



**Addis Ababa University
College of Health Science
School of Public Health
Department of Field Epidemiology Training
Program (EFETP)**

**Compiled Body of Works in Field Epidemiology
By Neamin Tesfaye (BSc in public health officer)**

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

**April 2019
Addis Ababa, Ethiopia**

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Acronyms and Abbreviation

AEFI	Adverse Effect Following Immunization
AIDS	Acquired immune deficiency syndrome
AFI	Acute Febrile Illness
AMR	American Region
ANC	Ante Natal care
AOR	Adjusted Odds Ratio
APHI	Amhara Public Health Institute
ArC GiS	Advanced Geographical information system
BEmONC	Basic Emergency obstetrics and new-born care
CAPI	Computer assisted personal interview
CDC	Centre for Disease Control and prevention
CEmONC	Comprehensive Emergency obstetrics and new-born care
CEO	Chief Executive Officer
COR	Crude Odds Ratio
CSA	Central statics agency
CSPRO	Census and survey processing system
DDO	Deputy district office
EDHS	Ethiopian demographic health survey
EmoNC	Emergency obstetrics and new-born care
EMR	Easter Mediterranean Region
EPHI	Ethiopian public health institute
EPI-INFO	Epidemiological information
EUR	European Region
FBA	Facility Based Extraction Format
FMOH	Federal Minster of Health
GAVI	Global Alliance for vaccine and Immunization
GRHB	Gambella Regional Health Bureau
HA	Hector
HC	Health Centre
Hib	Hemophilus influenza type B
HIV	Human immune virus

HMIS	Health management information system
Hos	Hospital
HP	Health Post
HPDP	Health promotion and disease prevention
HR	Human resource
Hr	Hour
ICE	Information Communication and Education
ICRC	International Red Cross and Red Crescent
IDP	Internally Displaced population
ISR	Inter residual spray
ITN	Insecticide Treated Net
IUD	Intrauterine device
KM	Kilometer
L	Litter
MAM	Moderate Acute Malnutrition
MCH	Maternal child health
MCV1	Measles-Containing Vaccine first dose
MDG	Millennium development goal
MDR-TB	Multi drug resistance tuberculosis
MDSF	Maternal death surveillance format
MDSR	Maternal death surveillance response
MDRS	Maternal death Surveillance and Response
MFL	Master facility list
MM	Mille Meter
MSF	Medicines Sans Frontiers
MUAC	Mid Upper Arm Circumference
NFI	Non-Food items
NGO	Non-Government organization
NSAID	Non-Steroid Anti Inflammatory Drug
OPD	Outpatient department
OR	Operation Room
OTP	Outpatient therapeutic program
PCV1	Pneumococcal conjugated vaccine

PD	Paederus Dermatitis
PICT	Physician Induced counseling and Testing
PHEM	Public Health Emergency Management
PLW	Pregnant and Lactating Women
PMTCT	Prevention of mother to child HIV transmission
PNC	Post-natal care
RDRMC	Regional Disaster and Risk Management Commission
RH	Reproductive health
RRT	Rapid Response Team
RTA	Road traffic accident
RV1	Rotavirus vaccine
SAM	Severe acute malnutrition
SEAR	South East Asia Region
SIA	Supplementary Immunization Activity
SNNP	Southern nation and nationality people
SPSS	Statistical Package for the Social Science
Sq.KM	Square Kilo Meter
SSPE	subacute sclerosing pan encephalitis
STI	Sexual Transmitted Infection
TLCP	Tuberculosis and leprosy control program
TVET	Technical and vocational education training
TT	Tetanus toxoid
UNFPA	United nation population fund
UNICEF	United nation children fund
URTI	Upper Respiratory Tract Infection
USAID	United States agency for international development
VCT	Voluntary counselling and testing
VA	Verbal Autopsy
WHO	World Health Organization
WoHO	Woreda Health Office

Preface

This document contains two years Field Epidemiology Training Program outputs, to be submitted to the school of public health for the fulfilment of the master's degree in Field Epidemiology. This Compiled Body of Work has nine chapters and eight annexes. Reports of diseases outbreak investigations, public health surveillance data analysis, surveillance system evaluation, narrative summary of disaster situation report, manuscript and abstracts as well epidemiological project proposal with that additional output is incorporated within the nine chapters.

Chapter One: This chapter contains the findings of two outbreak investigations. The first outbreak investigation was conducted on a Paederus dermatitis in three districts of Bole sub-city, Addis Ababa city Administration. The outbreak investigation was conducted with the aim of confirming the existence and identify the factor associated with the outbreak. A descriptive analysis of the line list were used followed by unmatched case-control study; A total of 122 cases were identified among them female was 87(71%).The presence of outdoor light (AOR=12.9, 95% CI 4.22-39.5, P=0.003), the presence excess vegetation AOR 10.4 95% CI (2.8- 38.7) p=0.001) and use soap after contact with a beetle (AOR=0.04,95% CI 0.01-0.13, P=0.002) were independently associated with outbreak. Educating the public about the illness in a way addressing that identification of beetle and avoid contact with the beetle. Reducing burning outdoor light, clean excess vegetation and use soap after contact with beetle can be recommended as the preventive measure.

The second outbreak investigation was on Measles outbreak in Mubarak district, Dawa zone, Somalia region. A descriptive analysis of the line list was used followed by an unmatched case-control study; a total 35 cases of Measles were identified (the (3/5) cases were lab confirmed). Seventy-six percent of the cases weren't vaccinated for measles. The outbreak was controlled by providing mass vaccination and health education activities. We recommend strengthening health education and routine and catch up immunization programs activities by the district health office to prevent similar outbreaks.

Chapter Two: Presents report of surveillance data analysis conducted on maternal death. Retrospective review and analyse was done on national surveillance report collected from October 2013 to January 2017 to describe the distribution and determinant of maternal death in Ethiopia. The summary of the findings has shown that the overall maternal mortality rate is 22.2 per 100,000 live birth with big disparity among regions the maximum being at Dire Dawa

338 deaths per 100,00 live birth and the minimum being at SNNP 15.4 deaths per 100,000 live births. The top three causes of maternal deaths found to be haemorrhage followed by Anaemia and hypertensive disease of pregnancy. Much focus should be given to the top three common causes of maternal deaths (haemorrhage, sepsis and hypertension disorder of pregnancy) to reduce and improve maternal outcomes. The number of reported maternal mortality is far below the local and international estimates, which needs an evaluation of the overall maternal mortality surveillance system (based on this result, we conducted an evaluation of MDSR system in Gambella region which presented in the next chapter).

Chapter Three: Addresses surveillance system evaluation conducted on “Maternal Death Surveillance and Response System in the Gambella Region, western Ethiopia”. This chapter aims to answer the systemic reasons for the major gaps identified from the data analysis of maternal death surveillance presented in chapter two of this document. The chapter clearly presents the purpose and objectives of maternal death surveillance its progress towards its objectives. The surveillance attributes: simplicity, flexibility, acceptability, representativeness, timeliness, data quality, sensitivity, cost, predictive value positive and usefulness of the surveillance system were also assessed and presented in the chapter. We used descriptive data analysis of the MDSR report in the region followed by a cross-sectional study of selected health facilities and key informants. We identified that the implementation process of the surveillance system at the region is not well coordinate and unavailability of training, guidelines, and feedback was a hindrance for good implementation of the system. The stability (scored 2.5/5), timeliness (score 3.1/5), acceptability and usefulness each of them (score 3.2/5) and representativeness (3.4/5) are attributes of the system, which identified as areas demanding improvement. There is a big disparity between the estimated number of maternal deaths and deaths reported through the surveillance system, which reduce the representativeness (calculated representativeness of 31%) of the system. The Federal Public Health Emergency Management Unit (PHEM) and Gambella Health Office should give focus to attributes that identified as areas’ demanding improvement, guidance and follow up are recommended to improve the representativeness of the system.

Chapter four: Describes assessment of Health Profile Description of Dilla Zuria district, Geode zone, SNNP region. In this chapter health and health-related data of the sub-city populations were evidently presented which is helpful for prioritizing high-flying problems and implement strategies against the major public health problems of the sub-city. The findings showed communicable disease was identified as a leading cause of morbidity in the both adult

and paediatric age group. Regarding MCH delivery service contraceptive acceptance was good and performance in ANC 4 follow up was lower as compared to ANC 1. A detail action plan showing identified problems and with proposed interventions were developed and submitted to the Sub city health office (it is also annexed in this document).

Chapter five: Presents Scientific Manuscript for Peer-reviewed Journals. The manuscript was prepared according to Bio-medical center manuscript guidelines. The manuscripts are on “, “outbreak investigation of Paederus dermatitis in three districts of Ethiopian metropolitan city, case-control study August 2018” and “A five-year retrospective study on Magnitude and Causes of Maternal Death in Ethiopia”.

Chapter Six: Presents Abstracts on “The first outbreak of Paederus dermatitis in three district of Ethiopian metropolitan city, case-control study August 2018”, “Measles outbreak investigation in remote part of Ethio- Somalia region: case-control study, October 2018”, “Improving Maternal Health services in Ethiopia: Evidence from MDSR Surveillance data analysis, 2016 - 2017 and “Evaluation of Maternal Death Surveillance and Response System in Gambella Region Western Ethiopia”.

Chapter Seven: Includes the narrative disaster situation report. Which was rapid need assessment conducted in Amhara region on an internally displaced population. It mainly focusses on health component but also it was highlighted other non-food and food item at mean times. The assessment was conducted in three zones in four IDP site namely Finto Selam, Wenberima, Chagni and Aymba from February 13-19/2019. Semi-structure question and site observation were used to extract the data. A total of 51064 were reported in the assessed site from them central Gonder were hosted 44633(87.3%) IDP from assessed site followed by East Gojam which account 5883(11.5%). Aymba, Tkl dngay and Chilga 1 were contributed 32401(60.5%) from total thirteen IDP site of assessed place. A total of 1083 case were treated in Aymba mobile clinics, but no record was found others assessed IDP site. 102 latrines were availed for the IDP community. Unavailability of regular nutritional screening, mass vaccination for epidemic-prone illness and Well prepared EPRP is seen in all site. Poor coordination among sector (expect the regional level) and limited involvement partner were observed which result in deteriorated the humanitarian situation in the region.

Chapter Eight: Contain an epidemiological project protocol entitled “. Assessment on Level of preparedness in managing obstetrics complication in Ethiopia, 2019” This project bases from my one output finding suggest that most maternal deaths were preventable at community and

health care provider level. This study focuses on assessing the level of readiness among health facility in managing obstetrics complication to avert unwanted outcomes of pregnancy-related complication. Facility-based crossed sectional study will conduct in selected 1094 health facility. The findings of the study will share to all stakeholders for possible policy interventions.

Chapter Nine: This chapter is the final chapter of the compiled body of work contain two additional outputs which are weekly epidemiological bulletin and Front-line field epidemiology training given for district PHEM officers located in the Oromia region.

Annex: In this Document, there are eight annexes containing different questionnaires and useful documents used during accomplishing the two years' residency outputs.

Chapter One- Outbreak Investigation

1.1 Outbreak investigation of *Paederus dermatitis* in three districts of Bole sub-city, Addis Ababa city Administration, Ethiopia, August 2018

Abstract

Background

Paederus dermatitis is peculiar irritant contact dermatitis caused by a beetle of genus *Paederus* (rove beetle) due to crushed on the skin realizing vesicant pederin which result in acute inflammation. These beetles are found in many tropical and sub-tropical habitats. In Ethiopia, *Paederus dermatitis* has not reported previously. On July 28, 2018, public health emergency team were received 12 cases with erythema, itching, burning sensation after contact with the beetle. We investigate with the aim of confirming and identify the factor associated with the outbreak.

Methods

We conducted a case-control study during August 10-22, 2018 in district 10,11 &15 in Bole sub-city, Addis Ababa. Cases were defined as District 10,11&15 residents of bole sub city who have itching, burning sensation, and blister or may also present with pustules and temporal blindness who has contact with rove beetle with last three days prior to developing sign and symptom during the study period. Controls were persons at the community on the same day without any symptoms, unmatched 2:1 ratio. We interviewed participants with a standardized questionnaire. We abstracted demographic and clinical data from line list and questioner, and it was analysed in SPSS version 23.

Results

Seventy-five cases were identified; fifty-five (77.3%) were female, with a mean age of 22.9 ± 16.9 (range 0.5-70) and only 41.3% case was aware of the illness. Itching, burning sensation, the pain was presented in 98.7%, 96.0% and 93.5 % of cases. Sixty (80%) cases were presented with one lesion and fifty-two (69.3%) lesion was occurred in faces. Erythema was common lesion feature reported in all case and seven (9.3%) cases were presented with the kissing lesion. The tropical steroid was used thirty (40%) of cases. In multivariable, a factor associated with illness included the presence of outdoor light (AOR=12.9, 95% CI 4.22-39.5, $P=0.003$), the presence excess vegetation AOR 10.4 95% CI (2.8- 38.7) $p=0.001$ and use soap after contact with a beetle (AOR=0.04, 95% CI 0.01-0.13, $P=0.002$) were independently associated with outbreak.

Conclusion

The outbreak was confirmed, and the risk factor was the Presence of outdoor light, excess vegetation and usage of soap after contact. Educating the public about the illness in a way addressing that identification of beetle and avoid contact with the beetle. Reducing burning outdoor light, clean excess vegetation and use soap after contact with beetle can be recommended as the preventive measure.

Introduction

Background

Dermatitis linearis refers to an acute skin condition caused by exposure to the potent toxin pederin, found in certain species of the subfamily Paederina in the staphylinidae family of beetles in the class of Insecta. Paederus beetles are relatively slender and can be uniquely identified by their size (1.5 mm wide and 7–10 mm in length) and colouring (black head with red, russet or orange thorax). The typical red or orange colouring is aposematic, warning predators that the beetle is toxic. The Paederus genus has approximately 622 species, 30 of which have been shown to cause linear dermatitis or to contain the pederin toxic agent. Paederus belongs to the is widely distributed throughout the world, except in Antarctica. The name Nairobi fly or Kenya fly applied to two species of beetle which live in East Africa, Paederus eximius, and Paederus sabaeus [1].

Pederin is a complex non-protein molecule, highly toxic, more potent than cobra venom. It inhibits protein synthesis and prevents cell division. Pederin (C₂₅H₄₅O₉N) is amide with two tetrahydropyran rings the toxin constitutes only 1% of the total insect body weight, pederin is incredibly potent even in small concentrations, with the ability to totally inhibit cell growth at concentrations as low as 1.5 Nanograms per millimetre [1,2]. Recently, the production of pederin is depended on the activities of an endosymbiont with Pederin. The manufacture of pederin is mostly confined to adult females, larvae and males pederin is very small quantities compared to female. The active agent is commonly referred to as pederin, although depending on the beetle species it may be one of several similar molecules including pederone and pseudopederin. besides pederin substance also occurred in lichen and marine sponges [2]. Furthermore, other local names given to Paederus dermatitis include spider-lick, whiplash dermatitis and Nairobi fly dermatitis across the different contents of the world [3].

History of outbreak

The first report of dermatitis linearis dates to the late nineteenth century, when local staff stationed at the Anjet-Kidoel lighthouse in Java, Indonesia, suffered from skin irritation after encountering an ant-like beetle that was later identified as Paederus. Since then Outbreaks of PD have been reported in several countries including Africa, South America, Turkey, Iran, and Asia. A major outbreak involving 2,000 cases of vesicular dermatitis was reported in Okinawa in 1966. However, several dermatosis outbreaks reported before and after Okinawa in America

across the different content of the country [4]. Most of the outbreak was reported in Asia continent. It is illustrated in the table below.

Table 1.1: Number and year of the reported outbreak in the different continent of the world in 2018

S.no	Continent reported	year of outbreak reported
Asia		
1	China	Three outbreaks in 1990 and 2009
2	India	1961, 2006, two outbreak of 2007 and three outbreaks in 2013
3	Indonesia	1901
4	Iran	2003 and 2008
5	Iraq	2008 and 2009
6	Japan	1942 and 1968
7	Malaysia	1993,2008 and two outbreaks in 2013
8	Nepal	2013
9	South Korea	1989,1995 and 2007
10	Sri Lanka	1997
11	Taiwan	1969
12	Thailand	2011
Africa		
13	The central African Republic	1994
14	Democratic Republic of Congo	1921 and two outbreaks in 1994
15	Egypt	1996,2010 and 2013
16	Guinea	1922
17	Kenya	1993,1998 and 2005
18	Namibia	1963
19	Nigeria	1963,1989,1990 and 1996
20	Sierra Leone	2006
21	Sudan	2012
22	Tanzania	1981,1993 and 1998
23	Uganda	1963
Europe		
24	Bosnia	1996
25	France	2013
26	Italy	1993 and 2013
27	Russia	1995
28	Turkey	199,2002 and 2014
Americas		
29	Amazon river	2001
30	Argentina	1931

31	Arizona	1999
32	Brazil	1994
33	Ecuador	1945
34	Panama	1982
35	Peru	2002
36	Venezuela	1966,2001 and 2013
Oceania		
37	Australia	1996 and 2001
38	Papua New Guinea	1996

Location and species

Three different genera of rove beetles, all members of the same subtribe Paederina, can cause paederus dermatitis: Paederus, Paederidus, and Megalopaederus. This irritant is called pederin and is highly toxic, more potent than cobra venom.

In different parts of the world, different species of rove beetle cause Paederus dermatitis:[5]

- ✓ Paederus melampus, also known as the Manipal bug or Nitte Police, occurs in the Indian state of Karnataka. (Manipal is the name of a university town.) In a 2007 article titled 'Paederus Dermatitis', two dermatologists from Sri Devaraj Medical College in Karnataka identified the Manipal bug as Paederus melampus. They are also sometimes called "blister beetle", although rove beetles such as P. melampus are in a different family (Staphylinidae) than the blister beetle family Meloidae.
- ✓ Paederus brasiliensis, also called "El podo," causes dermatitis in South America. There is also a Venezuelan species, Paederus columbinus.
- ✓ Paederus fuscipes is probably the major agent that causes linear dermatitis in northern Iran. Whereas this disease is a rural difficulty in the south, mainly in villages or small towns, it is an urban problem in northern provinces along the Caspian Sea shore. The same species also causes linear dermatitis in Taiwan.
- ✓ Paederus australis is responsible for outbreaks of dermatitis in Queensland and the Northern Territory, and Paederus cruenticollis for outbreaks in southern New South Wales.
- ✓ Nairobi fly: Paederus crebrepunctatus and Paederus sabaeus both cause dermatitis in Central and East Africa.

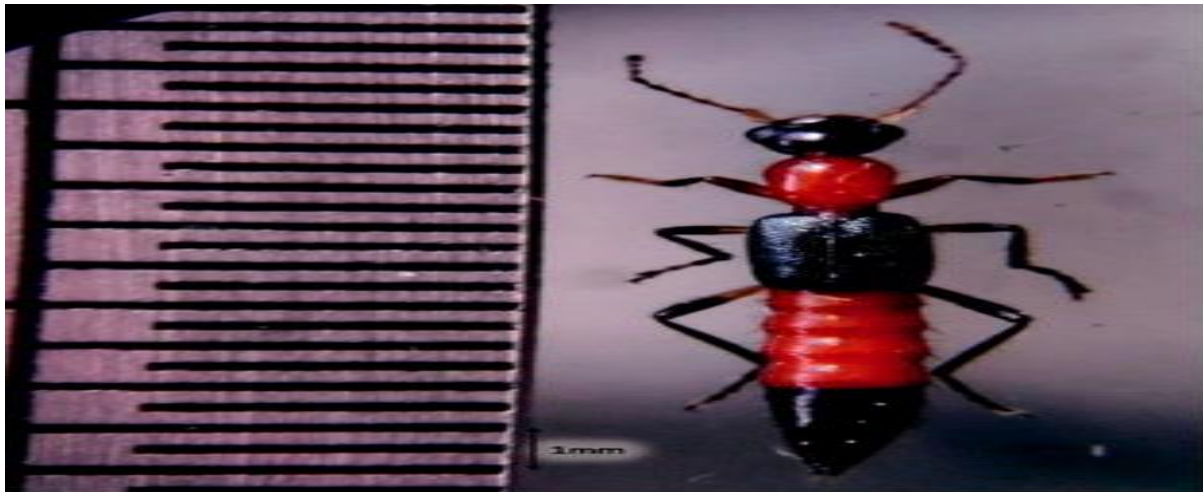


Figure 1.1: Paederus beetle collected in Moshi, Tanzania (Photo credit: Corey LeClair)

Sign and symptoms Sign and symptoms

Paederus dermatitis is an acute irritant contact dermatitis caused by pederin, a hemolymph fluid released when Paederus beetles are crushed against the skin. The dermatitis is characterized by erythematous-bullous lesions of sudden onset in exposed areas of the body: the neck was the most common site involved followed by the face. A periorbital predilection was present in 75 percent of the facial lesions [6].

On contact with the conjunctiva and/or cornea, Paederus sp. cause extensive painful pre-orbital swelling and purulent conjunctivitis known as Nairobi eye in Africa. Corneal erosions and blindness can follow. The effect of pederin is not immediately noticeable and only becomes apparent after 1 to 2 days. Dermatitis, often in the elongate pattern (dermatitis linearis), is a result of slapping the beetle and crushing and smearing a Paederus against and across the exposed skin, with the following symptoms [7].

- ✓ In mild cases, there is a slight erythema that begins at 24 hr. and lasts for approximately 48 hr. The patient complaints of peppery, burning, itchy sensation;
- ✓ In moderate cases, the erythema is marked and begin about 24 hr. after contact followed, after about 48 hr., by a vesicular stage, with blisters that enlarge gradually and attain maximal development within another 48 hr. The vesicles dry out over about 8 days, exfoliate to leave smooth, linear hyperpigmentation with wrinkling of the affected skin areas that can persist for a month or more;
- ✓ In severe cases, erythema, blisters, and pigmented scars usually are more extensive due to crushing several Paederus on the skin. In one outbreak attributed to the species *P. columbinus*, headache, fever, arthralgia, neuralgia, and nausea were also reported.

Additionally, Epiphora, or excessive watering of the eye, and conjunctivitis have been reported in cases where the eye itself has been exposed to pederin. In some cases, vision and the cornea remain relatively unaffected and intact; however, in more severe cases the cornea may be compromised [1]

- ✓ There may be Possible secondary infections in affected areas, post-inflammatory hyperpigmentation and extensive exfoliating and ulcerating dermatitis required hospitalization [8].

Transmission

The rove beetle (Nairobi fly's) circulatory system contains a strong toxin, apparently, this toxin is 15 times more poisonous than cobra venom, that causes blistering and burns on the skin like having acid on your skin (which the toxin in fact is). This happens if you crush the animal against your skin, and the worst is that the poison will spread to a wider area and if you rub the infected area against other parts of your body chances are, you'll get the toxin there too. As the animal is small, 6-10mm, it is easy to crush it by accident. You'll not notice it immediately, the itching and burning start 10-18 hours after you've been exposed to it. Healing takes time too, the rash will typically disappear within 10-12 days and may leave scars on the skin [9].

Risk factors

Nairobi fly is not a fly at all, but a small beetle. It does neither fly, nor does it sting or bite, but it can still cause some serious harm to us. Although it lives in rotting leaves and long grass, it's attracted by light and tries to get inside the house in the evenings.

Seasonal influence

Climate has a prominent effect on the activity patterns of *Paederus*, and sequentially epidemics of dermatitis linearis. Beetles are most active during the rainy season, after unusually wet weather patterns, and during hot and humid weather. Humid, wet conditions prevent desiccation of the beetle during flight and movement generally, thereby encouraging higher levels of activity and wider ranges of dispersal. Peaks of dermatitis linearis most commonly occur during the regional rainy season, though in some localities, population increases in *Paederus* and corresponding outbreaks occur after the rainy season when temperatures rise.²⁶ Interestingly, certain studies have also documented increases in dermatitis linearis in extremely dry conditions, postulating that beetles may seek shelter in-doors in order to escape extreme heat [10].

Human exposurer and activity

Paederus beetles most commonly inhabit crop fields but can also be found in marshes and riverbanks. Beetles migrate to residential areas for a variety of reasons. Paederus beetles are attracted to sources of artificial light. Sources such as light towers and indoor lights have been documented as beacons that induce increased beetle migration to human populated areas such as military bases, bus stops, and housing. Additionally, aggravation of inhabited croplands through harvesting processes such as plowing, tilling and burning may drive Paederus beetles out of the fields into more residential areas. The use of insecticides that target crop pests, consequentially diminishing the amount of available prey, may influence the dispersal of beetles from the fields into nearby residential areas in search of food. Generally, the risk of exposure increases as urbanization facilitates the overlap of beetle and human habitat; however, it should be noted that urbanization may also reduce beetle populations through the destruction of natural habitat [1].

Night-time contact with Paederus beetles is most common. Attracted to artificial light, beetles migrate into houses through open doors or windows. Patients in case series studies frequently report waking up with unexplained lesions or itching the next day, suggesting that accidentally crushing beetles while sleeping is a prominent form of exposure. Standing near light sources outdoors at night also results in increased beetle contact. Exposure may also occur during the day, usually through occupational activities [11].

Differential Diagnosis

Paederus induced keratitis has also been reported. The clinical differential diagnosis includes acute allergic or irritant contact dermatitis, thermal burns, chemical burns, herpes zoster, herpes simplex, and bullous impetigo. An important differential diagnosis to consider is phytophoto dermatitis as there are many similarities between the two conditions including linear asymmetrical erythema, blister formation and depigmentation [12].

Case and outbreak management

Experts agree that affected patients should be managed as irritant contact dermatitis, with the removal of the toxin by immediate washing with soap and water. Primary prevention by increasing public awareness during outbreaks, decreasing the use of artificial lights at night and using mosquito nets is advocated by several authors [12].

Epidemiology of *Paederus dermatitis* in Ethiopian

The rove beetle was reported in most of eastern Africa and a lot of outbreak was documented as well as reported. However, in Ethiopia, there is no reported and documented outbreak as well as epidemiological data that shown as the prevalence and which used as a reference. Even if, a rumour of cases was from western Ethiopia frequently. Besides, there is no stated threshold to declared as outbreak from WHO or CDC.

Objective of the Outbreak Investigation

General Objective

To assess the distribution and associated risk factors of Paederus dermatitis outbreak in three districts of Bole sub-city, Addis Ababa city administration

Specific Objectives

- ✓ To describe the distribution of cases in terms of place, person and time, in district
- ✓ To confirm the existence of the outbreak in the district
- ✓ To identify potential risk factors for the Paederus dermatitis outbreak, in the district
- ✓ To implement control and prevention measures for Paederus dermatitis outbreak in the district

Materials and Methods

Study Area and Period

The Investigation was conducted in Addis Ababa city administration, in Bole sub-city, three districts of the sub-city. Based on the information we get from the local authority; the sub-city has 328,900 populations from which 154,542 were male and 174,358 were female with a population density of 122.85 sq. km. The cases were actively reported from the district (10,11 and 15). The study was conducted from 10/07/2018-22/07/2018.

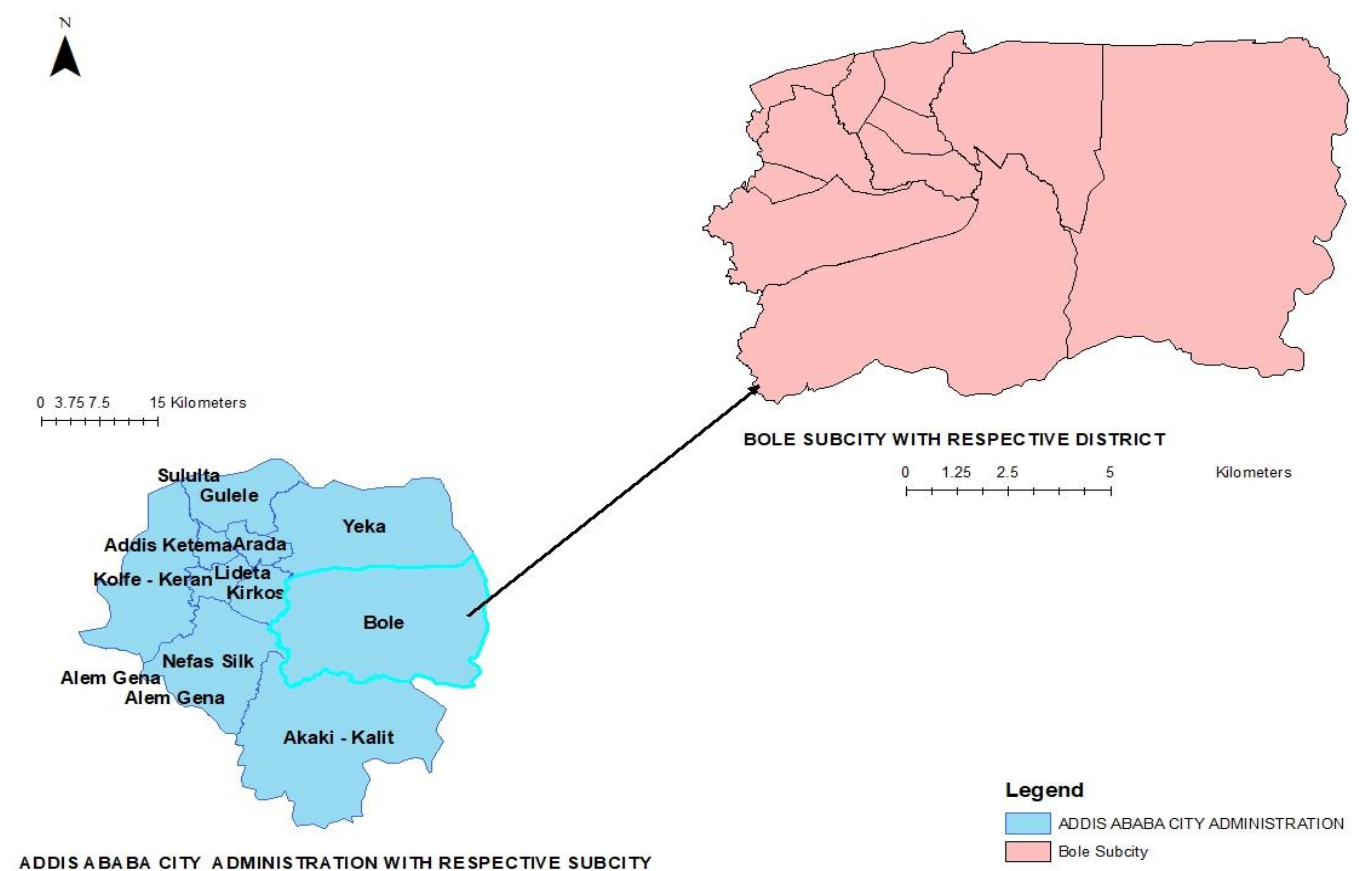


Figure 1.2: Map of Bole sub-city, Addis Ababa city administration, Ethiopia, 2018

Study Design

We applied a descriptive analysis of the collected line list of cases followed by partially matched case-control study with a case to control the ratio of 1:2, in order to identify the possible risk factors of the outbreak.

Source population

The source population this study resident of Bole sub-city who resides in district 10,11and 15.

Target population

The population who resides in three districts of the sub-city

Sampling Method

We selected 75 cases which were cases recently and those who were active during the investigation period and using a 1:2 case to control ratio we selected 150 controls who were neighbor of cases.

Sample size determination

The sample size was determined using EPI-info version 7 by means of *STATACALC*. The following assumption was used: two side confidence level of 95% with a power of 80%. The percent of control exposed was 30% and percent case with exposure was 49.1 % with minimum expected odd ratio was 2.25 obtain from Malaysia study [10].

Sampling procedure

Since the study was community-based case and control were selected using neighbor methods. Controls were selected who was the neighbor of cases reside in the left and right of the cases.

Data collection procedure

Case definition and selection of cases and controls

Working case definition

Any person with itching, burning sensation, blister or any other lesion who have contact with beetle and resides in three districts of bole sub-city (10,11&15) during the study period.

Cases- Are individuals, which fulfills the above criteria and all reported cases were included in the study

Controls- Are individuals, who do not fulfill the above criteria and selected from a similar village where cases were identified

Data collection procedures and tool used

A. Document review- since there was no compiled line list from the District, we reviewed the document prepared by health extension workers.

B. Discussion with key informants: the discussion was held with PHEM team members starting from A.A PHEM office to each district PHEM offices.

C. Interviewing cases and controls- Using a structured and semi-structured questionnaire (annexed at Annex 1), case and controls were interviewed by three data collectors (including the principal investigator)

D. Environmental observation- we were observed each district who reported the case with entomology team sample of species were taken for confirmation.

Data Quality Assurance

Before the start of data collection, a brief orientation was given for data collectors. Each completed questionnaire was daily reviewed by the principal investigators to monitor the data quality. Before analysis, data were also cleaned for any missing and logically inconsistent values.

Data processing and analysis

Different data analysis software was used in the analysis process from Microsoft Excel version 2016 to SPSS version 23. Data collected for cases and controls were entered in SPSS. However, line list analysis was carried out using excel.

Data analysis procedure for SPSS dataset were list as follow

- ✓ Bivariate analysis was conducted using logistic regression with entering method for search potential risk factor
- ✓ Next to this variable which had significant association were taken with P-value 0.05 and below

Ethical considerations

Before the filed investigation, a formal letter was written by Ethiopian Public Health Institute (EPHI) to Bole sub-city health officials to get permission and facilitate the investigation process. Before data collection, informed consent was taken from all respondent cases as well as control. Furthermore, any information related to personal identification was not used in the report.

Dissemination Plan

This study report was submitted to the Ethiopian Public Health Institute and Addis Ababa University, School of Public Health. The result was submitted to Addis Ababa PHEM offices and to Bole sub-city with respect district of sub-city the manuscript of the report can be published in peer-reviewed journals to reach the scientific community.

Results

Overall description of the outbreak

Cases were started to report from 08/06/2018: however, it started to notify to the concerned body very lately. It was affected three districts of the sub-city within the month of June and July. A total of 122 cases were reported as sub-city with no death.

Description by person

Regarding the personal element of the outbreak 87(71%) were female and 35(29%) were at the age group of 15-44.

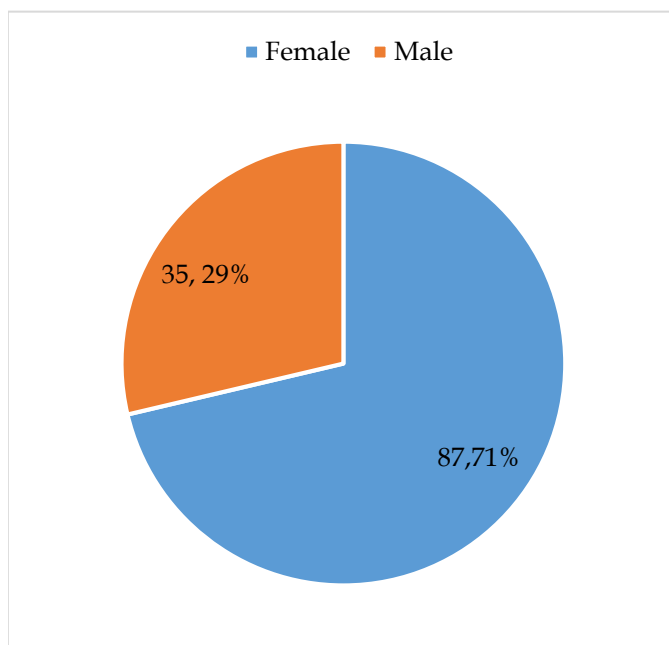


Figure 1.3: Distribution of cases by sex in bole sub city, Addis Ababa, Ethiopia 2018

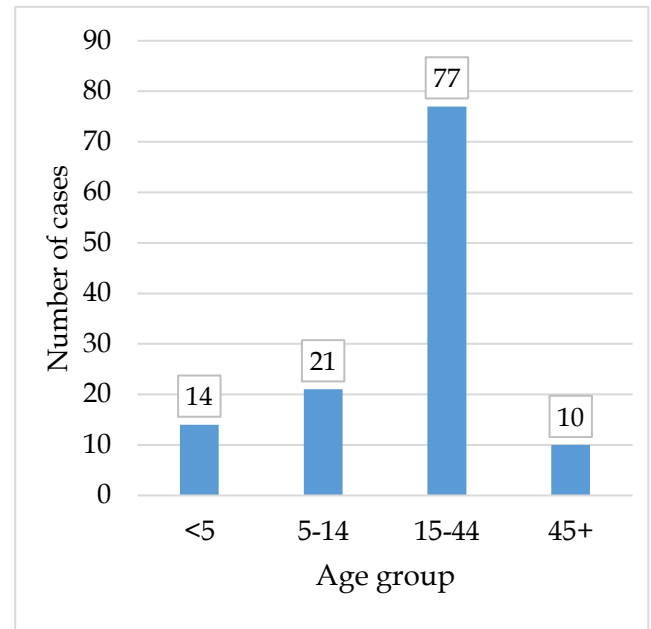


Figure 1.4: Distribution of case by age group in bole sub city, Addis Ababa, Ethiopia 2018

Distribution by place

Three districts of the sub-city were affected by the outbreak 53(43.4%) cases were reported from district 15 followed by district 10 by reporting 48 (39.3%) of total cases.

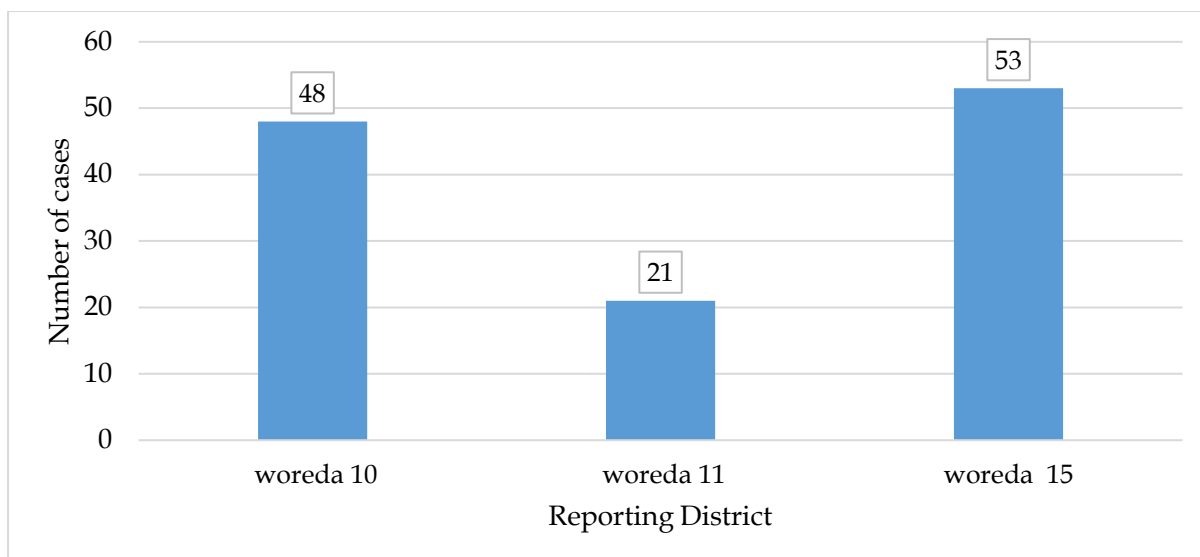


Figure 1.5: Distribution of the case by the district in bole sub city, Addis Ababa, Ethiopia 2018

The total attack rate was 2.3 per thousand population the highest attack rate was in district 15(4.9/1000) and the lowest was seen in district 10(1.5/1000).

