling technique will be used. The primary sampling units, three villages will be randomly selected from the six villages and then, the secondary sampling units, households will be selected after the sampling frames obtained from village administrations. Sample size will be proportionally distributed to each of the selected village based on the number of households in the villages. Finally, a systematic random sampling technique will be employed to select households to be visited for data collection. From the selected households, eligible adults aged between 25 and 64 will be identified, and if there are more than one in a household, then one will be randomly selected.

8.4.3. Data collection

Data will be collected by interviewing the clients using a structured and semi-structured questionnaire. Measuring BP will be conducted using standard blood pressure measuring tool with WHO steps of measuring blood pressure.

8.4.4. Data Quality Assurance

Before actual data collection started, a pre-test will be conducted in villages those not included in the study to check for validity of the instruments and then, necessary modifications will be made.

8.4.5. Data Analysis

The data collected will be entered and analyzed by using Epi-Info version 7.2 and Micro-soft Excel.

8.4.6. Inclusion and exclusion criteria

Individuals below the age of 25 years, those above the age of 64 years, pregnant mothers and disabled people will be excluded from the study. The primary reason for excluding pregnant women and individuals above the age of 64 is that they are mostly at risk for hypertension and their inclusion may preclude generalization. Contrarily, young people below the age of 25 years are at low risk for hypertension and disabled people are not eligible for exercise-related inquiries relevant for this study, which might affect the true finding in the population.

8.4.7. Dissemination of the study

After the study report finalized hard copy of this study report will be submitted to Addis Ababa University Health Sciences College, School of Public Health, Department of Field Epidemiology and Burayu Town Health Office.

8.4.8. Ethical Consideration

Ethical clearance will be obtained from the Institutional Health Research Ethics Review Committee of the Addis Ababa University, College of Health Sciences. Additionally, a permission letter will be obtained from Burayu Town Administration. Before each interview, informed verbal consent will be obtained from respondents. Confidentiality of any personal related information will be maintained by keeping the anonymity of the individual participants and used confidentially only for study purpose. Participants with unapparent disease conditions like hypertension and diabetes will be referred to nearby health facilities for a thorough investigation and prompt management.

8.4.9. Study Variables

Dependent variable-Prevalence of Hypertension

Independent variables-Age, Sex, Educational status, marital status, religion, smoking status, alcohol consumption, nutritional status, family history, physical status, Obesity status, diabetes status

8.4.10. Operational Definition

Abdominal obesity-is defined as waist-to-hip ratio (WHR) greater than 0.85m for women and above 1m for men.

Alcohol use -Refers to the consumption of local or manufactured alcohol beverages on a daily basis or occasionally.

Fruit and vegetable intake- will be considered insufficient if consumption was less than five servings per day. **Servings** were measured by showing pictorial show cards. For raw green leafy vegetables, 1 serving = one cup; for cooked or chopped vegetables, 1 serving = ½ cup; for fruit (apple, banana, orange etc…), 1 serving = 1 medium size piece; for chopped, cooked and canned fruit, 1 serving = ½ cup; and for juice from fruit, 1 serving = ½ cup.

Hypertension- is defined as having Systolic BP ≥ 140 mmHg or Diastolic BP ≥ 90 mmHg or reported use of regular anti-hypertensive medications prescribed by professionals for raised BP [2].

Intensive Khat chewers- Individuals who reported Khat use for 5 days or more in a week, and this will be considered clinically significant.

Obese Patients- will be declared as obese if their BMI being above 30 kg/m2.

Overweight- is Body mass index (BMI) ≥ 25, but less than 30 kg/m2.

Physical activity-1.Vigorous-intensity activities- are activities that require hard physical effort and cause large increases in breathing or heart rate,

2. Moderate-intensity activities- are activities that require moderate physical effort and cause small increases in breathing or heart rate.

Smoking history- is based on patients' history of using manufactured or locally made tobacco.

8.4.11. Expected outcome

Although the aim of this study was indicated above at the end of this study, the expected outcome is to identify the representative prevalence/magnitude of hypertension in Burayu Town. This study will be accomplished settled expected outcome.

8.5. Work Plan

Table 27:-Work schedule for the accomplishment of research in Burayu Town, Oromia Regional State, Ethiopia, 2020

Activities	Responsible bodies	Time frame						
		Dec	Jan	Feb	Mar	Apr	May	June
Topic selection, draft proposal writing and consultation of advisor	Principal investigator							
Finalization of proposal and submission	Principal Investigator and advisor							
Submit proposal to the school for approval	Principal Investigator and advisor							
Data collectors training and data collection	Principal Investigator and data collectors							
Data clean up, data entry and analysis	Principal Investigator							
Draft result writing and advisor consultation	Principal investigator and advisor							
Finalizing report writing	Principal investigator							
Final report submission	Principal investigator							
Defense	Principal investigator							

8.6. Budget for the study

Table 28:-Budget break down

No.	Descriptions	Unit	Qty	Unit cost	Total cost
	I. Production of study tools and stationary				
1	Production of the study tools (1 page x 0.50 Eth Birr x 1320)	Pages	1320	1	1320
2	Stationeries (5 x 60)	Assorted	300	5	1500
	Subtotal				**2820**
	II. Training				
4	Field supervisors (4 days)	Days	16	300	4800
5	Data collectors training (3 days training)	Days	30	300	3000
6	House rent for training of data collectors	Days	3	1000	1000
	Subtotal				**7000**
	III. Per diem (Field work)				
7	Project coordinator	days	15	300	4500
8	Field supervisor	days	15	300	4500
9	Data collectors	days	100	150	15000
	Subtotal				**24,000**
	Total				33,820
	Contingency (10%)				3382
	Grand total		**Eth Birr**		**37,202**

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Informed consent for participants

Assessment of prevalence of hypertension and associated factors among adults in Burayu Town in Oromia Region, Ethiopia 2020

Principal Investigators**:** Ababu Fayisa,

Interviewer:-_____

Organization: Addis Ababa University, Health Science College

You are invited to take part in this study at your Town/village. Before you decide, it is important for you to understand why this study is being done and what it will involve. The objective of this study is to assess the prevalence of Hypertension among adults and its associated factors in Burayu Town, Oromia Regional State. If you choose to respond to us, the interview will take a maximum of around 50 minutes. I will ask you questions as necessary related to your current understanding and measure status of your health status with hypertension.

You are unlikely to experience any risks from participating in this study. This is not a test of your knowledge or personnel status. Your name or other facts on you will not appear on any presentations of the findings and it will be used for this study only. There are no direct benefits or compensation for participating in this study, except knowing some of your body measurements. If there is finding you will get medical advice for treatment and control. However, the answers you provide may help to improve the prevention and control of hypertension.

_____ _____

Sign and name of participant Sign and name of person taking the consent

Annex-6-Questionnaire for Assessment of Hypertension prevalence and associated factors among adults in Burayu Town in Oromia, Ethiopia 2020

Participant Identification Number- ⌊__⌋⌊__⌋⌊__⌋ ⌊__⌋⌊__⌋⌊__⌋ ⌊__⌋⌊__⌋⌊__⌋

Location and Date		Response	Code
1	Village ID	⌊__⌋⌊__⌋⌊__⌋	I1
2	Village name		I2
3	Interviewer ID	⌊__⌋⌊__⌋⌊__⌋	I3
4	Date of completion of the instrument (G.C)	⌊__⌋⌊__⌋ ⌊__⌋⌊__⌋ ⌊__⌋⌊__⌋⌊__⌋⌊__⌋ dd mm year	I4

Consent, interview language and name		Response	Code
5	Consent has been read and obtained	Yes 1 No 2 If "No", end	I5
6	Interview language (insert language)		I6
7	Time of interview (24 hour clock)	⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ Hrs mins	I7
8	Family surname		I8
9	First name		I9
Additional information that may be helpful			
10	Contact phone number where possible		I10

NB:-Record and file identification information (I5 to I10) separately from the completed questionnaire.

Step 1 Demographic Information

CORE: Demographic Information			
Question		**Response**	**Code**
11	Sex (*Record Male / Female as observed)*	Male 1 Female 2	C1
12	When is your date of birth? *Don't Know 77 77 7777*	⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋⌊_⌋⌊_⌋ dd mm year	C2
13	How old are you?	Years ⌊_⌋⌊_⌋	C3
14	In total, how many years have you spent at school or in full-time study (excluding pre-school)?	Years ⌊_⌋⌊_⌋	C4
EXPANDED: Demographic Information			
15	What is the **highest level of education** you have completed?	No formal schooling 1 Less than primary school 2 Primary school completed 3 Secondary school completed 4 High school completed 5 College/University completed 6 Post graduate degree 7 Refused 88	C5
16	What is your *[insert relevant ethnic group / racial group / cultural subgroup / others]* **background**?	Oromo 1 Amhara 2 Others 3 Refused 88	C6
17	What is your **marital status**?	Never married 1 Currently married 2 Separated 3 Divorced 4 Widowed 5 Cohabitating 6 Refused 88	C7
		Government employee 1	

18	Which of the following best describes your **main work** status over the past 12 months?	Non-government employee 2 Self-employed 3 Merchant 4 Student 5 Homemaker 6 Retired 7 Unemployed (able to work) 8 Unemployed (unable to work) 9 Refused 88	C8
19	How many people older than 18 years, including yourself, live in your household?	Number of people ⌊__⌋	C9
20	Taking **the past year**, can you tell me what the average earnings of the household have been? *(RECORD ONLY ONE, NOT ALL 3)*	Per week ⌊__⌋ *Go to T1*	C10a
		OR per month ⌊__⌋ *Go to T1*	C10b
		OR per year ⌊__⌋ *Go to T1*	C10c
		Refused 88	C10d
21	If you don't know the amount (ETB), can you give an **estimate** of the annual household income if I read some options to you? Is it *(READ OPTIONS)*	≤ 12,000 1 1 12,001-27,000 2 27,001-39,600 3 ≥39,6001 4 Don't Know 77 Refused 88	C11

Step 1-Behavioral Measurements

CORE A: Tobacco Use

Now I am going to ask you some questions about various health behaviors. Those include things like smoking, drinking alcohol, eating fruits and vegetables and physical activity. Let's start with tobacco.			
Question		Response	Code
22	Do you currently smoke any tobacco products, such as cigarettes, cigars or pipes? (USE SHOWCARD)	Yes 1 No 2 If No, go to T6	T1
23	Do you currently smoke tobacco products daily?	Yes 1	T2

		No 2 If No, go to T6	
24	How old were you when you first started smoking daily?	Age (years) ⌊__⌋⌊__⌋ If Known, go to T5a Don't know 77	T3
25	Do you remember how long ago it was? (RECORD ONLY 1, NOT ALL 3) Don't know 77	In Years ⌊__⌋⌊__⌋ If Known, go to T5a	T4a
		OR in Months ⌊__⌋⌊__⌋ If Known, go to T5a	T4b
		OR in Weeks ⌊__⌋⌊__⌋	T4c
26	On average, how many of the following do you smoke each day? (RECORD FOR EACH TYPE, USE SHOWCARD) Don't Know 77	Manufactured cigarettes ⌊__⌋⌊__⌋	T5a
		Other If Other, go to T5 Other, ⌊__⌋⌊__⌋ else go to T9	T5e
		Other (please specify): ⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋⌊_⌋ Go to T9	T5other

EXPANDED: Tobacco Use

Question		Response	Code
27	In the past, did you ever smoke daily?	Yes 1 No 2 If No, go to T9	T6
28	How old were you when you stopped smoking daily?	Age (years) ⌊__⌋⌊__⌋ If Known, go to T9 Don't Know 77	T7
29	How long ago did you stop smoking daily? (RECORD ONLY 1, NOT ALL 3) Don't Know 77	Years ago ⌊__⌋⌊__⌋ If Known, go to T9	T8a
		OR Months ago ⌊__⌋⌊__⌋ If Known, go to T9	T8b
		OR Weeks ago ⌊__⌋⌊__⌋	T8c
30	Do you currently use any smokeless tobacco such as [snuff, chewing tobacco, betel]? (USE SHOWCARD)	Yes 1 No 2 If No, go to T12	T9
31	Do you currently use smokeless tobacco products daily?	Yes 1 No 2 If No, go to T12	T10
32		Snuff, by mouth ⌊__⌋__⌋	T11a

	On average, how many times a day do you use …. (RECORD FOR EACH TYPE, USE SHOWCARD) Don't Know 77	Snuff, by nose ⌊__⌊__ ⌊__⌋	T11b
		Chewing tobacco ⌊__⌊__⌊__⌋	T11c
		Betel, quid ⌊__⌊__⌊__⌋	T11d
		Other ⌊__⌊__⌊__⌋ If Other, go to T11other else go to T13	T11e
		Other (specify) ⌊__⌊__⌊__⌊__⌊__⌊__⌊__⌊__⌊__⌋ Go to T13	T11other
33	In the past, did you ever use smokeless tobacco such as [snuff, chewing tobacco, or betel] daily?	Yes 1 No 2	T12
34	During the past 7 days, on how many days did someone in your home/ work place smoke when you were present?	Number of days ⌊__⌊__⌋ Don't know 77	T13

CORE B: -Alcohol Consumption

The next questions ask about the consumption of alcohol			
Question		**Response**	**Code**
35	Have you **ever** consumed an alcoholic drink such as beer, wine, Areke, Tella, or *[add other local examples]*? *(USE SHOWCARD OR SHOW EXAMPLES)*	Yes 1 No 2 *If No, go to D1*	A1a
36	Have you consumed an alcoholic drink within the past 12 months?	Yes 1 No 2 *If No, go to D1*	A1b
37	During the past 12 months, **how frequently** have you had at least one alcoholic drink? *(READ RESPONSES, USE SHOWCARD)*	Daily 1 5-6 days per week 2 1-4 days per week 3 1-3 days per month 4 Less than once a month 5	A2
38	Have you consumed an alcoholic drink within the **past 30 days**?	Yes 1 No 2 *If No, go to D1*	A3
39	During the past 30 days, on how many **occasions** did you have at least one alcoholic drink?	Number ⌊__⌊__⌋ Don't know 77	A4

40	During the past 30 days, when you drank alcohol, **on average**, how many **standard alcoholic drinks** did you have during one drinking occasion? *(USE SHOWCARD)*	Number ⌊_⌋⌊_⌋ Don't know 77	A5
41	During the past 30 days, what was the **largest number** of standard alcoholic drinks you had on a single occasion, counting all types of alcoholic drinks together?	Largest number ⌊_⌋⌊_⌋ Don't Know 77	A6
42	During the past 30 days, how many times did you have for **men**: **five or more** for **women**: **four or more** standard alcoholic drinks in a single drinking occasion?	Number of times ⌊_⌋⌊_⌋ Don't Know 77	A7

EXPANDED: Alcohol Consumption			
43	During the past 30 days, when you consumed an alcoholic drink, how often was it with meals? Please do not count snacks.	Usually with meals 1 Sometimes with meals 2 Rarely with meals 3 Never with meals 4	A8
44	During each of the **past 7 days**, how many standard alcoholic drinks did you have each day? *(USE SHOWCARD)* *Don't Know 77*	Monday ⌊_⌋⌊_⌋	A9a
		Tuesday ⌊_⌋⌊_⌋	A9b
		Wednesday ⌊_⌋⌊_⌋	A9c
		Thursday ⌊_⌋⌊_⌋	A9d
		Friday ⌊_⌋⌊_⌋	A9e
		Saturday ⌊_⌋⌊_⌋	A9f
		Sunday ⌊_⌋⌊_⌋	A9g

CORE C: Diet

The next questions ask about the fruits and vegetables that you usually eat. I have a nutrition card here that shows you some examples of local fruits and vegetables. Each picture represents the size of a serving. As you answer these questions, please think of a typical week in the last year.		
Question	Response	Code

45	In a typical week, on how many days do you eat fruit? (USE SHOWCARD)	Number of days ⌊__⌋__⌋ If Zero Don't Know 77 days, go to D3	D1
46	How many servings of fruits do you eat on one of those days? (USE SHOWCARD)	Number of servings ⌊__⌋__⌋ Don't know 77	D2
47	In a typical week, on how many days do you eat vegetables? (USE SHOW CARD)	Number of days ⌊__⌋__⌋ If Zero Don't Know 77 days, go to D5	D3
48	How many servings of vegetables do you eat on one of those days? (USE SHOWCARD)	Number of servings ⌊__⌋__⌋ Don't know 77	D4

EXPANDED: Diet			
49	What type of oil or fat is most often used for meal preparation in your household? (USE SHOWCARD) (SELECT ONLY ONE)	Vegetable oil 1 Lard or suet 2 Butter or ghee 3 Margarine 4 Other 5 If Other, go to D5 other None in particular 6 None used 7 Don't know 77	D5
		Other ⌊__⌋__⌋__⌋__⌋__⌋__⌋__⌋__⌋	D5 other
50	On average, how many meals per week do you eat that were not prepared at a home? By meal, I mean breakfast, lunch and dinner.	Number Don't know 77 ⌊__⌋__⌋	D6

CORE D: Physical Activity

Next, I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself a physically active person.

Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. *[Insert other examples if needed]*. In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.

	Question	Response	Code
Work			
51	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 4*	P1
52	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days ⌊__⌋	P2
53	How much time do you spend doing vigorous-intensity activities at work on a typical day?	⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ Hours : minutes hrs mins	P3 (a-b)
54	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 *If No, go to P 7*	P4
55	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days ⌊__⌋	P5
Travel to and from places			
	The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship. *[Insert other examples if needed]*		
56	Do you walk or use a bicycle *(pedal cycle)* for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 *If No, go to P 10*	P7
57	In a typical week, on how many days do you walk or bicycle for at least 10	Number of days	P8

	minutes continuously to get to and from places?	⌊__⌋	
58	How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins	P9 (a-b)
Recreational activities			
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure), *[Insert relevant terms]*.			
59	Do you do any vigorous-intensity sports, fitness or recreational *(leisure)* activities that cause large increases in breathing or heart rate like *[running or football]* for at least 10 minutes continuously	Yes 1 No 2 *If No, go to P 13*	P10
60	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational *(leisure)* activities?	Number of days ⌊__⌋	P11
	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ Hours : minutes hrs mins	P12 (a-b)
61	Do you do any moderate-intensity sports, fitness or recreational *(leisure)* activities that cause a small increase in breathing or heart rate such as brisk walking, *[cycling, swimming, and volleyball]* for at least 10 minutes continuously?	Yes 1 No 2 *If No, go to P16*	P13
62	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational *(leisure)* activities?	Number of days ⌊__⌋	P14
63	How much time do you spend doing moderate-intensity sports, fitness or recreational *(leisure)* activities on a typical day?	⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ Hours : minutes hrs mins	P15 (a-b)

EXPANDED: Physical Activity
Sedentary behavior

The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television, but do not include time spent sleeping.			
64	How much time do you usually spend sitting or reclining on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins	P16 (a-b)

CORE E: History of Raised Blood Pressure

Question		Response	Code
65	Have you ever had your blood pressure measured by a doctor or other health workers?	Yes 1 No 2 *If No, go to H6*	H1
66	Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?	Yes 1 No 2 *If No, go to H6*	H2a
67	Have you been told in the past 12 months?	Yes 1 No 2	H2b

EXPANDED: History of Raised Blood Pressure			
68	Are you currently receiving any of the following treatments/advice for high blood pressure prescribed by a doctor or other health worker ?		
	Drugs (medication) that you have taken in the past two weeks	Yes 1 No 2	H3a
	Advice to reduce salt intake	Yes 1 No 2	H3b
	Advice or treatment to lose weight	Yes 1 No 2	H3c
	Advice or treatment to stop smoking	Yes 1 No 2	H3d

	Advice to start or do more exercise	Yes No	1 2	H3e
69	Have you ever seen a traditional healer for raised blood pressure or hypertension?	Yes No	1 2	H4
70	Are you currently taking any herbal or traditional remedy for your raised blood pressure?	Yes No	1 2	H5

Step 2-Physical Measurements

CORE 1: -Height and Weight

Question		Response		Code
71	Interviewer ID		⌊__⌋_⌊__⌋	M1
72	Device IDs for height and weight	Height Weight	⌊__⌋ ⌊__⌋	M2a M2b
73	Height	in Centimeters (cm)	⌊__⌋_⌊__⌋. ⌊__⌋	M3
74	Weight If too large for scale 666.6	in Kilograms (kg)	⌊__⌋__⌊__⌋ . ⌊__⌋	M4
75	For women: Are you pregnant?	Yes No	1 If Yes, go to M 8 2	M5
CORE 2: Waist				
76	Device ID for waist		⌊__⌋_⌊__⌋	M6
77	Waist circumference	in Centimeters (cm)	⌊__⌋__⌊__⌋ . ⌊__⌋	M7
CORE 3: Blood Pressure				
78	Interviewer ID		⌊__⌋_⌊__⌋	M8
79	Device ID for blood pressure		⌊__⌋_⌊__⌋	M9
80	Cuff size used	Small Medium Large	1 2 3	M10
81	Reading 1	Systolic (mmHg) Diastolic (mmHg)	⌊__⌋_⌊__⌋ ⌊__⌋_⌊__⌋	M11a M11b

82	Reading 2	Systolic (mmHg) ⌊__⌋_⌊_⌋	M12a
		Diastolic (mmHg) ⌊__⌋_⌊_⌋	M12b
83	Reading 3	Systolic (mmHg) ⌊__⌋_⌊_⌋	M13a
		Diastolic (mmHg) ⌊__⌋_⌊_⌋	M13b
84	During the past two weeks, have you been treated for raised blood pressure with drugs (medication) prescribed by a doctor or other health worker?	Yes 1 No 2	M14
EXPANDED: Hip Circumference and Heart Rate			
85	Hip circumference	in Centimeters (cm) ⌊__⌋_⌊__⌋ . ⌊_⌋	M15
86	Heart Rate		M16 a
	Reading 1	Beats per minute ⌊__⌋_⌊_⌋	
	Reading 2	Beats per minute ⌊__⌋_⌊_⌋	M16 b
	Reading 3	Beats per minute ⌊__⌋_⌊_⌋	M16 c

Chapter Nine- Other Additional Output Reports

9.1. Bulletin of Weekly Surveillance Report at Southern Nations, Nationalities and People's Regional State Health Bureau, Public Health Emergency Management, 2019

Epidemiologic Week 24, 2019 (10/06/2019-16/06/2019)

Background

Southern Nations Nationalities and Peoples Region is one of the regions among nine regions in Ethiopia. It has of 17 Zones, one City Administration, three special Districts, 210 Districts, 22 town administrations, 3602 rural villages, 324 urban villages, with an area of 118,000 km2(20% of the country). It has more than 56 endogenous nations and nationalities with 20,151,221 total population. At the beginning of statements, write acronyms in full. Mind your usage of capitalizations.