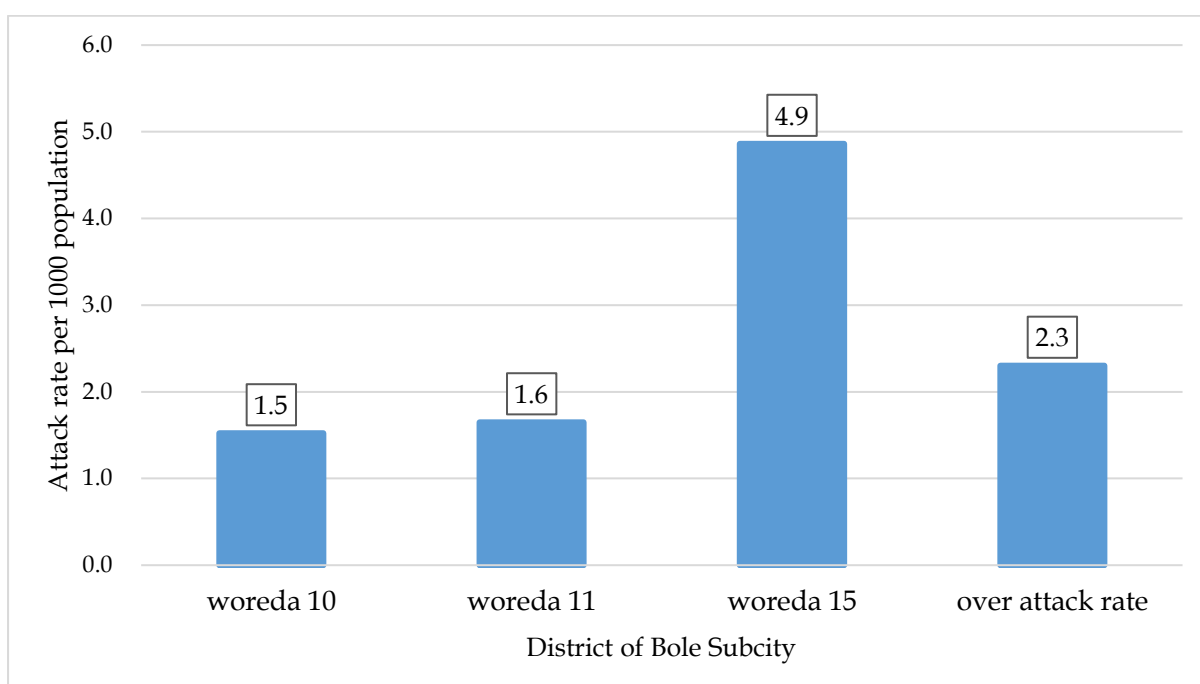


Figure 1.6: Attack rate *Paederus dermatitis* in bole sub city, Addis Ababa, Ethiopia 2018

Distribution by time

Starting from 8/06/2018 122 cases were reported in the sub-city and 74(61%) cases reported during June.

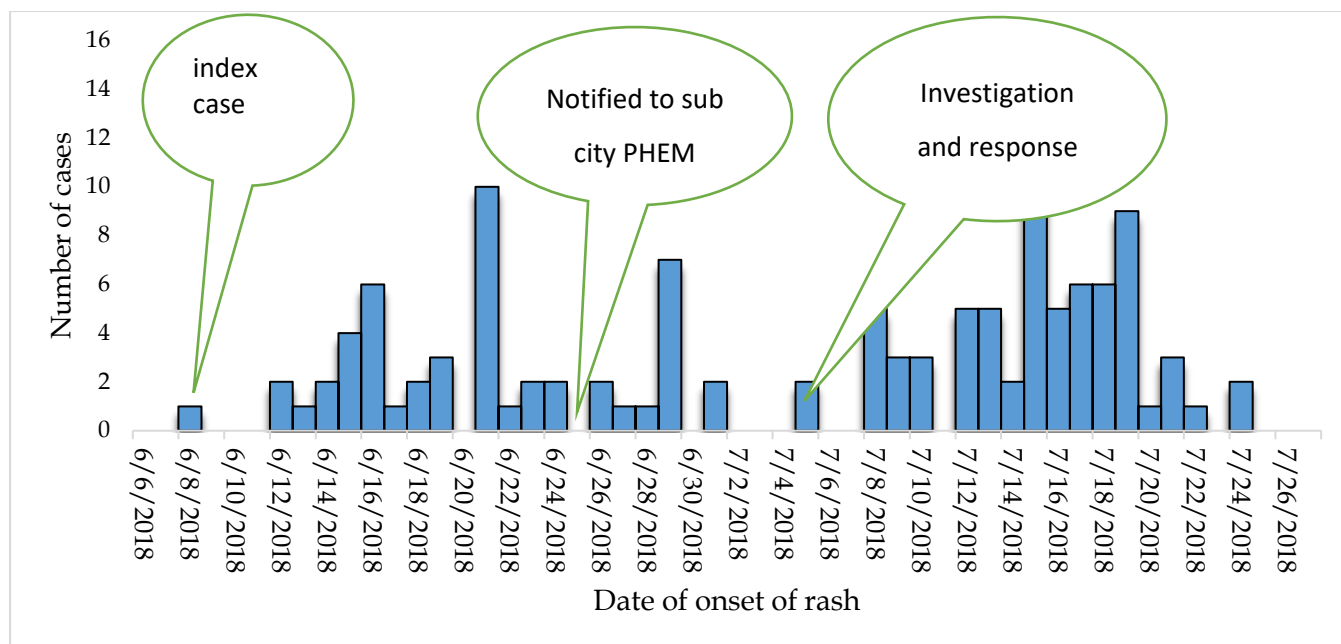


Figure 1.7: Epi-curve of 'Paederus Dermatitis' in bole sub city, Addis Ababa, Ethiopia 2018
Confirmation of the existence of the outbreak was done by taking an environmental sample from the threedistricts in which cases was reported. The entomological investigation was revealed that Paederus were responsible for the outbreak in the sub-city.

Description of an outbreak investigation

Socio-demographical characteristics

Seventy-five cases and one hundred fifty cases were taken for further investigation of the outbreak. From total cases 55(77.3%) were female, 24(32%) were have Oromo ethnicity, with 45(60%) orthodox religion follower. The mean age of cases was (22.9±16.9) with a minimum of 6 months and with a maximum of 70 years. The detail will explain in the table below.

Table 1.2. Social demographic characteristics of case and control in bole sub city, Addis Ababa, Ethiopia 2018

Social demographic characterizes	Case (%)	Control (%)
Sex		
Male	20(26.7)	34(22.7)
Female	55(73.3)	116(77.3)
Ethnicity		
Oromo	24(32)	40(26.7)
Amhara	15(20)	30(20)
Tigraway	21(28)	42(28)
Gurage	12(16)	16(10.6)
Others	3(4)	22(14.7)
Religion		

Orthodox	45(60)	83(55.3)
Muslim	15(20)	28(18.7)
Protestant	12(16)	37(24.7)
Catholic	3(4)	2(1.3)
Educational status		
Illiterate	6(8)	0(0)
Read and write	4(5.3)	1(0.7)
Primary	36(48)	44(27.3)
Secondary	18(24)	61(44)
Above secondary	11(14.7)	42(28)
Marital status		
Single	34(45.3)	59(39.3)
Married	34(45.3)	80(53.3)
Divorced	4(5.3)	7(4.7)
Window	3(4)	4(2.7)
Place of residence		
District (10)	28(37.3)	48(32)
District (11)	11(14.7)	26(17.3)
District (15)	36(48.6)	76(50.7)
Place of resident floor		
Ground floor	6(8)	15(10)
First floor	18(24)	35(23.3)
Second floor	7(9.3)	17(11.3)
Third floor	16(21.3)	47(31.3)
Fourth floor	28(37.3)	36(24)

Knowledge status of cases

The cases were asked a list of question to measure their knowledge on the paederus dermatitis disease and the summary of the result is displayed in the table below.

Table 1.3. Distribution of knowledge status cases about paederus dermatitis disease in bole subsidy, Addis Ababa, August - 2018

Knowledge question	Count	Percentage
Do you know Paederus before		
Yes	31	41.3
No	44	58.7
Cause of dermatitis		
Insect	46	61.3
Curse	2	2.7
Parasites	17	22.7
I don't know	10	13.3
Where do you for treatment		
Health facility	48	64
Stay at home	27	36
Treatment		
Modern treatment	53	70.7
Traditional treatment (home-made ready)	22	29.3

Previous medical history

The cases were interviewed about their previous medical history for further confirmation of the cases and the summary of the will displayed in the table below.

Table 1.4: Distribution of previous medical history among case in bole sub city, Addis Ababa, Ethiopia, August 2018

Previous medical history	Count	Percentage
Diabetes's Mellitus		
Yes	4	5.3
No	71	94.7
Hypertension		
Yes	3	4
No	72	96
Know allergy		
Yes	0	0
No	75	100
Tuberculosis		
Yes	0	0
No	75	100

The responders were asked for the common sign and symptoms and itching 74(98.7%), pain 72 (96.0%), burning sensation 70 (93.5%) the top identified symptoms. The incubation period the illness lay between from one day up to three days and the majority of the 59(78.9%) presented with lesion after two days after contact. Regarding the number of lesions 60(80%) were presented with one lesion.

Table 1.5: Distribution of cases by an incubation period, number of lesion and sign& symptom in bole sub city, Addis Ababa, Ethiopia 2018

Characteristics of the illness	Count	Percent (%)
Incubation period		
One day	10	13.3
Two day	59	78.9
Three day	6	8.0
Number of lesions		
One lesion	60	80
Two lesions	12	16
Three lesions	3	4
Sign and symptom		
Itching	74	98.7
Pain	72	96.0
Fever	6	8.0
Vomiting	0	0
Burning sensation	70	93.5

Site of lesion

The common site the lesion was on faces which accounts for 52(69.3%) cases followed by back 11(14.3%).

Table 1.6: Distribution of site of lesion among case in bole sub city, Addis Ababa, Ethiopia- August 2018

Site of lesion	Frequency	Percent
Face	52	69.3
Back	11	14.3
Back of neck	7	9.3
Shoulder	4	5.3
Lower Limb	5	6.7
Upper limb	7	9.3

Lesion feature

Regarding the lesion, feature case was interviewed, and physical examination conducted, and a summary is presented in the table below.

Table 1.7: Distribution of lesion feature among case in the district (10,11,15) bole sub city, Addis Ababa Ethiopia, August 2018

Lesion feature	Frequency	Percent
Erythema	75	100
Linear lesion	46	61.3
Vesicles	32	42.3
Pustules	14	18.7
Erosion	38	50.7
Kissing lesion	7	9.3

Treatment

The topical steroid was the most common treatment taken for dermatitis and other list treatments were describe below

Table 1.8: Distribution of treatment taken by cases in the district (10.11&15) Bole sub-city, Addis Ababa, Ethiopia, August 2018

Treatment taken	Frequency	Percent
Topical steroid	30	40
Anti-bacterial	23	30.7
Antihistamine	11	14.7
NSAID	6	8
Topical anaesthesia	0	0
Local treatment	20	20.7

Complication

The different kind complication may arise due to contact dermatitis starting from temporal blindness to residual pigmentation. The detail is presented in the figure below

Table 1.9: Distribution of complication among case in the district (10,11&15), Bole sub-city, Addis Ababa, Ethiopia, August 2018

Complication	Frequency	Percent
conjunctivitis	11	14.7
Temporal blindness	11	14.7
Secondary infection	15	20.0
Residual pigmentation	35	47

Risk factor

We conducted a case-control study selecting 75 cases and 150 controls unmatched for sex and age. Fifty-five of the cases were females and the overall mean age of the cases were 22.8 years (+/- 16.4 years).

Bivariate analysis

On bivariate analysis risk factor variables such as open window during night (COR 12.5 95% CI (6.43-24.20), P=0.003), presence of rotten leave around accommodation area (COR 7.10 95% CI (3.60 -13.86), p=0.000) and presence of outdoor light COR 6.00 95% CI (3.26 – 11.04), p=0.000) are some of the significantly associated factor with the illness.

Table 1.10: Bivariate analysis of risk factors for paederus dermatitis outbreak in the district (10,11 and 15), Bole sub-city, Addis Ababa, Ethiopia, August -2018

Variable	Case patient(%) (N=75)	Control (%) (N=150)	COR (95%CI)	P-values
Sex				
Female	55(73)	116(77)	1.24(0.65-2.35)	0.50
Male	20(27)	34(23)	*1*	
Number of floors reside				
Ground floor	6(8)	15(10)	0.52(0.18-1.49)	0.22
First floor	18(24)	17(11)	0.66(0.33-1.40)	0.28
Second floor	7(9)	17(11)	0.53(0.19-1.45)	0.22
Third floor	16(21)	47(31)	0.43(0.20-0.92)	0.03
Fourth floor	28(37)	36(24)	*1*	
Age group				
<5	10(13)	0(0)	1.52(0.61-3.79)	0.37
5-14	18(24)	7(5)	∞	0.99
15-44	39(52)	126(84)	8.3(3.2-21.3)	0.0001
>45	8(11)	17(11)	*1*	

Travel history				
Yes	11(15)	22(15)	1.0(0.46-2.19)	1.00
No	64(85)	128(85)	*1*	
Surrounded by farmland				
Yes	47(63)	73(49)	1.77(1.04-3.12)	0.048
No	28(37)	77(51)	*1*	
Close window before switching on the light				
Yes	24(32)	96(64)	0.26(0.15-0.48)	0.002
No	51(68)	54(36)	*1*	
Use Artificial light				
Yes	34(45)	97(65)	0.45(0.25-0.80)	0.45
No	41(55)	53(35)	*1*	
Open window during night				
Yes	52(69)	23(15)	12.5(6.4-24.2)	0.003
No	23(31)	127(85)	*1*	
Fluorescent lamp				
Yes	61(81)	83(55)	3.51(1.81-6.83)	0.002
No	14(19)	67(45)	*1*	
Rotten leave in surrounding				
Yes	61(81)	57(38)	7.10(3.6-13.9)	0.002
No	14(19)	93(62)	*1*	
Wear protective close				
Yes	42(56)	108(72)	0.49(0.27-0.88)	0.02
No	33(44)	42(28)	*1*	
Use pesticides				
Yes	16(21)	90(60)	0.18(0.10-0.35)	0.002
No	59(79)	60(40)	*1*	
Use repellent				
Yes	8(12)	44(290)	0.29(0.13-0.65)	0.003
No	66(88)	106(71)	*1*	
Checking for ceiling before bed				
Yes	33(44)	94(63)	0.47(0.27-0.82)	0.008
No	42(56)	56(37)	*1*	
Use bed net				
Yes	18(24)	92(61)	0.20(0.11-0.37)	0.003
No	57(76)	58(39)	*1*	
Use soap after contact				
Yes	24(32)	87(58)	0.28(0.16-0.51)	0.001
No	51(68)	63(42)	*1*	
Window screen				
Yes	28(37)	68(45)	0.43(0.24-0.76)	0.004
No	47(63)	82(55)	*1*	
Stay outside during night				

Yes	49(65)	68(45)	2.27(1.28-4.03)	0.005
No	26(35)	82(55)	*1*	
Presence of outdoor light				
Yes	53(71)	42(29)	6.00(3.3-11.0)	0.013
No	22(29)	107(71)	*1*	
Sleep on the floor				
Yes	36(48)	40(27)	2.53(1.42-4.53)	0.002
No	39(52)	110(73)	*1*	

*() * reference

P value will be significant at a value of < 0.05

Multivariate analysis

Six study variables were found independently significant in multivariate analysis from the variable who were significantly associated with the bivariate analysis. Presence of outdoor light has a risk of (AOR 12.9 95% CI (4.22-39.5), p=0.003) and presence rotten leave in the surrounding area has a risk of (AOR 10.4 95% CI (2.8-38.7), p=0.001). regarding protective risk factor use soap after contact has (AOR 0.04 95% CI (0.01-0.13), p=0.002). The detail is illustrated table below.

Table 1.11: Multivariable analysis of risk factors for paederus dermatitis outbreak in the district (10,11 and 15), Bole sub-city, Addis Ababa, Ethiopia August -2018

Variables	Yes/No	Case (%)	Controls (%)	AOR (95% CI)	P - value
Presence of outdoor light	Yes	53(71)	42(28)	12.9 (4.22-39.5)	0.003
	No	22(29)	107(72)	*1*	
Presence of rotten leave	Yes	61(81)	57(38)	10.4 (2.8- 38.7)	0.001
	No	14(19)	93(62)	*1*	
Wear proactive cloth	Yes	42(56)	108(72)	0.051 (0.01-0.23)	0.004
	No	33(44)	42(28)	*1*	
Usage of soap after contact	Yes	24(32)	87(58)	0.04 (0.01-0.13)	0.002
	No	51(68)	63(42)	*1*	
Sleep on floor	Yes	36(48)	40(27)	25.3(6.9-92.6)	0.002
	No	39(52)	110(73)	*1*	
Use repellent	Yes	8(11)	44(29)	0.09 (0.03- 0.33)	0.003
	No	66(89)	106(71)	*1*	

Environmental Investigation

After the case started to report the team were organized from the different office starting from national PHEM up health extension worker of each district. The team composition was multi-disciplinary included medical entomologist. All district who were reported cases environmental investigation was conducted. A sample of species was taken for further entomological study to entomology laboratory. Finally, the entomological investigation was revealed that *Paederus* were responsible for the outbreak in the sub-city.

Result in a qualitative interview

After discussing with the key informants, we have found the following findings from different respondent located in district. Miss Almaz from district 10 “The case was started to report before seven years, but it gets public health attention in this year”. Mr. Yonas health professional from district 10 health centre “The case to rise after the rainy season and it disappears after the end of the rainy season”. According to environmental investigation, higher number of cases were seen in the area which has a lot of rotten leave and swampy area. Besides this significant number of cases were reported in place who has several our door light. The most cases were also complaining that dermatitis result with residual pigmentation which ends up cosmetic disfigurement since most lesions occurred in the face. Some case also explained that using soap after contact also has a role in reducing pain and itching which come up with a contact of beetle. as we discussed with health professional also revealed that they were unaware of the situation and not consider as one differential diagnosis for similar illness. Here are some of the picture of the case with the different type of lesion and site lesion with that of complication.



Figure 1.8: Cutaneous manifestation and periorbital edema of dermatitis from paederus observed during the outbreak reported in district 10,11 and 15, Bole sub-city, Addis Ababa, Ethiopia August-2018.

Intervention

- ✓ Health education and awareness creation were done for the host community
- ✓ Aware of a health professional to consider as one differential diagnosis
- ✓ Environmental cleaning was done for a selected place which had rotten leave
- ✓ With the help of RRT and municipality of the district wasted were collected to dispose of the right place
- ✓ Reduced number of outdoor lights in condominium who was reported a significant number of cases

Discussion

Paederus dermatitis is a peculiar irritant contact dermatitis. It occurs when beetles of the genus *Paederus* belonging to the family Staphylinidae (rove beetles), order Coleoptera (beetles) are crushed on the skin, releasing the hemolymph pederin [14]. It is characterized by sudden onset of burning or stinging sensation with the appearance of vesicles and pustules on an erythematous base [15].

The outbreak of dermatitis in the bole sub city is characterized by an unusual increase in the the population of *Paederus* species as well as several cases of dermatitis in a different district that is located adjacent to farmland area. Most cases were reported from district 15 which surrounded by farmland and forest. The increase in the population of the *Paederus* species was found with an invasion of these beetles in the houses [1].

Regarding social demographic characteristics case, 87(71%) were female and 77(63%) were at the age group of 15- 40. The mean age of cases was (22.9±16.9) with a minimum of 6 months and with a maximum of 70 years. It reveals that all sex and age group are susceptible regardless of their social demographics character the only thing that matter for dermatitis is contacted with beetles [10].

The attack rate of sub-city was 2.3/1000 population the highest was seen in district 15 with an attack rate of 4.9/1000 and lowest was seen in district 10 with attack rate 1.5/1000. The reported case also varies from month to month 48(39%) were reported during June and 74(61%) case was reported during July which revealed that slight increment case as compare to the previous month. During the heavy season, it showed significant both density and case were revealed in the study conducted military campus. This explains that due to insect are highly sensitive to a disturbance. Habitat disturbances generally pose a serious threat to insects and trigger dispersal that results in the infestation of human settings [4,6].

The knowledge statues of the patient also assessed for the cases only 31% of cases know about dermatitis, 46(61.3%) believe that caused by insect and 27(36%) remain at home for the treatment. Furthermore, previous medical history cases were reviewed in order to reduce differential diagnoses for them only four cases have diabetes millets, three patient has hypertension and no cases have known allergy.

The average duration of dermatitis was 1.9±0.5 days after the contact of the beetle. The incubation period ranges from one day to three days. Fifty-nine (78.9%) cases were reported dermatitis after two days and ten (13.3%) develop dermatitis with the first-day contact. A

similar study conducted Malaysia also shown incubation period were lasted from one up to four days [16].

The number of lesions is determined by the number of contacts with beetle sixty (80%) cases were presented with one lesion and twelve (16%) cases also presented with two lesion and remaining cases were also presented with three lesions at a time. A similar study conducted in Iran revealed that most cases were presented with multiple lesion (>3) at a time. consistency of the study carried out in India revealed that most cases were presented with a single lesion at a time. This explained that the number of the lesion is limited to number contact with beetle at the time [9,11].

The sign and system were determined by a substance called perdin which toxic occurred by beetle after crushing result in inflammation. The cases were presented with itching, pain, burning sensation and fever which was a common sign and symptom in 98.7%,96.6%,93.5% and 8% cases respectively. A study conducted in the hospital of Sri Lanka publicized that most common symptom of cases was parallel with our study [17].

Regarding site lesion all part of body expects (palm and sole) can be presented and matter on site of contact. Faces were a most common site which affects 52(69.3%) cases followed by back which account 11(14.3%) cases. A study conducted in Iraq, Malaysia and Sri Lanka also shown a comparable result. this explained most uncovered part of the body usual like faces and neck are more vulnerable [17,18,19].

The lesion features also differ from patient to the patient from erythema up to erosion. all case was had erythema, forty-six (16.3%) cases were a linear lesion, thirty-two case also presented with vesicles. Besides case also presented with a pustule, erosion and kissing lesion at the proximal part of the body in 18.7%, 50.7%, and 8.3% cases respectively. A similar study conducted in Sri Lanka also revealed that most cases have similar lesion feature but in some case, regional lymphadenopathy was reported [17]. beside comparative finding was occurred in India study the most common morphology of lesion was erythema with that of vesicles and bullae [20]. The extent morphology is determined by the dose of toxin which contacts with our body.

The treatment of paederus dermatitis traditionally considers as a palliative; concerning the treatment was taken by the patient it comprises from local treatment to extent tropical steroid treatment. 40 %, 30.7%, 14.7%, 8% and 20.7% cases were taken tropical steroid, anti-bacterial, antihistamine, NSAID and local treatment was respectively. Low-potent or mid-strength

topical steroids and oral antihistamines reduce the swelling, the pain and the healing time. Antibiotics are usually not recommended, but in our series, we added fusidic acid 2% cream twice daily for a week, as we experience a high infection rate of Gram-positive in skin diseases in Luanda. In the case of general malaise, fever and headache, NSAIDs and analgesics should be prescribed. Systemic corticosteroids are reserved for patients with high exposure to pederin [21].

The different complication may arise due to paederus dermatitis it matters on amount and site contact with the substance. Our study revealed that different complication was recorded it ends with temporal up to permanent complication like conjunctivitis, temporal blindness, secondary infection, and residual pigmentation was reported in 14.7%,14.7%,20.7%,47% case respectively. A similar finding was observed in a study conducted in Malaysia, Sri Lanka, Austria and lecture review carried out in Africa have consistency with our study. The case ended up with some complication including conjunctivitis with preorbital edema (Nairobi eye in Africa) and residual pigmentation to extent of drip mark. This may explain complication is determined by the site of location, dose of the toxin, inflammatory process, and reaction of case and type of species [1,13].

our study revealed that the presence of outdoor light has a risk with the odds ratio of 12.9 (95% CI (4.22-39.5) ($p=0.003$) as comparing those have no outdoor light. A comparative study conducted in Sri Lanka, Panama, Malaysia also revealed that artificial light is one contributor that increases the chance of contact with the beetle. This explains that Paederus species are attracted by artificial light which is commonly located in the inhabitant of human and this increased the chance of contact with beetle inadvertently. Reducing burning light and use mesh (net) at light has a significant effect in reducing the number of cases. [14,17,22].

Presence of rotten leave also one factor which increased the risk for dermatitis. our study revealed that presence of rotten level including vegetation near the house has a risk with odds ratio 10.4 (95%CI (2.8-38.7) ($P=0.001$) as compared to those have no rotten leave to the surrounding. A comparative study conducted in India, Malaysia also revealed that the presence of rotten leave including vegetation and the presence of stagnant water and building under construction was related to the outbreak. This explained such sites were potential harbourage and breeding site for the beetles and their larvae. Besides normally the beetle was an inhabitant in the farmland area but urbanization makes the flight to human residency area [5,23,24].

Sleeping on the floor also one the factor which identified in this study and a person who was slept on the floor has a risk with odds ratio 25.3 (95%CI (6.9-92.6) (P=0.002) as compared to those who didn't sleep on the floor. A study conducted in a closed population set up like (military camp) and nut farmer of Turkey also indicated that sleep on the floor is a possible risk factor. This due to the increase the risk contact with beetle since they prefer to walk rather fly [8].

Wearing protective cloth (a cloth which has long sleeves) has a protective effect for dermatitis. this study revealed that wear protective cloth during the night has a risk with an odds ratio of 0.05(95%CI 0.01-0.23) (P=0.004). it means a person who wasn't wearing proactive cloth has 20 times at risk of developing as compared to those who were protective cloth. A similar study conducted in India also shows an effect in reducing contact dermatitis [20]. This explains due to the most affected part of our body which uncovered are more susceptible to dermatitis, so it helps by reducing coincidental interaction with the beetle.

Use repellent during the night is also found as one protective mechanism for dermatitides. our study revealed that use repellent during the night has a risk of dermatitis with an odds ratio of 0.09(95%CI 0.03-0.33) (P=0.003), it interpreted those who wasn't used repellent has 11 times likely to exposed to beetle as compared to those who use repellent. a different study conducted in Angola, Malaysia, and other literature review use repellent has positive impact reducing dermatitis: repellent like neem oil, common oil and use greasy ointments (which commonly used by our study participant) has a protective effect to dermatitis. This may explicate due repellent provides a protective layer for toxic which contact with our body [10,17,21].

Finally, in this study using soap after contact with beetle was shown the protective effect with an odds ratio of 0.04 (95% CI 0.01-0.13) (P=0.002), it means those who weren't used soap after contact has 25 times likely to develop dermatitis after contact as compared to those who used soap after contact. A study conducted in Panama also reported that removing the irritant by washing the area with soap and water has the potential to reduce the development of dermatitis. regarding health information and guidance on Nairobi, fly stated that pederin slowly acting toxin which can reduce and prevent dermatitis by washing with water and soap immediately after contact (crash) the beetle on the body [25,26].

Limitation

The study was included entomological investigation, but the investigation wasn't as such good identifying the species circulate in the sub-city. It is unable to provide beyond physical appearance the beetle like histopathological investigation and vector density across the district.

Conclusion

Paederus dermatitis is contact dermatitis that can affect every individual who has contact with beetle and it occurred during the rainy season. The sign and symptom depend on inflammatory process and reaction of host and it included erythema to the extent of different degree lesion with different morphology. The cases also have developed temporal complication like temporal blindness due to periorbital edema up to permanent complication like residual pigmentation. The circulating Paederus species wasn't identified in town which makes the response activity ineffective. However, Presence of outdoor light, rotten leave (with excessive vegetation) and sleep on the floor were identified as major risk factor prone to dermatitis. however, use repellent, wear protective cloth (a cloth which has long sleeves) and use soap and water immediately after contact with beetle has found a protective risk factor.

Recommendation

Community

- ✓ Reducing the number of burning outdoor light. if not possible use net (mesh) on light to reduce the chance of contact with the beetle.
- ✓ Clear excess and decomposing plants and foliage (rotten leave) around your accommodation and work areas
- ✓ Avoid sleeping on the floor in a way exposed to the beetle.
- ✓ Wearing appropriate clothing i.e. Long-sleeved tops and long trousers in outdoors and indoor activity during the high-risk season.
- ✓ Use repellent during the night it serves as a barrier to reduce contact with the beetle.
- ✓ If you crush a Nairobi fly, immediately wash your hands and the affected area with water and soap.

Health professional

- ✓ The physician needs to consider as one differential diagnosis during the rainy season in order to early diagnosis and prompt treatment.

Health office of the sub-city

- ✓ Creating awareness regarding rove beetle, its management and control tactics through routine health extension program in bole sub-city.

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1.2 Investigation of a measles outbreak in Mubarak district, Dawa zone, Somalia region, October 2018

Abstract

Background

Measles is a highly contagious disease causes significant morbidity and mortality in Ethiopia. On 24/10/2018, we received a report of suspected measles outbreak from Mubarak district from Somalia region, Ethiopia. We investigate the outbreak with the aim of confirming the outbreak and to identify risk factors associated with measles transmission during the outbreak.

Methods

On October 27, 2018, both descriptive & unmatched case-control study was conducted. 35 case were selected with criteria of fever, rash, cough, and coryza in Mubarak district from September 27 to October 13, 2018. seventy neighbor control were selected randomly. We reviewed data from the health office. Case and control were interviewed using questioner. univariate and Multi-variate analyses were conducted, and odds ratio were calculated using SPSS version 23.

Result

Starting from the date of 09/09/2018 up to 28/09/2018, a total of 35 suspected case were reported with five deaths. The over attack rate and the case fatality rate was 5.7/10000 population and 12.5% consecutively. The mean age cases were (12.1±11.5) with a range of 6months up 50 years. The most affected age group were less one year old (AR 32.8 per 10000 population). Out of five blood samples, three become positive for measles IgM. Among the cases, only 9(24.7%) are vaccinated. We compared 35 cases to 70 controls. Being vaccinated against measles (AOR 0.19 95%CI (0.04-0.81), $p=0.03$) & know the mode of transmission of measles AOR=0.06 95%CI (0.01-0.37), $P=0.003$) are protective factor for measles. Contact with the affected person in neighbor (AOR7.23 95%CI (1.32-39.6), $p=0.001$), & Travel to measles outbreak confirmed area were 30.7 95% CI (4.1-232.5), $p=0.001$) and being malnourished (AOR=5.48 95%CI (1.21-24.8), $p=0.03$) significant risk factors for contracting measles.

Conclusion

The measles was confirmed, and the risk factor was low vaccination coverage, not know the mode of transmission, have contact with measles case, travel to measles confirmed area and being malnutrition. Improved the vaccination coverage via routine and catch up immunization, strengthen the routine nutritional screening program and providing of health promotion information with messages emphasizing measles prevention are recommended.

Background

Introduction

Measles is an acute viral illness caused by a virus in the family paramyxovirus, genus Morbillivirus. Measles is a highly contagious viral disease that is characterized by a prodromal illness of fever, cough, coryza, and conjunctivitis followed by the appearance of a generalized maculopapular rash [1]. According to the World health organization (WHO), Measles is one of the leading causes of death among young children even though a safe and cost-effective vaccine is available. Globally, measles remains a leading cause of childhood deaths and an estimated 160 000 children die each year from complications of the disease in 2015, there were 134 200 measles deaths globally – about 367 deaths every day or 15 deaths every hour [2].

Before the introduction of measles vaccine in 1963 and widespread vaccination, major epidemics occurred approximately every 2–3 years and measles caused an estimated 2.6 million deaths each year. But, now days approximately 110 000 people died from measles in 2017 it reduced by 80% as compared to 2000 which was 545000 deaths per year: most of them were children under the age of 5 years. despite, the availability of a safe and effective vaccine. Accelerated immunization activities have had a major impact on reducing measles deaths. During 2000– 2017, measles vaccination prevented an estimated 21.1 million deaths [3].

Signs and symptoms

Measles is a serious infection characterized by high fever, an enanthem, cough, coryza, conjunctivitis, and a prominent exanthem. After an incubation period of 8-12 days, the prodromal phase begins with a mild fever followed by the onset of conjunctivitis with photophobia, coryza, a prominent cough, and increasing fever. Koplik spots represent the enanthem and are the pathognomonic sign of measles, appearing 1-4 days prior to the onset of the rash. They first appear as discrete red lesions with bluish white spots in the center on the inner aspects of the cheeks at the level of the premolars. They may spread to involve the lips, hard palate, and gingiva. They also may occur in conjunctival folds and in the vaginal mucosa. Koplik spots have been reported in 50-70% of measles cases but probably occur in the great majority. Symptoms increase in intensity for 2-4 days until the 1st day of the rash. The rash begins on the forehead (around the hairline), behind the ears, and on the upper neck like a red maculopapular eruption. It then spreads downward to the torso and extremities, reaching the palms and soles in up to 50% of cases. The exanthem frequently becomes confluent on the face and upper trunk. With the onset of the rash, symptoms begin to subside. The rash fades over

about 7 days in the same progression as it evolved, often leaving fine desquamation of skin in its wake. Of the major symptoms of measles, the cough lasts the longest, often up to 10 days. In more severe cases, generalized lymphadenopathy may be present, with cervical and occipital lymph nodes especially prominent [4,5].

Transmission

Transmission is airborne, by droplet spread or by direct contact with the nasal and throat secretions of infected persons. Measles is one of the most highly communicable diseases in man, with a basic reproductive rate of 17-20 (i.e., the introduction of one case of measles in a completely susceptible community generates 17-20 new cases) [6]. Patients are contagious from 1 or 2 days before symptom onset until 4 days after the rash appears. Infectivity peaks during the prodromal phase. The mean intervals from infection to symptom onset and rash appearance are 10 and 14 days, respectively [7].

Risk factors

The reasons for the continuing transmission of measles viruses a lot of cause can be explained. The first one accumulation of susceptible individuals among older children and young adults who were not included in immunization schedules or missed routine vaccination in their childhood and did not get the natural diseases due to reduced opportunities for exposure with the decline of measles incidence after vaccine introduction. Besides the existence of pockets of low vaccination coverage in some population groups due to lack of access to health services or resistance to vaccination based on religious or philosophical beliefs [8].

In Ethiopian context the possible reasons for continued high incidence are: low routine immunization coverage, measles second dose has not yet been introduced in the routine immunization system, the proportion of children receiving measles vaccine before 9 months' age (receiving invalid measles doses) is high, estimated at 24 % nationally , suboptimal measles SIAs coverage, with post SIA coverage survey result of 90.9% for the 2013 measles SIAs, which is below the 95% coverage target for SIAs and SIAs conducted between 2006-2015 period targeted children under the age of 5 years only, (which account for only 42% of the cases) [9].

Additionally, Babies who are unvaccinated because they are too young, People who are unvaccinated for medical reasons (being immunocompromised or by fact of taking certain drug like chemotherapy or high doses of steroid) being incompletely vaccinated (not taking second booster dose), not developing immunity even if being fully vaccinated, malnutrition (vitamin

A deficiency) and travel to endemic area [10].

Forecaster of high measles occurrence in Ethiopia can be taken as a proportion of under-five children, the median age of measles cases, routine and SIA immunization coverage and population density can be considered as a predictor of measles incidence [9].

Differential diagnosis

Laboratory support is essential for definitive diagnosis, especially during periods of low measles incidence. Many illnesses are accompanied by fever, rash, and a variety of non-specific symptoms. In examining for measles, it is important to consider rubella, scarlet fever, exanthema subitum (roseola), dengue fever, and the early stages of chickenpox in the differential diagnosis. Moreover, there are other conditions that may present in a similar form, including erythema infectiosum, enterovirus or adenovirus infections, toxic shock syndrome, rickettsial diseases, and drug hypersensitivity reactions [11].

Complication

The different complication may rise from measles that can affect every system of the body. Respiratory system result in pneumonia (1-6%) cases, gastroenteritis system (diarrhoea (8%) of case and vomiting) and otitis media (7-9%) are a common complication. Moreover, the patient may develop some less commonly happen complication like upper airway obstruction from croup, corneal dried up the lead to corneal ulceration and encephalitis (1-2 per 1000 case) as well as responsible for the almost uniformly fatal subacute sclerosing panencephalitis (SSPE), seen several yr. after infection at a frequency of 1 per 100,000 cases [12].

Case and Outbreak Management

supportive treatment is appropriate for most cases of measles. If bacterial superinfection is suspected, antibiotic therapy is necessary. Generally, specific antiviral therapy is not recommended. Severe measles may occur in children with decreased serum levels of vitamin A, supplementation is considered in young children (at or over 6 months of age) who either have complications of measles, malnutrition, immunodeficiency, and impaired intestinal absorption, or who are recent immigrants from countries with high mortality rates due to measles [13].

Routine measles vaccinations for children, combined with mass immunization campaigns are key public health strategies to reduce measles deaths. The measles vaccine has been in use for over 50 years. It is safe, effective and inexpensive. The measles vaccine is incorporated with

rubella and/or mumps vaccines in countries where these illnesses are problems. It is equally effective in a single or combined form. Adding rubella to measles vaccine increases the cost only slightly, and allows for shared delivery and administration cost [8]

Laboratory Investigations

There are four recommended techniques for collecting specimens from suspected measles cases like (nasopharyngeal and conjunctival swab in addition blood and urine sample can be taken)[6]. In Ethiopia currently, a blood sample (serum specimen) and nasopharyngeal swab samples are the two sample types collected. A blood sample is for measles-specific IgM detection and a nasopharyngeal swab sample is collected for virus isolation in order to identify the genotype of the measles virus in a outbreak. World Health Organization (WHO) recommends the IgM indirect ELISA method for rapid confirmation of measles cases. The test can be run in one day so that results can be returned in a timely manner. The laboratory result has to be sent to the users to the maximum within 7 days [11].

Prevention mechanism

Immunization is the only effective preventive measure against acquiring measles. The measles vaccine is at least 95% effective and seroconversion rate is close 100%. Primary vaccine failure of the first dose at 12 months of age or older age occur in up to 5% of people due to the introduction of measles vaccine the death of measles is decreased from 550,100 deaths in 2000 to 89,780 in 2016 measles is still common in many developing countries [14].

During 2000–2017, estimated MCV1 coverage increased globally from 72% to 85% although coverage has remained 84%–85% since 2010, and considerable variation in regional coverage exists. Since 2013, MCV1 coverage has remained relatively constant in the African Region (AFR) (69%–70%), the Region of the Americas (AMR) (92%), the European Region (EUR) (93%–95%), and the Western Pacific Region (WPR) (96%–97%). During 2013–2017, MCV1 coverage increased from 78% to 81% in the Eastern Mediterranean Region (EMR) and from 84% to 87% in the South-East Asia Region (SEAR). West Pacific region (WPR) is the only region to achieve and sustain >95% MCV1 coverage since 2006. Among the 73 countries that receive funding through Gavi, the Vaccine Alliance (Gavi-eligible countries), MCV1 coverage increased during 2000–2017, from 59% to 79%. Globally, 118 (61%) countries achieved $\geq 90\%$ MCV1 coverage in 2017, an increase from 85 (44%) countries in 2000, and a slight decrease from 120 (62%) countries in 2016 [15].

Ethiopia adopted these regional goals and strategies and has been taking important steps to

control and ultimately to eliminate measles by 2020. Strategies for sustained measles morbidity and mortality reduction [11].

- ✓ Routine immunization of > 90% of children aged 9 to 11 months
- ✓ Provide a second opportunity for measles vaccination
- ✓ Case-based measles surveillance
- ✓ Improved case management including the provision of vitamin A.

Epidemiology and vaccination coverage of measles in Ethiopia

There was no documented immunization and epidemiological data regarding measles prior to 1980. Case-based measles surveillance was initiated in Ethiopia in 2003. Measles is also one of the immediately reportable diseases in Ethiopia surveillance system. Ethiopia has documented reported measles cases from 3332 in 2002 to 976 in 2018 of November [16,17]. However, completed data regarding measles report were started reported from 2006 and up to 2018. During these years a total of 67,927 confirmed cases reported out of 94,104 (70.9%) of the total reported cases: from confirmed cases, 31,925 (47 %) were reported in 2014 and 2015 which was 14,282 and 17,778 respectively each year. Measles incidence increased from 20 cases per million in 2006 to 194 cases per million populations in 2015 and declined to 49 per million in 2016 following the wide-age group measles SIAs.

Immunization, the coverage remained below 50% until 2003. It was 44% during 2003 its showmen slight increment in 2004 to 55%. According to the survey carried out during 2006 and 2012 revealed the coverage was 54.3 % and 68.2 respectively. Some report of MOF revealed that in 2015 the vaccination coverage was 90.3. The lowest is reported from Somalia region which was 35.9%. In contrast to this report, the EDHS, the coverage report was 54.3 it beat higher in the urban setup which was 76.0% and 51.2 % in a rural area. Region wise it was range from 93.1% in A.A to 30% of Somalia region. A recent report by MOH indicted that measles vaccination coverage was 94% in 2017 and it was a range of 100% from A.A and 70% in Somalia region [18,19,20].

Objectives of the outbreak investigation

General objectives

To determine the distribution and associated risk factors of Measles outbreak in Mubarak district

Specific objectives

- ✓ To describe the distribution of cases in terms of place, person and time in Mubarak district
- ✓ To confirm the existence of the outbreak in Mubarak district
- ✓ To assess the cold chain system in Mubarak district
- ✓ To identify factors, contribute to the Measles outbreak in Mubarak district
- ✓ To implement control and prevention measures for Measles outbreak in Mubarak district

Methodology

Study area and period

The Investigation was conducted in Somalia Region, Mubarak district in Oda Dima and Birkir Kebele, which situated 730 K.M from the capital city Addis Ababa. Based on the information we get from the local authority; the district has 69617 populations from which 8946 and 1218 are under five and under one aged population respectively. The district has a total of 3 health centers and 16 health posts which delivery health care service to the community. According to the administrative report, the current coverage of measles immunization is 82%. The district is administratively classified into 15 Kebeles. Oda Dima and Bidiru are two of the fifteen Kebeles in which the current outbreak of Measles happened. Oda Dima and Bidiru are situated 30 K.M and 50 K.M from the center of the district respectively. Both kebeles have 4361 populations, from which 520 and 76 are under five and under one-year aged population respectively. This investigation was conducted from September 27 to October 13, 2018.