Highlight of the Week 24, 2019

All private and public institutions were included to increase the detection rate of any public health threats. Beyond being a major public health problem, Malaria & Scabies continued to be a problem of social, economical and well-being of the communities in the Region. Even though the magnitude of severe acute malnutrition decreased from the last week, it is consistently becoming a huge problem in specific locations of the Region.

Report completeness

Totally, out of 4, 644 expected government health facilities, 4380 submitted their 24th week PHEM report, despite their completeness and timeliness.

The cumulative report completeness of the Region was 94%. The majority of Zones/sp. Districts report completeness were maintained above targeted, on the contrary of this Konta special District, Segen, Benchi Maji and Gurage Zones were below the targets in that week (24th of 2019).

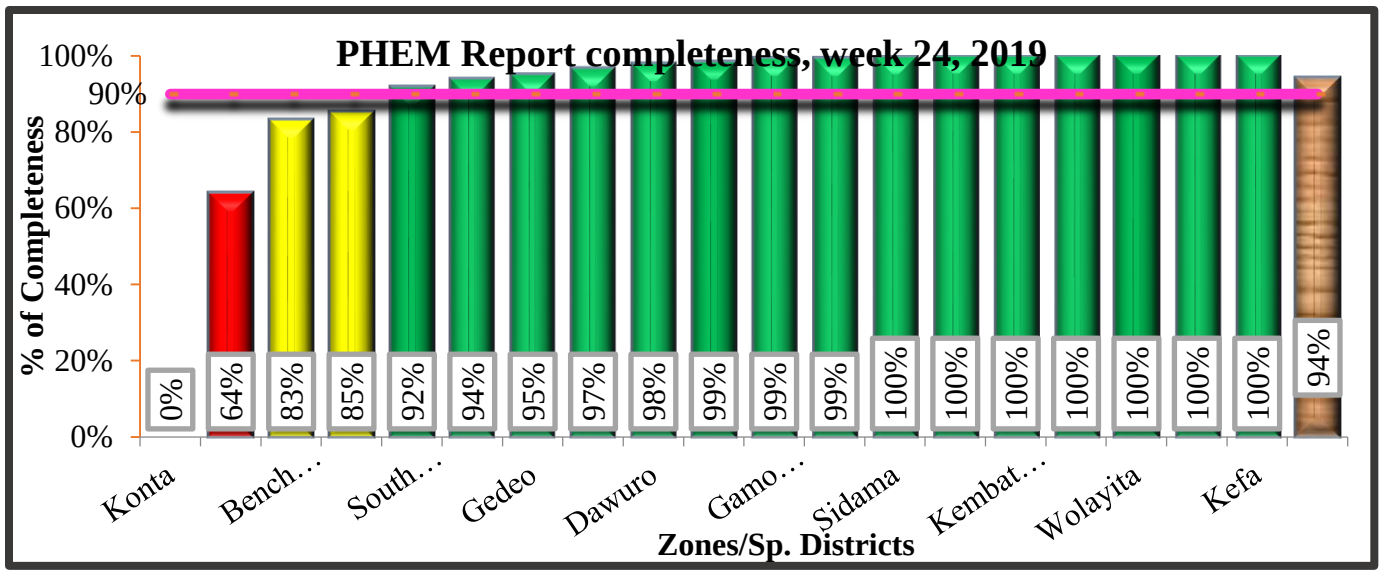

Figure 33:-PHEM report completeness by Zones/Special Districts in SNNPR, Week 24, 2019

Malaria-Among 29,088 suspected malaria cases 5734 (20%) of cases were confirmed. Among those, 3857(67%) were Plasmodium falciparum and 1877(33%) Plasmodium Vivax cases as confirmed using RDT and microscopy. From all confirmed cases, 3857(67%) were Plasmodium falciparum indicating new cases in the Region. As indicated below, many zones/ Districts were in epidemic situations. Over 99% (5778), of malaria cases, were reported from OPD and a few cases from IP, with no death reported during a week.

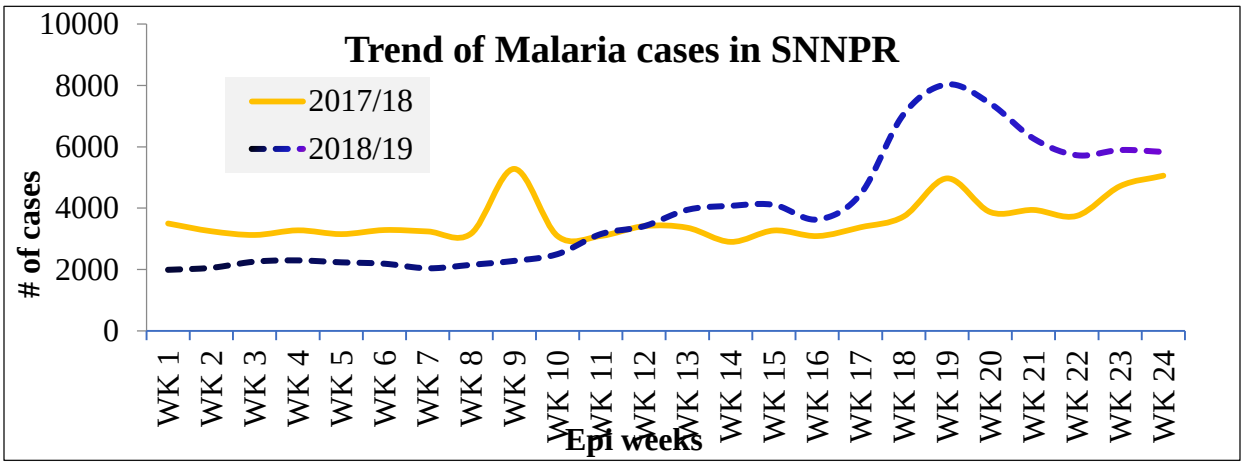

Figure 34:-Trend of Malaria cases over the last 24 weeks in SNNPR, 2019

When we compare malaria trend 2018 Vs 2019 it shows consistently increased ranging from 585 (wk-13) to 773 (wk-24) and with a weekly mean difference of 1701 cases. Among 94,980 malaria cases reported from week 01 to 24, Wolayita 27877(29.30%), Gamo Gofa 22,847(24.01%) & South Omo 10,947(11.50%) ranked 1 to 3. In the current week, the total number of malaria cases reported decreased by 63(5831), as compared to last week (5894) malaria cases.

Malaria attack rate was 29 per 100,000 population as reported in the week. Hawassa City, Basketo Special District, South Omo, Benchi Maji, Segen Zone, Gamo Gofa, and Wolayita Zones were areas of the high number of malaria incidence. Also at District level, Salamago, Bero and Surma Districts had high malaria attack rate (10, 5 and 3 cases per 1000 population respectively).

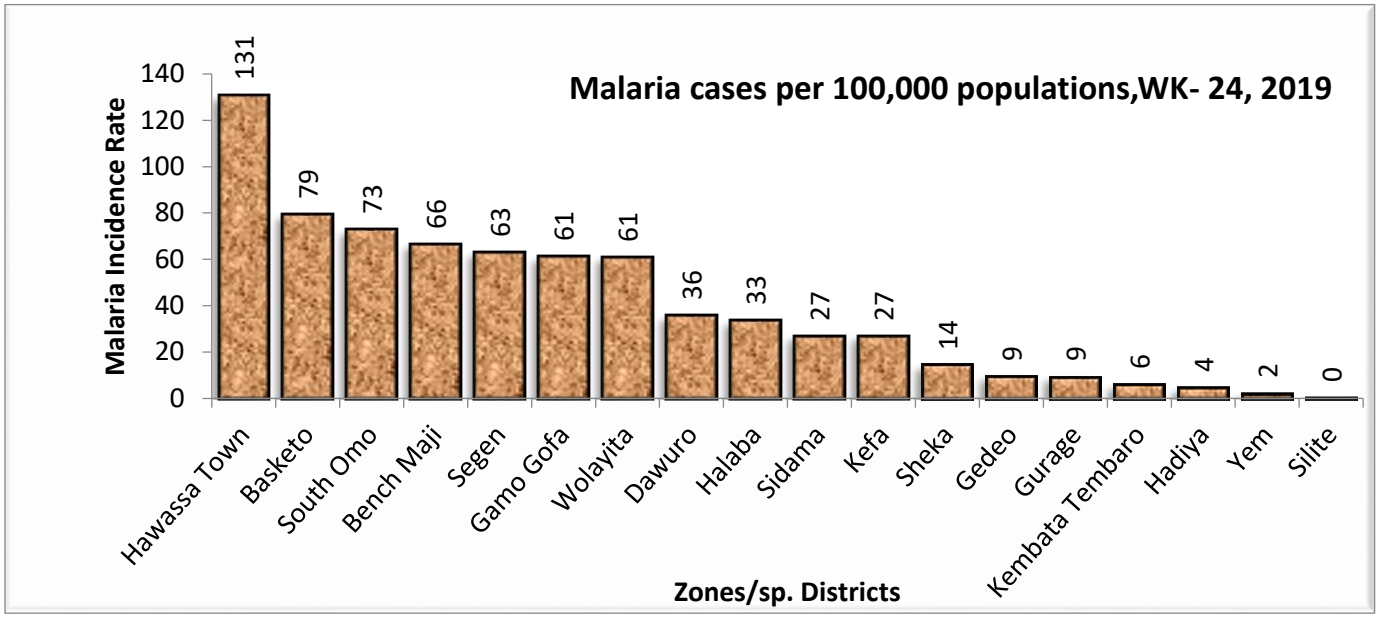

Figure 35:-Malaria cases per 100,000 populations by Zones/Sp. Districts in SNNPR, Week 24, 2019

As indicated in table-29 below, the burden of malaria remained high in specific areas of the Region.

Table 29:-Top 10 Districts with highest malaria cases in the last 4wks 2019 SNNPR

SN	Districts	Wk 21	Wk 22	wk 23	Wk 24	Total
1	Daramalo WoHO	581	309	308	182	1380
2	Salamago WoHO	326	268	335	382	1311
3	Bolosso Sore WoHO	413	332	254	161	1160
4	Arba Minch taHO	178	201	178	193	750
5	Damot Gale WoHO	261	179	168	122	730
6	Kindo Koysha WoHO	307	182	126	112	727
7	Arba Minch Zuria	155	149	131	171	606
8	Damot Woyde WoHO	188	161	132	103	584
9	Konso WoHO	105	106	145	189	545
10	Hawassa sub city	100	126	162	150	538
11	Damot Pulussa WoHO	152	133	130	104	519
12	Uba Debretsahay WoHO	94	102	127	166	489
13	Areka taHO	173	116	86	81	456
14	Zalla WoHO	103	92	121	137	453
15	Basketo	153	121	116	60	450

The trend analysis of malaria in the top six Districts of the Region from 12 consecutive weeks starting from above threshold (Week 13) showed that Damot Gale, Bolosso Sore, and Daramalo ranked from 1 to 3 reporting high number of malaria cases.

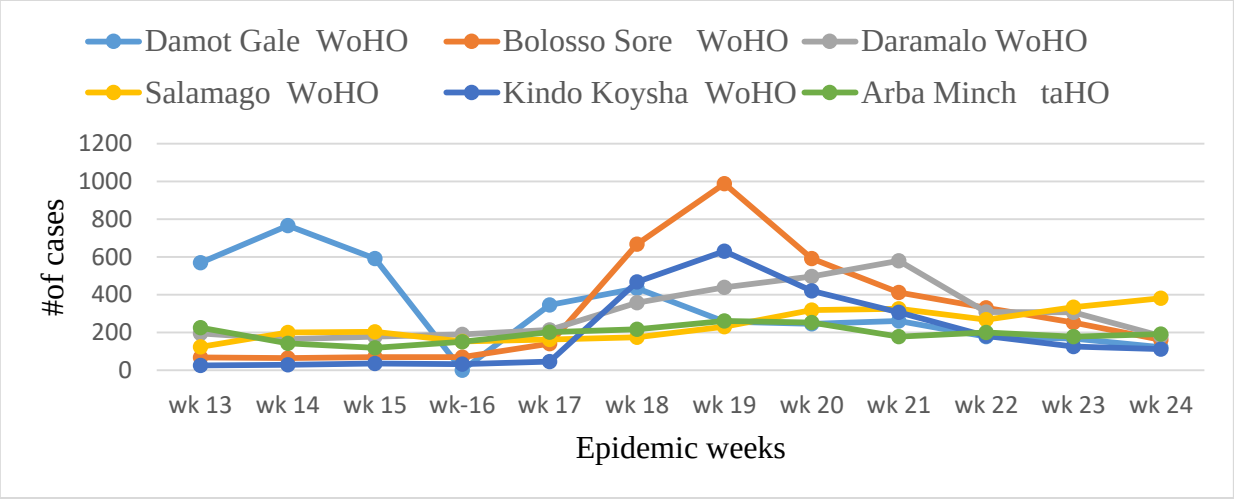

Figure 36:-Trend of malaria cases in six highest reporting Districts in SNNPR, from Week 13 to 24 in 2019

From top 10 leading Districts of high caseload during week-24, three Districts were from Gamo Gofa Zone (Daramalo, Arba Minch Town and Arba Minch zuria) (Figure-37).

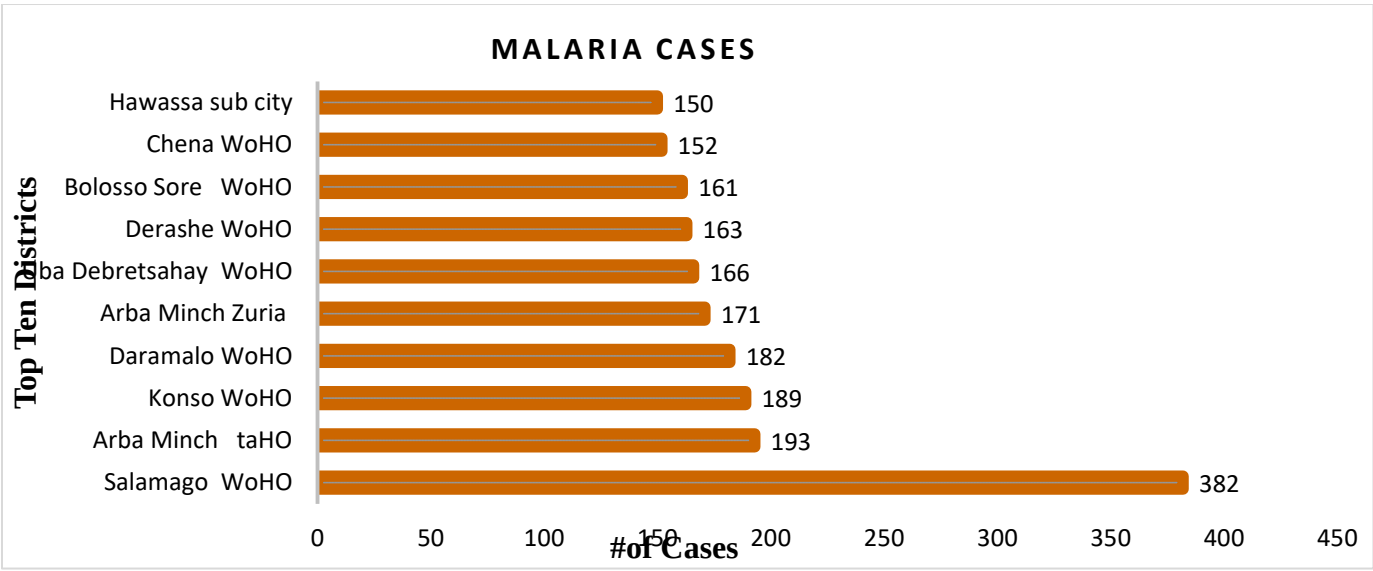

Figure 37:-Top 10 Districts with highest malaria case in SNNPR, week 24, 2019

Meningitis-In this week, suspected meningitis cases slightly increased compared to cases reported during last week. The cases were reported from Benchi Maji, Gedeo, Wolayita, Hawassa town, Dawuro, Kembata Tembaro and Silte Zones.

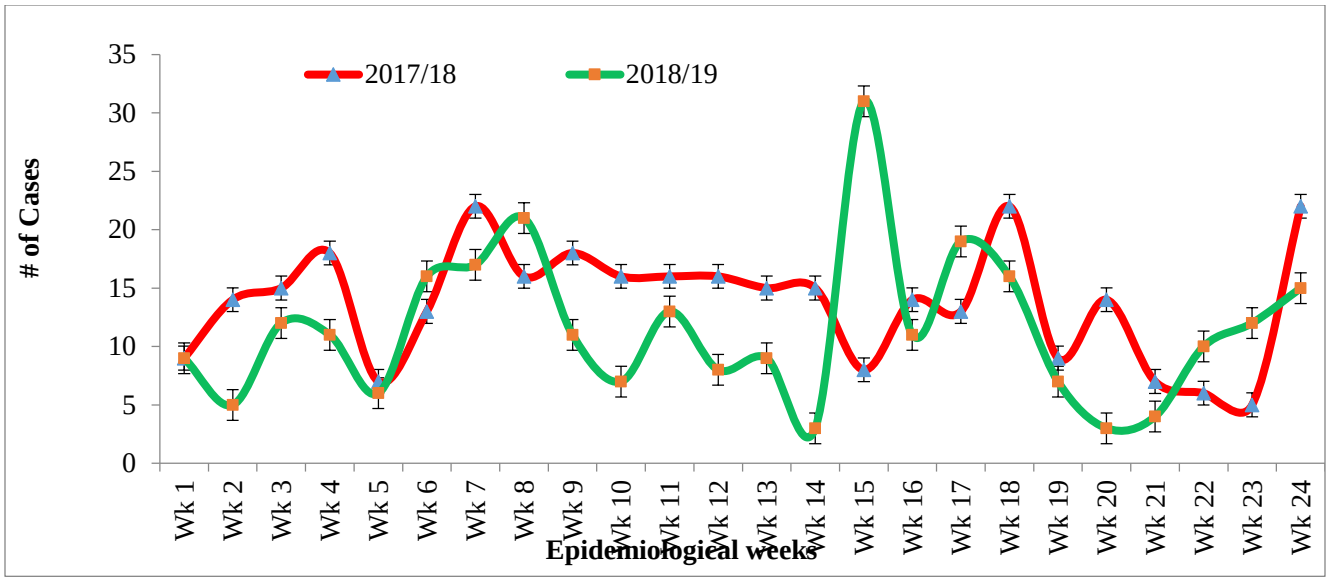

Figure 38:-Trend of suspected meningitis cases over the last 24 weeks in SNNPR, Week 24, 2019.

Dysentery-There were 834 cases of dysentery reported from Out Patients. However, there was no death. From the last week report, there was 134 cases decrement.

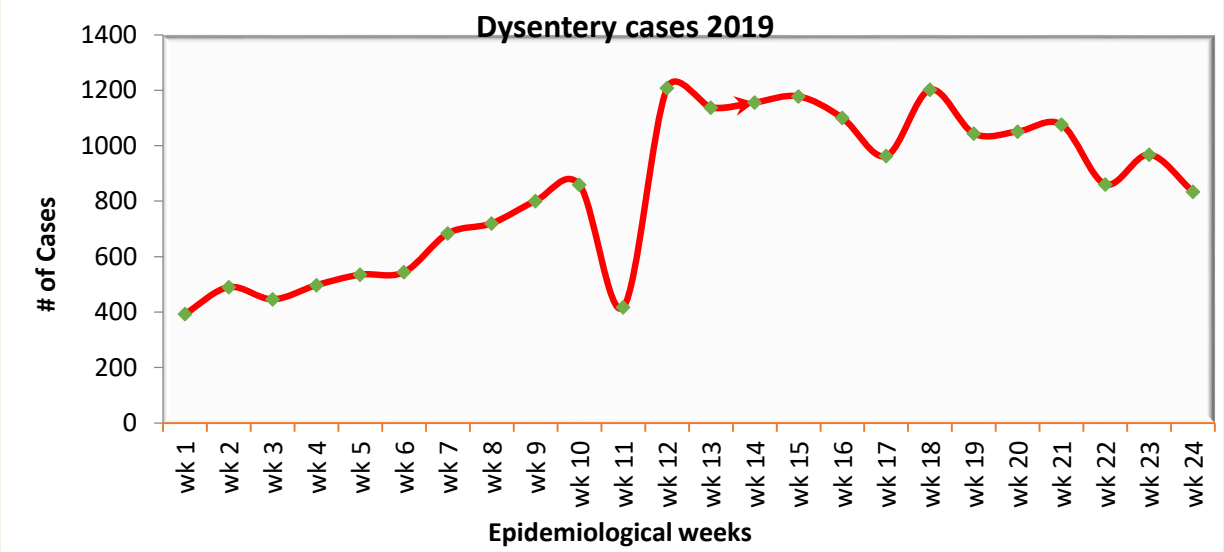

Figure 39:-Trend of dysentery cases for the last 24 weeks, SNNPR, 2019

Regarding the distribution of dysentery cases, Malie District, Konso, Hawassa Sub City and Borricha District ranked 1-4th in this week.