Map of Mubarak District ,Somalia region,Ethiopia, Sep -2018

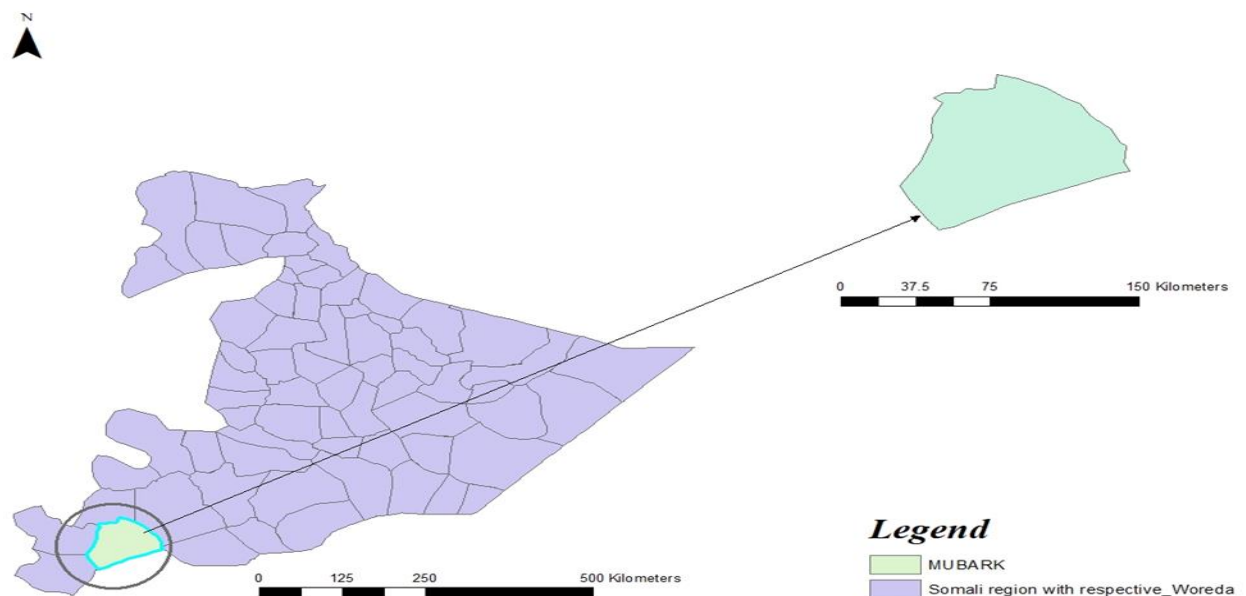


Figure 1.9: Map of Mubarak district in Somalia region, Ethiopia, September -2018

Study Design

We applied a descriptive analysis of the collected line list of cases followed by unmatched case-control study with a case to control the ratio of 1:2, in order to identify the possible risk factors of the outbreak.

Sampling Method

We included all reported 35 cases and using a 1:2 case to control ratio we selected 70 controls who were a neighbor of each case from the same village where cases were identified.

Case Definition and Selection of Cases and Controls

Case definition: The WHO adopted; national integrated disease surveillance case definition was used.

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

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

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

Cases- Are individuals, which fulfills the above criteria and all reported cases were included in the study

Controls- Are individuals, who do not fulfill the above criteria and selected from a similar village where cases were identified.

Data Collection Tools and Procedures

The following procedures and tools were used to collect data during the investigation.

- A. Document Review- We reviewed the outpatient medical logbooks and medical record of cases at Oda Dima and Bikitu health post. We also reviewed the laboratory findings of the first five cases at the national reference laboratory.
- B. Discussion with Key Informants- Using a semi-structured checklist we interviewed and discussed with key informants which include health professionals who attended medical care of cases, District health officials and families of cases.
- C. Interviewing Cases and Controls- Using a structured and semi-structured questionnaire (annexed), case and controls were interviewed by three data collectors (including the principal investigator)

Operational definition

Malnutrition: in this study malnourished were considered as MAUC less than 12.5 takes us malnourished for children up from 6-60 months. Whereas for adult were use MAUC less than 25 cm [21,22].

Data Quality Assurance

Before the start of data collection, an hour orientation was given for data collectors. Each completed questionnaire was daily reviewed by the principal investigators to monitor the data quality. Before analysis, data were also cleaned for any missing and logically inconsistent values.

Data Analysis

All collected data were entered and analyzed using SPSS version 23, bivariate and multivariate (using logistic regression model) analysis are conducted using as same statistical software by taking 95% confidence limit.

Data analysis procedure for SPSS dataset were list as follow

- ✓ Bivariate analysis was conducted using logistic regression with entering method for search potential risk factor
- ✓ Next to this variable which had significant association were taken with P-value 0.05 and below

Ethical Considerations

Before the filed investigation, a formal letter was written by Ethiopian Public Health Institute (EPHI) to Mubarak District health office to get permission and facilitate the investigation process. Before data collection, orientation was given to the cases (including take giver of cases and for a case without surrogate) and any information related to personal identification was not used on the report. Cases were also treated and sever cases were referred to the nearby health facilities for medical care.

Dissemination Plan

The report was submitted to the Ethiopian Public Health Institute and Addis Ababa University, School of Public Health. The manuscript of the report will be published in peer-reviewed journals to reach the scientific community.

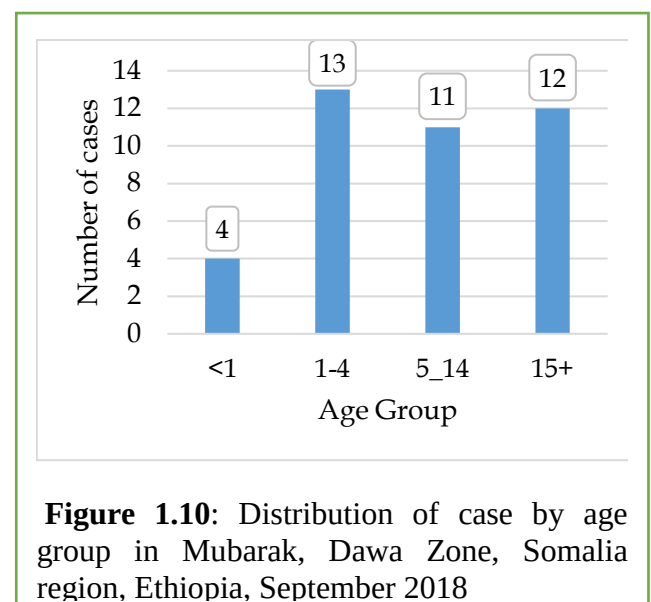
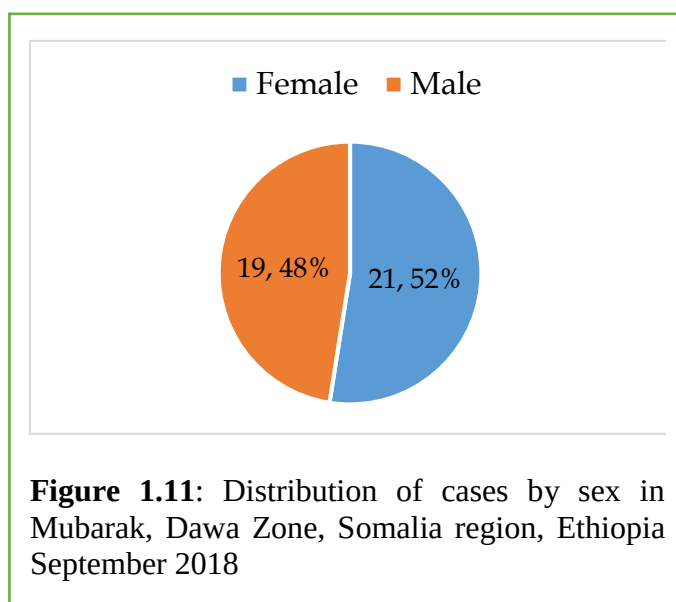
Result

Overall description of the outbreak

Cases were started to seen from 10/09/2018 at continued up 30/09/2018: however, it started to notify to the concerned body very lately. It was affected two districts of the Mubarak within the month of October. A total of 35 cases with 5 deaths were reported at the district level.

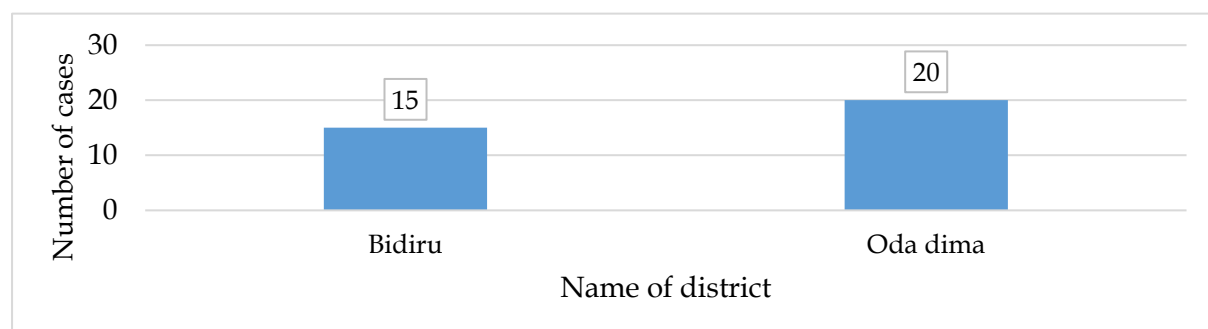
Description by person

Regarding the personal element of the outbreak 21 (52%) were female and 23(58%) were beyond the age of five.



Distribution by place

Two districts of the Mubarak were affected by outbreak 57%(20) cases were reported from kebele Oda Dima and 15 cases were reported by Biridu 4.



Distribution by time

The case was started to develop symptom on the date of 10/09/2018 and it was notified to District PHEM on the date of 20/09/2018. Even if, it was notified early the response and investigation was carried out at 27/09/2018 with a team sent with EPHI and another related partner. The peak case was seen on the date of 14/09/the 2018.

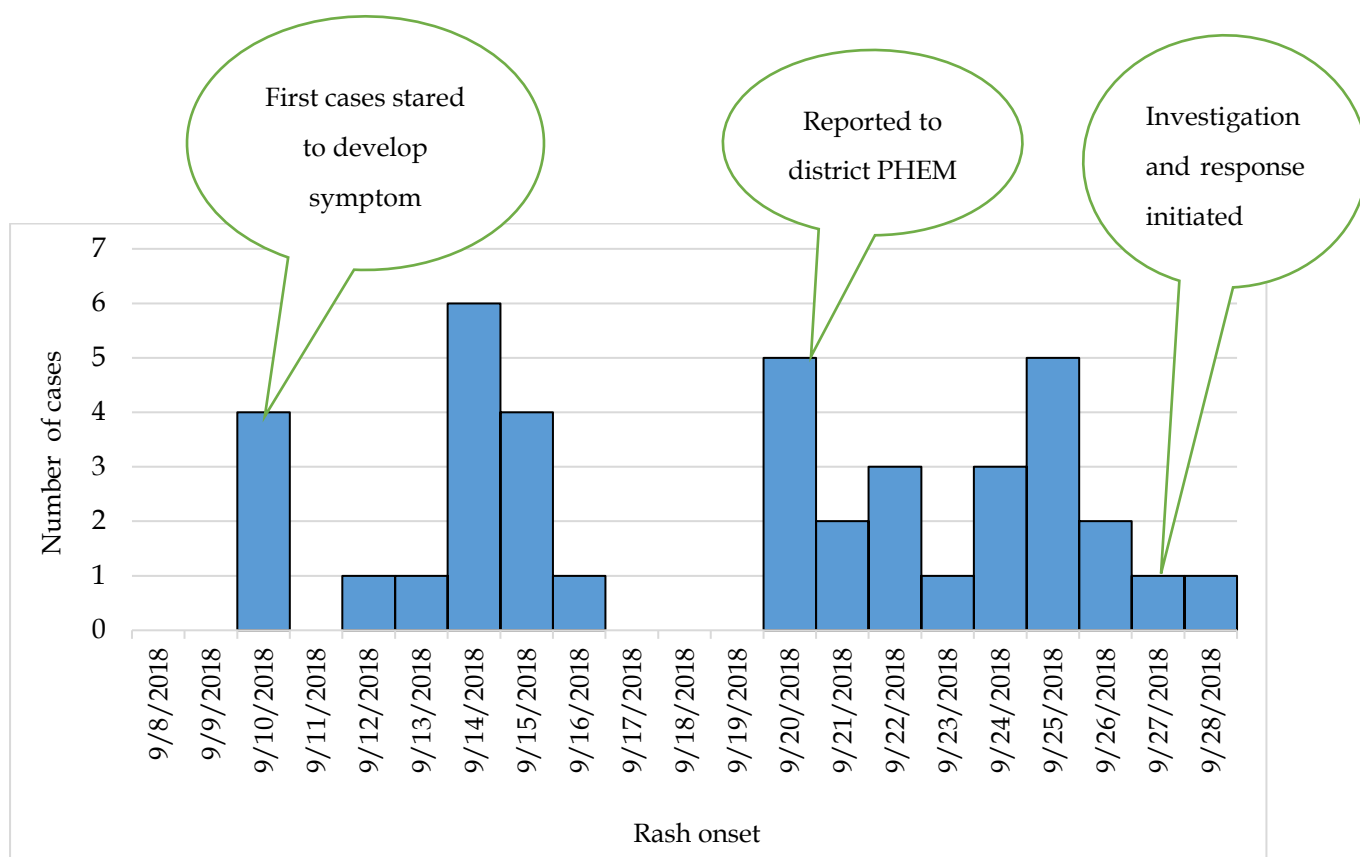


Figure 1.13: Epi-curve of measles in Mubarak district, Dawa zone, Somalia region, Ethiopia, September 2018

Descriptive summary of the outbreak

The patient was stayed out of treatment with an average day of (9.5 ± 5.2) with a range of 2 up to 19 days. Regarding the distribution of cases Female, children age less one and Oda Dima district was more affected with an attack rate of 6.6, 32.8 and 98.8 per 10000 populations respectively. Concerning to reported death most death was seen in male, at children at the age group of 1 up to 4 and Oda Dima kebele with a case fatality rate of 21%,38% and 13% correspondingly. The detail will be illustrated in the table below.

Table 1.12: Distribution of measles cases by sex, age group, and site of the report in Mubarak, Dawa zone, Somalia region, Ethiopia, September 2018

Descriptive characteristics	Category	Number of cases	Number of deaths	Total population	AR/10000 Population	CFR (%)
sex	Female	21	1	32024	6.6	5
	Male	19	4	37593	5.1	21
Age group	<1	4	0	1218	32.8	0
	1-4	13	5	8946	14.5	38
	5-15	11	0	18518	5.9	0
	>15	12	0	40935	2.9	0
Reported site	Oda					
	dima	23	3	2328	98.8	13.0
	Bidiru	17	2	2033	83.6	11.8
Total for reported site				4361	91.7	
Total for the whole district		40	5	69617	5.7	12.5

The existence the outbreak was confirmed by taking five blood sample for conformation for them (3/5) were positive for measles IgM.

Description of an analytical epidemiology

Socio-demographical characteristics

Thirty-five cases and seventy control were taken for further investigation of the outbreak. From total cases 20 (57.1%) were female and all case were Muslim and Somalia by ethnicity. The mean age of cases was (12.1±11.5) with a minimum of 6 months and with a maximum of 50 years. The detail will explain in the table below.

Table 1.13: Social demographic characteristics of case and control in Mubarak, Dawa zone, Somalia region, Ethiopia, September -2018

Social demographic variable	Category	Cases (%) N=35	Control (%) N=70	X ² , P, df
Sex	Male	15(42.9)	25 (35.7)	X ² =0.505, P=0.47 df=1
	Female	20(57.1)	45(64.3)	
Ethnicity	Somalia	35(100)	170(100)	—
Religion	Muslim	35(100)	70(100)	—
Educational status of respondent	Under school age	13(35.7)	25(35.7)	X ² =0.56, P=0.91 df=3
	Illiterate	17(48.7)	35(50)	
	Primary	5(14.3)	9(12.9)	
	Secondary	0(0)	1(1.4)	
Educational status of the	Illiterate	24(68.6)	42(60.0)	X ² =2.45, P=0.29 df=2
	Read and write	4(11.4)	17(24.3)	

respondent family	Primary	7(20.0)	11(15.7)	$\chi^2=11.62$ P= 0.003 df=2
Marital status	Single	27(77.1)	33(47.1)	
	Married	7(20.0)	37(52.9)	
	Divorced	1(2.9)	0(0)	
Place of residence	Oda dima	20(57.1)	44(62.9)	$\chi^2=0.32$, P=0.57 df=1
	Bikiritu	15(42.9)	26(37.1)	
Occupation of respondent	Underage	16(45.7)	28(40.0)	$\chi^2=18.2$, P=0.20, df =7
	Housewife	6(17.1)	25(35.7)	
	Pastoral	8(14.3)	5(7.1)	
	Unemployed	1(2.9)	5(7.1)	
	Student	6(17.1)	3(4.3)	
	Daily labour	0(0)	1(1.4)	
	Gov't employee	1(2.9)	0 (0)	
	Merchant	0(0)	3(4.3)	
occupation of the respondent family	Pastoral	30(85.7)	58(82.9)	$\chi^2=4.64$, P=0.33 df=3
	Merchant	4(11.4)	8(11.4)	
	Gov't employee	1(2.9)	3(4.3)	
	Daily labour	0(0)	1(1.4)	
Family size	Average size		5.64	
	Minimum		2	
	Maximum		10	
	Standard deviation		1.68	

The responders were asked for the common sign and symptoms and Fever 35(100%), Rash 35(100%), Cough 31(88.6%) and Coryza 25(71%) were the top identified symptoms. Regarding complication, 4(11.4 %) were developed pneumonia and otitis media whereas 34.3 % case develops diarrhea following to the illness. The detail will be depicted in the table below.

Table 1.14: Distribution of common symptoms and complication of Measles cases in Mubarak district, Dawa zone, Somalia region, Ethiopia, September 2018

Symptoms	Number	Percentage (%)
Fever	35	100
Rash	35	100
Cough	31	88.6
Coryza	25	71.4
Conjunctivitis	23	65.7
Complication		
Pneumonia	4	11.4
Diarrhea	12	34.3
Ear Discharge	4	11.4
Vomiting	13	37.1
Anorexia	15	43.3

Knowledge status of cases

The cases were asked a list of question to measure their knowledge on the measles disease and the summary of the result is displayed in the table below.

Table 1.15: Distribution of knowledge status cases about measles disease in Mubarak, Dawa Zone, Somalia region, Ethiopia, September 2018

Knowledge Questions	Count	%
Do you Know Mode of transmission		
Yes	4	11.4
No	31	88.6
Cause of measles		
Contact with ill person	4	11.4
From God	16	77.1
Bad weather condition	3	8.6
Others	1	2.9
Do think the measles vaccine is preventable from the illness?		
Yes	25	71.4
No	5	14.3
I don't know	5	14.3
commonly affected part of the community		
Children <5	12	34.3
Children <18	2	5.7
Women of any age	8	22.9
Any age group regardless of sex	13	37.1
How measles gets cured		
Using modern medicine	21	60
Traditional medicine	7	20
By feeding nutritious	1	2.9
By staying home	2	5.7
By praying	4	11.4
Where do you go first when you get ill		
Health facility	16	45.6
Traditional healer	2	5.7
Stayed at home	17	48.6

Most of the cases 22 (62.7%) were seen at a health facility, from treated case 17(77.3%) of cases were provided with antibiotics at a health facility. During the study period, 17(68.2%) were gotten partial improvement after taking medication.

Table 1.16: Distribution of treatment type taken by cases with Measles in Mubarak, Dawa zone, Somalia region, Ethiopia, September 2018.

Treated at Health Facility(N=35)	Number	%
Yes	22	62.90%
No	13	37.10%
Treatment was given at health facility (N=22)		
ORS	10	45.5
Antibiotics	17	77.3
Vitamin A	5	22.7
Recovery status after treatment (N=22)		
Cured	5	31.8
Partially	17	68.2

During the investigation vaccination status of the cases as well as controls were identified with that of the reason not to be vaccinated. According to the finding, only 24.7% case had received the vaccination at once. The main reason is not vaccinated were lack of knowledge about vaccination is recorded 16(57) of cases. The detail information regarding vaccination and reason for unvaccinated will be displayed in a table below for both case and control.

Table 1.17: Distribution of vaccination, a dose of vaccination and the reason for unvaccinated among case and control in Mubarak, Dawa Zone, Somalia region, Ethiopia, September 2018

Status	Case (%)	Control (%)
Vaccinated at least once		
Yes	9(24.7)	42(60)
No	26(74.3)	28(40)
Dose of vaccination		
One dose	8(88.9)	35(83.3)
Two doses	1(11.9)	7(16.7)
Reason for unvaccinated		
Lack of knowledge	16(57)	17(65)
Absence during campaign	7(25)	4(15)
Religious exemption	1(4)	2(8)
Fear of side effect	4(14)	3(12)

Regarding the vaccination coverage of the district, it was 57 % in 2017 and 64 % in 2018 which is below the national target. Low vaccination coverage far apart from the national target may result in the current outbreak.

Risk factor

A case-control study was conducted using selected 35 cases and 70 controls which was unmatched for sex and age. On bivariate analysis risk factor variables such as not vaccinated (COR 4.33 95% CI (1.77-10.6), positive travel history (COR 3.3 95% CI (1.43-7.77), positive contact history (COR 6.35 95% CI (2.29 -18.3) and being malnourished (COR 10.5 95% CI (4.10-27.4) are some of the significantly associated factors with measles outbreak.

Table 1.18: Bivariate analysis of risk factors for the measles outbreak in the Mubarak district, Dawa zone, Somalia region, Ethiopia September -2018

Variables	Category	Case (%)	Controls (%)	COR (95% CI)	X ² P, df
Sex	Female	20(57.1)	45(64.3)	0.74(0.32-1.69)	X ² =0.5, P=0.48 df=1
	Male	15(42.9)	25(34.7)	*1*	
Age group	<1	6(17.1)	6(8.6)	3.50(0.95-12.8)	X ² =9.2, P=0.03 df=3
	1-4	9(25.7)	17(24.3)	1.85(0.66-5.20)	
	5-14	8(22.9)	5(7.1)	5.60(1.54-20.3)	
	15+	12(34.3)	42(60.0)	*1*	
Education level	Illiterate	30(85.7)	60(85.7)	1.00(0.34-3.18)	X ² =0.0, P=1.0 df=1
	Literate	5(14.3)	10(14.3)	*1*	
Family education level	Illiterate	24(68.6)	42(60)	1.45 (0.61-3.43)	X ² =0.73, P=0.4 df=1
	Literate	11(31.4)	28(40)	*1*	
Vaccination history	Yes	9(25.7)	42(60.0)	0.23(0.10-0.64)	X ² =9.26, P=0.003 df=1
	No	26(74.3)	28(40.0)	*1*	
Travel history	Positive	20(57.1)	20(28.6)	3.3(1.43-7.77)	X ² =8.0, P=0.005 df=1
	Negative	15(42.9)	50(71.4)	*1*	
Contact history	Positive	30(85.7)	34(48.6)	6.35(2.29-18.3)	X ² =13.25, P=0.001 df=1
	Negative	5(14.3)	36(51.4)	*1*	
Know mode of transmission	Yes	4(11.4)	38(54.3)	0.11(0.04-0.34)	X ² =17.86, P=0.000 df=1
	No	31(88.6)	32(45.7)	*1*	
Distance from HF	≤ 5KM	16(45.7)	42(60.0)	1.78(0.78-4.04)	X ² =1.92, P=0.17 df=1
	≥ 5km	19(54.3)	28(40.0)	*1*	
Presence of window	Yes	8(22.9)	18(25.7)	1.20(0.45-3.03)	X ² =0.10, P=0.80 df=1
	No	27(77.1)	52(74.3)	*1*	
Malnutrition	Yes	24(68.6)	12(17.1)	10.5(4.1-27.4)	X ² =27.4, P=0.001 df=1
	No	11(31.4)	58(82.9)	*1*	
Family size	>7 family member	28(80.0)	28(40.0)	6.00(2.30-15.6)	X ² =15.0, P=0.002 df=1
	≤ 6 family members	7(20.0)	42(60.0)	*1*	

*() * reference P value will be significant at a value of < 0.05

Multivariate analysis

Six study variables were found significant in multivariate analysis from the variable who were significantly associated with the bivariate analysis. Being Vaccination AOR (95%CI 0.19(0.04-0.81), $p=0.03$) positive contact history AOR (95%CI 30.7(4.1-232.5), $p= 0.001$) positive travel history AOR (7.23(1.32 CI (1.32-39.6), $p=0.023$) have family member more than 7 AOR (95% CI 17.4(2.55-119.2), $p= 0.004$) are some of factor-independent associated with outbreak. The detail will be illustrated in the table below.

Table 1.19: Multivariable analysis of risk factors for the measles outbreak in the Mubarak district, Dawa zone, Somalia region, Ethiopia September -2018

Variable	Category	Case (%)	Control (%)	AOR (95%CI)	P-value
Vaccinated	Yes	26(74.3)	28(40.0)	0.19(0.04- 0.81)	0.03
	No	9(25.7)	42(60.0)	*1*	
Contact history	Positive	30(85.7)	34(48.6)	30.7(4.1- 232.5)	0.001
	Negative	5(14.3)	36(51.4)	*1*	
Travel history	Positive	20(57.1)	20(28.6)	7.23(1.32-39.6)	0.023
	Negative	15(42.9)	50(71.4)	*1*	
Family size	>7 family member	28(80.0)	28(40.0)	17.4(2.55-119.2)	0.004
	≤ 6 family members	7(20.0)	42(60.0)	*1*	
Know mode of transmission	Yes	4(11.4)	38(54.3)	0.06 (0.01-0.37)	0.003
	No	31(88.6)	32(45.7)	*1*	
Malnutrition	Yes	24(68.6)	12(17.1)	5.48 (1.21-24.8)	0.03
	No	11(31.4)	58(82.9)	*1*	

*) * reference P value will be significant at a value of < 0.05

Intervention

After the team arrived at Mubarak district: firstly, had held a meeting with district PHEM officer to brief about the current situation. Consequently, after the meeting team was composite in the different thematic area in a way control the outbreak in short duration. The first team case management team who has the mandate of managing and stabilized case for both for illness and complication. Besides blood sample were taken for five patients three of them were positive for measles. The second team was a surveillance team who identified a new case who were not gotten treatment and data management activity were taken by this team. The third

team was a social mobilization team who had an intention increasing aware of the community regarding the illness. As EPHI team we were involved in every activity before the district team operated things by themselves. Besides we tried to assure the cold chain system of the district since there was no electrical supply maintaining the system with an expected standard which was identified as a hinder in availing measles vaccine. The vaccination coverage of district was 57% in 2017 and 64% in 2018 which is far way from targeted coverage level. Later, the team was prepared a vaccination plan with the aim of mass vaccination for all eligible individual. It is annexed in annex 3.

Discussion

Measles is the fifth killer disease among children under five years of age in the world [23]. A measles outbreak is one most important public health problem in the Somalia region which faces recurrent outbreak in a different part of the region in the last few years [24]. The current outbreak was lately detected and investigated even if the patient was reported on 20/09/2018 to district PHEM which has its own negative impact in providing an adequate response. However, studies were revealed that annual rate investigation suspect measles was increased from 2.9 in 2006 to 4.8 to 2015 per 100,000 at level [16].

Regarding social demographic characteristics case, 20(57.1%) were female and 23(66%) were beyond five age. The mean age of cases was (12.1±11.5) with a minimum of 6 months and with a maximum of 50 years. A study conducted in Nigeria revealed that both sexes were affected fairly by illness [25]. A similar study in China revealed that there is an epidemiological shift in the age of measles transmission. it started to affect adult and children below 24 months. This may explain adult has a lower level of protection for measles as compared to children and SIA provide additional level protection for targeted children [26].

Regarding the distribution of cases Female, children age less one and Oda Dima district was more affected with an attack rate of 6.6, 32.8 and 98.8 per 10000 populations respectively. Concerning to reported death most death was seen in male, at children at the age group of 1 up to 4 and Oda Dima kebele with a case fatality rate of 21%,38% and 13% correspondingly with an overall case fatality of 12.5%. the case fatality is higher as compared to study conducted in Jarar zone Somalia region and Guji zone (Oromia region) (Ethiopia): however, it was consistency with finding Simada Gonder, Ethiopia and Balochistan province, Pakistan. The reported mortality rate was the beyond expected mortality rate as national as well as in developing nation, which is 3-6%. The reason for the discrepancy in mortality rate is explained due to late detection and response as well as not registered all death occurred in the community and this only includes health facility deaths [24,27,28,29].

The knowledge status of cases was assessed among case from them only 4(11.4%) were aware of the mode of transmission of measles. Twenty-five cases were believed in vaccination can provide protection from a further similar illness. Regarding the health seeking behavior of 17(47%) cases stayed home during the first time of their illness. The study also reviews for vaccination status 9(24.7%) cases were being vaccinated at least once: from them, eight cases got the first dose. The reason for unvaccinated is lack knowledge, absence during vaccination

campaign and fear of side effect were considered as the main reason to be unvaccinated in 57%, 25% and 14% among unvaccinated cases. This also includes that 13(35.7%) cases and 24(68.6%) family (included both mother and father of cases) were illiterate which may contribute to low vaccination. In a study conducted in Germany and India also revealed that reason not to be vaccinated was fear of sides, belief measles is not vaccinated, total resistance to vaccination and unknown of the site and age of vaccination was the main reason to be unvaccinated [30,31,32].

Concerning to manifestation all patients complained about symptoms like fever and rash. Besides, 31(88.6%), 25(71.4%) and 23(65.7%) have a cough, coryza and conjunctivitis cases were developed the following symptoms respectively. In addition, some cases were developed the following complication like pneumonia 4(11.4%), diarrhea 12(34.3%), ear charge 4(11.4%) and vomiting 13(37.1%) as result of measles. Different lecture revealed that measles can affect every system of the body. However, mostly seen complication was diarrhea (8%), otitis media (7-9%) and pneumonia (1-6) expected to develop among cases and it can also end up with death [33,34,35].

This study revealed that different factor has contributed for the measles outbreak in the district it includes socio-demographic characteristics (know the mode of transmission, family size), and others risk behavior like (contact history, vaccination status, travel history, and nutrition status) has their own impact in the outbreak.

Being vaccinated has a risk of (AOR=0.19, 95%CI (0.04-0.81), $p=0.003$) develop measles as compare those who were not vaccinated. It implies that being unvaccinated has a risk of 5.26 times as compared to the vaccinated individual to develop measles. A similar study also revealed being unvaccinated is undisputable cause for the measles. This may explain provide measles vaccination for an eligible individual can enable in developing long last immunity for the illness [36,37,38].

Contact history also found as one factor in which is having positive contact history with the cases has a risk of (AOR=30.7, 95%CI (4.1-232.5), $p=0.001$) as compared to those who have no contact history with the case in the previous day before developing the illness. A study conducted in Ethiopia, Iran, and Chana also revealed that there is a strong association between contact history and acquiring measles. This may explain have close intimacy with the case will increase the chance of developing the illness since measles is transmitted through the air as well as direct contact with a body section of ill person [39,40,41].

Travel history to the area which has confirmed an outbreak of measles also has a strong association with acquiring measles with an odds ratio (AOR=7.23, 95%CI (1.32-39.6), P=0.023) as compared to those who has no travel history during the outbreak. A similar study conducted in Burkina Faso showed that travel history to the epidemic area without fully vaccinated for measles has a strong association with measles incidence. Population movement has affected the distribution of disease through history. This may illustrate the movement of people who are unvaccinated (not fully vaccinated) to the area which has an outbreak increase risk of having the measles since it lowers the herd immunity level of the community by increasing unvaccinated population to the host community [42].

Family size one of the factors contribute in this outbreak those who have household size beyond seven has a risk of having measles with an odds ratio (AOR 17.5, 95%CI (2.55-119.2), P=0.004) as compared to those who have family member below seven. In line with our study having family size more four has strong association acquire measles. However, in contrast to our finding study conducted in China and Ecuador revealed having a large family and overcrowding have protective effect measles. Having large family size casually related to measles acquisition through several mechanism larger households plausibly have more opportunities for measles exposure because of the close contact of people in close quarters Larger households plausibly have more opportunities for measles exposure because of the close contact of people in close quarters Larger households plausibly have more opportunities for measles exposure because of the close contact of people in close quarters [43]. Regarding the variation finding with China and Ecuador were explained due to having large family reduce the chance of having contact with the outside community and it is independent on level crowding rather than depend on the level of vaccination [44,45].

Knowing the mode of transmission also has a protective effect with an odds ratio (AOR=0.06 95% CI (0.01-0.37), P=0.003) as compared to those who do not know the mode of transmission. equivalently, not knowing the mode of transmission increased the chance of developing measles by 16 times. In line to this study knowing the mode of transmission (a mother who had knowledge about measles their children are protected for the illness) has protective effects in a study conducted in southern Ethiopia. This may explain, poor knowledge about measles (signs, symptoms, and mode of transmission), the most important predictor in determining the outbreak of measles [46].

Being malnourished (MUAC < 11.5 for children, <25 for an adult) were a factor has a strong association with acquiring measles by an odds ratio of (AOR=5.48, 95%CI (1.21-24.8) as compared to those were not malnourished. A similar study conducted in Ethiopia also revealed being malnourished positive associated with measles. Since Ethiopian face recurrent drought and famine, the chance of having measles highly associated malnutrition especially those who have wasting increased the chance of having measles as well morbidity due to the illness. This may explain being malnourished reduce natural immunity and expose for measles other illness even if being fully vaccinated for measles [47,48].

The cold chain refers to the storage and transportation of vaccines within the optimally required temperature starting from the time the vaccines leave the manufacturing plant until they reach the end-users. The cold chain needs to be functional and intact at all levels in the health system for efficient and effective immunization. services. In assessed health facilities, all have refrigerators (in certain instances with water pack freezing/cooling compartments), cold boxes and vaccine carriers. Unavailability of the perpetual power source was one perplexing dilemma in the district even if there are refrigerators works with kerosene it was dysfunctional. It has a negative impact on combating measles in a sustainable manner unless the problem solved enduringly [49].

Limitation

Since the outbreak was detected lately recall bias was introduced in determining the exact date of rash. Besides, unavailability vaccination card for both case and control during the investigation may affect the estimation of vaccination coverage.

Conclusion

Measles is still a public health problem despite high vaccination coverage reported. The patient has low health-seeking behavior most of them were preferring to stay home during the time of illness. Most cases were unvaccinated for measles due to unaware of measles vaccine and absence during the measles campaign. Being unvaccinated, contact history with measles case, travel to an area with the confirmed outbreak, being malnourished were some of the factors which was independently associated with the outbreak. The cold chain system was installed in the district but has no adequate power supply which takes as hinder in providing vaccine for the end user. Avail routine immunization and consider supplementary immunization can provide assurance in controlling similar outbreak in the future.

Recommendation

For district health office

- ✓ Health education and advocacy activities should be performed by the district health office on Measles causes, transmission methods, the importance of vaccination with the involvement of community stakeholder (religious leader).
- ✓ The regional and district health offices should strengthen the routine and the catch-up immunization programs should consider beyond the adopted age group which is (>15) against measles
- ✓ The regional and district health offices should strengthen the surveillance activities to detect possible similar outbreaks at the earliest period.
- ✓ Health Extension Workers should conduct nutritional screening regularly and treat them accordingly
- ✓ Availing alternative power source for cold chain system

For community

- ✓ Avoid close contact with measles case (especially needs conscious for those who has a large family) and travel to measles confirmed area during the outbreak

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Chapter Two – Surveillance Data Analysis

2.1 Retrospective Maternal death data analysis in Ethiopia, 2013 -2017

Abstract

Background: The maternal mortality ratio is considered as a primary important indicator of the country over the health status including quality of life. Ethiopia is one of the top eleven countries with high maternal mortalities ratio with an estimate of 412 deaths per 100,000 live births a year. Ethiopian were taken initiation in 2013 for the integration of maternal death to be part of the routine of surveillance system as one report event informs of maternal death surveillance and response. Hence, this study will provide evidence and area focus on further reducing maternal death. The study was conducted with the aim of estimate the magnitude and potential factors associated with maternal death in Ethiopia.

Methods: a retrospective data analysis was conducted on maternal death surveillance reports collected from October 2013 to December 2017 from all region except Ethio-Somali region using Epi-Info version 7.2 after getting approvals from Ethiopian Public Health Institute.

Result: The summary of the findings has shown that the overall maternal mortality ratio was 22.2 per 100,000 live birth with big disparity among regions the maximum being at Dire Dawa 333.8 deaths per 100,00 live birth and the minimum being at SNNP 15.4 deaths per 100,000 live births. The study also showed the surveillance system does not capture beyond 10% maternal death than expected to be reported. A total of 2714 maternal death was reported from October 2013 and December 2017 from them 782(28.8%) were at the age between 25 to 29. All most death was seen on mothers who were illiterate and residing in a rural part of country contribute 1570(60%) and 438 (76%) respectively. one thousand, six hundred and eighty-six (62%) maternal death occurred at hospital setup, 1726 (64%) occurred after delivery. The leading cause of maternal death was hemorrhage account for 1225(45.1%) followed by anemia 451(16.3 %) and 412 (15.1%) were due to hyperstion disorder of pregnancy.

Conclusion: The current maternal death surveillance can't estimate the true magnitude of maternal death as country level due to the reason a significant amount of maternal deaths was not reported from regions. The top three common causes of maternal deaths (haemorrhage, anemia, and pregnancy-induced hypertension) were identified. The engagement of higher official to promote the importance of MDSR system to improve the commitment towards the system. Much focus should be given for a major cause of maternal death to reduce maternal death and improve the outcome.

Introduction

Background

Pregnancy is a special asset that is given to a female. It is a maternal condition at which developing fetus in the body at which most women want to achieve at least one time in their live hood [1].

Maternal death is a subset of all female death and is associated with pregnancy as well as childbearing. It also defined Maternal death is death with 42 days not only after pregnancy ends, but also; including a death that occurs during pregnancy period and childbirth. Moreover, the compressive definition is stated by WHO which maternal death of women while pregnant or within 42 days of termination of pregnancy irrespective of the duration and site pregnancy from any cause related to aggravating by pregnancy and management but is from accident or incident. Which isn't consider as death maternal if due to the accident, homicide and suicide [2,3].

The impact of maternal death is seen adversely affected the survival and development of her children, especially infants. The cause of maternal may direct obstetric deaths are maternal deaths resulting from obstetric complications of the pregnancy state (pregnancy, during childbirth, or after childbirth); from interventions, omissions, or incorrect treatment; or from a chain of events resulting from any of the above. Besides, to this may Indirect obstetric deaths are maternal deaths resulting from previously existing disease or disease that developed during pregnancy. These deaths are not due to direct obstetric causes but are aggravated by the physiological effects of pregnancy. Another factor that increases maternal death is poverty, distance from a health facility, lack of information, inadequate serves and culture practice [2], [5,6].

The maternal mortality ratio is considered as a primary and important indicator of the country's overall health status as well as the quality of life. Globally, each day around 830 women die from a preventable cause of pregnancy and childbirth; from this almost all death occurs in developing country. it is higher in women living in a rural area among poor country; young adolescent faced higher complication as compare older women [2,6]. The maternal rate is 240 per 100000 in a developing country and 16 per 100000 live births from a developed country [5].

Globally, the maternal mortality ratio is decreased from time to time. For instance, maternal mortality during 1990 was 532000(496000-590000) to an estimate of 303000(291000-34900)

in 2015. Developing regions account for approximately 99% (302 000) of the global maternal deaths in 2015, with sub-Saharan Africa alone accounting for roughly 66% (201, 000), followed by Southern Asia (66,000). At the country level, Nigeria and India contribute one-third of all maternal death in 2015, an approximate 58000 maternal deaths (19%) and 45,000 maternal deaths (15%) respectively. Eighteen other countries, all in sub-Saharan Africa, are estimated to have very high MMR in 2015, with estimates ranging from 999 down to 500 deaths per 100,000 live birth. Among them, the highest was in the central Africa Republic and the lowest was Kenya [5].