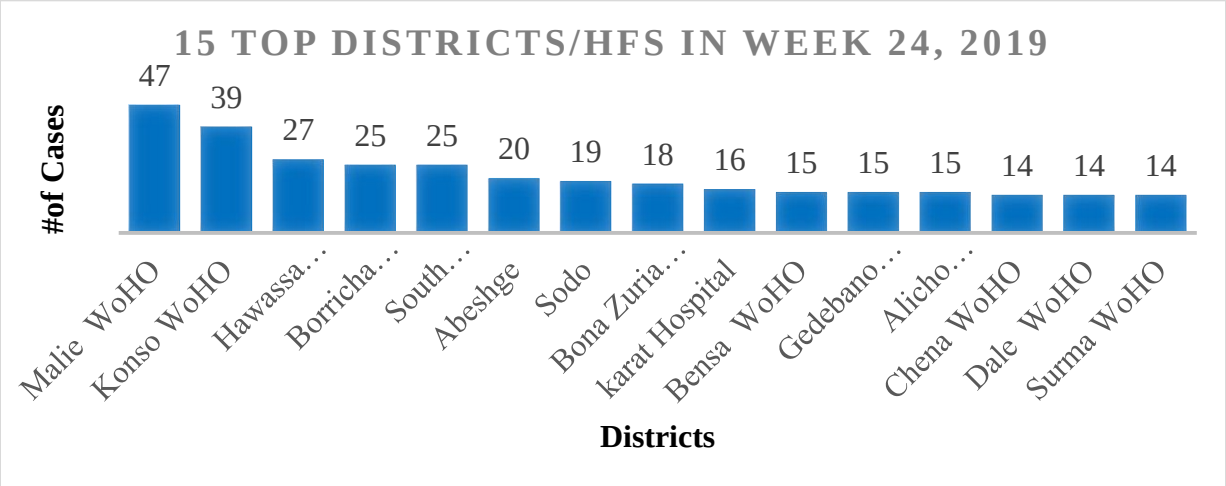

Figure 40:-Dysentery cases by Districts/sp. Districts, week 24, 2019

Severe Acute Malnutrition (SAM)-Totally 817 cases were reported during the week. From those cases, 637(78%) were outpatient therapeutic program (OTP) & 180(22%) were from Stabilization center (SC) cases. Two deaths were reported from Gedeb District during the week. The total SAM cases decreased by 105 cases as compared to last week and Yirga chefe, Gedeb and Konso Districts were ranked 1-3rd.

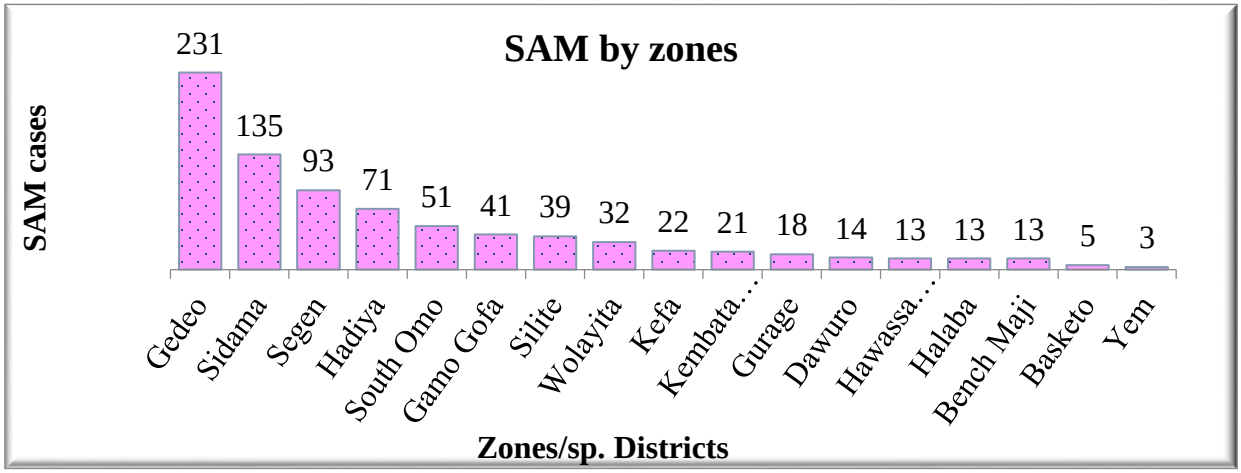

Figure 41:-SAM cases by Zone/sp. District, week 24, 2019, SNNPR

The number of SC was consistently increasing from week 01-24, with a mean difference of 177 cases per week. The proportion of SC was about 22% in a week, which is unacceptable according to the standard set by the National Nutrition Program (NNP).

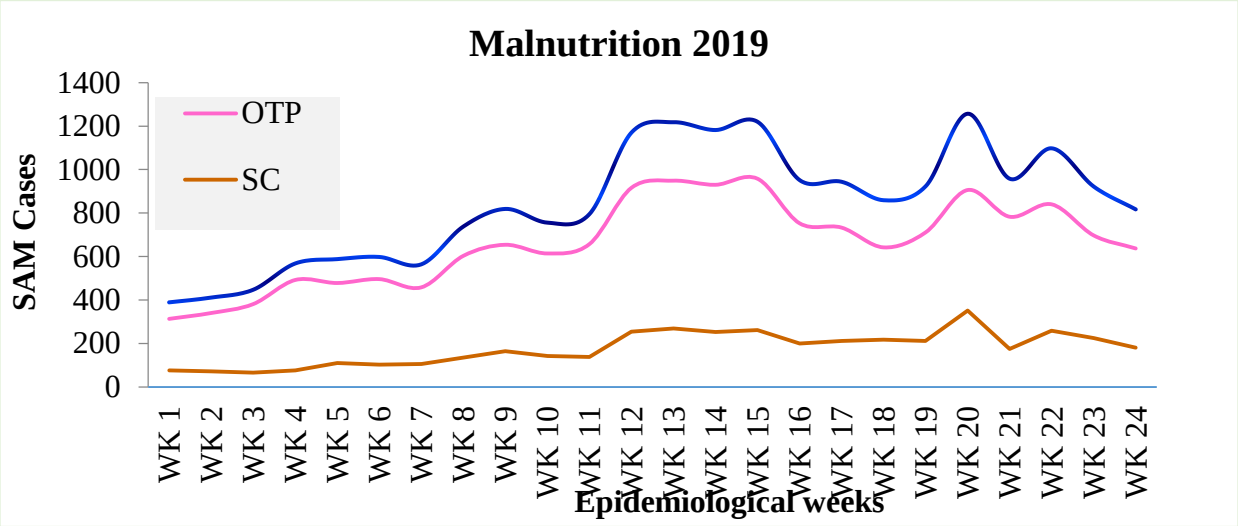

Figure 42:-Trend of SAM cases over the last 24 weeks, 2019 in SNNPR

A Weekly trend of SAM illustrated in figure-43, among top six Districts which reported a high number of cases in weeks 24 there were five Districts from Gedeo Zone (Yirga Chefe, Gedeb, Kochore, Wenago & Bulle). Internal displacement, food insecurity and social crisis due to conflicts have remained to be aggravating factors for critical malnutrition.

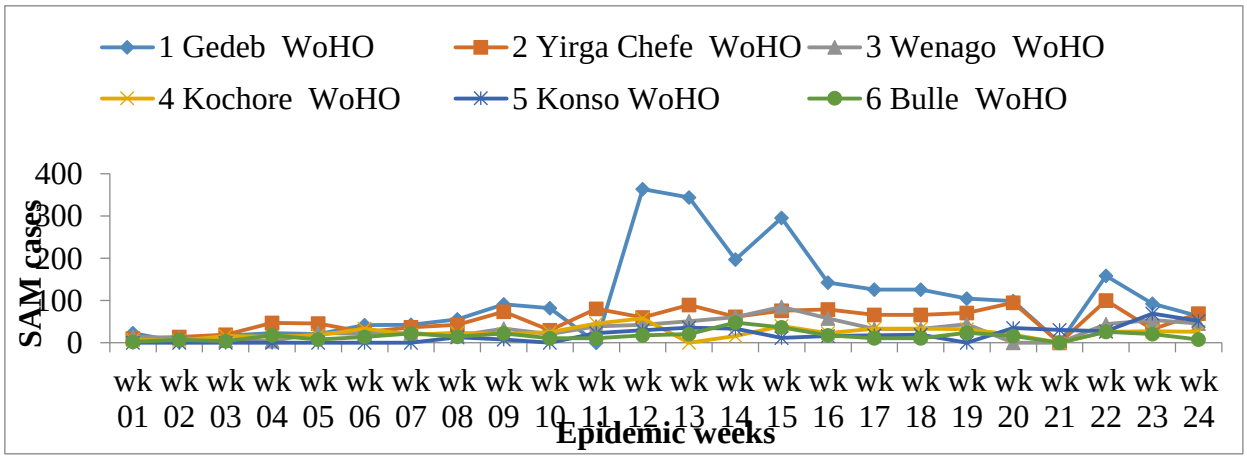

Figure 43:-Trends of SAM cases in six highest reporting District in SNNPR, Week 01 – 24, 2019

From top 20 leading Districts/HFs of SAM cases (OTP+SC) in the last 4 weeks, (Wks 21-24) a high number of SC cases were reported from Gedeb, Yirgachefe and Konso District ranked 1-3 respectively.

Measles and AFP-During Week 24, 2019, twenty suspected measles specimen was received from Gamo Gofa, Segen, Silte and Gurage Zone and the results were negative. Two AFP/Polio suspected cases specimen were sent from Kefa Zone Gimbo District and Benchi Maji Zone Shebench District to Ethiopian Public Health Institute (EPHI).

Scabies-In this week, there were 615 cases reported almost all 557(91%) were from Halaba, Gurage, Silte, Kembata Tambaro, Dawro and Sidama Zones. It decreased by 652 cases compared to report last week (1267 cases). However, no death reported this week.

Maternal and Perinatal Death Surveillance Report -There was one maternal death report from South Ari District and two perinatal deaths from Sankura and Werabe District within this week.

Other Surveillance Cases and deaths-There were 13-dog bites from Hamer District (5), Bonga Hospital(4), Kele HSP(3) and Sodo District (1). But, zero cases and deaths were reported for Cholera, yellow fever, Anthrax, AHI, SARS, Pandemic influenza, Viral Hemorrhagic Fever, Guinea worm, Smallpox, and Rabies.

9.1. Supportive Supervision on Malaria Epidemic at Wolayita and Hadiya Zones of Southern Nations, Nationalities and People's Regional State, 2019

Introduction

Southern Nations, Nationalities and peoples Regional Health Bureau deployed a team constituting of two officers from Diseases Prevention and Control (DPC), Field epidemiology resident from PHEM and one from each Zonal Health Department. This supportive supervision was made following the Malaria epidemic in Wolayita Zone and Hadiya Zone. It was conducted from December 13 to 16, 2019.

According to the National Malaria Guideline, when an epidemic is detected and reported by any Primary Health Care Unit (PHCU), it must be immediately relayed to all responsible higher levels[1]. The mitigation activities initiated must be followed-up and supportive supervision must be planned and implemented if necessary. Any epidemic beyond the capacity of the District should be handled by the Zone/RHB. Progress on mitigation activities and gaps must be reported to higher levels on a daily/weekly basis throughout the mitigation process [1].

In the last consecutive four weeks, a high number of Malaria cases reported from Wolayita and Hadiya zones. Especially, Damot Pulussa District from Wolayita Zone and Shashego District from Hadiya Zone had 2667 and 1075 cases respectively [2].

Therefore, this supportive supervision was aimed to strengthen the Malaria epidemic prevention and control by identifying the strengths, weaknesses, opportunities and threats in both Zones.

Objectives

General Objective

To strengthen the Malaria prevention and control, case management and surveillance system at all health facilities of the Wolayita and Hadiya Zones.

Specific objectives

- To assess the prevention and control methods of Malaria
- To identify the main gabs in health facilities
- To address the direction towards malaria epidemic control
- To assess the way health facilities conduct Malaria surveillance activities

Methods and Materials

This supportive supervision was conducted in Wolayita Zone, Damot Pullusa District and in Hadiya Zone, Shashego District. Shashego and Damot Pussa District had 139,463 and 140,850 total population respectively.

It was conducted by interviewing concerned bodies, using main issues extended from the RHB. Documents, like registers, reports and monitoring charts were reviewed and field visit was conducted in the community on IRS, ITNs utilization and environmental management. There was no structured supervision checklist used. Analysis of the visited data, strengthens, weaknesses, opportunities and threats were made without the use of any software.

Feedbacks were given to the visited health facilities soon after supervision.

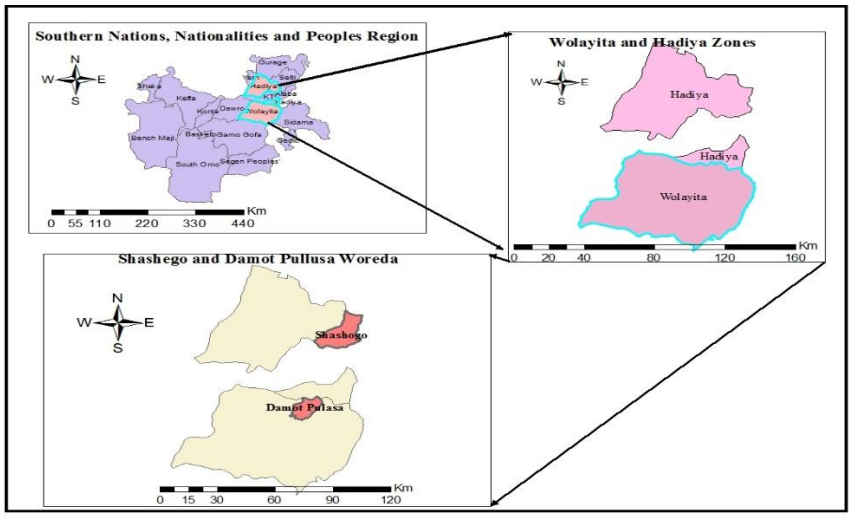

Figure 44:-Map of Damot Pulussa District in Wolayita and Shashego District in Hadiya Zone of SNNPR, 2019

Main findings

This team of supportive supervision addressed–two District Health Offices, two-Health Centers and one Primary Hospital for quick response.

1. Damot Pulussa District Health Office in Wolayita Zone

Damot Pulussa is one of the 15 Districts in Wolayita Zone, found in the South East of Sodo Town. The District was in an epidemic situation according to the trends shown on the Malaria Monitoring Chart.

Strengthens

- Emergency response team was organized and lead by the District administration
- District Health Office follow and evaluate the daily response activities
- Surveillance activities are ongoing integrated with active case search through HWs and HEWs
- Use of wasted kerosene for mosquito breeding site
- IRS operation was done in four villages where more than 25,000 population protected
- Social mobilization and community sensitization activities were ongoing on LLITNs utilization at HH level and prompt treatment
- Availability of antimalarial commodities at the Health Center

Weaknesses

- Primaquine was not consistently given for all eligible malaria cases and no follow up for those given the drug
- Mass test and treatment campaign was not done in malaria outbreak villages
- Weak logistic report and request to the next level.

Opportunities

- Availabilities of functional Health Posts in all villages.
- Well organized Government administration structures in District.
- Enough trained health workers

Challenges

- Shortage of Abate Chemical for the breeding areas
- Shortage of budget for IRS operation in targeted villages, including transportation
- Laboratory malaria testing services (BF) interrupted because of electric power interruption and RDT shortage

2. Shashego District Health Office in Hadiya Zone

Shashego District is one of the 11 Districts of Hadiya Zone in SNNP Regional State in Easten part of HossainaTown, which is Zonal Town.

Strengthens

- Good laboratory performance on Blood Film

- 11 out of 15 malarious villages were sprayed
- HEW and HDA– involved in environmental management and awareness creation activities for the communities
- There is enough trained health workers in health facilities

Weaknesses

- Poor response coordination at District level
- Weak logistic request and report to the next level
- No Mass test and treat campaign conducted for epidemic villages
- Weak malaria surveillance activities
- Epidemic malaria monitoring charts were not updated and properly utilized
- No Primaquine provision for all malaria cases, but there were trained health workers
- Weak social mobilization and health education in malarious villages

Opportunities

- Availabilities of Primaquine at all health facilities.
- Availabilities of functional Health Posts in all villages.
- Enough trained health workers

Challenges

- There are shortage of logistics – Coartem, quinine inj., Artesunate and RDT, Abate chemical
- District PHEM officer – not monitoring the outbreak trends, analysis of the data as well as poor capacity to manage surveillance activities
- Shortage of budget to conduct IRS operation in all villages
- Shortage of ITNs for replacement

Threat for both Districts

- Too many swampy areas in both Districts
- Limited social mobilization and community involvement on malaria control & prevention interventions
- Response team not aligned with RRT – focused on administrative activities

- Shortage of Antimalarial drugs because there is weak logistic report and request
- Shortage of budget for all activities of Malaria epidemic prevention and control.

Conclusions

According to these findings, there is malaria epidemic situation in both Zones. To prevent and control the worsening epidemic situation, there were evident gaps in all visited health facilities and Districts of both Zones. Primaquine provision and follow up was not properly implemented in all health facilities, but there was no shortage of drug and trained health worker. There was a shortage of logistics due to poor request and report of health facilities to the next level on time. This epidemic situation might continue since the weather condition might remain favourable for the situation.

Recommendations

- Immediate support from the Region and Zone to mitigate logistic and financial encounters
- Rapid response team(RRT) should be revitalized and involved in response activities at all levels
- Environmental management activities should be continuously implemented through community involvement and local leaders participation
- Advocacy, communication and social mobilization should be strengthened and continued intensively
- Test and treat campaigns need to be continued widely in malarious villages

References

[1] Federal Ministry of Health Ethiopia (FMoH), “National Malaria Guideline,” 2012.

[2] SNNPR-PHEM Department, “SNNPR-PHEM Weekly Surveillance report from 46 to 49, 2019,” 2019.

Photo galleries of Field visit at malarious villages

Mosquito breeding site


Indoor Residual Spray in household


9.3. COVID-19 Pandemic Response in Kirkos Sub-city of Addis Ababa Ethiopia, 2020

Abstract

Background- Corona viruses are a large family of viruses, which may cause illness in animals or humans. The most recently discovered coronavirus causes corona virus disease (COVID-19). The aim of this response was to interrupt the transmission of SARS-COV-2(COVID_19) in the Addis Ababa City of Ethiopia. The aim of this rapid response team activity was to mitigate the COVID-19 pandemic in the Sub-city.

Objective: To investigate rumors/suspected cases and quarantine as well as isolating confirmed cases in Kirkos Sub-city of Addis Ababa Ethiopia, 2020.

Methods: The case investigation was conducted on health facilities and at Community level using descriptive study design from March 13 to August 31/2020. Data were collected using ODK software on an android mobile phone from suspected individuals with face-to-face interview using a semi-structured questionnaire.

Results- Kirkos Sub-city is one of the affected Sub-cities of Addis Ababa by COVID-19. Totally, from 24 March to 24_August_2020, 138 individuals were investigated in this Sub-city by our rapid response team. Among those individuals, 78(57%) were males and 60(43%) Females. Among 104 suspect cases, tested for RT-PCR 23(22%) were positive and were isolated in the treatment center.

Conclusion: Kirkos Sub-city was one of the Addis Ababa City administration that was affected by COVID-19. The positivity rate in this sub-city among suspected cases was higher. There was contact between probable or confirmed cases and healthy person in this Sub-city. Its isolation and management in this Sub-city were very challenging.

Keywords: COVID_19, risk factors, Death, Addis Ababa City

9.3.1. Introduction

Background

Corona viruses are a large family of viruses, which may cause illnesses in animals or humans. Several corona viruses are known to cause respiratory infection ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) [1]. The most recently discovered coronavirus causes coronavirus disease (COVID-19) [1]. Now, coronaviruses that circulate among humans are typically benign, and they cause about a quarter of all common cold illnesses [2]. This new virus and disease were unknown before the outbreak began in Wuhan, China in December 2019[1]. COVID-19 is now pandemic affecting more than 213 countries globally[1]. On 12 January 2020, the World Health Organization (WHO) confirmed that a novel coronavirus was the cause of a respiratory illness in a cluster of people in Wuhan City, Hubei Province, China[1]. It was reported to the WHO on 31 December 2019 [1].