Ethiopia is one of the countries with high maternal mortality ratio per year. Even if, there is progress to decrease maternal mortality rate, still it is remaining high. For 2000 previous EDHS report, it shows it was higher 600 deaths per live birth. For instance, previous 2000 it was 873(703-1039), in 2005 it was 673(548-799), in 2011 it was higher than 2005 676(541-810) and very recently it was estimated 412 (273-551) in 2016 per live birth [4].

Traditionally the cause of maternal death around 70%- 80% due to direct cause and the rest 20-30% death was linked to indirect causes. Most deaths were occurred during childbirth and after pregnancy [3,7]. The majority complication that accounts for 80% of all maternal death is; severe bleeding, infection, high blood pressure, and unsafe abortion. The period of gestation can be divided into units consisting of 3 calendar months each or 3 trimesters. The first trimester can be subdivided into the embryonic and fetal periods. The embryonic period starts at the time of fertilization (developmental age) or at 2 through 10 weeks' gestational age. The embryonic period is the stage at which the development of most organ occurs and the time period during which the embryo is most sensitive to an agent that causes malformation (teratogens). The end of the embryonic period and the beginning of the fetal period occurs 8 weeks after fertilization (developmental age) or 10 weeks after the onset of the last menstrual period. The cause of maternal death is varying from one trimester to others as well as after delivery. For instance, death due to vaginal bleeding at first trimester is caused by abortion whereas during at end of pregnancy and after delivery cause by antepartum hemorrhage and post-partum hemorrhage respectively [1,2]. Globally, 1.6% maternal death is due to AIDS; it accounts for 2% of the sub-Saharan country. In 2015 five countries 10% and more of maternal death are estimated to the AIDS-related indirect cause of maternal death; South Africa (32%), Swaziland (19%), Botswana (18%), Lesotho (13%) and Mozambique (11%) [5].

In Ethiopia abortion and obstructed labour was the leading cause of mortality in 1980-1990 which contribute 31% and 29% respectively followed by infection (21%) and hemorrhage (22%). However, after millennium also obstructed labour is account (36%) and followed by hemorrhage (22%), a hypertension-related complication of pregnancy (19%), and infection (13%) was seen the top four causes maternal mortality [7].

Preconception evaluation and counseling of women of reproductive age have gained increasing acceptance as an important component of women's health. Issues of the potential consequence of pregnancy, such as medical problems, lifestyle (e.g., substance abuse, weight, exercise), or genetic issues should be investigated, and interventions devised before pregnancy. Specific recommendations include folic acid for the prevention of fetal neural tube defects (0.4 mg/d), strict blood sugar control in diabetic women, general management of any medical problems in the mother, avoidance of known teratogenic medications, and smoking cessation. The following situation needs to consider during pregnancy for effective ways in the reduction of maternal mortality and better health child [1,3].

Maternal age

Extremes of maternal age increase risks of maternal or fetal morbidity and mortality. Adolescents are at increased risk for the hypertensive disorder of pregnancy preeclampsia-eclampsia, intrauterine growth restriction, and maternal malnutrition. An increased risk of cesarean section, stillbirth, and placenta grow too deeply to urine wall to the placenta (Placenta accrete) are noted in women with advanced maternal age

Past medical history

Many medical disorders can complicate the pregnancy course for the mother and thus the fetus. It is important that these diseases and their severity be addressed before conception if possible. During pregnancy, the patient may require aggressive management and additional visits and testing to follow the course of the disease, in addition to possible consultation or management of a high-risk specialist.

Past obstetric history

Recurrent abortion: A diagnosis of recurrent abortion is made after 3 or more consecutive spontaneous losses of a pregnancy before 20 weeks' gestation

Previous stillbirth or neonatal death: A history of previous stillbirth or neonatal death should trigger an immediate investigation regarding the conditions or circumstances

surrounding the event. If the demise was the result of a nonrecurring event, such as cord prolapse or traumatic injury, then the present pregnancy has a risk approaching the background risk

Previous preterm delivery: A history of preterm birth confers an increased risk of early delivery in subsequent pregnancies. Furthermore, the risk of a subsequent pre-term birth increases as the number of prior preterm births increases, and the risk decreases with each subsequent birth that is not preterm.

Rh all immunization or ABO incompatibility All pregnant patients should undergo an antibody screen at the first prenatal visit

Previous preeclampsia–eclampsia: Previous preeclampsia–eclampsia increases the risk of hypertension in the current pregnancy, especially if underlying chronic hypertension or renal disease is present.

Teratogen exposure: A teratogen is any substance, agent, or environmental factor that has an adverse effect on the developing fetus. Whereas malformations caused by teratogen exposure are relatively rare, knowledge of exposure can aid in the diagnosis and management. Like that of the drug, infectious agent and radiation.

As mentioned earlier Ethiopia is one of the countries with highest mortality rate; in order to address this problem, Ethiopia began implementation of MDSR as an integral part of the routine surveillance activity in 2013 integrated to surveillance system provide MDSR analysis and interpretation which are the major use of surveillance. MDRS enable routine identification, notification, quantification, and determination of causes and avoidability of all maternal deaths, as well as the use of this information to respond with actions that will prevent future deaths. This data will be used to make evidence-based recommendations for action; increase awareness about the magnitude, social effects, and preventability of maternal mortality by different actors; monitor the implementation of recommendations inform programs on the effectiveness of interventions and their impact on maternal mortality; allocate resources more effectively and efficiently by identifying specific needs; enhance accountability for maternal health; improve maternal mortality statistics and move towards complete civil registration/ vital statistics records; and guide and prioritize research related to maternal mortality [3].

Statement of the problem

Maternal death is one of immediately notify event under surveillance after incorporated in 2013. For last to consecutive decade maternal mortality progressive reduced; but, still, Ethiopia is one country with a high mortality rate. According to EDHS 2016 the maternal mortality of the country 412 maternal deaths per 100000 live birth which show that it needs effort to reduce because it also indicates over health and development status of the country. In 2015 in Ethiopia were intended to reduce maternal death up 350/100000 live birth in order to achieved MDG, however, it wasn't achieved as expected. This study will identification of the possible cause of death in order to act accordingly.

Justification of the study

Maternal health is among the top priorities of the health system in Ethiopia. Considering the high burden of maternal mortality and its impact on the overall development of the nation, the FMOH has emphasized maternal health throughout its health sector development program. This study will help by characterization of maternal mortality in term of place, person and time. It will also use in showing the trend of maternal death and help to improve future planning. Additionally, the study will show a major cause of maternal death from a reported case-based format.

Objectives

General objective:

To assess the magnitude, major causes of death and contributors to maternal death in Ethiopia from 2013 to 2017.

Specific objectives:

- ✓ To characterize the maternal mortality by a person, time and place
- ✓ To identify the possible cause of maternal death and contributory factor
- ✓ To determine the magnitude of maternal death
- ✓ To assess the data quality and surveillance system capturing maternal death.

Material and Methods

Study area and period

According to the latest United Nations estimates current Ethiopia population is esteemed to be 106,387,602 with annual growth rate of 3.4% and contribute 1.39% of the total world population. Among them, 24894699 (23.4) are female at reproductive age with estimated annual growth of 3.4% (CSA). Ethiopia's climate is generally mild, in which the average temperature in the highland areas including most of the major cities like Addis Ababa is below 23°C and exceeding 50°C in lowlands like the Dallol Depression. Ethiopia generally has a tropical climate. The study was conducted from 3/02/2018-22/02/2018

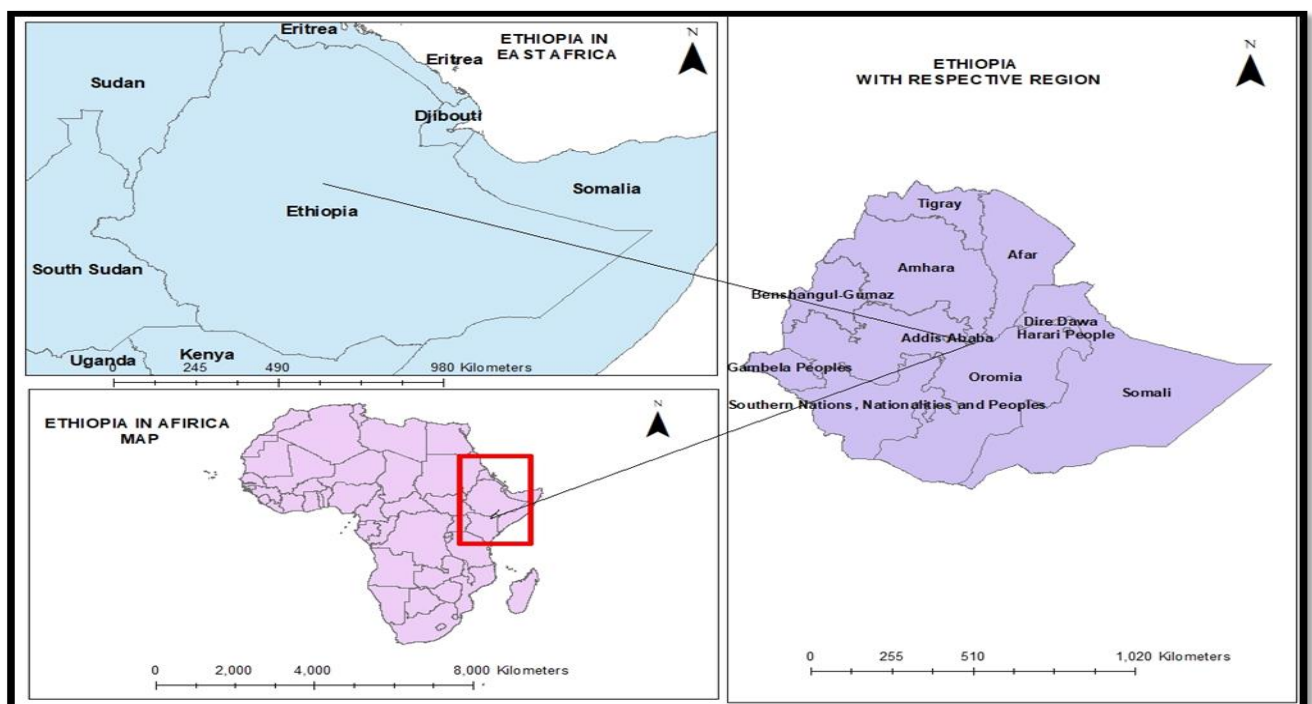


Figure 2.1: Map of Ethiopia with its administrative division in 2017

Study design

The descriptive study was conducted using complied maternal case-based format from PHEM database which can be taken as a secondary data source.

Data management and analysis

Data cleaning was done from the initial secondary data stored in Microsoft Excel in the centre using the same version. Descriptive analysis was used to compute using Microsoft office excel 2013 and EPI- INFO version 7.2. Finally, the data were described using tables and figures.

Data collection and quality control

All maternal deaths were systematically identified from the recorded PHEM data centre. The data were collected using MDRF from all health facilities which were continues to report. It includes all the region and administrative even if, is not done as expected. The data quality was assured by supervision using senior staff starting from data cleaning up to the final submission.

Study variable

Socio-demographic characteristics

- ✓ Marital status
- ✓ Place of residence
- ✓ Level of education

Possible risk factors to the death

- ✓ Antennal care
- ✓ Cause of deaths
- ✓ Contributory factor

Operation definition

- ✓ Abortion (miscarriage): is the termination of pregnancy before fetal viability which before 28 weeks in our set up [1].
- ✓ Obstructed labor is a failure of descent of the fetus in the birth canal for mechanical reasons despite good uterine contractions [1].
- ✓ Gravid is the total number of pregnancies that a woman has had, regardless of the outcome [1].
- ✓ Parity is the number of births, both before and after 20 weeks' gestation which is alive [1].
- ✓ Live birth: is the delivery of an infant (regardless of gestational age) that demonstrates evidence of life (e.g., a heartbeat, umbilical cord pulsation, voluntary and involuntary movement), independent of whether the umbilical cord has been cut or the placenta detached [1].
- ✓ Antepartum hemorrhage (APH) is defined as bleeding from or into the genital tract, occurring from 24+4 weeks of pregnancy and prior to the birth of the baby.
- ✓ Postpartum haemorrhage: denotes excessive bleeding (>500 mL in vaginal delivery) following delivery. Haemorrhage may occur before, during, or after delivery of the placenta. Blood loss during the first 24 hours after delivery is early postpartum

haemorrhage; blood lost between 24 hours and 6 weeks after delivery is late postpartum haemorrhage [1].

- ✓ Maternal near misses a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy. In practical terms, women are considered near miss cases when they survive life-threatening conditions (i.e. organ dysfunction) [1].
- ✓ Late maternal death: defined as a maternal death due to pregnancy (direct or indirect obstetric causes) which occurred more than 42 days but less than one year after the end of pregnancy [1].
- ✓ Direct obstetric deaths are maternal deaths resulting from obstetric complications of the pregnancy state (pregnancy, labor, or puerperium); from interventions, omissions, or incorrect treatment; or from a chain of events resulting from any of the above [1].
- ✓ Indirect obstetric deaths are maternal deaths resulting from previously existing disease or disease that developed during pregnancy. These deaths are not due to direct obstetric causes but are aggravated by the physiological effects of pregnancy [1].
- ✓ Maternal death (maternal mortality) as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes [23].
- ✓ A Suspected Maternal Death – “The death of any woman while pregnant or within 42 days of the termination of pregnancy [23].
- ✓ A Probable Maternal Death – “Deaths among women of reproductive age, not clearly due to incidental or accidental causes [23].
- ✓ Maternal mortality ratio (MMR): is the annual number of female deaths per 100,000 live births from any cause related to or aggravated by the pregnancy or its management (excluding accidental or incidental causes)

Eligibility criteria

Inclusion criteria:

Data collected using case definitions of maternal death in Ethiopia

Community case definition (probable maternal deaths)

- ✓ Death of a woman of reproductive age (between 15-49 years of age)

Suspected maternal death:

Community case definition plus at least one of the following:

- ✓ Died while pregnant,
- ✓ Died within 42 days of termination of pregnancy or
- ✓ Missed her menses before she died

Standard case definition (confirmed maternal death):

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

Exclusion criteria

- ✓ Any maternal death related to accident and incident (homicide, suicide).

Ethical consideration

After submission of a concept note to field coordinate permission was granted by email. The name of the patient was omitted from the list during the analysis for sake of confidentiality

Dissemination

It used both for academic as one output and used by the national PHEM for further planning. Prepared Manuscript for purpose of publication and it will be presented

Results

A total of 2,409 deaths were reported in the period between Oct 2013 to Dec 2017 in weekly PHEM reporting. Looking at the national MDSR database 2,714 maternal deaths were reported using case-based reporting format. The data below shows the socioeconomic status of mothers who died in the reporting period.

Socio-demography

Most of the death reports in the last five from 2013 to 2017 was as described in the table below the majority of the deaths 782 (28.8 %) occurred in the age group between 25 to 29), 2516 (93) % of mothers were married, 1570 (59%) of mothers were illiterate as well as 1142 (41%) were orthodox religion follower. Moreover; most mothers 70 % dwelled rural part of the county and 34 % they were had two –four had previous pregnancy regardless of the outcome. Moreover; 66% of data were collected from facility-based maternal abstraction form. The mean age at death was 29±6 year with a range of 14 up to 49 ages.

Table 2.1: Socio-demographic status of mothers who died in the period between Oct 2013 to Dec 2017

characteristics	Category	Frequency	percentage
Age group (Year)	10-14	3	0.10%
	15-29	154	5.70%
	20-24	462	17.00%
	25-29	782	28.80%
	30-34	595	21.90%
	35-39	490	18.10%
	40-44	110	4.10%
	45-49	22	0.80%
	UNKNOWN	96	3.50%
Marital status	Single	55	2.10%
	Married	2516	96.10%
	Widowed	4	0.20%
	Divorced	30	1.20%
	Illiterate	1590	59%
Level of education	read and write only	251	9%
	Elementary	276	10%
	High school	139	5%
	College and above	89	3%
	No record	330	12%
	Orthodox	1112	47.1%

Religion	Muslim	958	40.5%
	Catholic	5	0.20%
	Protestant	260	11.0%
	Traditional	11	0.50%
	Others	17	0.70%
Gravidity	0_1	772	28%
	2_4	1014	37.4%
	5 and above	928	34.2%
Place of residence	Rural	438	70%
	Urban	184	30%
	Verbal autopsy	911	34%
Data source	Facility-based MDRF	1803	66%

Distribution of Maternal death by place, person and time

Distribution of Maternal death by place

Amhara and Oromia regions were contributed 1554(57 %) all reported maternal together using cased formant. Lowest maternal death reported from Gambella (1%), Harari, afar and Benishangul Gumuz were contributed 2% each. In Contrary; Ethio –Somalia region has no contribution still 2017 using MDRF.

Table 2.1: Distribution of maternal death by reporting Region in the period between Oct 2013 to Dec 2017

Place of residence	Report	Percentage
Addis Ababa	129	5%
Afar	59	2%
Amhara	761	28%
Benishangul Gumuz	49	2%
Dire Dawa	141	5%
Gambella	24	1%
Harari	53	2%
Oromia	793	29%
SNNP	394	15%
Somali	0	0%
Tigray	311	11%
total	2714	100%

In zonal level since more than half of reported maternal death was reported from two regions in the figure below show that the zone which contributes high compared to other zones in their

respective region. In Amhara region south Gonder and west Gojam zones contribute 18% and 19%: and in Oromia region, East Hararge and West Arsi zones also contribute 19% and 17% respectively in their region.

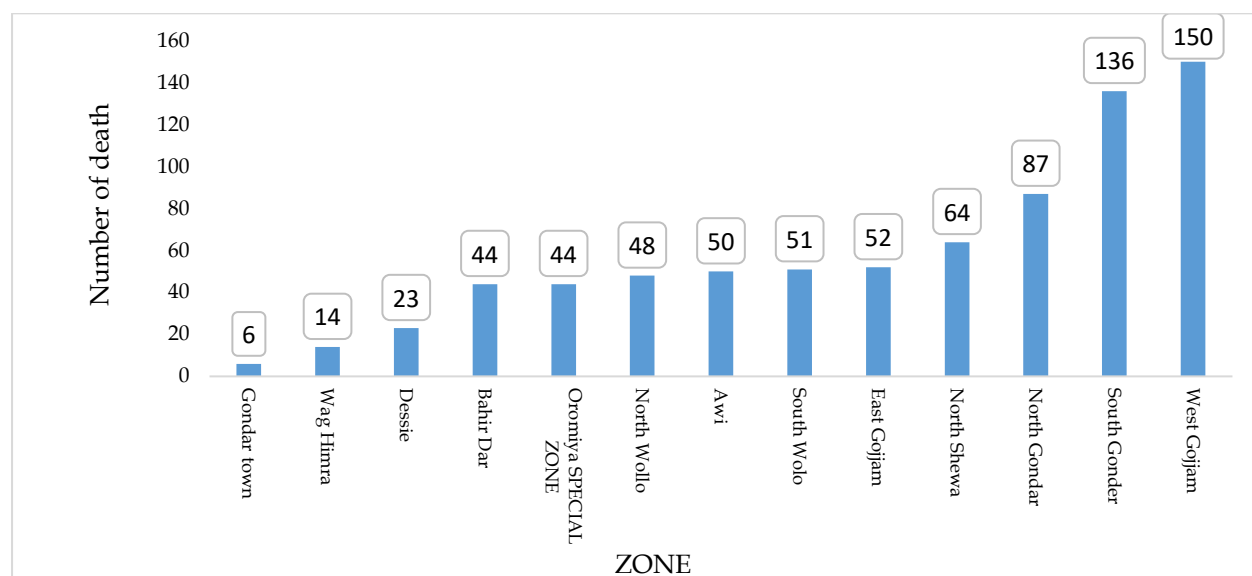


Figure 2.2: Distribution of maternal death report in Amhara Region from Oct 2013 to Dec 2017

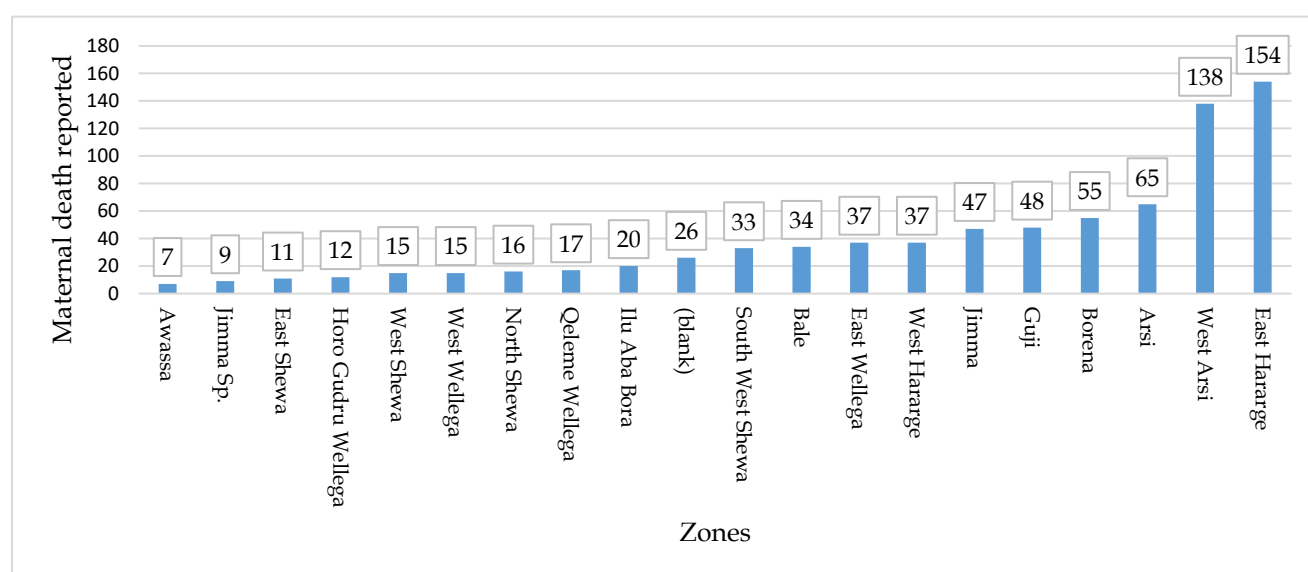


Figure 2.3: Distribution of maternal death report in Oromia Region from Oct 2013 to Dec 2017

A higher number of maternal death occurred in hospital setup 1686 (62%) followed by home 433(16%) and during a referral to the next level which was 354(16%).

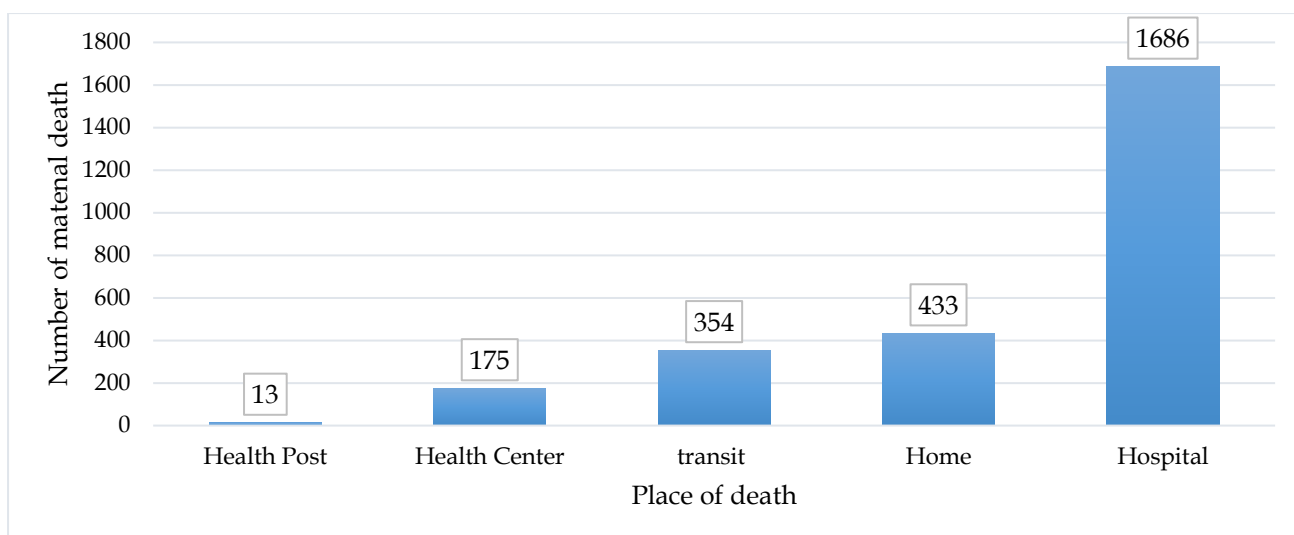


Figure 2.4: Frequency distribution of maternal death by place of death from Oct 2013 to Dec 2017.

Tigray region was one of the regions with a high number of maternal deaths occurred in the home which was 71(23%) followed by Amhara 167(22%) and Oromia 134(17.6%) regions. In contrast; Tigray region higher number of deaths were reported from hospital set up in Dire Dawa 127(90%) followed by Harir 47(89%) and SNNP 304(80%) according to their reported maternal death by using case-based format. Furthermore; in Afar region around 10% maternal death was reported in the health post.

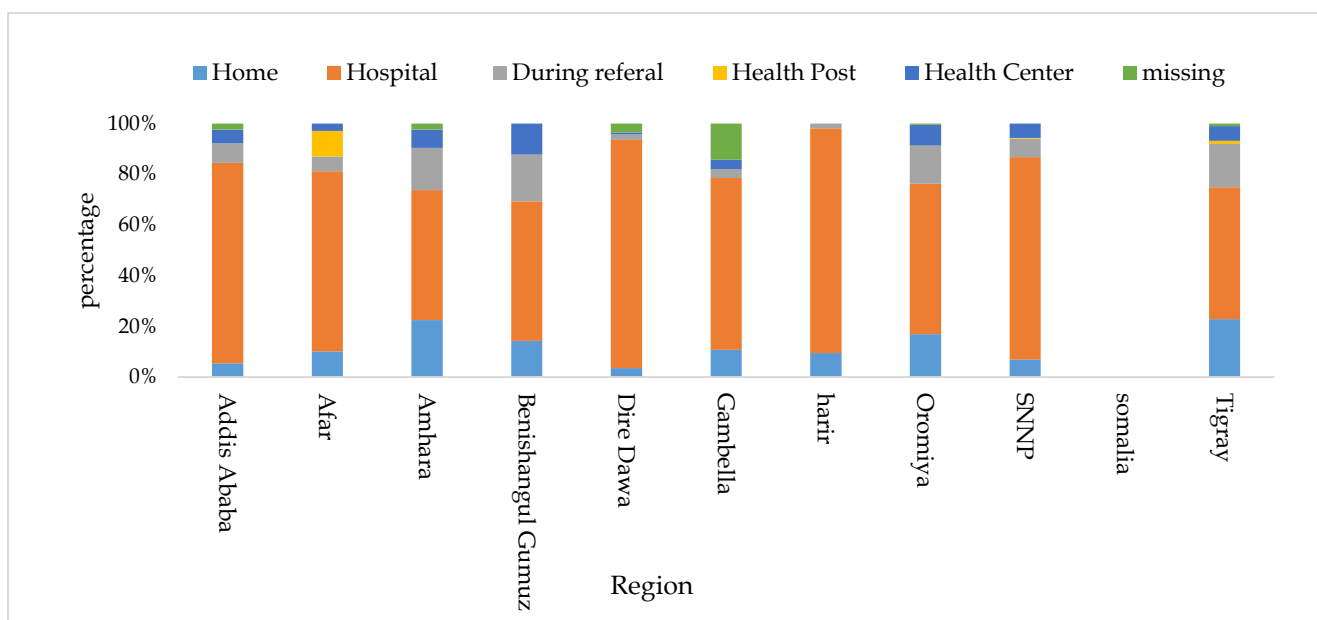


Figure 2.5: Distribution of maternal death by Place of death within the respective region from Oct 2013 to Dec 2017.

Distribution of maternal death by person

In each age group, the number reported maternal death increased from year to year expected in the age group 10-14 Year.

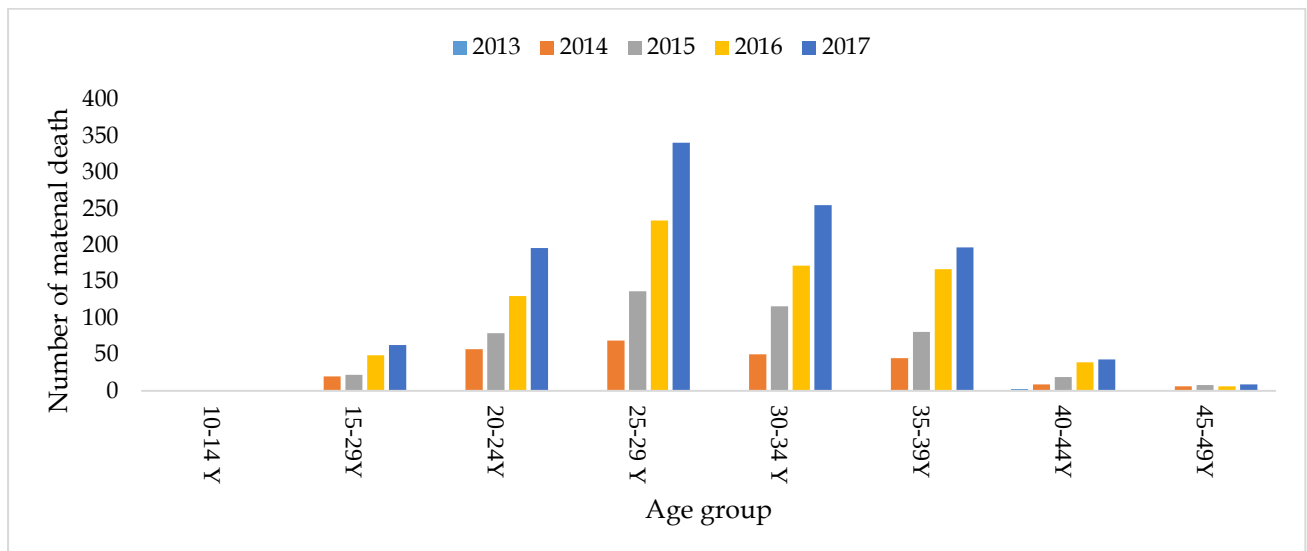


Figure 2.6: Frequency distribution of maternal death by age group each reported year from Oct 2013 to Dec 2017.

In this study, a high number of maternal deaths were seen in a mother who has parity from zero to four. Whereas; it was lower in mothers who have five and above parity.

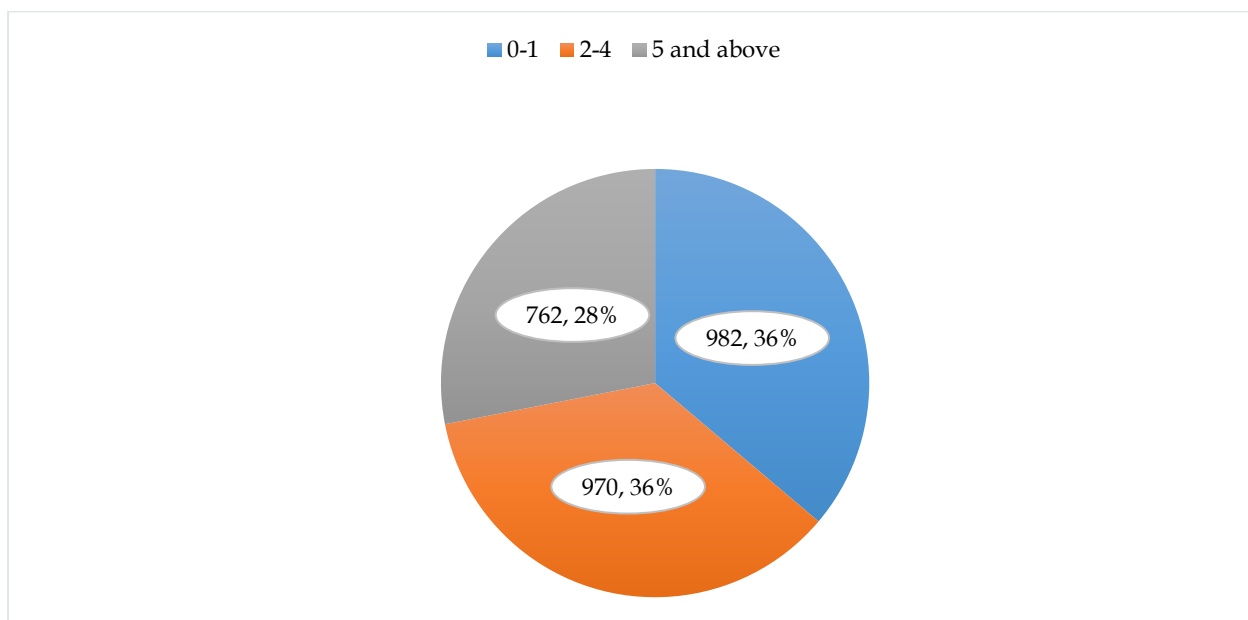


Figure 2.7: Frequency distribution of maternal death by Parity from Oct 2013 to Dec 2017.

Distribution of maternal death by the time

As depicted below most reported death was reported in 2017 which 42% all reported the death in the last five years by case-based format. A high number of maternal death was seen in March, April, and May during 2017.

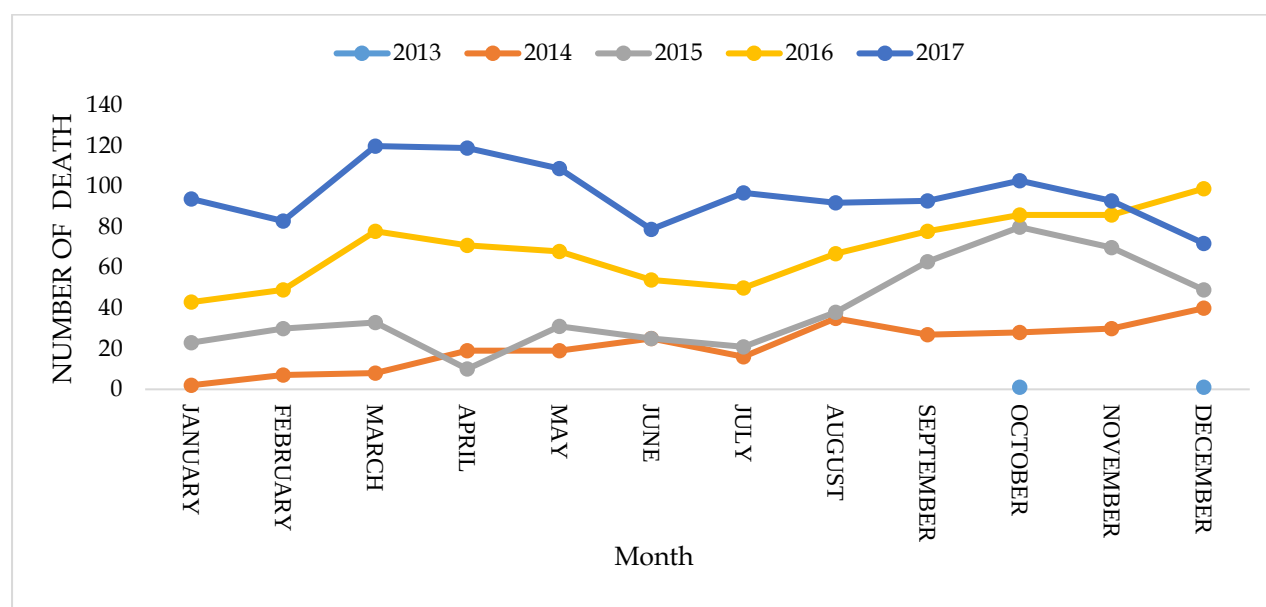


Figure 2.8: Frequency distribution of maternal death by a period of death from Oct 2013 to Dec 2017

A higher number of maternal death was seen in both years after delivery (post-partum) which is 1726(64%) and before delivery (ante partum) account for 527 (20%) all maternal death.

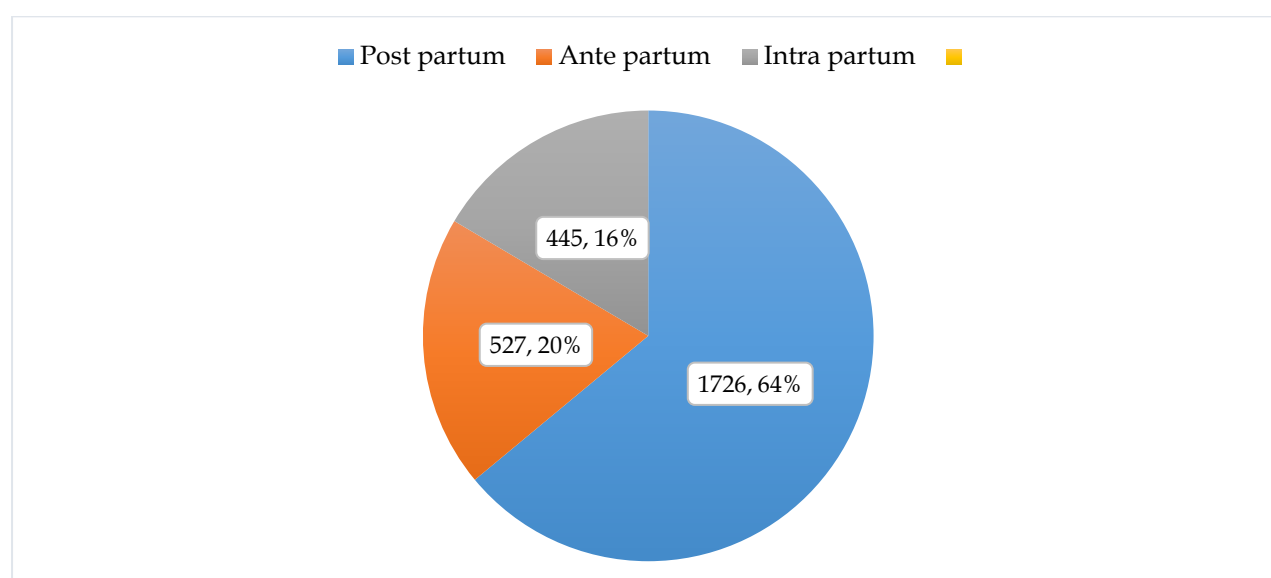


Figure 2.9: Frequency distribution of maternal death by the timing of death from Oct 2013 to Dec 2017.

Among mothers who were died during post-partum 1096(63%) death occurred in the first 24 hrs followed by 379(22%) which were died within two up to three days later after delivery.

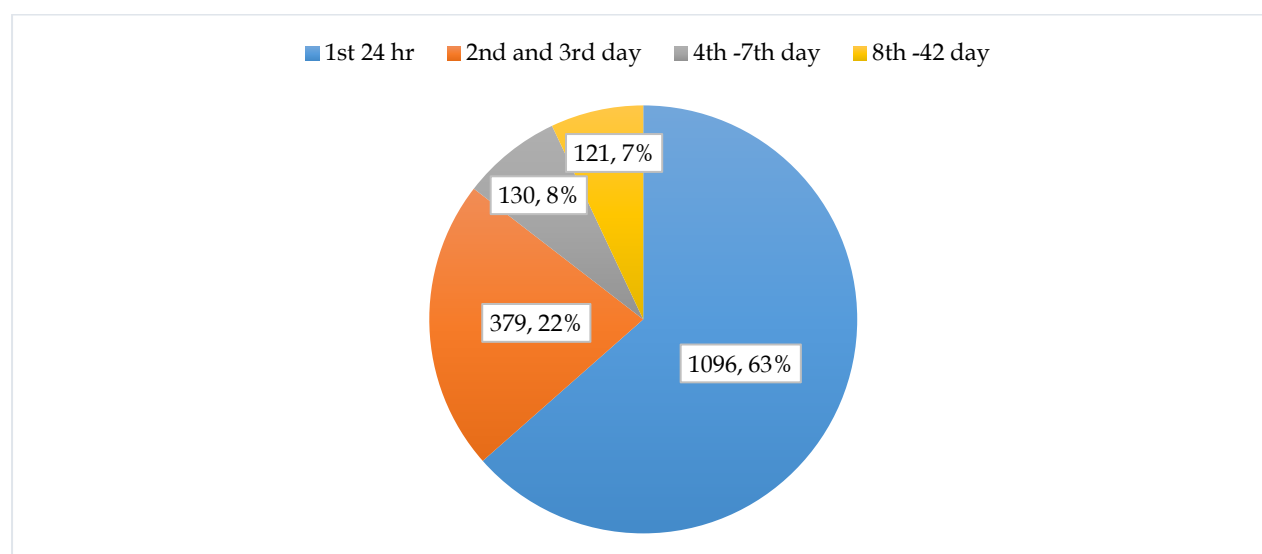


Figure 2.10: Frequency distribution of post-partum maternal death by the timing of death from Oct 2013 to Dec 2017

Death from post-partum sharply increased from year to year as compared to other timing of death in previous five years during the study period.

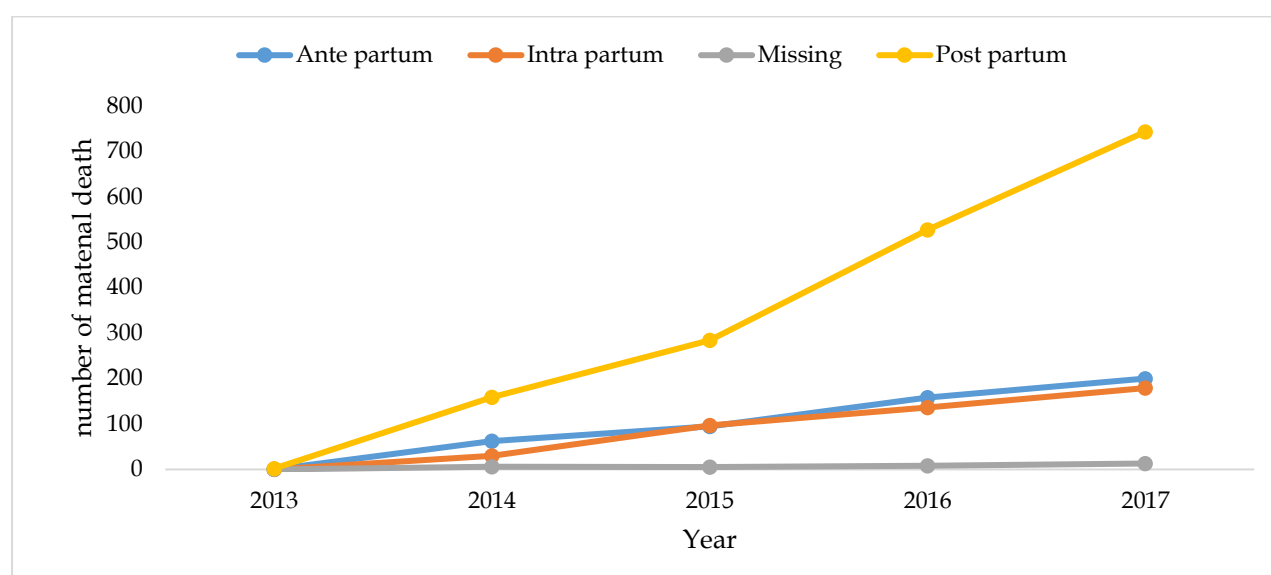


Figure 2.11: Frequency distribution timing death across the last five years from Oct 2013 to Dec 2017.

As described before around 80% maternal death was occurred in hospital and home. There is an increased number of maternal deaths in a hospital set up for the last five years. For instance;

45% maternal death occurred in the hospital were reported in 2017 in addition; 36.7% maternal deaths were reported from home in the same year of 2017.

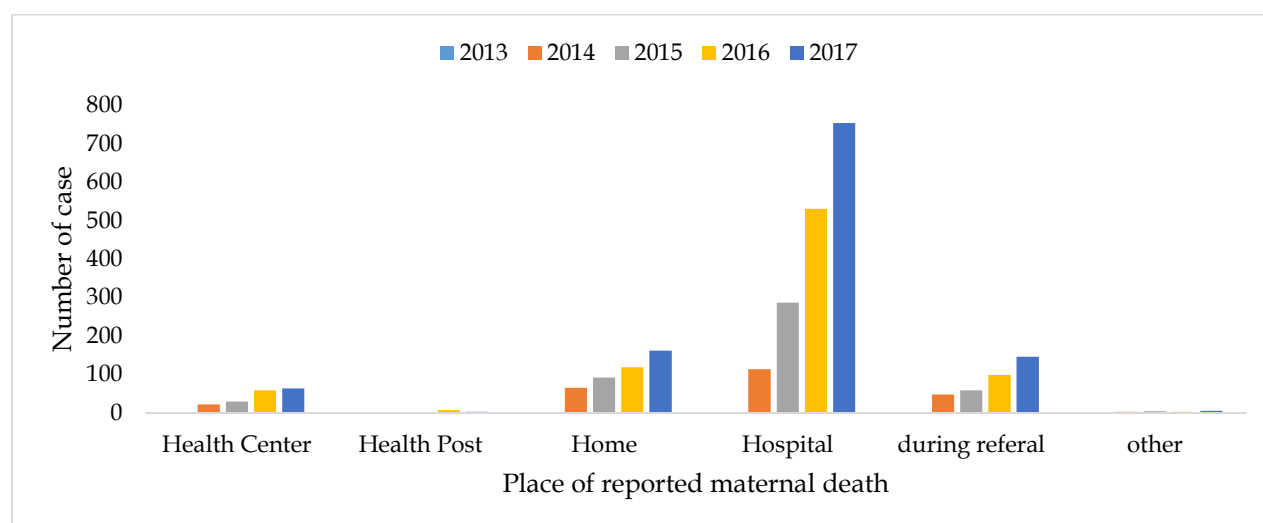


Figure 2.12: Frequency distribution place of maternal death each year from Oct 2013 to Dec2017.

Cause and contributors to maternal death

From the total maternal death, 1981(73%) were occurred due to a direct cause whereas the remaining 733(27%) occurred as a result of the indirect cause of maternal deaths.

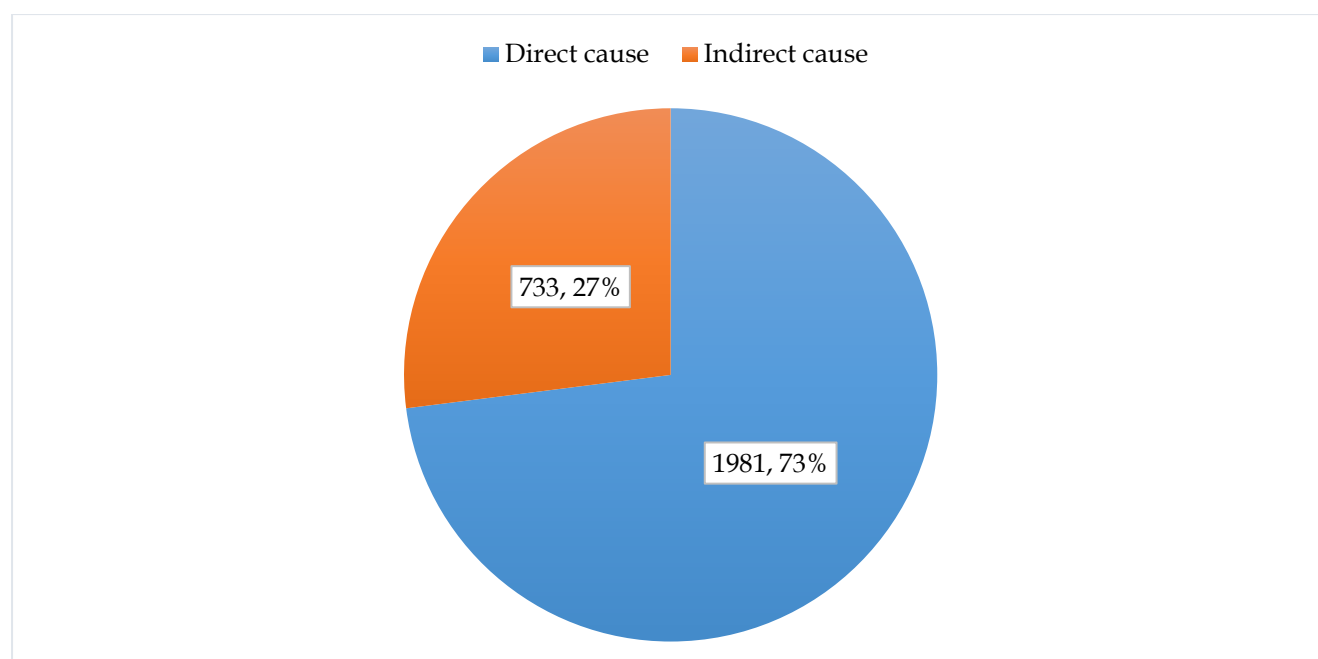


Figure 2.13: Frequency distribution of causes of maternal death from Oct 2013 to Dec 2017.

As described in the chart below near half of the maternal deaths that are categorized as direct obstetric causes are identified to be caused by hemorrhages.

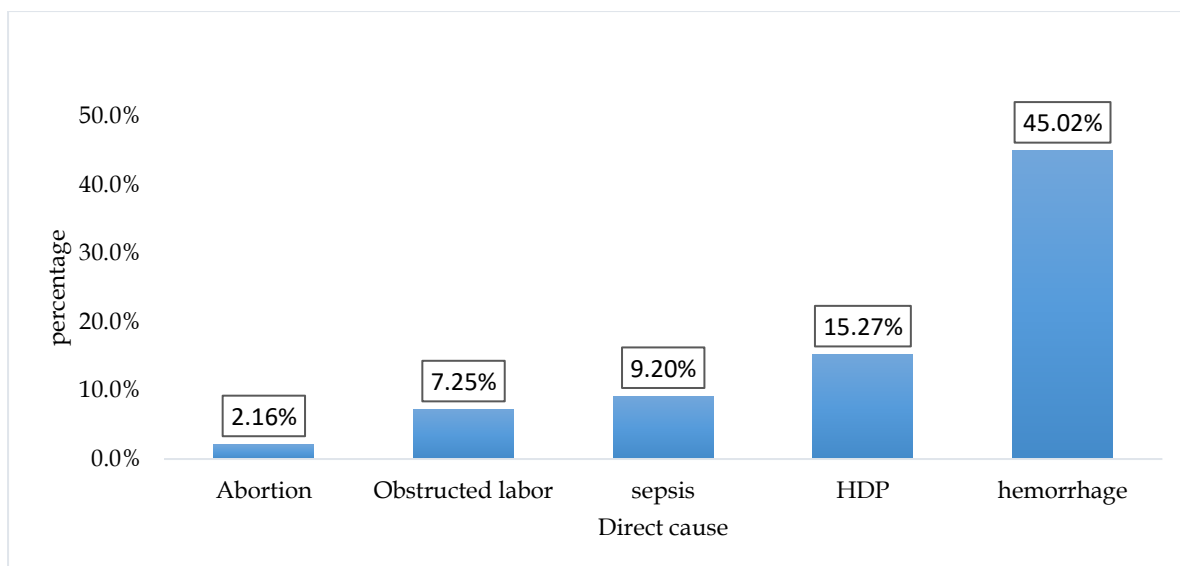


Figure 2.14: Frequency distribution of direct obstetric causes of maternal death from Oct 2013 to Dec 2017.

From all indirect cause, 451(60%) accounted by Anaemia and followed by a cardiopulmonary complication which accounts for 118(16%) from all total cases.

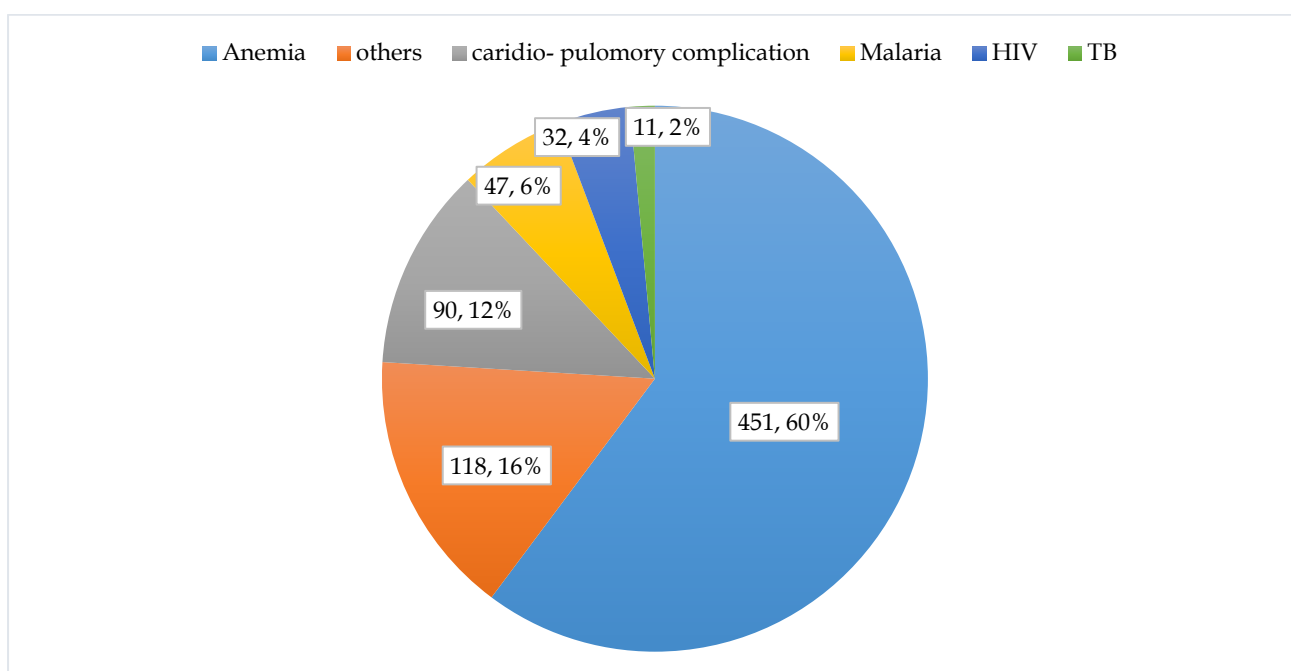


Figure 2.15: Frequency distribution of indirect obstetric causes of maternal death from Oct 2013 to Dec 2017

Death due to hemorrhage increases dramatically in each year as compared to other direct cause maternal death.

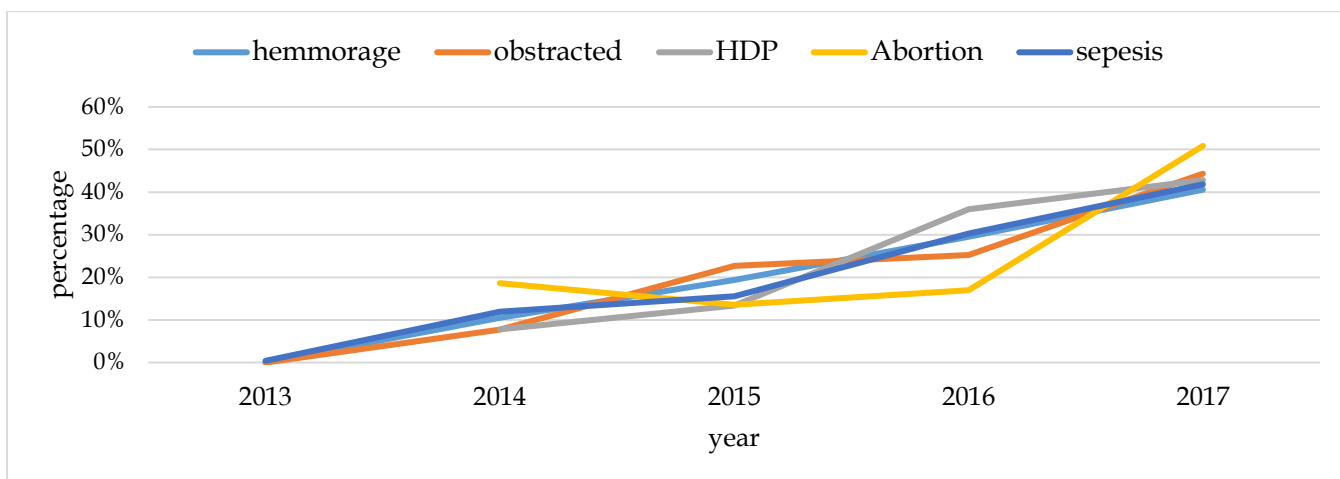


Figure 2.16: Trend of maternal death as a result of direct obstetric cause from Oct 2013 to Dec 2017

Contributory factors

Beside to cause of maternal death there are different delay contribute for mother including in delay in the decision of seeking care, delay in reaching care and delay in receiving adequate health care. Most deaths were subsidized by delay one which accounts for 42% of total death followed by delay two and delay three contributed 32% and 26% respectively. Among the first one (delay in the decision to seek care) lack of decision to go facility account 986(36%) followed by delay referral from home contribute 853(32%). Second delay (delay in reaching care) delay arrival to the referred facility (24%) and precede by lack of transportation account for 14%. Third delay (delayed in receiving adequate health care) delay arrival to next health facility account for 22% and followed by a delay in management after the admission of 12%.

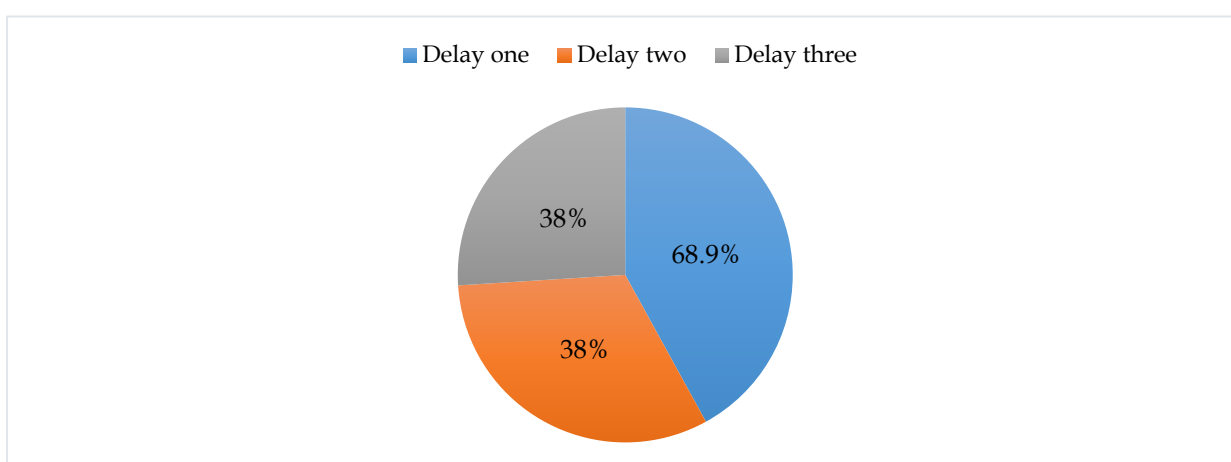


Figure 2.17: Distribution of contributory factor for maternal death from Oct 2013 to Dec 2017

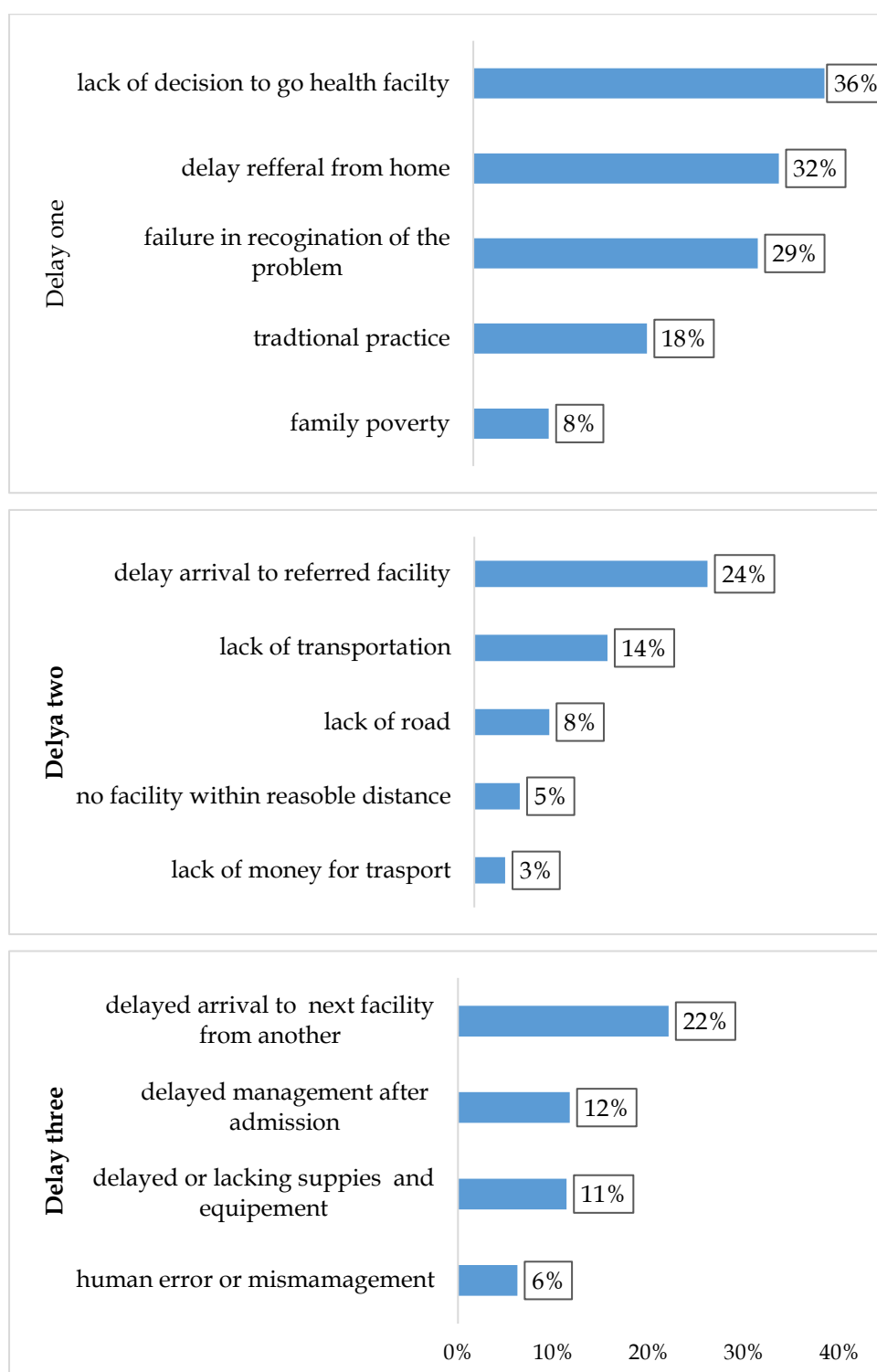


Figure 2.18: Distribution of three delays of maternal death from Oct 2013 to Dec2017 in Ethiopia

Cause of deaths and other risk factors

Cause of death vs age group

Cause of maternal death across different age group is not similar. An overall higher number of maternal death due to direct obstetric was seen at the age between 20 up to 34 age group expect for obstructed labour 51(25 %) death occurred at age group 35-39. A higher number of deaths occurred at age group 25-27 for instance by 27 % hemorrhage, 31% HDP and 26% abortion.

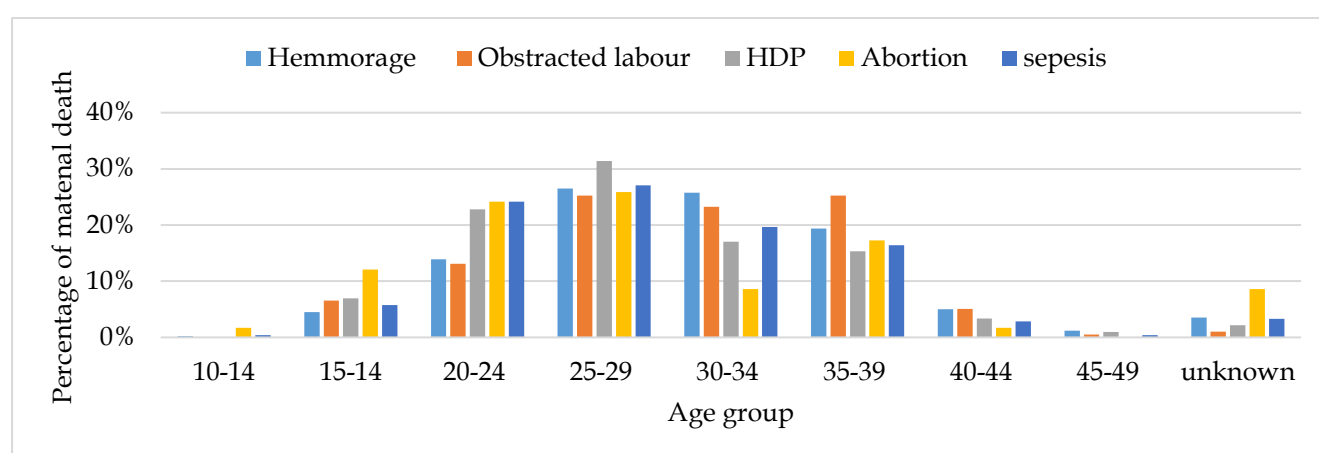


Figure 2.19: Frequency distribution of direct cause of maternal death with the respective age group.

Indirect obstetric cause also contributes to death mother: it also differs across the different age group.

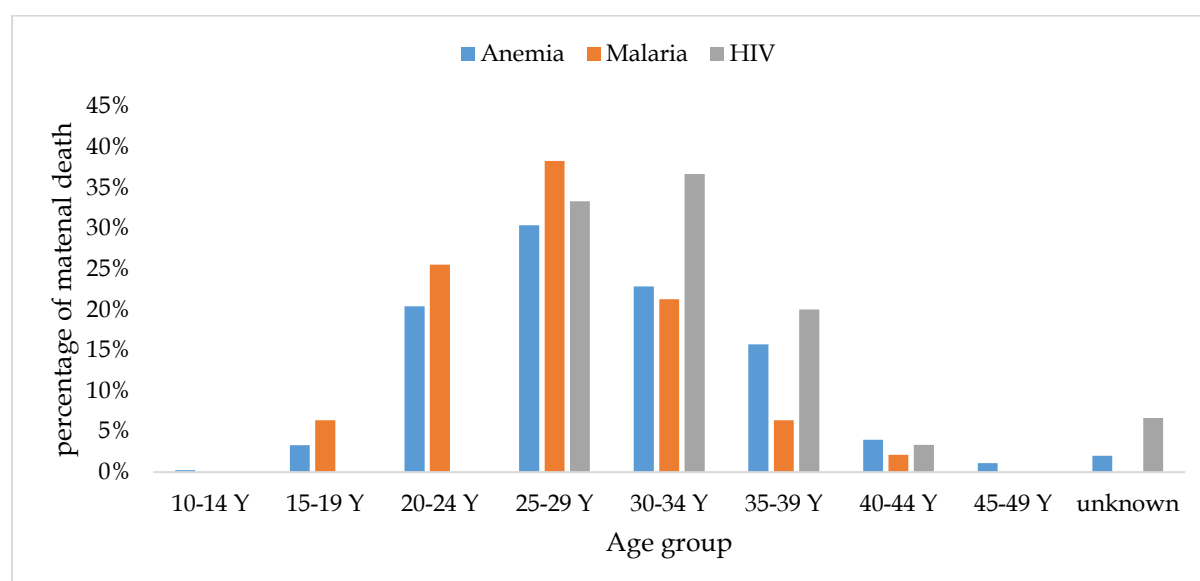


Figure 2.20: Frequency distribution of indirect cause of maternal death with the respective age group.

Cause of deaths vs region

As described earlier most of the death reported were from Amhara and Oromia followed by region SNNP and Tigray.

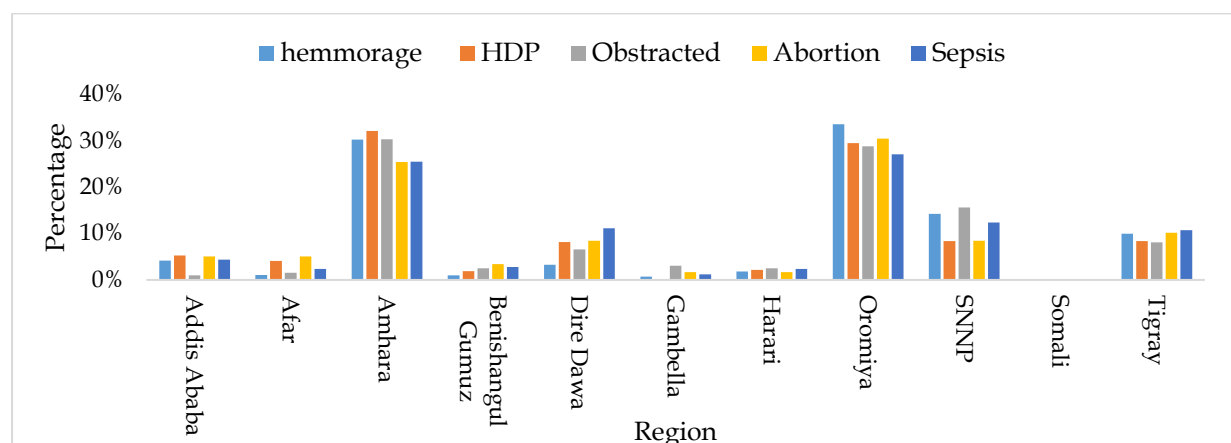


Figure 2.21: Frequency distribution of direct cause of maternal death with the respective region.

Unlike direct cause, most deaths due to the indirect cause were reported from Oromia region followed by Amhara and Tigray region.

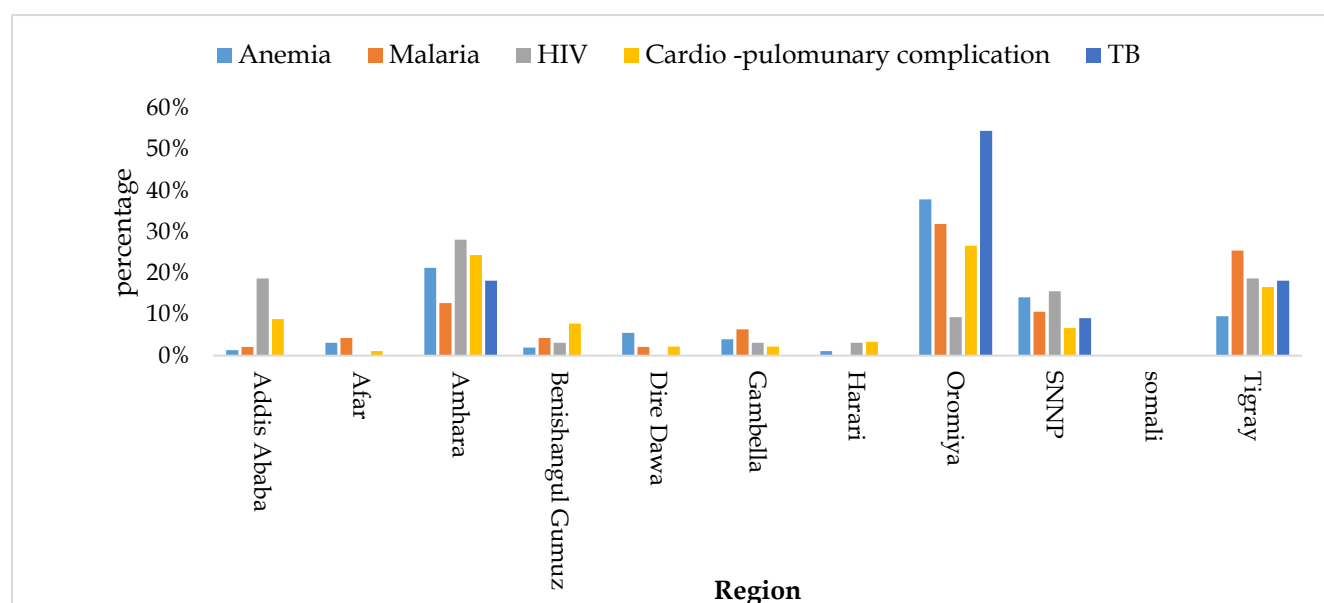


Figure 2.22: Frequency distribution of indirect cause of maternal death with the respective region

Cause of death and parity

Cause of death may have affected by the number of parity. Those who have parity between zero up one most maternal death seen due to cardiopulmonary complication and hypertension disorder of pregnancy contribute 56(48.5%) and 200(48%) respectively. Whereas; in case of

parity between two up to four most died due to obstructed labour and sepsis account for 42.1% and 39.2% respectively. As parity go behind five most death occurred as a result of hemorrhage

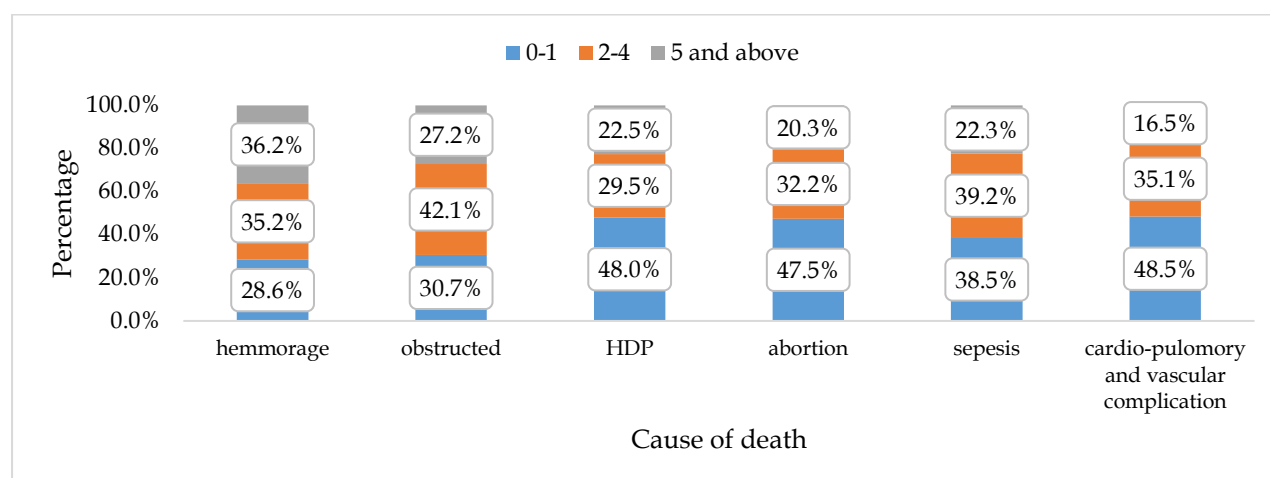


Figure 2.23: Distribution of maternal death across differ parity group from Oct 2013-Dec 2017 in Ethiopia.

Cause of death vs educational status

Most reported death from all region during the study period were illiterate and the majority reported death due to the direct obstetric cause were also illiterate expect in death as a result of hypertension disorder pregnancy were higher on mothers who had educational status college and above.

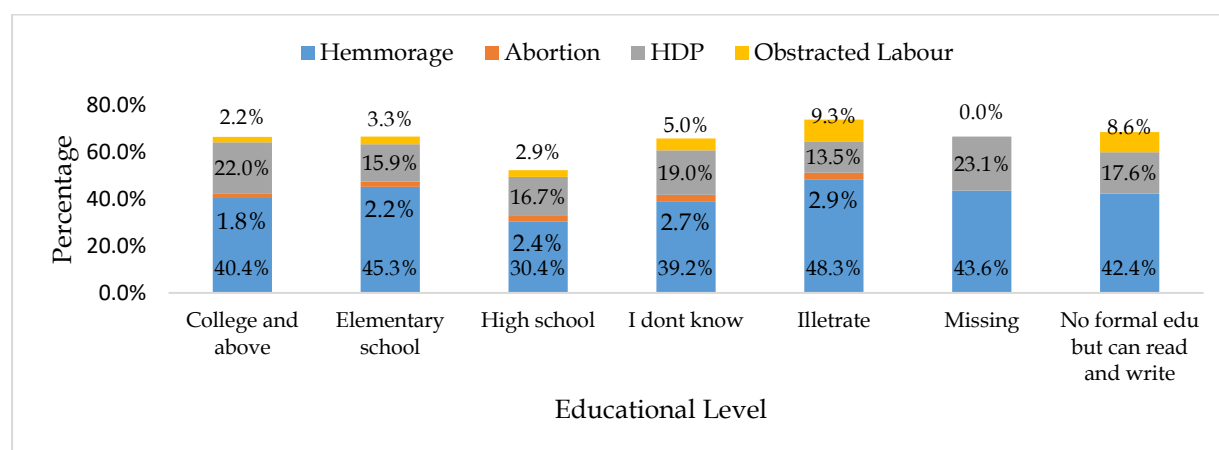


Figure 2.24: Distribution of maternal death across different educational level from Oct 2013 to Dec 2017.

As described above most reported death are occurring in a hospital set up. Cause of death is different as a place of death as well. For instance, a significant number of death due to hemorrhage were seen in health post (62%), home (59.2%) and on transit (59%) as compared to others cause of death in their respective setup. Death as a result of HDP was higher in a hospital set up an account of around 20%.

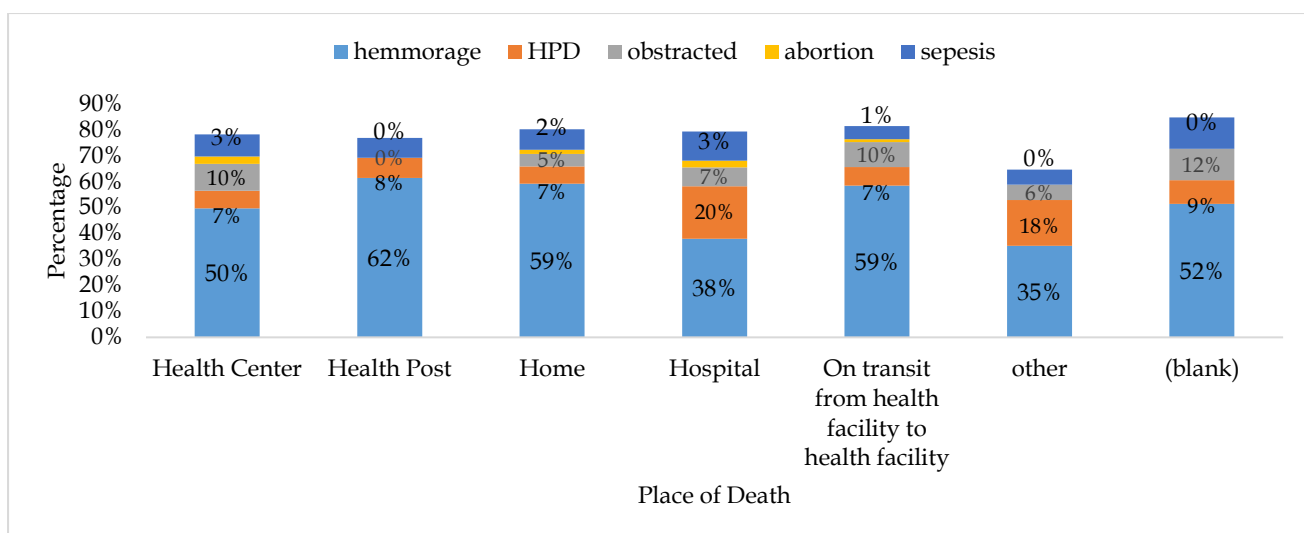


Figure 2.25: Distribution maternal death across the different place of death from Oct 2013 to Dec 2017

Comorbidity cause of death

Among reported death, not all death occurred as a result of direct or indirect obstetric cause alone but also occurred simultaneously together in reported deaths as described in the table below.

Table 2.2: Number of maternal deaths who were died due to the direct and indirect obstetric cause from 2013- 2017

Direct obstetric cause	Indirect obstetric cause			
	Anemia	Malaria	HIV	TB
Haemorrhage	221(18%)	8(0.65%)	—	—
Obstructed labour	28(14%)	2(0.99%)		
HDP	26(6.5%)	3(0.7%)		1(0.24)
Abortion	8(14%)			

Delay vs cause of death

Delay in making the decision to seek care vs cause of death

Lack of decision to go health facility and failure in recognition of the problem was a main contributory factor for mothers who were passed away due to abortion according to case-based reporting format.

Delay in reaching the health service vs cause death

Delayed arrival to the referred facility and lack of transportation were higher in mothers who were died due to obstructed labour.

Delayed in reaching the care vs cause of death

A significant number of deaths was occurred a result of abortion and obstructed labour during transit time.

Table 2.3: Distribution of contributory factor and cause of death from 2013-2017.