Sign and Symptoms

The most common symptoms of COVID-19 are fever, dry cough and tiredness [3]. Other symptoms that are less common and may affect some patients include aches and pains, nasal congestion, headache, conjunctivitis, sore throat, diarrhea, loss of taste or smell or a rash on skin or discoloration of fingers or toes[3]. These symptoms are usually mild and begin gradually. Some people may be infected, but only have very mild symptoms[1]. Based on the recent data over 80% of the patients with COVID-19 have a mild infection, and some people don't develop any symptoms at all [2].

Incubation period

The time between exposure to COVID-19 and the moment when symptoms start is commonly around five to six days, but can range from 2-14 days[1].

Mode of transmission

People can catch COVID-19 from others who have the virus. The disease spreads primarily from person to person through small droplet from nose or mouth, which are expelled when a person

with COVID-19 coughs, sneezes or speaks. These droplets are relatively heavy, do not travel far and quickly sink to the ground. People can catch COVID-19 if they breathe in these droplets from a person infected with the virus. This is why it is important to stay at least one meter away from others. These droplets can land on objects and surfaces around the person such as tables, doorknobs and handrails. People can become infected by touching these objects or surfaces, then touching their eyes, nose or mouth. This is why it is important to wash hands regularly with soap and water or clean with alcohol-based hand rub[1]. A person can catch COVID-19 from someone who has just a mild cough and does not feel ill [3]. The case-fatality ratio for CoViD-19 has been much lower than SARS of 2003, but the transmission has been significantly greater, with a significant total death toll.

Diagnosis

To confirm the diagnosis, a reverse transcription-polymerase chain reaction or rt-PCR test can be done, which can detect very small amounts of viral RNA[2]. It is worth mentioning, however, that early in the disease; the rt-PCR can often miss the infection altogether meaning that it is not very sensitive. So if the severe pulmonary disease is suspected, the chest CT can be done to help detect the presence of viral pneumonia [2]. Next, newer rapid testing methods for COVID-19 can get the results within minutes. One of these is isothermal amplification, which also checks for viral RNA. The other is rapid serological testing which checks for the antibodies created by the immune system to fight the virus. Since it is checking for the antibodies made by the body, it can detect previous infections even after the virus is gone.

Treatment

There is no specific treatment for COVID-19. Triage recognize and sort patients with SARI, immediate implementation of appropriate infection prevention and control (IPC) measures and early supportive therapy and monitoring; including O2 supplementation if needed[1]. Collection of specimens for laboratory diagnosis, management of hypoxemic respiratory failure & acute respiratory distress syndrome (ARDS), management of septic shock, prevent complications and special considerations for a pregnant patient are the most important activities for COVID-19[1].

Prevention Methods

There are currently no vaccines available to protect you against human coronavirus infection. Transmission is reduced through washing hands with soap and water for at least 40-60 seconds or using alcohol-based hand rub, avoid touching eyes, nose, and mouth with unwashed hands, avoid close contact with people who show respiratory illness symptoms (eg. coughing, sneezing…) and thoroughly cook meat and eggs[1]. Also, cover your mouth and nose with face mask/tissue when you cough and sneeze then, wash your hands and clean and disinfect objects and surfaces. Seek medical attention if you have flu-like symptoms (especially if you have travel history to the 2019-nCOV affected countries), isolate the suspect and advice to cover his/her mouth and nose with a face mask and ensure that the room is ventilated [1].

9.3.2. Objective

9.3.2.1. General Objective

To investigate rumor/suspected cases and isolating cases in Kirkos Sub-city of Addis Ababa Ethiopia 2020.

9.3.2.2. Specific objectives

- To identify the case early for prevention and control methods/isolation
- To describe the COVID_19 pandemic in terms of person, place and time
- To institute possible prevention and control measures

9.3.3. Methods and Materials

9.3.3.1. Study Area and Population

Kirkos Sub-city is one of the ten sub-cities of Addis Ababa, Ethiopia. Ethiopia is the second-largest country in Africa by its population. According to 2007 census, Kirkos Sub-city population was 221,234 male 103,500 and female 117,734. However, in 2020 it is projected to be 345889, which is 161,807 males and 184,082 females.

This Sub-city has 11kebeles, and eight health centers. This Sub-city is located on $9^0$0’15.12”N $38^0$45’31.28”E and the area of it is 14.62km^2.

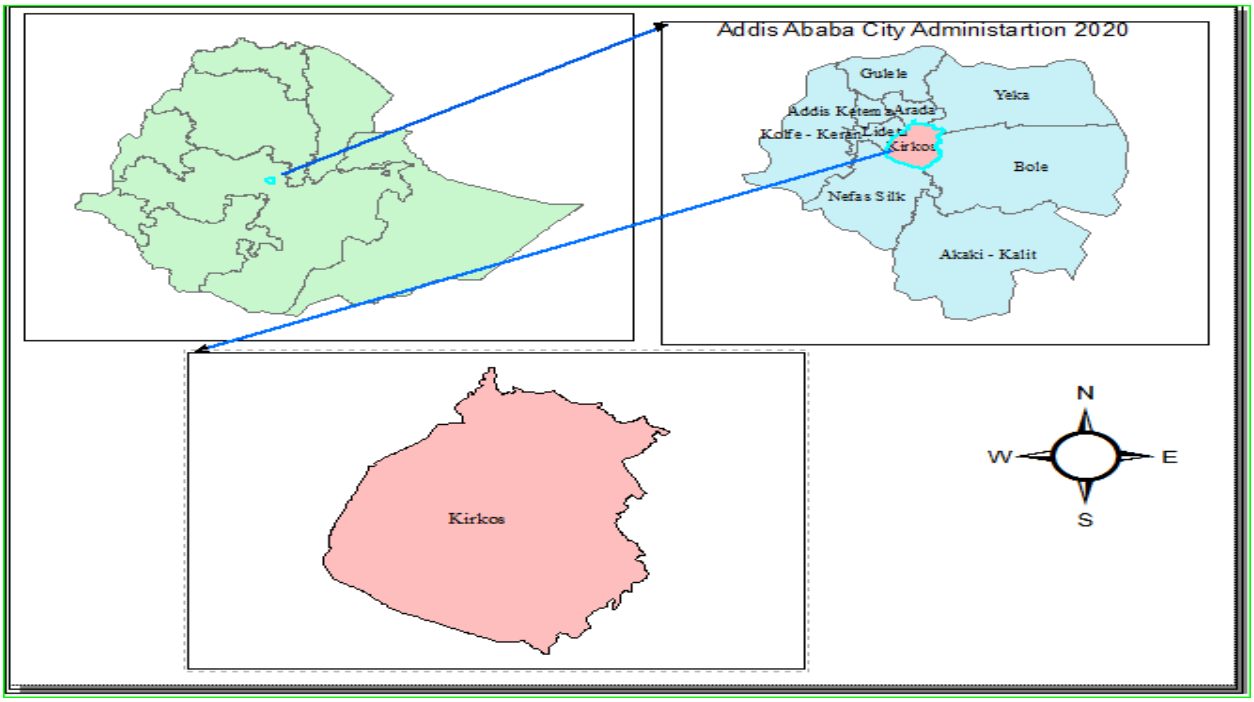

Figure 45:-Map of Kirkos Sub-city in Addis Ababa Ethiopia 2020

9.3.3.2. Study Design and Period

The investigation was conducted on health facility and Community utilizing descriptive study design from March 13 to August 31/2020.

9.3.3.3. Data Collection and Analysis

The data were collected from suspected individuals through face-to-face interview using a semi-structured questionnaire. After data were collected, entered and cleaned it was analyzed using Microsoft office excel 2013.

9.3.3.4. Permission for the Study

Verbal informed consents were taken from all participants prior to interviewing them. In addition, photos were taken based on the willingness of participants. Confidentiality of any personal related information was maintained by keeping the anonymity of the individual participants. Also, the data were used confidentially only for case diagnosis and treatment of the related problems. Participants who fulfilled the COVID-19 case definition were taken to the nearby-prepared isolation center for a thorough investigation and prompt management.

9.3.3.5. Case Definition

WHO periodically updates the global surveillance for human infection with coronavirus disease (COVID-19) documents that include case definition.

Suspected case

A. A patient with acute respiratory illness (fever, and at least one sign/symptom of respiratory disease, eg. Cough, shortness of breath), and a history of travel to or residence in a location reporting community transmission of COVID-19 disease during the 14 days prior to symptom onset. Or
B. A patient with an acute respiratory illness and has been in contact with a confirmed or probable COVID-19 case in the last 14 days prior to symptom onset. Or
C. A patient with severe acute respiratory illness (fever and at least one sign/symptom of respiratory disease, e.g. cough, shortness of breath; and requiring hospitalization) and in the absence of an alternative diagnosis, that fully explains the clinical presentation[1].

Probable case

A. suspected case for whom testing for the COVID-19 virus is inconclusive. A conclusive being the result of the test report by the laboratory. Or
B. A suspect case for whom testing could not be performed for any reason[1].

Confirmed case

A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms[1].

9.3.3.6. Operational definition

Contact-is a person who experienced any one of the following exposures during the 2 days before and the 14 days after the onset of symptoms of probable or confirmed case:

1. Face-to-face contact with a probable or confirmed case within one meter and for more than 15minutes;

2. Direct physical contact with a probable or confirmed case;
3. Direct care for a patient with probable or confirmed COVID-19 disease without using proper personal protective equipment, Or
4. Other situation as indicated by local risk assessment.

9.3.4. Results

The CoViD-19 pandemic was confirmed to have reached Ethiopia on 13 March 2020. On 13 March, the first coronavirus case was reported in the country and the victim later identified as a Japanese citizen. On 15 March, three additional cases of the coronavirus were reported. The infected persons, one Ethiopian and two Japanese nationals had contact with the individual who was reported to be infected by the virus on 13 March. On 16 March, a 34-year-old male Ethiopian who was said to have arrived from Dubai on 12 March 2020 tested positive for the virus.

There was only one isolation center (Felege Hiwot Health Center) and no quarantine center in Kirkos Sub-city.

Totally, 138 individuals were investigated for COVID-19 and actions were taken at Kirkos Sub-city from 24 March 2020 to 24 August 2020. Among those individuals, 78(57%) were males and 60(43%) Females (Fig.46).

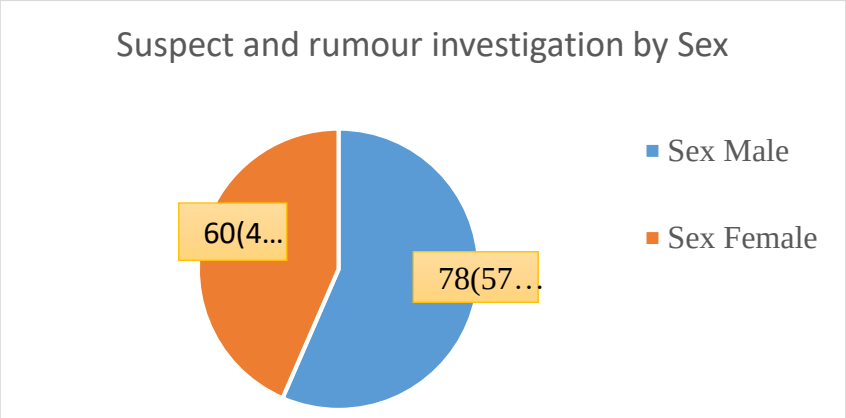

Figure 46:- Suspect and rumours investigations done in Kirkos Sub-city of Addis Ababa Ethiopia 24 March to 24 August 2020

From these suspect and rumor investigation done 104(75%) were identified as suspect case and isolated to the isolation centers for RT-PCR test. Among 104 tested for rt-PCR 23(22%) were positive and isolated to the treatment center (Fig.47). Others, 81(78%) rt-PCR tested were negative.

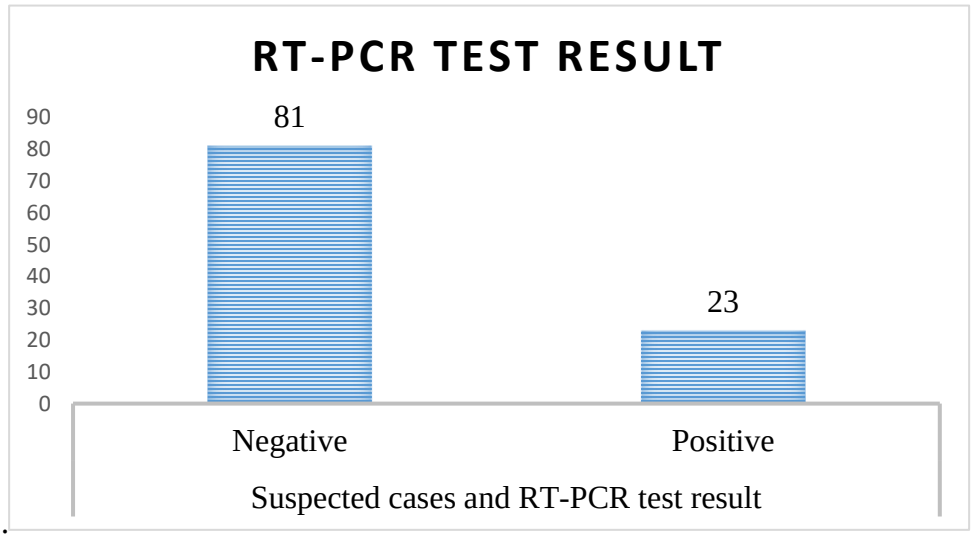

Figure 47:-RT-PCR test results of suspected cases isolated individuals in Kirkos Sub-city Addis Ababa of Ethiopia 24March to 24 August 2020

Among suspected cases, 17(16%) had a travel history to COVID-19 pandemic area within the last two weeks (Table 30). From those having travel history to COVID-19 pandemic area, 4(23%) were positive for RT-PCR (Table 30).

Table 30:-Travel history to the COVID-19 affected area within the last two weeks in Kirkos Sub-city Addis Ababa Ethiopia 2020

RT-PCR Test result	Travel history to COVID-19 affected area					
	No		Yes		Grand Total	
	Count	%	Count	%	Count	%
Negative	68	78.16	13	76.47	81	77.88
Positive	19	21.84	4	23.53	23	22.12
Grand Total	87	100.00	17	100.00	104	100.00

Contact history with acute upper respiratory infection with in the last two weeks among suspected cases were 28(27%) (Table 31). Among those who had contact history with AURTI, 17(61%) were positive for COVID-19 and isolated for further investigation (Table 31).

Table 31:-Contact history with AURTI within the last two weeks in Kirkos Sub-city Addis Ababa Ethiopia 2020

RT-PCR Test result	Contact history with AURTI							
	No		Unknown		Yes		Grand Total	
	count	%	count	%	count	%	count	%
Negative	65	92.86	5	83.33	11	39.29	81	77.88
Positive	5	7.14	1	16.67	17	60.71	23	22.12
Grand Total	70	100.00	6	100.00	28	100.00	104	100.00

Among suspected cases 25(24%) had contact history with a probable or confirmed case within the last two weeks. From those who had contact history with a probable or confirmed case within the last two weeks, 15(60%) were positive for COVID-19 and isolated for further investigation (Table 32).

Table 32:-Contact history with a probable or confirmed case with in the last two weeks in Kirkos Sub-city Addis Ababa Ethiopia 2020

RT-PCR Test result	Contact history with a probable or confirmed case							
	No		Unknown		Yes		Grand Total	
	Count	%	Count	%	Count	%	Count	%
Negative	67	91.78	4	66.67	10	40.00	81	77.88
Positive	6	8.22	2	33.33	15	60.00	23	22.12
Grand Total	73	100.00	6	100.00	25	100.00	104	100.00

Due to confidentiality, the data of death related COVID-19 was not taken from national EOC. Therefore, we can not get the death rate and recovery rate of the case in our sub-city.

9.3.5. Discussions

Starting from the entry of COVID-19 to our country on 13 March 2020, the Rapid Response Team(RRT) was established and deployed to different parts of the country by EPHI and FMoH. So we (my team) was assigned to Addis Ababa City Administration at Kirkos Sub-city. At this sub-city, my team conducted rumor investigation and suspect case identification. Based on the finding of our investigation we decided for isolation and quarantine. However, absence of enough isolation and quarantine center was the main challenge of sub-city for COVID-19 response activities.

In Kirkos Sub-city, rt-PCR positivity rate was higher than the WHO report that may show the reluctance of community for respecting the recommended standard for COVID-19 precaution [1].

The investigation was done based on the WHO standards for suspect identification [3].

9.3.6. Conclusions

Kirkos Sub-city was one of the Addis Ababa City administration affected by COVID-19. The positivity rate in this sub-city among suspected cases was higher. There was contact between probable or confirmed cases and healthy person in this Sub-city. The isolation and management in this Sub-city were very challenging.

9.3.7. Recommendations

- Kirkos Sub-city should increase the isolation center for patient care
- Community social mobilization should be continued for prevention and control of the case

References

[1] WHO, “COVID-19 Pandemic situation in the world being major health problem,” 2020.

[2] CDC, prevention, treatment of Novel Coronavirus (2019-nCoV). (2020, February 8).Retrieved February 11, 2020. 2020.

[3] WHO, “COVID-19 pandemic update,” 2020.

Annex-7- Checklist for CoViD -19 Suspect/rumor Investigation Form 2020

1) Reporting institution: _____
2) Date of reporting to Regional health authority: _____(DD/MM/YYYY) GC
3) Point of Detection _____
4) Date of Investigation_____

Patients' Demographic information

5) Name of the patient_____
6) Date of arrival to Ethiopia_____
7) Age in years: _____
8) Sex: □ Male □ Female
9) Patient Address
   a. Country: _____
   b. Region _____
   c. Zone/Sub city: _____
   d. Woreda: _____
   e. Kebele: _____
   f. Phone no_____
   g. House number/specific identifier of that area:_____

Patient clinical course

10) Date of onset of symptoms: _____ (DD/MM/YYYY) □ asymptomatic □ Unknown
11) Admission to hospital: □ No □ Yes □ Unknown
12) If Yes, First date of admission to hospital: _____ (DD/MM/YYYY)
13) If Admitted, Name of hospital: _____
14) Was the patient ventilated: □ No □ Yes □ Unknown
15) Health status (circle) at time of reporting: sick/recovered / not recovered / death / unknown
16) Date of death, if applicable: _____ (DD/MM/YYYY)
17) **Patient symptoms** (check all reported symptoms):

□ History of fever / chills	□Chest pain	□ Sore throat
□ Shortness of breath	□ Cough	□ Headache
□ General weakness	□ Nausea/vomiting	□ Runny nose
□ Diarrhoea	□Abdominal Pain	□ Irritability/Confusion
□Muscular Pain	□Joint Pain	□ other, specify _____

18) Patient signs: Temperature: _____

Check all observed signs:

- Pharyngeal exudate
- Coma
- Abnormal lung X-Ray findings
- Conjunctiva infection

- Dyspnea / tachypnea
- Abnormal lung auscultation
- other, specify: _____
- Seizure

19) Underlying conditions and comorbidity (check all that apply):
- Pregnancy (trimester: _____)
- Post-partum (< 6 weeks)
- Cardio-vascular disease, including hypertension
- Immunodeficiency, including HIV
- Chronic neurological or neuromuscular disease
- Diabetes
- Renal disease
- Liver disease
- Chronic lung disease
- Malignancy
- other, specify_____

20) **Occupation:** (tick any that apply) A)Student B)Health care worker C)working with animals D)Health laboratory worker E)other, specify: _____

21) Has the patient **travelled to CoViD affected country** in the 14 days prior to symptom onset? □ No □ Yes □ Unknown

22) If yes, please specify the places the patient travelled:

Country	City
1._____	_____
2. _____	_____ 3. _____

23) Has the patient **visited any health care facility (ies)** in the 14 days prior to symptom onset? □ No □ Yes □ Unknown

24) Has the patient had **close contact** with a person with acute respiratory infection in the 14 days prior to symptom onset? □ No □ Yes □ Unknown

25) If yes, contact setting (check all that apply) Health care setting
- Family setting
- Work place
- Unknown
- Other, specify: _____

26) Has the patient **had contact with a probable or confirmed case** in the 14 days prior to symptom onset? **:** □ No □ Yes □ Unknown

27) If yes, please list all probable or confirmed cases:
Case 1. _____
Case 2. _____

28) If yes, contact setting (check all that apply):
- Health care setting
- Family setting
- Work place
- Unknown
- other, specify: _____

29) If yes, location/city/country for exposure: _____

30) Have you visited any **live animal markets** in the 14 days prior to symptom onset? □ No □ Yes □ Unknown

31) If yes, location/city/country for exposure: _____

32) Specimen taken: □ No □ Yes □ Unknown

33) Type of specimen taken: _____

34) Date specimen taken: _____ (DD/MM/YYYY)
35) Case classification: □ Confirmed □ Suspected ☐Not suspected Case

36) Final decision with recommendation of the investigation team

_____

Name of Investigators:

a) _____
b) _____

Close contact' is defined as: 1. Health care associated exposure, including providing direct care for nCoV patients, working with health care workers infected with novel coronavirus, visiting patients or staying in the same close environment of a nCoV patient. 2. Working together in close proximity or sharing the same classroom environment with a with nCoV patient. 3. Traveling together with nCoV patient in any kind of conveyance. 4. Living in the same household as a nCoV patient.

Annex 8: Declaration

I, the undersigned, declare that this is my original work and has never been presented by another person in this or any other University and that all the source materials and references used for this thesis have been duly acknowledged.

Name: **Ababu Fayisa**

Signature: _____

Place: _____

Date of Submission: _____

This thesis has been submitted for examination with my approval as a university mentor.

Name of Mentor: **Prof. Ahmed Ali**

Signature: _____

Date: _____