Contributory factor	cause of death from the total reported in each cause n/N (%)			
	Hemorrhage (n/N%)	obstructed labour(n/N%)	Abortion(n/N%)	HDP(n/N%)
Delay one				
Lack of decision to go health facility	457(37)	74(36)	24(41)	160(38.5)
Delayed referral from home	408(32)	91(45)	22(37.3)	124(30)
failure in recognition of the problem	326(26)	64(32)	19(32)	161(39)
Traditional practice	237(19)	35(12)	7(12)	78(19)
Family poverty	79(6)	15(7)	4(7)	47(11)
Delay two				
Delay arrival to referred facility	286(23.3)	66(42)	16(27)	114(27)
Lack of transportation	214(17)	53(26)	3(5)	50(12)
Lack of Road	126(10)	23(11)	3(5)	28(7)
No facility within a reasonable distance	70(5)	8(4)	3(5)	15(4)
Lack of money for transport	35(2.8)	12(4)	2(3)	18(4)
Delay three				
Delayed arrival to next facility from another	272(22)	72(30)	16(29)	92(22)
Delayed management after admission	137(11)	20(10)	8(14)	50(12)
lacking supplies and equipment	137(11)	20(10)	11(19)	63(15)
mismanagement (human error)	205(16)	28(13)	12(20)	74(18)

Antennal care (ANC follow up)

More than half mother had antennal follow up during their pregnancy account for 147(58%) of total reported death.

As parity goes behind five the tendency to antennal care decrease as compared to mothers those who had parity below five.

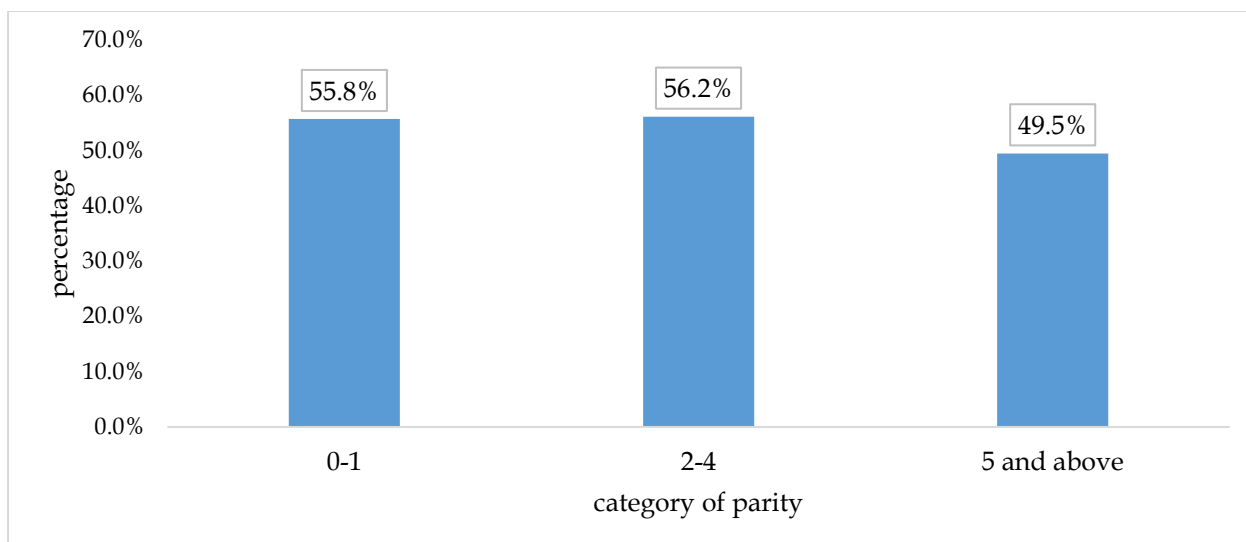


Figure 2.26: Frequency distribution of antenatal care based on parity in Ethiopia 2013-2017
The most outcome pregnancy was missed but from the delivery baby, 438 (58%) of them were a lived.

Preventability of death

Form 2714 deaths reported 2254 deaths were identified as preventability maternal death and as described in the figure bellow almost all (83%) of the deaths were reported as preventable

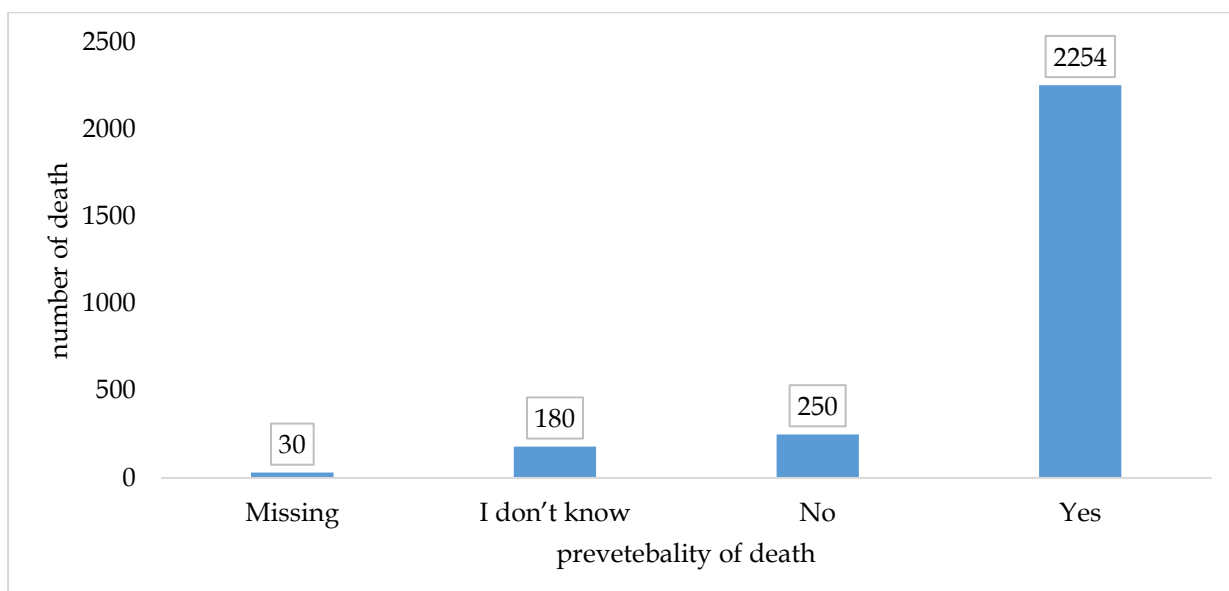


Figure 2.27: Frequency distribution of Preventability Status of Maternal death from Oct 2013 to Dec 2017

As depicted earlier most reported death was preventable According to cause of death almost all death reported by hemorrhage and obstructed labor were avoidable.

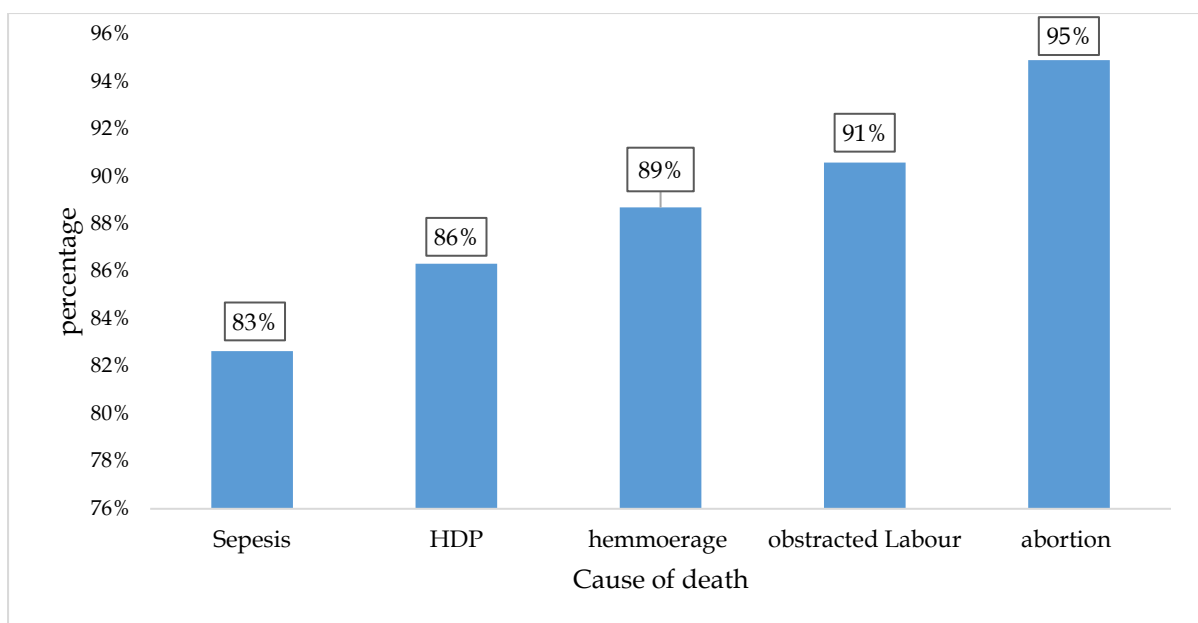


Figure 2.28: Frequency distribution of Preventability Status of Maternal death by cause of death from Oct 2013 to Dec 2017

Medical supply and equipment

Medical supply and essential equipment are vital in preventing maternal death. Lack of blood and blood product was the main challenge that faces during a time of preventing maternal death and it makes the professional effort worthless.

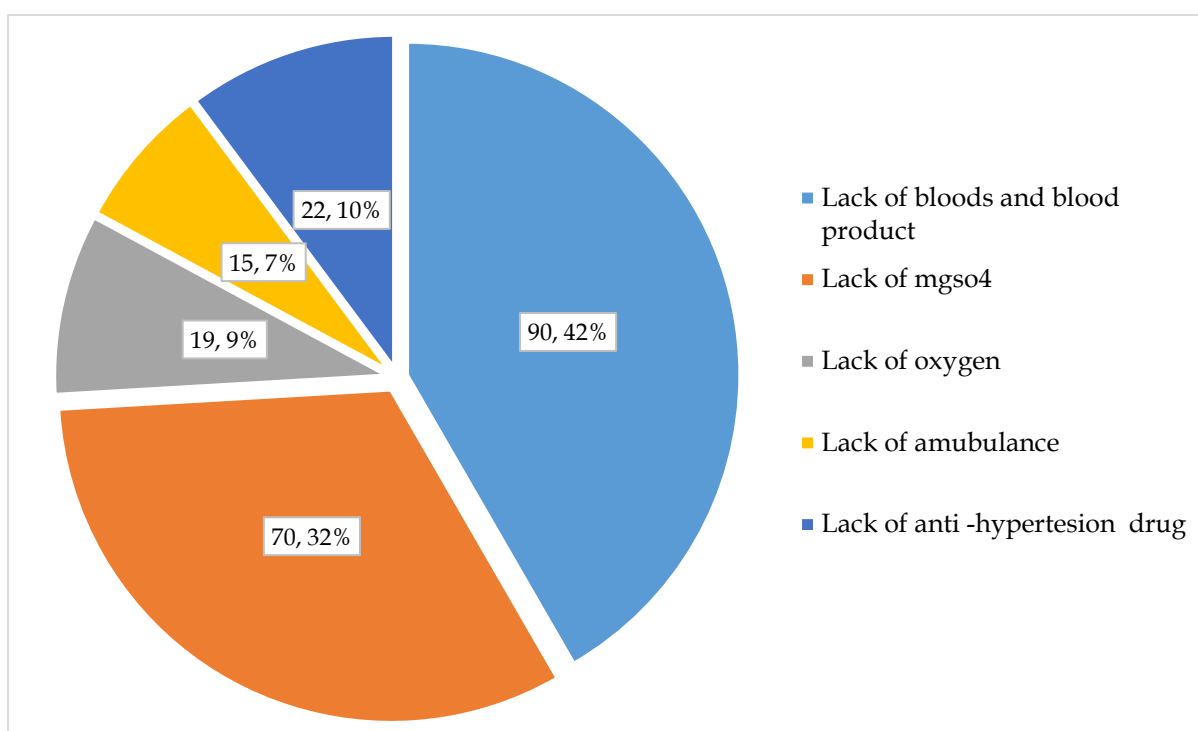


Figure 2.29: Distribution of medical equipment and supply contribute for maternal death in Ethiopia from 2013-2017

Performance of a surveillance system

Maternal death surveillance officially incorporated to surveillance system 2013: whereas reporting was started into weekly PHEM report after January 2014. The best performance was seen in Dire Dawa city administration by achieving 74 (46%:) the lowest was seen in Ethio-Somali region 1.7% by sending the weekly notified maternal death using MDRF Benishangul Gumuz and Gambella have better than other region expected in Ethio-Somali region weren't sent any maternal death using MDRF.

Table 2.4: The performance maternal surveillance across differ region in Ethiopia from 2014-2017

Region	weekly reported	MDRF REPORT	expected live birth	expected maternal death	reported by weekly vs expected death	MDRF VS Weekly	reported MMR (100,000 live birth)
Addis Ababa	111	129	304842	1164	9.5%	116%	42.3
Afar	27	59	200384	765	3.5%	219%	29.4
Amhara	585	761	2774284	10586	5.5%	130%	27.4
B-Gumuz	47	49	139162	531	8.8%	104%	35.2
Dire Dawa	74	141	41614	159	46.6%	191%	338.8
Gambella	23	24	50282	193	11.9%	104%	47.7
Harari	28	53	28948	113	24.8%	189%	183.1
Oromia	1210	793	4738285	18091	6.7%	66%	16.7
SNNPR	168	394	2560470	9774	1.7%	235%	15.4
Somali	32	0	698581	2667	1.2%	0%	0.0
Tigray	104	311	702276	2680	3.9%	299%	44.3
Ethiopia	2409	2714	12239129	46790	5.1%	113%	22.2

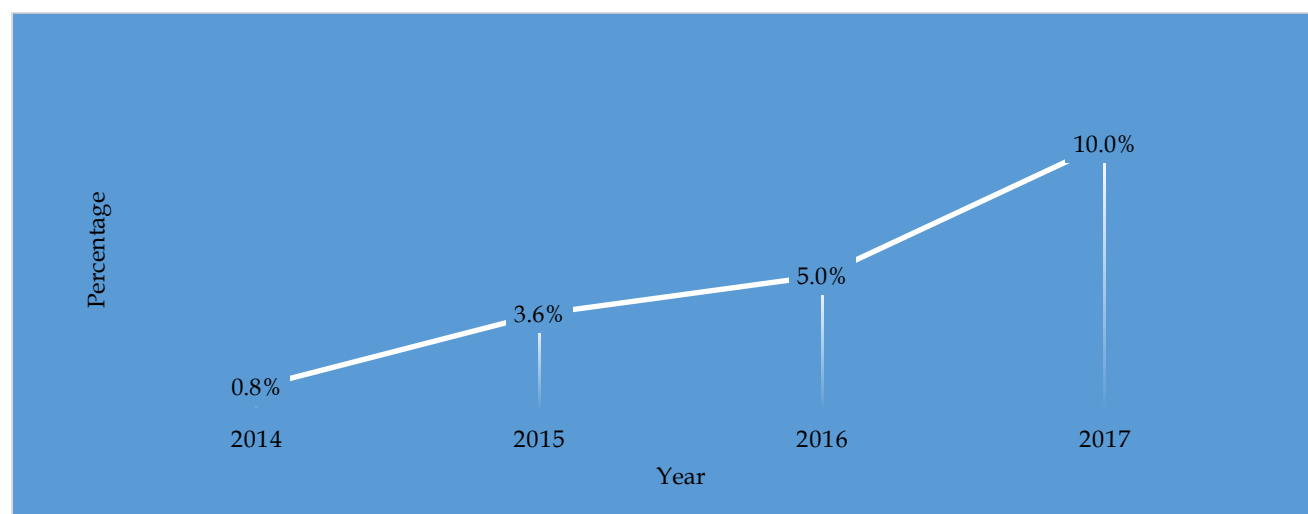


Figure 2.30: Performance of maternal death surveillance in Ethiopia from 2014-2017

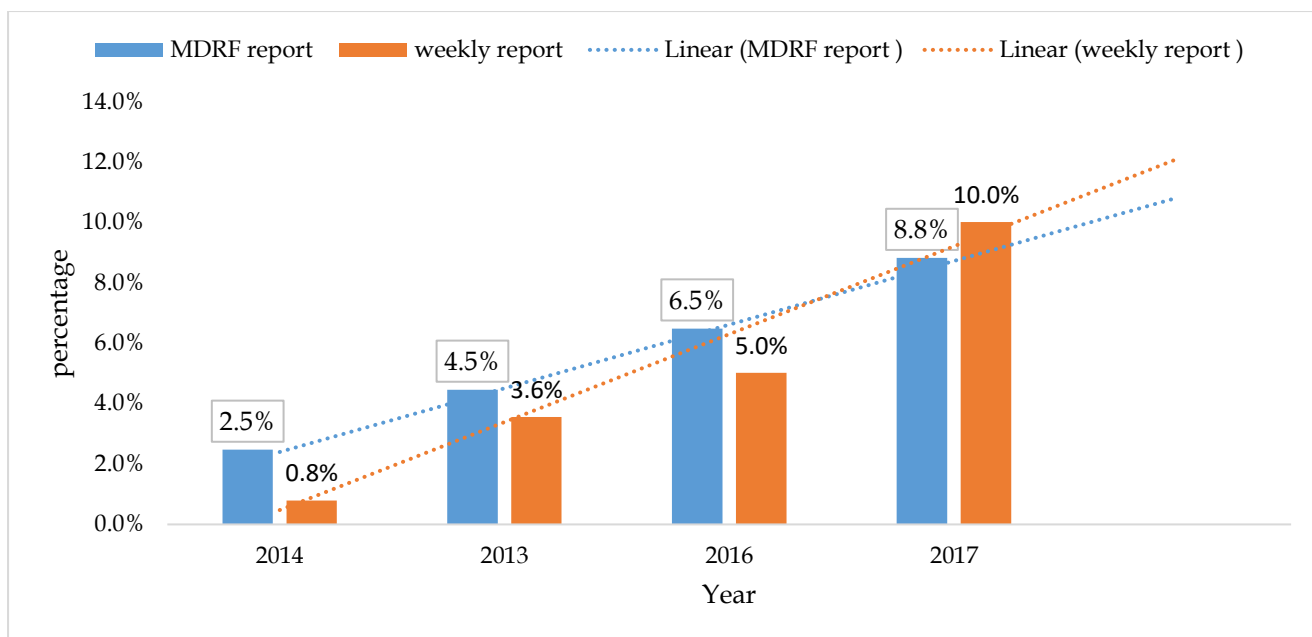


Figure 2.31: Performance of both weekly and MDRF report according to expect plan in Ethiopia from 2014-2017.

Data quality

As compare of observed cell to that expected cell, the completeness of data was 118,384(70%).

Discussion

Different kinds of literature show that the age of a pregnant woman affects her chances of dying from the maternal cause. Based on this study most of the deaths (49%) happened on the upper age groups 25 up to 34 with an overall mean age of 28.6 years (+/- 6 years). In each age group, the number reported maternal death increased from year to year expected in the age group 10-14 years. Age is one of the biological factors that have an influence on the occurrence of maternal death. This is due to a range of biological and social factors. For instance, young women may be at increased risk of obstructed labour, if their pelvis is not mature. Older women may have accumulated health problems like hypertension and diabetes which cause obstetric problems. Beside to this the rate of relatively low in highest age group even though the risk high due to medical complication because of few births occurred at those ages similar also for the lower age group. This finding is supported by a study done in 38 counties which assess maternal morality pattern according to age and assessment of risk factor maternal mortality conducted in Tanzania [8,9,14,19].

Most of the deaths reported in the study periods were in mothers with lower literacy level, with and those who reside in the rural part of the country. This is also observed in a maternal death surveillance data analysis conducted in the southern part of Ethiopia, Morocco, and China reveal that their higher maternal death was seen in the rural area [10,11,12,14]. A relatively higher number of deaths at rural setup can be explained by the combined effect of literacy status, lack of information and the physical difficulty of accessing health facilities as well as inequality health service. Literacy status or Education is a distant factor which offers the possibility of affecting the magnitude of maternal mortality in a number of different ways. One is the well-known effect of education on lowering fertility. If women get pregnant less and bear fewer children, they are less at risk of maternal death. Women's social status, self-image, and decision-making powers may all be increased through education, which may be key in reducing their risk of maternal death, resulting from early marriage and pregnancy or lack of information about health services [12,13].

From the total of nine regions and two city administration in the country, 10 of them reported maternal death through the MDSR system. More than half of the maternal deaths (58%) were reported from Amhara and Oromia region and followed by SNNP and Tigray reported (15%) of each region. The high number of maternal death report from both regions can be due to a relatively high number of live births is expected as compared to another regions. In contrast, to above Ethio-Somalia region weren't used the above system for the last five years. In zonal

level since more than half of reported maternal death was reported from two regions. In Amhara region South Gonder and West Gojam zones contribute 18% and 19%: and in Oromia region, East Hararge and West Arsi zones also contribute 19% and 17% respectively compared to another zone in their regions. According to this study higher maternal death reported for Dire Dawa city administration and Harir Region 338.3 and 183.1 maternal reported from 100,000 live births but those who large population like Oromia and Amhara and other need work a lot in improving the surveillance system.

Generally, the overall maternal mortality ratio observed in this study is far below the WHO estimation (353 per 100,000 live birth) and recent researches such as a study done in a central static agency that the over the socio-demographic situation of the country (2016) reports reveal that a maternal mortality ratio of 412 per 100,000 live births (95% CI:273–551) [6]. The big disparity of maternal mortality may show as much of the maternal deaths are not reported under the MDSR system and the huge variation among regions may indicate the difference in the strength of the system and the focus given to maternal death surveillance.

Overall Higher number of death were occurred in hospital setup 1686 (62%) followed by home 433(16%) and during referral to next level which was 354(16%) similarly the same study conducted in Morocco and Algeria show that comparative 76 % and 93% of death were reported from public hospital respectively,12% were also reported during transit and 17 %were at home in Morocco [8,15]. Tigray region was one of the regions with a high number of maternal deaths occurred in the home which was 71(23%) followed by Amhara 167(22%) and Oromia 134(17.6%) regions. In contrast to Tigray region, a higher number of deaths were reported from hospital set up in Dire Dawa 127(90%) followed by Harir 47(89%) and SNNP 304(80%) according to their reported maternal death by using case-based format. Furthermore; in Afar region around 10% maternal death was reported in the health post. As described before around 80% maternal death was occurred in hospital and home. There is an increased number of maternal deaths in a hospital set up during the last five years. For instance; 45% maternal death occurred in the hospital were reported in 2017.moreover,36.7% maternal death reported from home occurred in 2017. As described earlier the majority death reported was reported from Amhara and Oromia followed by region SNNP and Tigray similar for that direct cause of maternal death but, for indirect cause, the leading taken by Oromia Most reported death was reported in 2017 which 42% all reported the death in last five years by case-based format. A high number of deaths was seen in March, April, and May during 2016 and 2017: even if, no seasonality was reported to maternal death still now. A significant number of death was seen

after delivery (post-partum) which is 63% and the death was before delivery (ante partum) and during delivery (intrapartum) account 20% all and 16% respectively. Among mothers who were died during post-partum 63% death occurred in the first 24 hrs followed by 22% which were died within two up to three days later after delivery. The comparative similar finding was reported in meta-analysis study conductive between the USA and developing nation in 1996 as well as in the study conducted by WHO in 2006 and study conducted in Ethiopia in Meza tepi hospital in 2018 show almost all similar finding with this study [15,16,17].

A good referral system composes of an organized communication system between referring and receiving facilities have the necessary infrastructure such as vehicles and guided by policies and procedures to ensure mothers receive the best possible care closest to home [17]. The major proportion of mother also died during transfer or referral between two health facilities. In addition to the weak linkage and poor on referral care, there are also factors that demotivate mothers to accept and to comply with referral advice. A study done in rural Tanzania to assess the effectiveness of maternal referral shows that the major factors that not motivated to attend to referral advise includes financial difficulties, inaccessibility of transportation, the absence of accompanying and poor knowledge regarding the importance of referral [26]. The Ethiopian DHS, 2016 finding also shows that more than six women in ten (61%) stated that a health facility delivery was not necessary, and three in every ten (30 %) stated that it was not customary. Fourteen percent of women said that the health facility was either too far or that they did not have transportation other major proportion of mother also died during transfer or referral between two health facilities. In addition to the weak linkage and poor on referral care, there are also factors that demotivate mothers to accept and to comply with referral advice. A study done in rural Tanzania to assess the effectiveness of maternal referral shows that the major factors that due to motivating not to attend to referral advise includes financial difficulties, inaccessibility of transportation, the absence of accompanying and poor knowledge regarding the importance of referral were the main contributory factor to maternal death [22].

As WHO stated other factors that prevent women from receiving or seeking care during pregnancy and childbirth are poverty, distance, lack of information and inadequate services cultural practices. This study also revealed that different delay contributes for mother death including in delay in the decision to seeking care, delay in reaching care and delay in receiving adequate health care. In this most death was subsidized by delay one which accounts for 69% of total death followed by delay two and delay three contributed 38% and

27% respectively. Among the first one (delay in the decision to seek care) lack of decision to go facility account 36% followed by delay referral from home contribute 32%. Second delay (delay in reaching care) delay arrival to the referred facility (24%) and precede by lack of transportation account 14%. Third delay (delayed in receiving adequate health care) delay arrival to next health facility account for 22% and followed by a delay in management after admission 12% comparative similar finding was seen study piloted tertiary hospital at India in 2008 [20].

WHO estimates show that the leading causes of maternal deaths are hemorrhage and hypertension, which together accounts for more than half of maternal deaths. Indirect causes, which include deaths due to conditions such as malaria, HIV/AIDS, and cardiac diseases, account for about one-fifth of maternal deaths. Regional estimates show that hemorrhage and hypertension are among the top three causes of deaths in both South Asia and Sub-Saharan Africa, where most maternal deaths occur. In this study, it is shown that 73 % of the deaths caused by direct obstetric cause and from which nearly half of the death is caused by hemorrhage and 24 % of the deaths are caused by sepsis and hypertensive disease of pregnancy. It is also possible to see that hemorrhage is a single major factor which accounts for 45.1% of the total death. This finding is also supported by the MDSR data analysis conducted in Morocco which shows that Haemorrhage is the first direct obstetric cause (33% of all deaths). The second leading cause was pre-eclampsia/eclampsia (18%) followed by infections (8%). In Ethiopia, the cause of maternal death studied in different setup and time by different scholars. All study concluded that most deaths occurred as a result of the direct obstetric cause even if leading cause different in a different study. A study conducted in 2013 revealed that abortion and infection have declined meaningfully in the last decade. Obstructed labour is still the leading cause of maternal death. Death due to hypertension disorder and hemorrhage increased trend in recent year.in contrast to this study piloted in a hospital set up post-abortion sepsis, PPH and rupture uterus principal cause of maternal death under the direct cause of maternal death whereas, malaria and hepatitis leading cause in early 1980 but shift to TB and pneumonia after 1990 foremost cause of maternal death under indirect cause [6,19].

Among the independent obstetric causes anemia, cardio-pulmonary and malaria are found to be the most significant know causes of maternal death. Beside above-depicted cause, there were reported death due to TB, HIV, and others.

Death due hemorrhage increases dramatically in each year as compared to other direct cause maternal death. Cause of maternal death across in different age group and parity is not similar.

An overall higher number of maternal death due to direct obstetric was seen at the age between 20 up to 34 age group expect for obstructed labour 25 % death occurred at age group 35-39. the higher number of deaths occurred at age group 25-27 for instance by 27 % hemorrhage, 31% HDP and 26% abortion. This all may be explained first pregnancy occurred most likely at this age group. Indirect obstetric cause also contributes to death mother: it also differs across the different age group. Higher death due to HIV was seen at age group 25-29-year-old alternatively explained as result more became sexual activity during this age.in case parity cause of deaths may have affected by the number of maternal deaths. Those who have parity between zero up one most maternal death seen due to cardiopulmonary complication and hypertension disorder of pregnancy contribute 48.5% and 48% respectively. Whereas in case of parity between two up four most died due to obstructed labour and sepsis account for 42.1% and 39.2% respectively. As parity goes behind five most of deaths occurred as a result of hemorrhage. This may be explained due to lose the strength of myometrium muscle to contracted as expected after delivery. In this study, a high number of maternal deaths were seen in a mother who has parity from zero up to four. Whereas it was lower in mothers who have five and above parity.it also similar find was seen in a study conducted at the hospital set up in Ethiopian Unlike to this study conducted in Egypt higher number of maternal deaths were seen parity goes further with linear increment. This may be explained due to a lower tendency to delivery after older age their setup [14,19]. As described above most reported death are occurring in a hospital set up. Cause of death is different as a place of death as well. For instance; higher number of death due to hemorrhage were seen in health post (62%), home (59.2%) and on transit (59%) as compared to others cause of death in their respective setup. Death as a result of HDP was higher in-hospital setup account around 20%. It may be explained due to failure management and due to lack of ANC follow up during their pregnancy. Most reported death from all region during the study period were illiterate and the majority reported death due to the direct obstetric cause were also illiterate expect in death as a result of hypertension disorder pregnancy were higher on mothers who had educational status college.it may illustrate as result change of lifestyle modification as the educational level gets higher.

Among reported death not all death occurred as result of direct or indirect obstetric cause alone but also occurred Simultaneously together in reported deaths .for instance, 18% mothers who were died by haemorrhage ,14% mothers died by obstructed labour and 8% mother who were died were anaemic as well as less than one person mother who died by similar cause that

mentioned above were infected for malaria . This will increase and speed up the chance of death.

More than half mother had antenatal follow up at least once during their pregnancy account 54% of total reported death the majority of remaining had no antenatal care. This also increased the probability of death as compared to those have antenatal care according to standard. As parity goes behind five the tendency to antenatal care decrease as compared to mothers those who had parity below five. This may be explained due to prior poor experience regards to ANC follow up. The most outcome pregnancy was missed but from most of them were a lived even their mothers died.

From 2714 deaths reported 2254 deaths to have an identified judgment regarding preventability of maternal death. Majority of the death was preventable account for 83% of total death. A similar study conducted in Zimbabwe also revealed that 87 % of death was avoidable [21]. Regarding the cause of death, most reported deaths were preventable According to cause of death almost all loss of mothers reported by hemorrhage and obstructed labour were avoidable.

Maternal death surveillance officially incorporated to surveillance system 2013: whereas reporting was started into weekly PHEM report after January 2014. the best performance was seen in Dire Dawa city administration by achieving 46%: the lowest was seen in Ethio-Somali region 1.7% .by sending the weekly notified maternal death using MDRF Benishangul Gumuz and Gambella have better than other region expected in Ethio-Somali region they weren't sent any maternal death using MDRF. Dire Dawa city admiration shows that best performance in different parameter used in study and Oromia region is reported a high number of maternal deaths using weekly PHEM report but all case was not sent using MDRF. another region also needs to emphasize to the program by sticking to settled plan. Overall the ability of surveillance to capture maternal increased from year to year. But needs more work improving the performance of the surveillance system in both weekly and MDRF system. Moreover, the data quality need also sustained and needs also further improved.

Limitation of study

Since the study is conducted on death which is only reported using MDRF doesn't show the overall situation of maternal death throughout the country. Therefore, can't infer to the general population.

Conclusion

- ✓ Almost half of the maternal death was reported from mothers with the upper middle age group. Majority of maternal death is reported from mothers residing in rural parts of the country and with illiterate educational status.
- ✓ Most of the maternal deaths are reported in the post-partum period and most of the mothers died during their first pregnancy and after mother become grand para.
- ✓ The overall maternal mortality ratio obtained in this data analysis is by far below the result of other studies and international estimations and with a local estimation of the country
- ✓ Hospital, home and during transit are the most reported place on which maternal death occurred, accounting for 92% of the total death.
- ✓ 77% of deaths are reported to be caused by direct obstetric causes and from which hemorrhage alone causes almost nearly half of the total maternal deaths.
- ✓ Not all death was reported from direct or indirect cause alone. but also occurred Simultaneous together.
- ✓ There is a high risk of maternal death due to hemorrhage as parity goes further. Risk of death due to hypertensive disorder and abortion get higher in the first pregnancy.
- ✓ Hypertension disorder much higher among mothers who had a higher educational level beyond college and above
- ✓ First delay (which includes lack of decision to seek care, lack of knowledge to identify problems and delayed home referral) was identified by most reports as a major factor in which most mothers faced before death. Second delay (delay in reaching care) delay arrival to the referred facility and lack of transportation majority delay and in delay three delay arrival to next health in facility delayed of management after admission was most contributory factor identified in respective.
- ✓ Almost all the maternal death was reported as preventable maternal deaths
- ✓ Most deaths reported due to abortion and hemorrhage almost totally preventable.
- ✓ Nearly half of mother have no ANC follow up at least one.
- ✓ as parity goes behind five the tendency to antenatal care is decreased
- ✓ Data completeness and quality isn't good as demonstrated by 30 % data elements were missing on the case-based report and have a great variation among regions. performance surveillance system increased from year to year even if, vary from region to region.
- ✓ Current maternal death surveillance can't estimate true magnitude of maternal death

Recommendation

- ✓ Heath education should be prearranged especially for illiterate and who reside in a rural area more emphasized ought to give
 - ❖ on danger sign of pregnancy
 - ❖ encourage institutional delivery using nearby structure
 - ❖ increased the awareness of mothers towards ANC follow up
- ✓ Intensified ANC follow up is a need for mothers who have first pregnancy and grand para due to high death were seen between these two extremities. Beside good diagnosis and followed up is needed to comorbidities like anaemia, malaria, and TB during their pregnancy.
- ✓ As most of the deaths are occurring in the post-partum period, teaching institutes and health authorities at all level should provide capacity building activities and follow up focusing on active third stage management of labour and postnatal care. Emphasis should be given for the mother who faces bleeding after delivery.
- ✓ To reduce maternal mortality and improve maternal health focus should be given to top three killers (haemorrhage, sepsis and hypertensive disorder of pregnancy) which accounts for 70 % of all direct cause.
- ✓ Avail ambulance with BEmONC service at health center level to reduced maternal death during transit.
- ✓ Availing essential medical supply and equipment like blood and blood product and others
- ✓ Provide quality ANC service like screening for helminth and availing iron folate supplement
- ✓ Even if, a performance the surveillance system increased during the last five years the data quality and completeness should give improved.
- ✓ Maternal death review committee needs to work in sending all notified maternal using case-based format.

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Chapter Three- Surveillance System Evaluation

3.1 Maternal death surveillance system Evaluation in Gambella regional state, western Ethiopian, 2018

Background: Maternal mortality ratio is considering as a primary and important indicator of the country over the health status as well as the quality of life. Ethiopia is one of the countries with the highest maternal mortality ratio per year with an estimated ratio of 412 (273-551) per 100000 live birth in 2016. Ethiopian Ministry of Health started to implement maternal death surveillance and response (MDSR) system as a weekly reportable event since October 2013. The objective of this evaluation is to assess the efficiency and effectiveness of the current MDSR system in Gambella Region.

Methods: a descriptive data analysis was used on the MDSR report of the region followed by a cross-sectional study of selected health facilities and key informants. The data was entered and analyzed using Epi info version 7.2.

Result: The attributes score of the system in Gambella region: stability (scored 2.5/5), timeliness (score 3.1/5), acceptability and usefulness (score 3.2/5) and representativeness (3.4/5) were identified as areas demanding improvement. There is a big disparity between the estimated number of maternal deaths and deaths reported through the surveillance system, which was 17/55(31%) reported by the system. Poor coordination, unavailability of training, guideline and feedback were the reason for poor implementation of the system.

Conclusion: Stability and timeless was the weakest attributes of the system in the Gambella region. Gambella Health Office should give focus to attributes that identified as areas' demanding improvement, guidance and follow up are recommended to improve the usefulness of the system.

Introduction

Background

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding health and a health-related event for use in public health action to reduce morbidity and mortality and to improve health [1]. Data disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation [2].

The importance of conducting public health surveillance evaluation is to guide immediate action for events of public health importance, measure the burden of disease, detect new emerging health events, identify the population at risk, monitor trends of burden of diseases or other health event, detect outbreaks/epidemics/pandemics, guide the planning, implementation, and evaluation of programs to prevent and control disease or other health problem, injury, or adverse exposure, detect changes in health practices, prioritize the allocation of health resources, provide a basis for epidemiologic research hypothesis, and evaluate public policy. Evaluation of a public health surveillance system focuses on how well the system operates to meet its purpose and objectives. The purpose of evaluating a surveillance system is to promote the best use of public health resources by ensuring that only important problems are under surveillance and that surveillance system operates efficiently [3].

In Ethiopia 22 diseases (14 are immediately reportable whereas 8 are weekly reportable) are selected to be included in the routine surveillance. Maternal deaths one of the 22 nationally notifiable events [4].

Maternal death is a subset of all female death and is associated with pregnancy as well as childbearing. It also defined Maternal death is death with 42 days not only after pregnancy ends, but also; including a death that occurs during pregnancy period and childbirth. Moreover, the compressive definition is stated by WHO which maternal death of women while pregnant or within 42 days of termination of pregnancy irrespective of the duration and site pregnancy from any cause related to aggravating by pregnancy and management but is from accident or incident. Which isn't consider as death maternal if due to the accident, homicide and suicide [5,6].

The maternal mortality ratio is considering as a primary and important indicator of the country over the health status as well as the quality of life. Each day around 830 women die from preventing the cause of pregnancy and childbirth; from this, almost all death occurs in a

developing country. It is higher in women living in a rural area among poor country; young adolescent faced higher complication as compare older women [6,7]. The maternal rate is 240 and 16 per 100000 lived birth in developing and developed, countries respectively.

Globally, the maternal mortality ratio is decreased from time to time. Maternal mortality during 1990 it was 532,000(496,000-590,000) to an estimate of 303,000(291,000-349,000) in 2015. Developing regions account for approximately 99% (302,000) of the global maternal deaths in 2015, with sub-Saharan Africa alone accounting for roughly 66% (201,000), followed by Southern Asia (66,000). At the country level, Nigeria and India contribute one-third of all maternal death in 2015, an approximate 58000 maternal deaths (19%) and 45000 maternal deaths (15%) respectively. Eighteen other countries, all in sub-Saharan Africa, are estimated to have very high MMR in 2015, with estimates ranging from 999 down to 500 deaths per 100 000 live birth. Among them, the highest was in the central Africa Republic and the lowest was Kenya [8].

Ethiopia is one of the countries which has high maternal mortality per year. Even if, there is progress to decrease maternal rate, still; it is remaining high. For previous EDHS report, it shows it was higher 600 deaths per live birth. For instance, previous 2000 it was 873(703-1039), in 2005 it was 673(548-799), in 2011 it was higher than 2005 676(541-810) and very recently it was estimated 412 (273-551) in 2016 per live birth [9].

Traditionally the cause of maternal death around 70%- 80% due to direct cause and the rest 20-30% death was linked to indirect causes. Most deaths were occurred during childbirth and after pregnancy [5,10]. The majority complication that accounts for 80% of all maternal death is; severe bleeding, infection, high blood pressure, and unsafe abortion. The period of gestation can be divided into units consisting of 3 calendar months each or 3 trimesters. The first trimester can be subdivided into the embryonic and fetal periods. The embryonic period starts at the time of fertilization (developmental age) or at 2 through 10 weeks' gestational age. The embryonic period is the stage at which development of most organ occurs and the time period during which the embryo is most sensitive to an agent that causes malformation (teratogens). The end of the embryonic period and the beginning of the fetal period occurs 8 weeks after fertilization (developmental age) or 10 weeks after the onset of the last menstrual period. The cause of maternal death is varying from one trimester to others as well as after delivery. For instance, death due to vaginal bleeding at first trimester is caused by abortion whereas during at end of pregnancy and after delivery cause by antepartum hemorrhage and post-partum hemorrhage respectively [11].

Around 99% of maternal death occurs in developing nation. Most maternal deaths in these countries are due to five major direct obstetric complications: hemorrhage, infection, unsafe abortion, hypertensive disorders of pregnancy, and obstructed labour [10]. Beside to mentioned cause AIDS also contribute a significant number of maternal deaths. Globally, 1.6% maternal death is due to AIDS; it accounts for 2% in the sub-Saharan country. In 2015 five countries 10% and more of maternal death are estimated to AIDS-related indirect cause of maternal death; South Africa (32%), Swaziland (19%), Botswana (18%), Lesotho (13%) and Mozambique (11%) [8].

In Ethiopia abortion and obstructed labour was leading cause of maternal mortality in 1980-1990 which contribute 31% and 29% respectively followed by infection (21%) and haemorrhage (22%) But, after millennium also obstructed labour is account (36%) and followed by haemorrhage (22%), hypertension-related complication of pregnancy (19%) and infection (13%) were seen the top four causes maternal mortality [10].

MDSR underlines the critical need to respond to every maternal death. Each death provides information that, if acted on, can prevent future deaths. Due to above-mentioned reason integrating maternal death into existing surveillance system can provide means of tackling and reducing the maternal mortality rate.

System Description of Maternal Death Surveillance and Response (MDSR) in Ethiopia

The MDSR system in Ethiopia was started in October 2013 and based on the ministry of health MDSR technical guideline the system has two major purposes;

- ✓ MDSR provides information about avoidable factors that contributed to maternal death and guides actions that need to be taken at the community level, within the formal health care system, and at the inter-sectoral level (i.e. in other governmental and social sectors) to prevent similar deaths in the future [5].
- ✓ MDSR establishes the framework for an accurate assessment of the magnitude of women's deaths related to pregnancy. Having an accurate assessment of maternal mortality, policy and decision makers may be more compelled to give the problem the attention it deserves. In addition, evaluators will more accurately assess the effectiveness of interventions to decrease mortality rates [5].

Based on the MDSR guideline there are two major sources of maternal death report (community and health facility maternal death report) and the overall surveillance and response process follows the same pattern as the sources.

A. Community Based Maternal Death Surveillance

For deaths happening outside of the facility, the health extension workers will establish a link with all possible sources of information for identifying deceased women of reproductive age. For in the community, the sources for the information include:

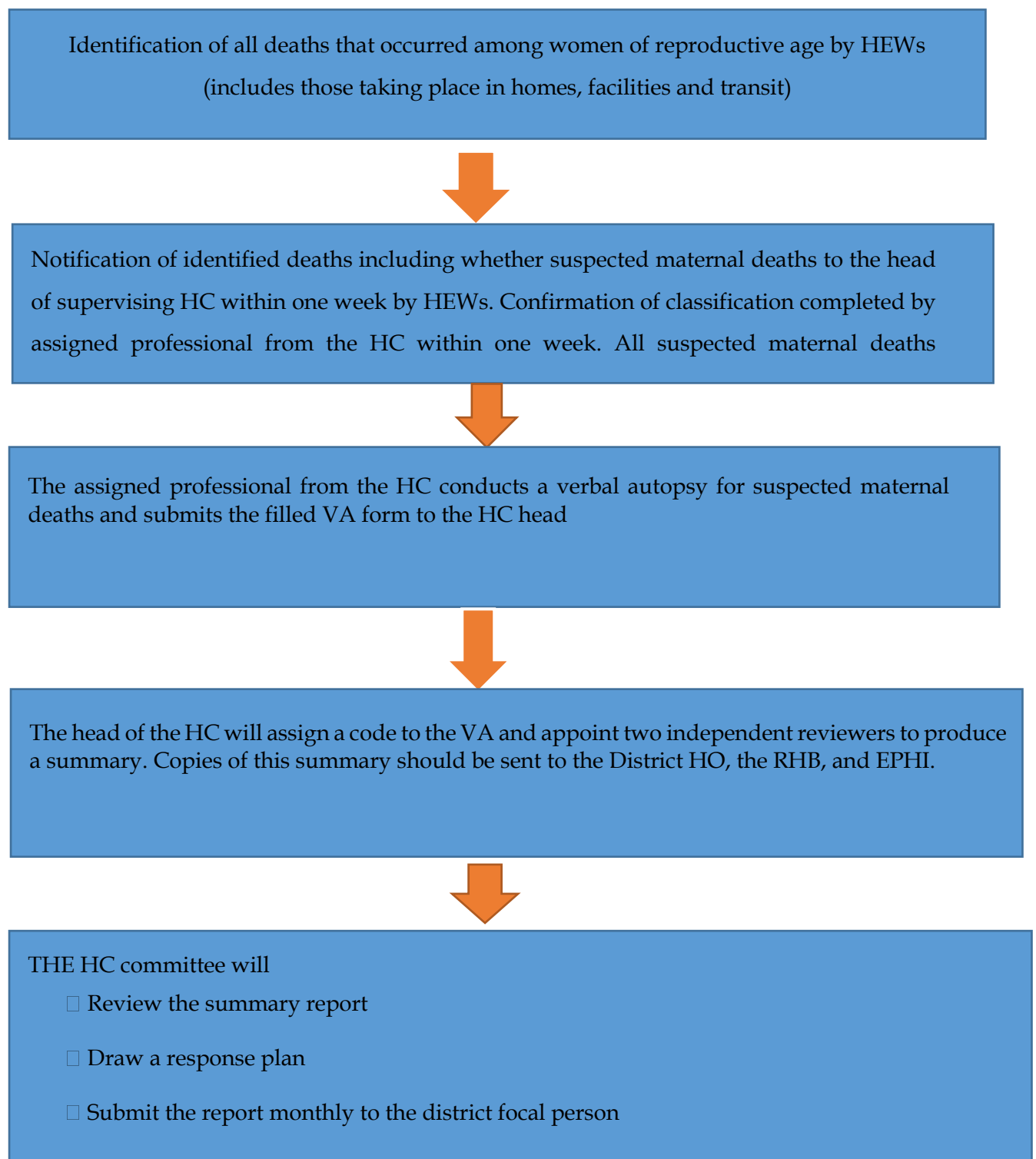
- ✓ Health Development Army members
- ✓ Religious leaders/institutes
- ✓ Community leaders
- ✓ Administrative leaders
- ✓ The HEW
- ✓ Community members [5]

Any of these individuals can identify a death to women of reproductive age (15-49) and should notify the local HEW. The HEW should pass on the information to the health centre head, who will arrange the verbal autopsy (VA). Family and other community members assist in completing the VA, which relies on the following sources of information:

- ✓ Persons who primarily attended the women during illness
- ✓ Persons who attended the women in labour and delivery (if at home)
- ✓ Persons who were present at the side of the woman at the time of death Husband (who is likely to have additional details on the woman's experiences during pregnancy) [5].

The details of the procedures are described in the following flowchart.

Maternal Death Review at Community Level (Source - Ethiopian MDSR technical Guideline)

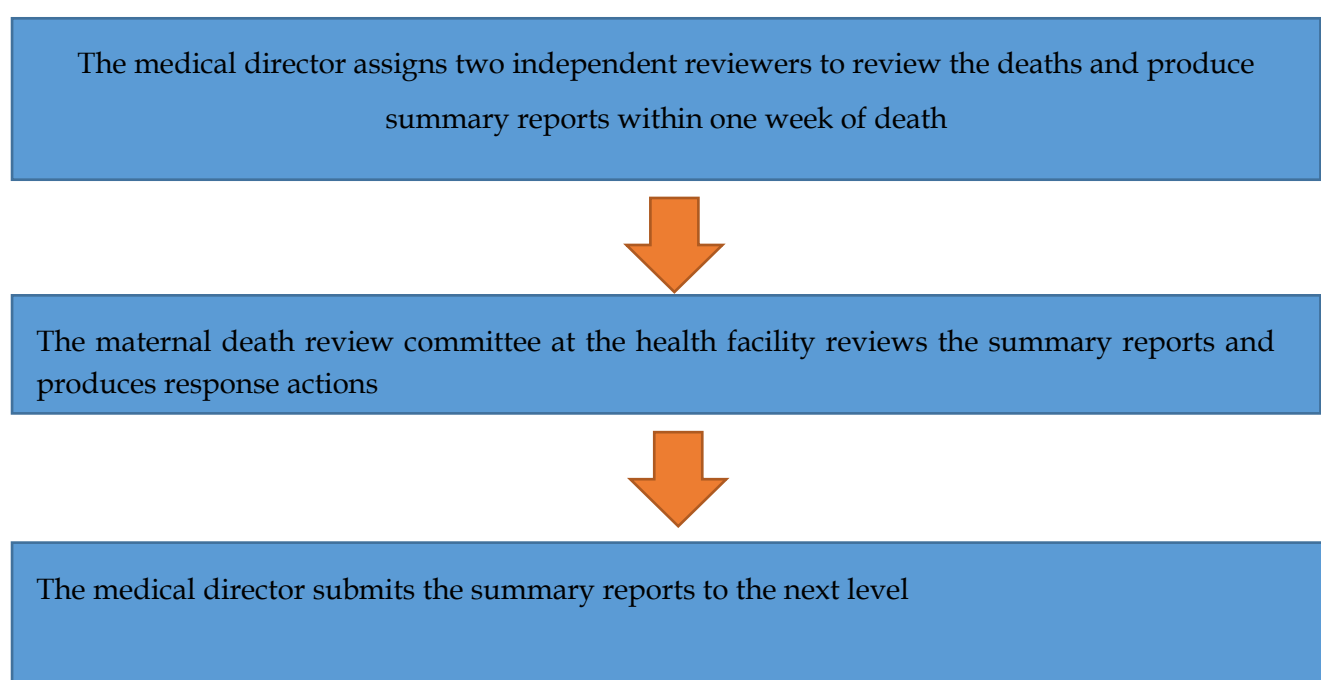


B. Health Facility-Based Maternal Death Surveillance

The head of any ward where a suspected maternal death occurs is responsible for notifying these to the head of the health facility/the medical director. The sources of the information for facility deaths reviews include:

- ✓ Referral sheets
- ✓ Medical records
- ✓ Logbooks (OR, maternity, OPD, anesthesia)
- ✓ Attending health workers (OPD, maternity, OR)
- ✓ Others (5)

The details of the procedures are described in the following flowchart. Maternal death review at health facility level (Source-Ethiopian MDSR Technical Guideline)



C. Cased Definitions Used in the Surveillance System

- ✓ Maternal Mortality – “The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.” [5].

- ✓ A Suspected Maternal Death – “The death of any woman while pregnant or within 42 days of the termination of pregnancy” [5].
- ✓ A Probable Maternal Death – “Deaths among women of reproductive age, not clearly due to incidental or accidental causes.” [5].
- ✓ Direct Obstetric Deaths – “Those resulting from obstetric complications of the pregnant state (pregnancy, labour, and puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above.” [5].
- ✓ Indirect Obstetric Deaths – “Those resulting from previous existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by physiologic effects of pregnancy” [5].
- ✓ Pregnancy-Related Death – “The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death (and) is intended for countries that wish to identify deaths occurring in pregnancy, childbirth and up to 6 weeks after the end of pregnancy but where the cause of death cannot be identified precisely [15].
- ✓ Late maternal death: defined as a maternal death due to pregnancy (direct or indirect obstetric causes) which occurred more than 42 days but less than one year after the end of pregnancy [15].

D. Data Analysis

The collected maternal death information was analyzed at a multiple level. At hospital and Health Centres level every death is reviewed based on a set of standardized formats and they are expected to generate a response plan based on the identified problems. A descriptive analysis is performed at district, Zonal and Federal level. The descriptive analysis is mainly consisting of information related to socio-demography of the deceased mothers, the cause of death, contributory factors, and maternal mortality ration [15].

E. Legal and Ethical Framework

Based on the MDSR guideline the consent informed the decision of the participants and confidentiality should be maintained and the following methods are recommended to be practiced.

- ✓ Family and friends of the deceased should be well informed about the review process. Their voluntary participation should be sought for and the interview can be

interrupted at their request. This particularly applies to verbal autopsy. Their consent should be sought.

- ✓ Families and healthcare workers directly and indirectly involved in the review process must be reassured of their privacy.
- ✓ The identities of the deceased, family and health care providers involved in the management should be kept confidential and known only to those who are doing the actual review
- ✓ An anonymizing staff member may be done for example by labeling them as Midwife A, Midwife B, Doctor X, etc.
- ✓ All persons having access to identifiable information will sign a confidentiality agreement stating that they will not disclose any identifiable information.
- ✓ Data collection forms, case summaries, review meeting minutes and reports or dissemination results will not contain any personal identifiers [5].

F. Dissemination of findings

The information needs to be disseminated using a variety of channels to enable a wide range of people to access it, to ensure that the information gets to the right audience, namely those who can act on the recommendations. If specific causes of deaths are identified as particularly problematic, conferences or seminars can be held to educate health staff. The guideline recommends using different dissemination methods of starting from a presentation on meetings to scientific publications and audiovisual reports [15].

G. Resources Used for Maternal Death Surveillance

In order to implement this system, there is a resource needed to be invested. This resource includes;

- ✓ Transportation costs for professionals doing community verbal autopsy
- ✓ Additional time spent by the health extension workers to collect and send maternal death reports
- ✓ Additional time spent by facility-based maternal review committee member
- ✓ Additional time spent by Zonal, regional and federal public health emergency personnel and task force members
- ✓ Printing and distribution cost for the following routinely used formats

- Notification form
- Verbal autopsy tool
- Verbal autopsy consent form
- Facility-based abstraction form
- Maternal death reporting form (summarizing the VA)
- Action plan template
- Near miss review forms

According to the FMOH, MDSR guideline, the regional health bureaus and District health offices are responsible to cover all Printing and distribution costs. The guideline doesn't implicate any source of the budget for other needed resources and the current practices show that the activities are integrated into the routine surveillance tasks and also using the routine sources of budgets of health facilities.

Rationales of the Evaluation

Ethiopia is one of the countries with a high burden of maternal death which was 412 per 100000 live birth according to Ethiopian demographic and health survey. As the country have no strong vital registration or another supporting system it is difficult to estimate maternal mortality rate on regular and routine bases which makes the implementation of an MDSR system to have a paramount value. The MDSR system in Ethiopia has five years' history in which the Ministry of health and development partners launched the program in May 2013 and started implementation in October 2013. Since then the ministry of health is using it as one of the methods to measure maternal death in the nation. However, there are no evaluation studies conducted in the nation regarding the current practiced MDSR system. Therefore, this study will help to identify the challenges of MDSR in Gambella region which can give clue information about the national status of the MDSR system in general.

Objectives

General objective

To evaluate the efficiency and effectiveness of the current MDSR system in Gambella Region western Ethiopian, March 2018

Specific objectives

- ✓ To describe the existing surveillance system
- ✓ To assess the surveillance key attributes
- ✓ To identify the strengths and weakness of the system

Methods of evaluation

Study area and period

The evaluation was conducted in the Gambella region which situated in the western part of Ethiopian 765 km from the capital city Addis Ababa. Based on the federal ministry of health (MoH) and CSA report in the region there are a total estimate of population 448,999 from them 113796 women in reproductive age group (15-49) and there are also 14,834 expected pregnancies as well as 14,621 live births in the year 2009 E.C with an estimated area of 29,782.82 square kilometers, this region has an estimated density of 10 people per square kilometer. The detail of the administration classification of the region is demonstrated in the map below. The study was conducted from March 20 to April 3, 2018.

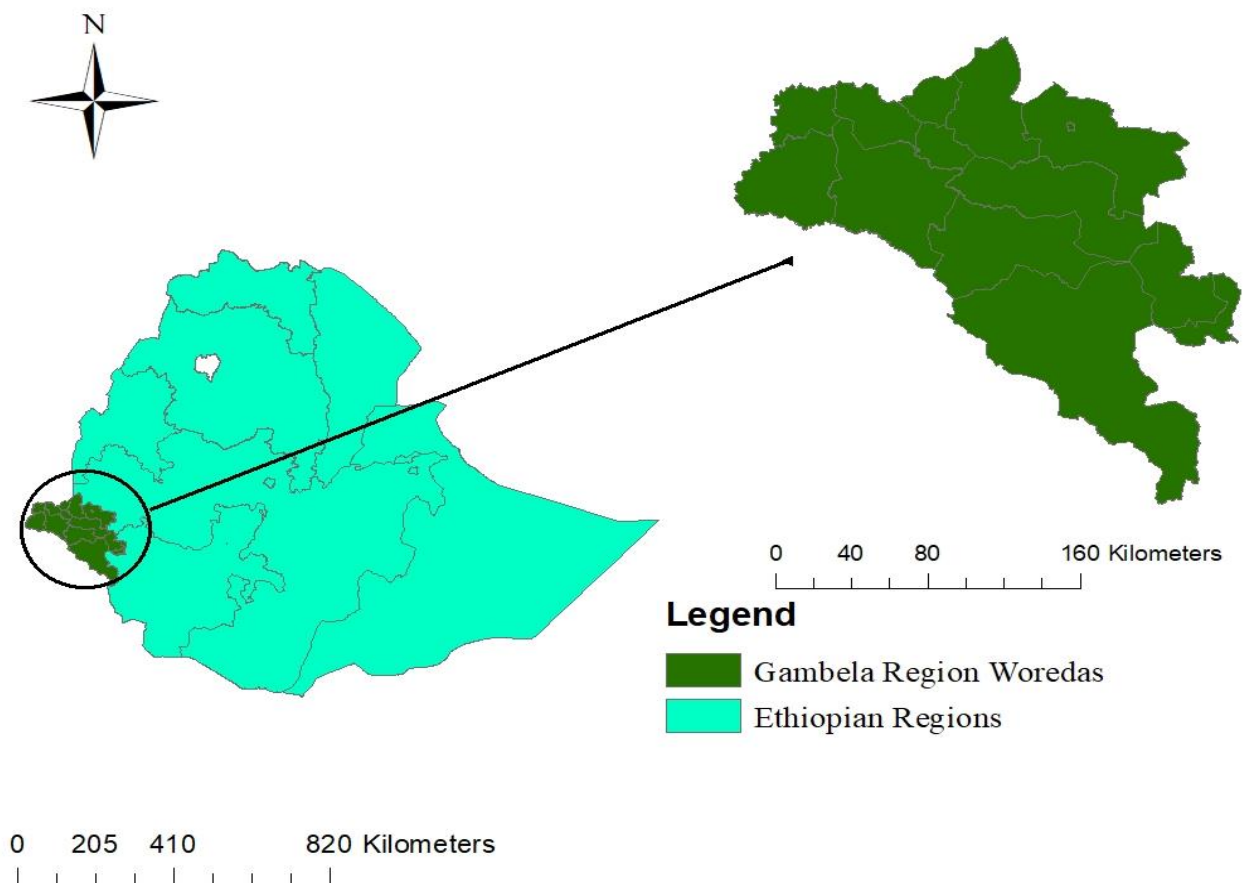


Figure 3.1 -Map of Ethiopian and Gambella region with the respective district in 2018

Study Design

A descriptive review of MDSR data followed by a cross-sectional survey of selected informants was applied.

Sampling Methods

In Gambella regional state there are 13 districts and a one city administration. Five districts and one city administration were selected by using simple random methods. Namely (Gambella Zuria district, Gambella city administration, Gog, Lare and Etang special district). From the selected district total of 12 health center, four hospitals and six health post were incorporated in the study.

Data Sources

The following were data source used in this study

Review of documents includes;

- ✓ National MDSR database
- ✓ Gambella regional MDSR database
- ✓ Health facilities labor and delivery logbooks
- ✓ Health facilities maternal death review documents and response plans
- ✓ Verbal autopsy report at health centers
- ✓ Health post notification forms and logbooks

Survey (face-to-face interview)

- ✓ Interview with the labour and delivery head, medical director, CEO (not applicable at health centers) and randomly selected health professionals working in labour and delivery units of the selected health facilities.
- ✓ Interview with the health extension workers in the selected health posts.
- ✓ Interview with key informants (MDSR focal units at EPHI, Gambella regional health bureau)

Data Collection Methods and Instruments

The review of the documents was done using a checklist and the interviews were conducted using a separate questionnaire for health facilities, health posts district zonal and regional level.

The face to face interview was conducted by the investigator.

Data Management

The collected data were entered, cleaned and analyzed using Microsoft Excel -2016.

Definition of Terms

Community-based Surveillance: it is an active process of community participation in detecting, reporting, responding to and monitoring health events in the community.

Health Facilities – In this study health facility refers to all types of hospitals and health centers in including health center.

Maternal Death Surveillance and Response (MDSR) is a form of continuous surveillance linking the health information system to quality improvement processes from local to national levels. It includes the routine identification, notification, quantification, and determination of causes and avoidability of all maternal deaths, as well as the use of this information to respond with actions that will prevent future deaths. Elimination of preventable maternal mortality is the goal of MDSR.

Rapid response team: A group of multi-sectoral/multidisciplinary persons that are ready to respond on a 24-hour basis to a public health event; trained in outbreak investigation and control, infection control and decontamination, social mobilization and communication, specimen collection and transportation, chemical event investigation and management and if applicable, radiation event investigation and management.

Surveillance: is the continuous, systematic collection, analysis, and interpretation of health-related data needed for the planning, implementation, and evaluation of public health practice.

A verbal autopsy (VA) is a method of gathering health information about a deceased individual to determine her cause of death for suspected maternal death reported from the community.

Surveillance Attributes and their Measurements to be used

Table 3.1: List of Attributes and their measurement Method for MDSR system Evaluation in Gambella Region

S.NO	List of attributes	Measurement methods
1	Simplicity	Case definition for maternal death is easy to apply
		Special training is required to collect and interpret data
		MDRS surveillance is time taking
		MDRS data is easy to manage during entry, storing and back up
		MDRS need continues to follow up
		MDRS data collection is easy to conduct
		sending a report to next level is easy
2	Flexibility	Do the system MDRF permit for the additional question in the format
		MDRF can be used in an electronic system
		current MDRF surveillance can we used to ally with prenatal mortality surveillance
		MDRF is Integrated well in PHEM system
3	Acceptability	MDRF case definition is suitable for any individual to report
		Health professional is comfortable to participate in the system
		Health professional is comfortable to work in assigned death review committee
		Health professional comfortable in assigned to participate in verbal autopsy team
		Health professional work in together in developing a work plan
		All stakeholder participates on system
4	Sensitivity	All concerned body report continues and regular way
		MDRS can monitor the change of maternal death over time
		MDRS can monitor the cause of maternal death
		The current system of MDRS system can identify nonpregnant related death in the community
		The current MDRS SYSTEM can easily capture maternal death at the community level
		Case definition at community level encourage to report
5	Predictive value is positive.	Death reported maternal death are true maternal death
6	Representativeness	MDRS system tell distribution maternal death by place
		MDRS system tell distribution maternal death by time
		MDRS system tell distribution of maternal death by a person
		Notified maternal death reported represents the death in the community
		MDRS real show all possible cause of maternal death
		All maternal death reported to the next level with the standard

7	Timeless	All notified maternal investigated with the standard
		MDRS data is always ready when we need it for planning purposes
8	Stability	The system is not costly as compared to the current benefit we gain from it
		The system can collect, manage, and provide data properly without failure
		The system have ability to be operational when it is needed
9	Usefulness	The current system has an ability to estimate maternal death in the facility /community
		The current system has an ability to show the progress and effect of preventive and control methods applied against maternal dea
		The current system has an ability to indicate major causes of maternal deaths in the health facility/community
		The current system has an ability to help the health facilities to improve clinical and ethical practices
		The system have ability to stimulate research by providing hypothesis

Ethical Considerations

A formal letter was written to the Gambella health offices and all selected health facilities in order to get permission to access data and personnel working on MDSR system. Any information related to personal identification (both the deceased mother and professionals attending the care of the mother) was not collected.

Dissemination Plan

The result of this evaluation will be disseminated as a written report to the Gambella regional health bureau will be presented on different scientific and performance review meetings and will be published in peer-reviewed scientific journals.

Results

Summary of the descriptive review

We reviewed the Gambella MDSR data from national MDRS database. The region has been starting to send a report to the national level from October 2016. From January 2017 to January 2018 around 17 maternal deaths were reported from the region.

According to reported maternal death from the region, Agnewak Zone was taken lead by reported which account 11(65%) followed by Mejengere Zone 3(27%). At the district level, only 7(50%) the district of the region reported at least one maternal death in last one year the remaining district was reported nothing at all. Furthermore, the highest MMR reported also from Agnewak which 230.8 per 100,000 live birth lowest were seen in Nuer zone which was 44.6 maternal death per 100,000 live birth. According to district level highest were seen from Jor district 547.9 followed by Gambella Zuria 314.9 and lowest reported from Etange special woreda which was 68.5 MMR reported from 2017. Overall the region only achieved 31% from expected maternal death to reported as regional level.

Table 3.2: Distribution maternal death by zone and district at Gambella region, 2018.

Gambella region health system structure	Total population	Expected Live birth	Expected maternal death	Reported maternal death	MMR Per 100000 Live birth
Agnewak	158875	4766	20	11	230.8
Abobo	22,470	674	3		
Dima	11409	342	1		
Gambella zuria	74091	2223	9	7	314.9
Gambella town	14007	420	2		
Gog	24763	743	3	2	269.2
Jor	12174	365	2	2	547.9
Etang special	48673	1460	6	1	68.5
Etang woreda	48673	1460	6		
Mejerger	79041	2371	10	3	126.5
Godere	53320	1600	7	1	62.5
Mezengur	25721	772	3	2	259.2
Nuwer	149,410	4482	19	2	44.6
Akobo	31413	942	4		—
Jikawo	46140	1384	6		—
Lare	43667	1310	6	1	76.3
Makuwey	7,028	211	1	1	474.3
Wantawo	21,162	635	3		—
Total	435,999	13,080	55	17	130.0

At the zonal level, Aguwak zonal were reported 55% maternal death expected to report which consider as good performance and lowest performance were seen at Nuer zone which was only 11% maternal death reported. By district level, Gambella zuria district report 78% expected maternal death.

-The performance of maternal death surveillance at Gambella regional state in 2017

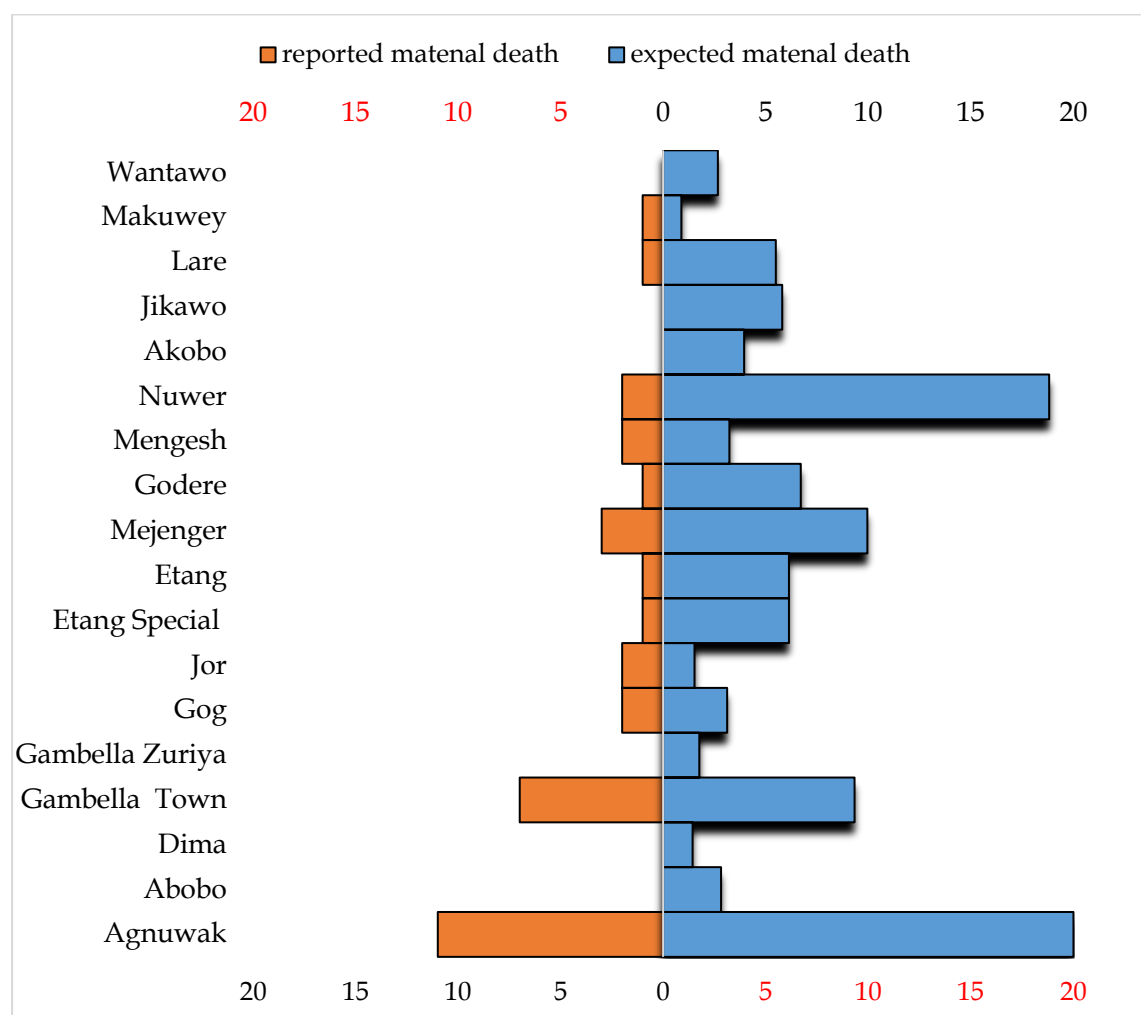


Figure 3.2 Performance maternal death surveillance as compare to expect vs. reported in Gambella region from January 2017 to January 2018.

As mentioned earlier highest maternal death reported from Jor district as compared to expected maternal death set by EDHS in 2016 and Followed by Makuwey, Gambella zuria district and Mezenger district.

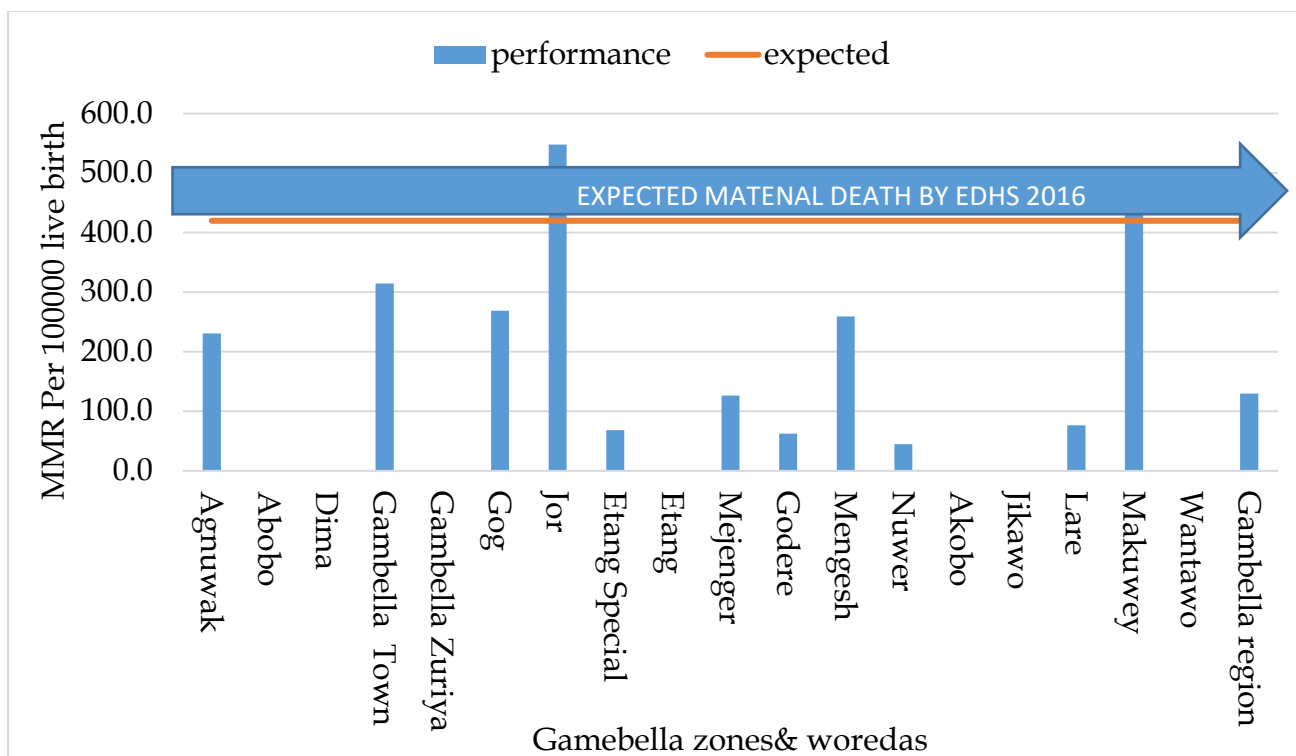


Figure 3.3: Distribution of maternal death zones in Gambella region zones and district of Gambella from February 2017 to February 2018 comparing to EDHS 2016 estimation.

In the figure below show that most reported maternal death occurred by the age of 25- 29 and 35 -39 age group.

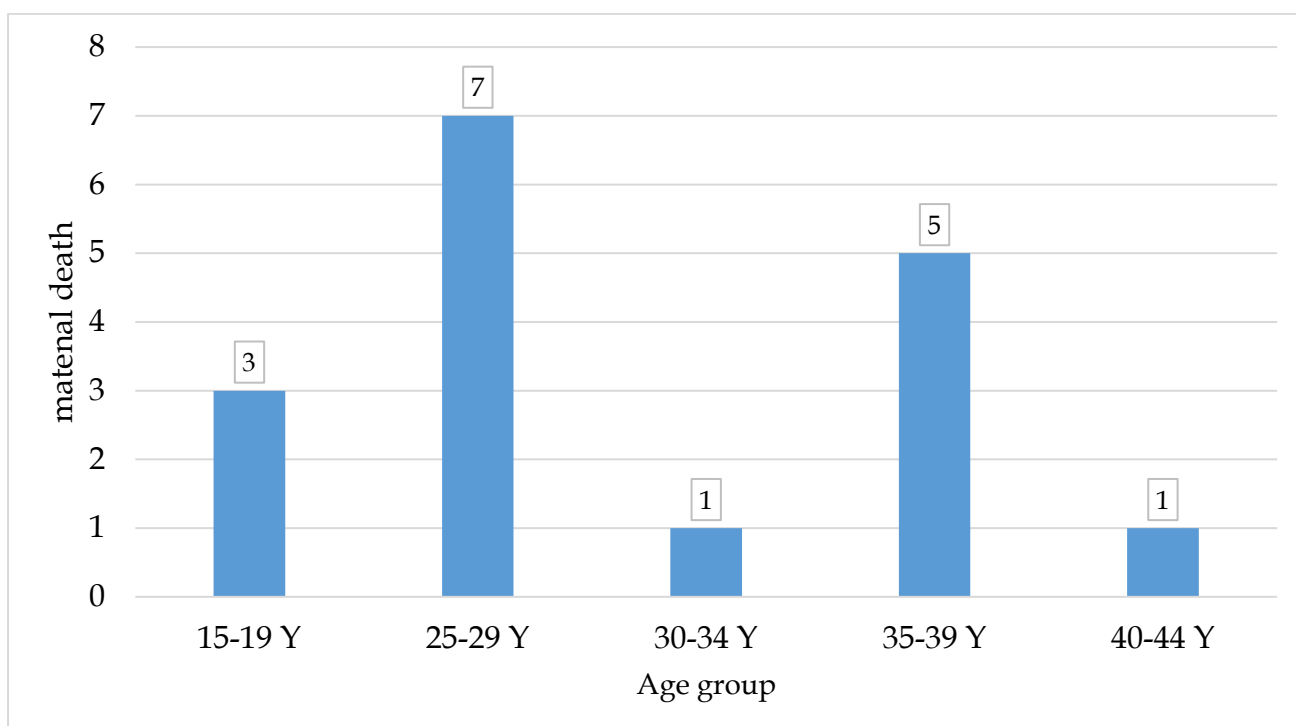


Figure 3.4: Distribution maternal death in Gambella region from January 2017 to January 2018

In the region, almost all maternal death was reported in a hospital set up during the year of 2017 and remaining death occurred during transit.

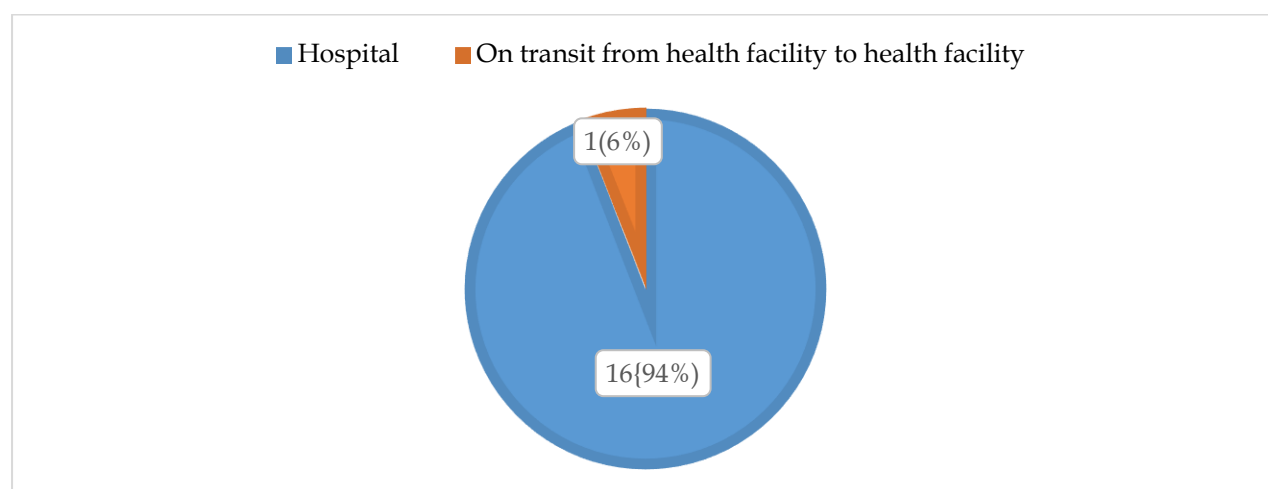


Figure 3.5: Distribution of maternal death by place of death in Gambella region from January 2017 to January 2018.

Most deaths were seen after delivery of fetus regardless of outcome followed by an intrapartum period. It is described in the figure below.

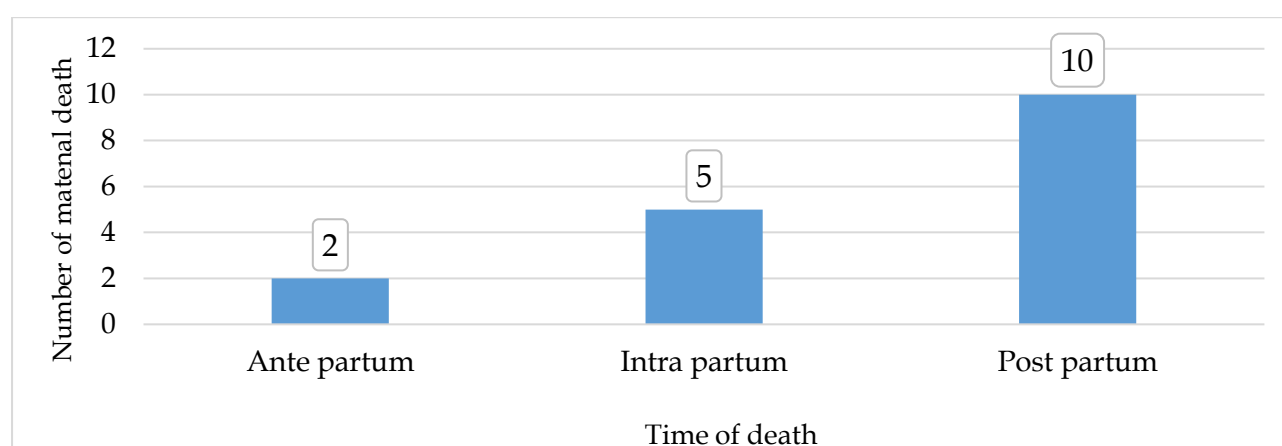


Figure 3.6: Distribution of maternal death by the timing of death during pregnancy in Gambella region from January 2017 to January 2018.

General Implementation of the System

In order to understand the current implementation and to measure the major attributes of the surveillance system, we interviewed 51 manager and professional from 4 selected hospitals, 8 health center and 8 health post using semi-structured questionnaire. The result is sensitized as follow.

Health post level

In assessed health post, all of them were incorporated maternal death as one event reported to next level. 4/6(67%) health post was reported maternal death immediately when occurred to next level remaining were reported weekly basis 2/6(33%) health post was community actively involved in reporting to health extension worker. Due to this only one health centre was identified and notified with one day according to the set the standard. Furthermore, only one health extension worker gets training 1/10(10%) on MDRS. No health post was posted community maternal case definition for maternal death during the assessment period and only 2/6(33%) get feedback from a higher level within the one-month duration.

Table 3.3: Overall implementation maternal death surveillance in assessed health post in Gambella region, western Ethiopian, March 2018

Quire	Respondent	
	Yes	No
Maternal death is modifiable	6(100%)	0(0%)
Category of reporting maternal death is immediately	4(67%)	2(33%)
Community is involved in reporting community maternal death for health extension worker.	2(33%)	4(67%)
Get regular feedback from a higher level	2(33%)	4(67%)
Case definition was posted in health post	0(0%)	6(100%)
Number health worker get training on MDRS	1(10%)	9(90%)

Health center level

System functionality and report

In assessed health center maternal death was one event report to the next level. From the assessed health center, 8/12(67%) reported maternal immediately to next but remaining still report weekly after the even happen. 6/12 health post was used revised PHEM tool whereas 4/12 were still used the old one. Furthermore, 7/12 health center labour and delivery head responsible in reporting maternal death occurred in a facility and 5/12 health center any professional who works in labour ward responsible for reporting the maternal death. In all health center, PHEM focal was responsible for collecting and submitting the MDRS report to the next level.

Capacity building

Overall, there was twelve PHEM focal personnel were assessed in health center among them 6/12 get training on MDRS there are also twelve MCH officer in assessed health center from them 4/12 get training. Only 10/24 (42%) stakeholder get training on MDRS.

Availability of documentation

From evaluated health center 9/12(75%) have a guideline for MDRS and all used standard case definition for maternal death. 6/12 (50%) have basic reporting format that used MDRS, but remaining health center has no reporting format. During the assessment, only 4/12(30%) health center posted cases definition during the assessment period. 10/12 were compiled date every month and completion are done manually.

Integration of MDSR to PHEM system

From evaluated health center 17/24(70%) respondent integration of MDRS to PHEM system is advantageous 4/24(17%) also integration was very advantageous on contrary to this 3/24(13%) respondent were responded integration of MDRS to PHEM system as is disadvantageous.

From differ component of MDRS identification of maternal death was is easy for 20/24 (83%) respondents. Nonfiction and feedback are easy for 11/24 (45%) and reviewing an investigation of maternal death was easy 4/24(16%) and 1/24(4.1%) respectively. Furthermore, the response of maternal easy for 4/24(16%) respondent. the remaining respondent in each component considers as difficult to carry out. Besides, to this from evaluated health center 7/12 have RRT among them 4 /12 (33%) included professional which midwife skill. 6/12(50%) RRT have a meeting when there is outbreak or event. 9/12(75%) health center was not yet started working on MDRS together and 2/12(16.6%) working together in reviewing maternal death.

Feedback mechanism

Of assessed health centers, 11/12(92%) were yet not started disseminated surveillance finding to stakeholders. Thirty-three percent 4/12(33.3%) health centers give feedback to health post report under them. Twenty-five percent of 3/12(25%) health center where get feedback from a higher level.

Table 3.4: Overall implementation of maternal death surveillance on an assessed health center in Gambella region, western Ethiopian ,March 2018

Quire	Respondent (N=12) (%)	
	Yes	No
Maternal death is notifiable	12(100%)	0(0%)
Category of reporting maternal death is immediately	8(67%)	4(33%)
Get regular feedback from a higher level	2(17%)	10(83%)
Give feedback to given health post below	3(25%)	9(75%)
Dissemination of weekly surveillance response	1(8%)	11(92%)
Functional RRT	7(58%)	5(42%)
Case definition was posted in the health center	4(33%)	8(67%)
Number PHEM focal worker get training on MDRS	6(50%)	6(50%)

Hospital-level

System functionality and report

In all assessed hospitals, maternal death was included under surveillance. Seventy-five percent ($\frac{3}{4}$) hospital reported maternal death immediately to the next level the remaining hospital report in weekly based. Seventy-five percent ($\frac{3}{4}$) hospital were used the revised PHEM guideline. Regarding the activity of MDRS, all have a common plan with MCH. From all respondent who asked during the evaluation 9/12 (75%) were saying that any professional in labour is responsible to report the maternal death to surveillance focal. In all evaluated hospital PHEM focal personnel in each hospital assigned to collect and submit maternal death.

Capacity building

There is four PHEM focal personnel in evaluated hospital from them $\frac{3}{4}$ (75%) get training on MDRS. beside this only 2/4(50%), MCH focal were trained. Additionally, from CEO the hospital $\frac{1}{4}$ (25%) get training on MDRS. Overall from 12 differ stakeholder involved in maternal death 6/12(50%) them were get training on MDRS.

Availability of documentation

In all evaluated hospitals have MDRS guideline and all of them were used standard case definition to report to the next level. The case definition was posted in 2/4(50%) hospital during the assessment and 2/4(50%) hospital has basic reporting formatted used in MDRS. All hospital compiled the data every month and $\frac{3}{4}$ (75%) hospital data were compiled manually.

Integration of MDSR to PHEM system

From different respondents in hospital 4/12(33.3%) were agree integration of MDRS to PHEM system became very advantages whereas, the remaining agree with that advantageous.

From different component, MDRS 7/12(58.3%) respondent agree that identification was easy 6/12(50%) notification maternal death, 3/12(25%) reviewing, 4/12(33.3%) cased based reporting and 4/12(33.3%) response consider as easy to cascades the remaining of each respondent agree that was difficult to carry out. 4/4(100%) hospital have RRT among them 2/4(50%) they include midwife in their established RRT. $\frac{1}{4}$ (25%) RRT became functional when there is an outbreak or event and $\frac{1}{4}$ (25%) RRT have met in the monthly base. Where in the remaining hospital the RRT is not operated.

Regarding MCH and PHEM focal working relation regarding MDRS 2/4(50%), it was stated as strong remaining in hospital the relationship was lost because of working together is not yet started. In facility where have strong relation there were work together on reviewing and investigate the maternal death.

Feedback mechanism

In assessed hospital ¼ (25%) disseminate their result in workshop and ¾ (75%) were not disseminated their surveillance result stakeholder. ¼ (25%) get feedback from a higher level the remaining were not get any feedback at all.

Table 3.5: Overall implementation of maternal death surveillance on an assessed hospital in Gambella region, western Ethiopian, March 2018

Quire	Respondent (N=12) (%)	
	Yes	No
Maternal death is notifiable	12(100%)	0(0%)
Category of reporting maternal death is immediately	8(67%)	4(33%)
Get regular feedback from a higher level	2(17%)	10(83%)
Give feedback to given health post below	3(25%)	9(75%)
Dissemination of weekly surveillance response	1(8%)	11(92%)
Functional RRT	7(58%)	5(42%)
Case definition was posted in the health center	4(33%)	8(67%)
Number PHEM focal worker get training on MDRS	6(50%)	6(50%)

District and town administration level

System functionality

In evaluated district and town administration were used the revised PHEM tool include maternal death. PHEM and MCH have a common plan regarding MDRS. Fifty percent (3/6) of assessed place have a response plan based on MDRS report.

Capacity building

There are nine PHEM focal in evaluated district and administration from 7/9(77.7%) get training on MDRS. in another hand there also seven MCH focal person among them 5/7(71.4%) get training on MDRS. overall 12/16(75%) stakeholder who is involved in the system was trained.

Availability documentation

From evaluated district 4/6(66.6%) have MDRS guideline. Among them, 2/6 (33.3%) were distributed basic reporting format for their respective health facility. 2/6(33.3%) data completion was done by computer whereas the remaining was used manually.

Integration of MDRS to PHEM system

Form evaluated areas integration of MDRS to PHEM system is advantageous rather standing alone it agree with 3/6(50%) respondent. And 3/6(50%) consider as very advantageous. From different component, MDRS identification was considered as easy from 5/6(83.3%) respondent. Notification and feedback 1/6 (16.6%), investigation 2/6(33.3%), review 3/6 (50%), case-based reporting 1/6 (16.6%) and response1/6 (16.6%) were considered as easy to cascade. However, the remaining respondent of each component considers as difficult.

Eighty-three percent (5/6) of evaluated maternal death review conducted by RRT and 1/6 was not started yet. Fifty percent of 3/6 RRT include professional with midwifery skill. Beside to this the relation MCH and PHEM focal was lost 3/6(50%) and remaining 3/6(50%) stated as strong .it explained as by 3/6(50%) areas working together on review and investigation of maternal death using verbal autopsy as well as facility-based extraction format. Fifty percent (3/6) of working together on MDRS is not yet started.

Feedback mechanism

Form evaluated areas 2/6 (33.3%) disseminate the result of surveillance for stakeholder by means of bulletin.one of six disseminate during workshop and 3/6 disseminate were not yet started. Fifty percent (3/6) give regular feedback to the next level in every month. Eighty-three percent (5/6) not get feedback from a higher level

Regional level

System functionality

Currently, the region is using the revised PHEM tool that includes maternal death. At the regional level, both PHEM and RMNCH has a common plan regarding MDRS. There is two assigned MDRS focal personnel's' regional level. There is established MDRS technical working group and three meetings were during the assessment period. All district of the regional RRT was established.

Capacity building

There are twelve PHEM officers including MDRS focal 6/12(50%) get training on MDRS and there are RMNCH at the regional level (2/2) get training on MDRS.

Availability of documentation

There is MDRS guideline at the regional level. According to the report of regional the guideline distributed in three zones of the region. Furthermore, basic reporting formats used for surveillance are distributed.

Integration of MDRS on PHEM system

According to the respondent implementation of MDRS integrated with PHEM system is advantageous rather standalone. From different component of MDRS identification was taken as easy to conduct. whereas, notification and feedback, investigate, review and response were difficult to carry out. Currently in the region maternal death reviewed by RRT and included midwifery professional during the review of maternal death. RRT get functional when there is outbreak or event. The working relation of PHEM and RMCH in MDRS was lost. this explained only working during the investigation of maternal death using verbal autopsy and facility-based extraction.

Feedback mechanism

The result of surveillance was disseminated for stakeholder by means of the bulletin. There also a problem in providing feedback regularly to the next level. But there is feedback from a higher level in continues manner.

General implementation of the system

Most of the respondent identified that any professional working at labour and delivery ward can report the death of the mother to the next level. 24 (66%) Surveillance officer hospital and at health center level are identified as a unit for the immediate report of maternal death incidence.

All health facilities (not included health post) where the evaluation carried out, have no committee to review, approve and respond to maternal case incidence. Regarding hospital-level, all interviewed hospital has a maternal death committee whereas in case of health center only 7/12 have maternal review committee which under established RRT

Table 3.6: The composition of maternal death review committees in the selected health facilities of Gambella Region, western Ethiopian, March 2018

Committee Composition at Hospital Level	Committee Composition at Health Center Level
Medical Director (chair)	Medical Director (Chair)
Head, Labor, and delivery (Secretary)	Head, Labor, and delivery or MCH (Secretary)
CEO	Head, a Pharmacy representative
Head, a Pharmacy representative	Surveillance officer
Gynecologist (when available)	OPD representative
Integrated Emergency Surgical Officers (only in one hospital)	Health extension worker
OPD representative	Head of District MCH department (member only in two of studied health centers)
Surveillance officer	

Overall system implementation

In all evaluated areas maternal death were under surveillance that is reported to the next level. 36(71%) of respondent know it needs to report immediately one occurred. Forty-three (61%) stakeholder on the surveillance were got at least one training on MDRS. 75% of respondent were data compilation for MDRS and other surveillance manipulated manually.

Table 3.7: Overall system implementation of MDRS in Gambella region, western Ethiopia, March 2018

Quire	Identified response	Regional respondent N=1		District respondent N=7		Hospital respondent N=12		Health centre respondent N=24		Health post respondent N=6	
		N	%	N	%	N	%	N	%	N	%
Is maternal death under surveillance	Yes	1	100	7	100	12	100	24	100	6	100
	No	-	-	-	-	-	-	-	-	-	-
	Total	1	100	7	100	12	100	24	100	100	100
In what category does report	Immediately	1	100	5	71	9	75	16	67	5	83
	Weekly	-	-	2	29	3	25	8	33	1	17
	Total	1	100	7	100	12	100	24	100	6	100
Number of staffs Trained on MDRS	Yes	6	50	7	78	6	50	21	75	1	10
	No	6	50	2	22	6	50	7	25	9	90
	Total	12	100	9	100	12	100	28	100	10	100
Data compilation	Manually	1	100	2	29	9	75	22	92	6	100
	Computer	0	0	5	71	3	25	2	8	0	0
	Total	1	100	7	100	12	100	24	100	6	100
Have guideline for MDRS	Yes	1	100	4	57	9	75	18	75	NA	
	No	0	0	3	43	3	25	6	25	NA	
	Total	1	100	7	100	12	100	24	100	NA	
Have and distributed basic reporting formant for MDRS	Yes	1	100	2	29	6	50	8	33	2	33
	No	0	0	5	71	6	50	16	67	4	67
	Total	1	100	7	100	12	100	24	100	6	100

Twenty-four percent of the responders reported that they have got feedback from the respective health authorities. Regarding the duration feedbacks, responders reported that the frequency is not regular (50%).

Table 3.8: The Reported Feedback system and Frequency of MDSR in Gambella Region western Ethiopia, March 2018.

Did you get feedback for your MDSR report? N=51				How frequently do you get feedback (n32)							
Yes		No		Weekly		monthly		Quarterly		Not regular	
N	%	N	%	N	%	N	%	N	%	N	%
12	24	39	76	-	-	5	42	1	8	6	50

Attributes of the surveillance system

We interviewed study units at the health facilities as well as district to measure the major attributes of the surveillance system. The responses to each question items were categorized into five groups. The groups include; strongly agree – coded as 5, agree- coded as 4, neutral-coded as 3, disagree coded as -2 and strongly disagree coded as – 1 then the average score was calculated for each question item and attribute.

Simplicity

To measure the simplicity of the surveillance system we used seven question items and the response towards each individual question and the summary results, disaggregated to facility type are shown in the figure below. The average score for simplicity is study is 3.71/5. The average score for each group differs from (3.5-4.1). The highest score was seen in hospital and the lowest one was seen health post.

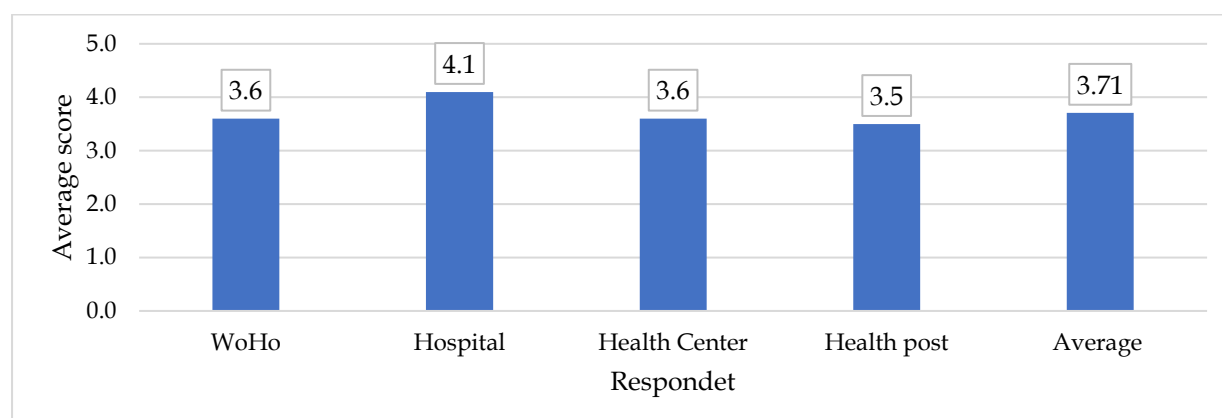


Figure 3.7: The Average score gives to measure simplicity for MDRS in Gambella region, western Ethiopia, March 2018.

Flexibility: to measure the simplicity of the surveillance system we used five question items and the response towards each individual question and the summary results, disaggregated to facility type are shown in the figure below. The average score for flexibility varies from (3.4-3.8)/5. Lowest score occurs from the health center and health post and the highest score occur from the hospital.

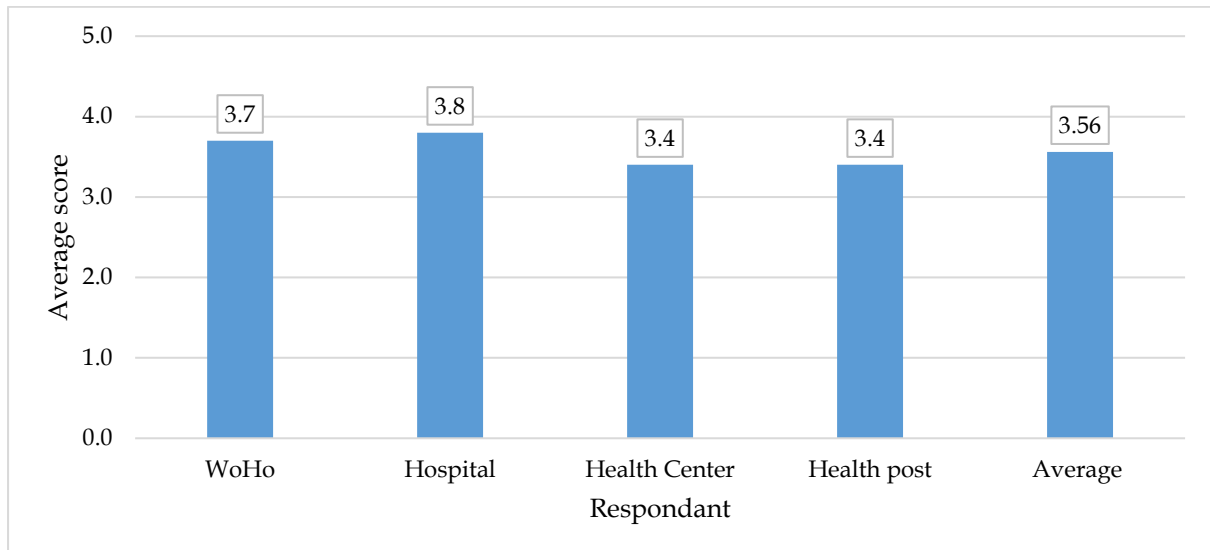


Figure 3.8: The Average score given to measure flexibility for MDRS in Gambella region, western Ethiopia, March 2018

Acceptability: to measure the simplicity of the surveillance system we used six question items and the response towards each individual question and the summary results, disaggregated to facility type are shown in the figure below. The cumulative average score varies from (3-3.4)/5. The maximum score occurs in the health post and the minimum score is occurring at the district.

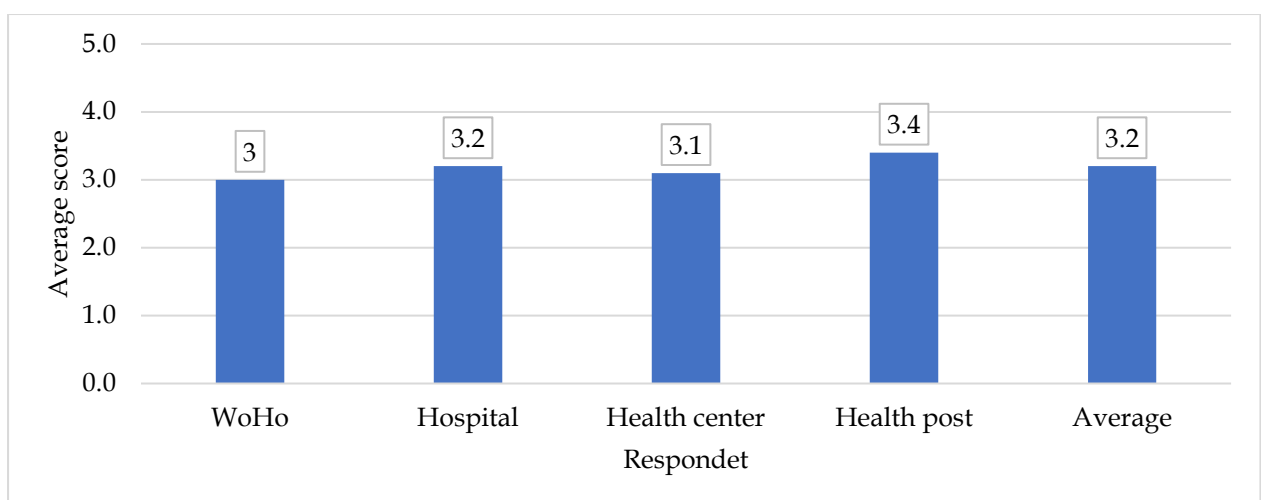


Figure 3.9: The Average score given to measure acceptability for MDRS in Gambella region, western Ethiopia, March 2018

Sensitivity: to measure the sensitivity of the surveillance system we used five question items and the response towards each individual question and the summary results, disaggregated to facility type are shown in the figure below. The cumulative score is 3.51 average score is with a range of (3.2-3.8) on a different level. the maximum score is 3.8 at the hospital.

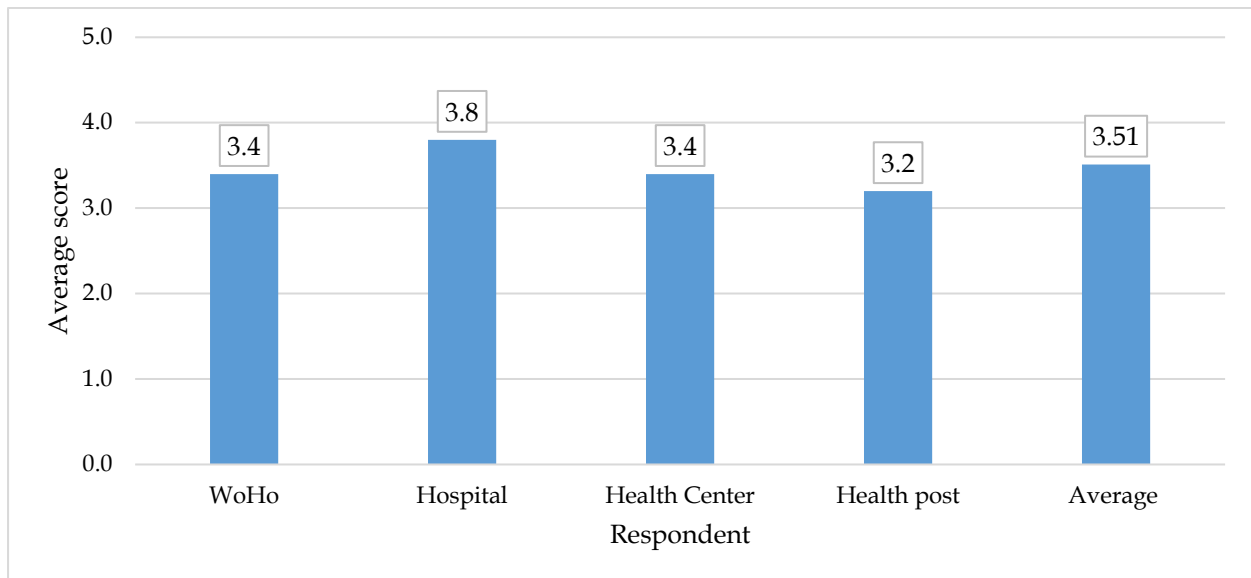


Figure 3.10: The Average score given to measure sensitivity for MDRS in Gambella region, western Ethiopian ,March 2018

Positive predictive value: to measure the positive predictive value of the surveillance system we used one question items and the response towards each individual question and the summary results, disaggregated to facility type are shown in the figure below. The average score of positive predictive value is range from (2.7-3.3) /5the maximum score gets from the health center and hospital, as well as the lowest score, is from the district health office.

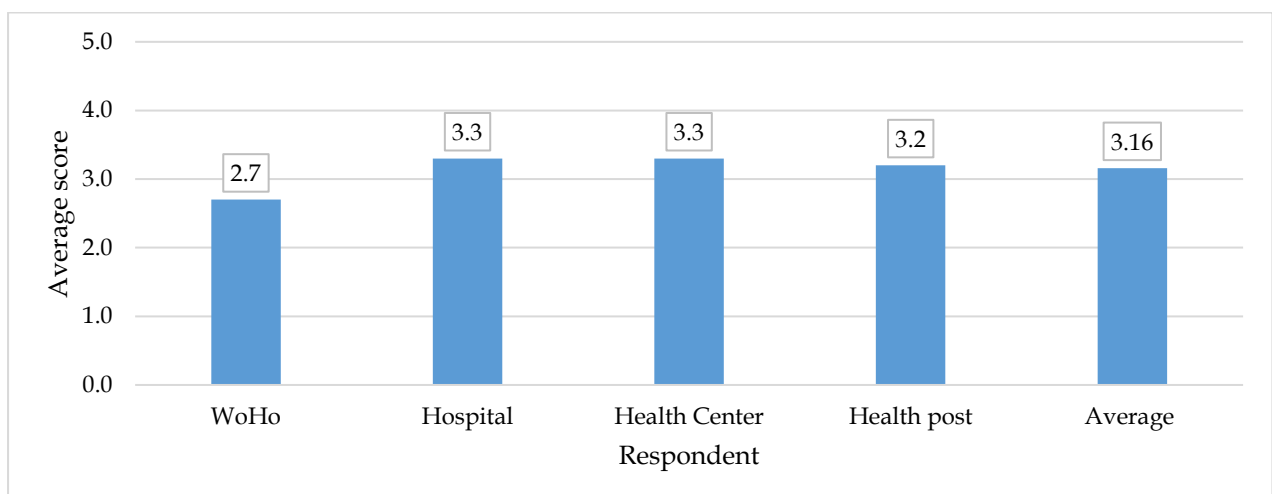


Figure 3.11: The Average score gives to measure positive predictive value for MDRS in Gambella region, western Ethiopian, March 2018

Representativeness is one system attribute needs to evaluate. Five questions were asked to assess and the response towards each individual question and the summary results, disaggregated to facility type is shown in the figure below. The cumulative average is 3.37 the score of each group of respondent varies from (3.3-3.5) across different respondent in a selected area of the study.

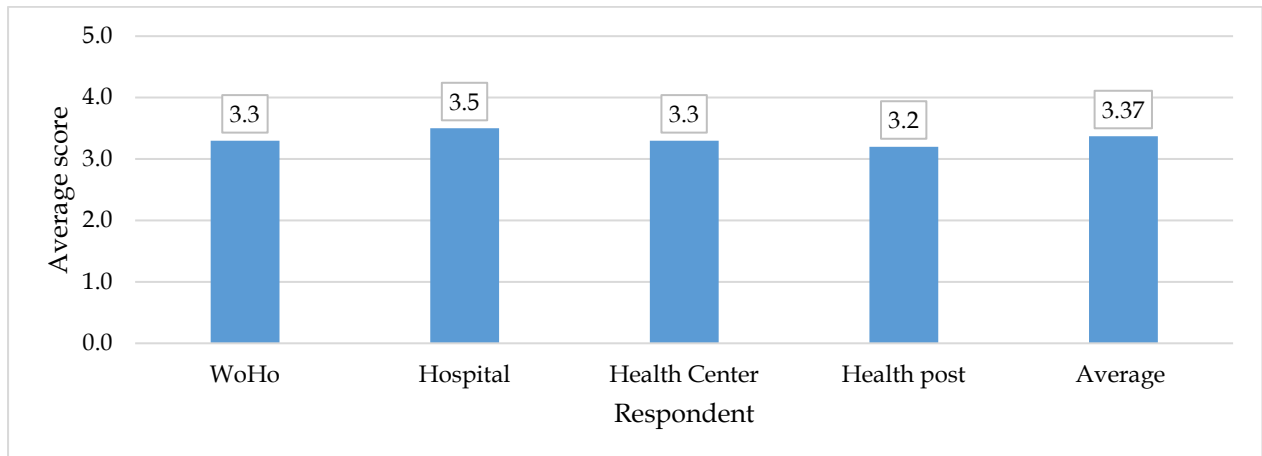


Figure 3.12: The Average score gives to measure representativeness MDRS in Gambella region, western Ethiopian, March 2018

Timeliness is one surveillance system attributes needs to be evaluated. Three questions were asked to assess it and the responsibility towards each individual question and the summary results, disaggregated to facility type are shown in the figure below. The average score varies from (3.0-3.2) along with a different group of the respondent.

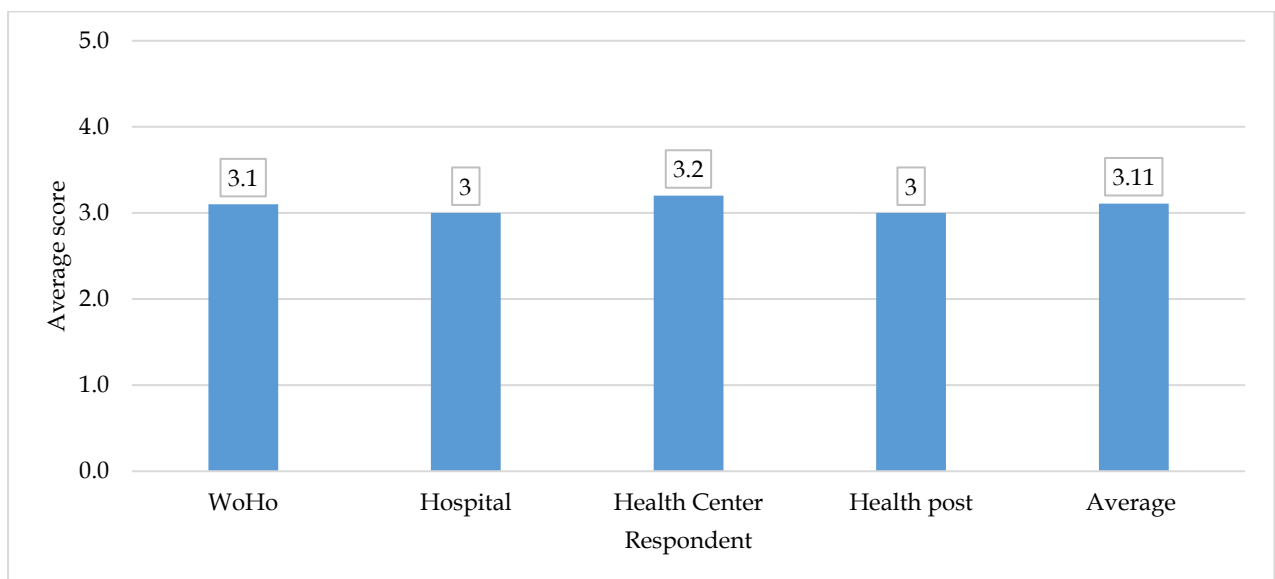


Figure 3.13: The Average score given to measure timelines value for MDRS in Gambella region, western Ethiopia, March 2018

Stability: in order to evaluate the system stability, three questions asked for differ stakeholder involved in MDRS across their give level. The respond towards each individual question and the summary results, disaggregated to facility type are shown in the below figure. The average score varies from (2.1-2.6/5) along with a different group of the respondent

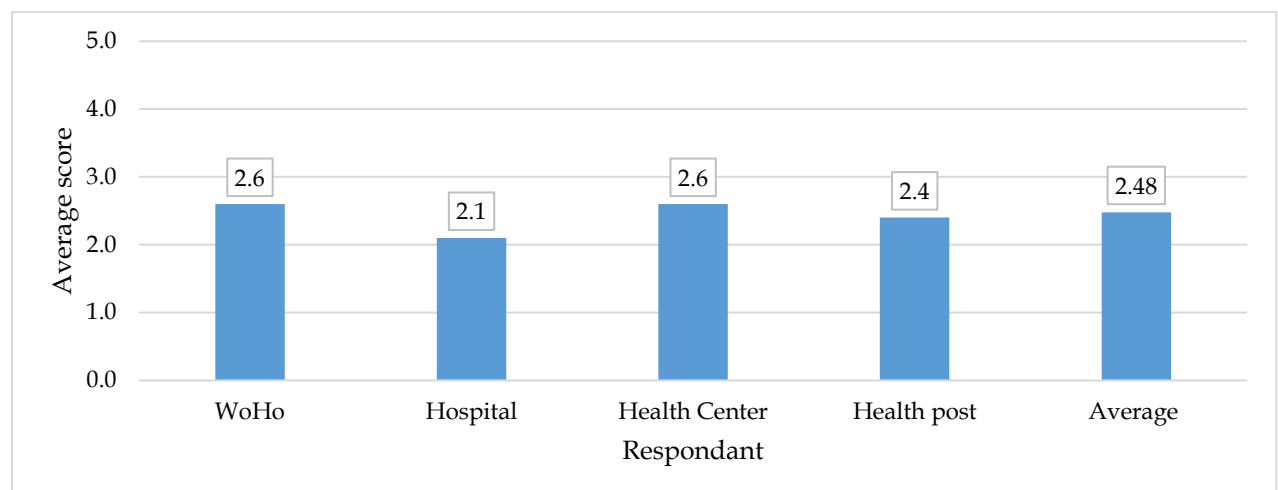


Figure 3.14: The Average score gives to measure stability value for MDRS in Gambella region, western Ethiopia, March 2018

Usefulness

It measures the importance of MDRS implementation in many aspects and seven questions was asked to evaluate it. The respond towards each individual question and the summary results, disaggregated to facility type are shown in the below figure.

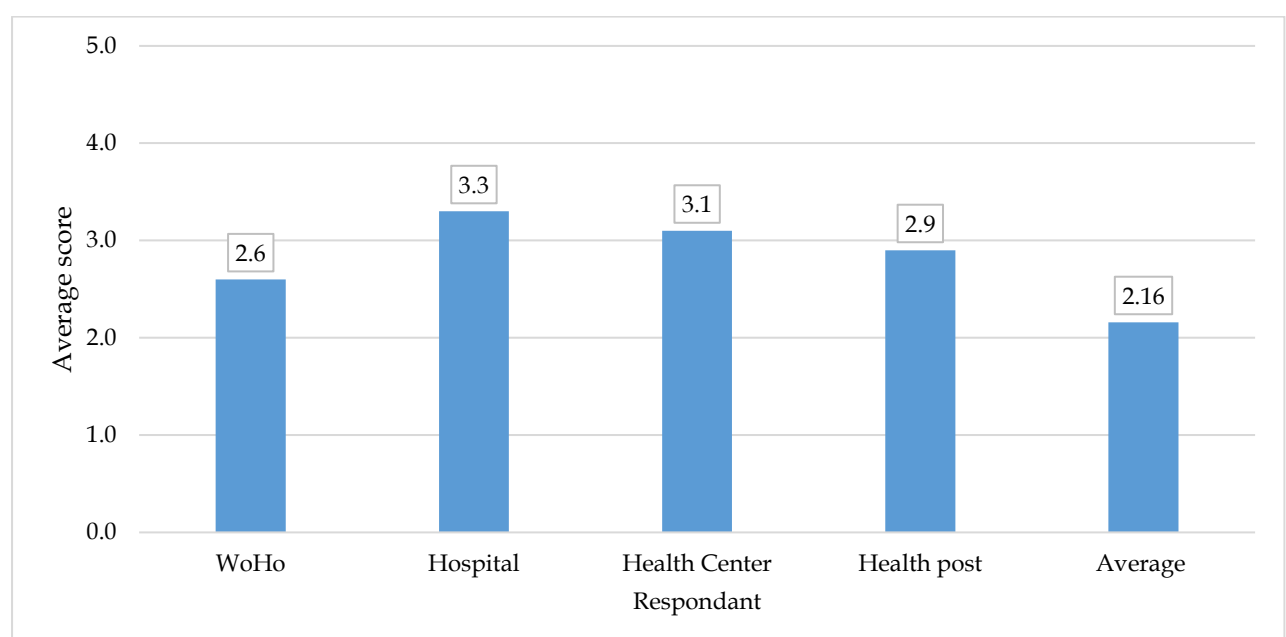


Figure 3.15: The Average score given to measure usefulness value for MDRS Gambella region, western Ethiopia, March 2018

Summarizing the overall finding of the surveillance attributes, Acceptability, Simplicity and Timelines and other five attributes of the system which the responders overall average score gives for each attributed is depicted in figure below.

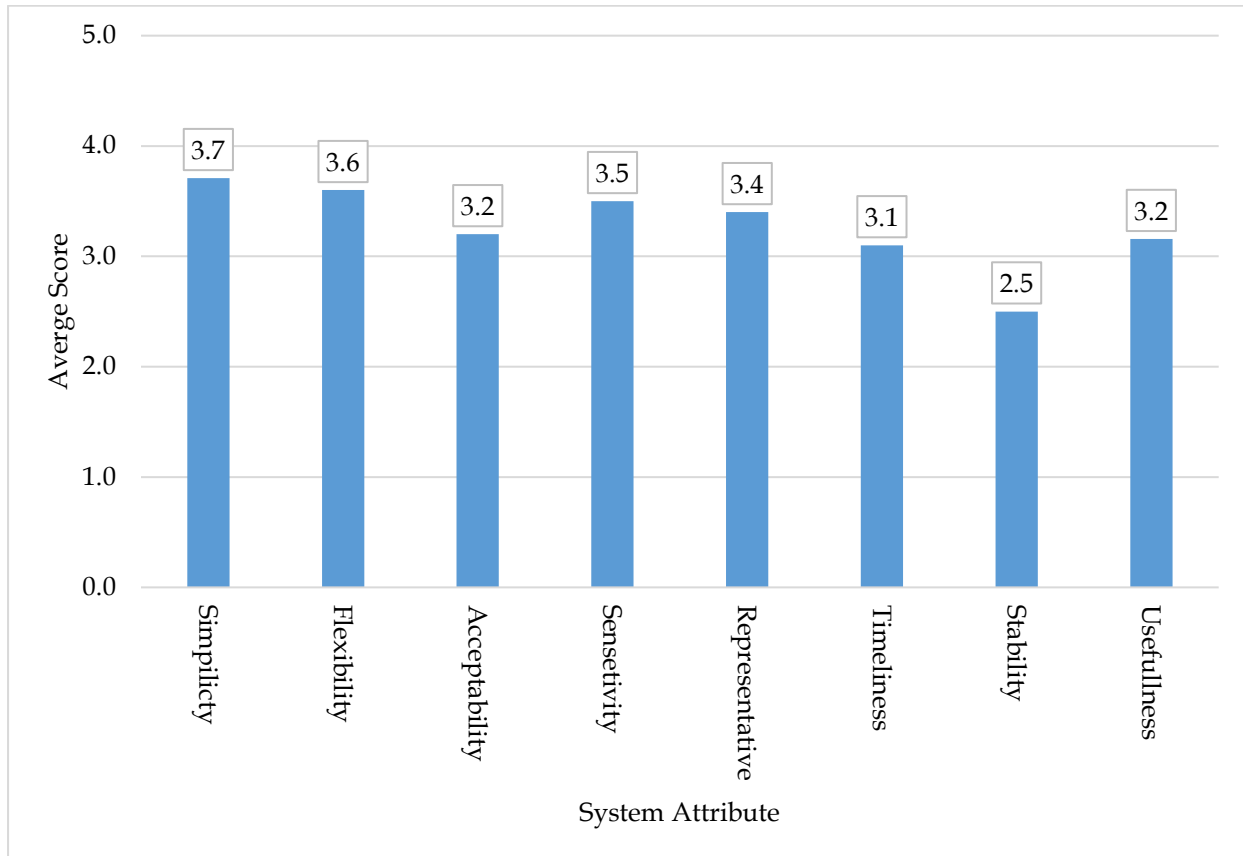


Figure 3.16: Summary of the average scores given for each attribute of the MDRS of Gambella Region, western Ethiopia March 2018

Data quality of MDRS

Data quality is one issue that need evaluation with the following indicator

- ✓ Completeness rate of MDRS formant for each reported death
- ✓ Number of maternal death report by weekly compared with that of maternal death send by case-based format
- ✓ District participation rate

Another indicator of the system will be summarized and presented in the table below.

For further calculation some of the attributes of the system: regional, selected district and selected health facilities (from labour and delivery logbooks) data was used. The Summary of the result is described below.

Table 3.9: Summary of a calculated attribute of MDRS system in Gambella region, western Ethiopia, March 2018.

Attributes	Data elements	Number	Calculated Attribute
Reported maternal death by a system	Weekly reported maternal death from January 2017-March 2018	12	71%
	Case-based reported from January 2017-March 2018	17	
	Reported Death in the 2017 year	17	
Representativeness of the System	Estimated annual maternal death (using EDHS estimation of 412 maternal deaths per 100000 live birth)	55	31%
Predictive Value Positive of the System (from only reported deaths)	Total Notified maternal deaths in the selected Health facilities	4	100%
	Total Verified Maternal deaths (by death review in hospitals and health centers and by Verbal autopsy in Community)	4	
Data Completeness	Total data elements that should be reported to the national database (for a total reported 17deaths)	952	76.3%
	Total reported data elements in a year (from the 17 reported deaths)	726	
Participation Rate	Total District in the region	14	50%
	District which reported at least one maternal death	7	

Discussion

Maternal Death Surveillance and Response (MDSR) is a form of continuous surveillance linking the health information system and quality improvement processes from local to national levels. It includes the routine identification, notification, quantification, and determination of causes and avoidability of all maternal deaths, as well as the use of this information to respond with actions that will prevent future deaths. Elimination of preventable maternal mortality is the goal of MDSR. The MDSR system, in Ethiopia and specifically in Gambella region started in October 2013 with an aim to measure the magnitude and contributing factors of maternal death to aid in the evidence-based implementation of interventions against preventable maternal death.

Before started the evaluation of the MDSR system in Gambella region, descriptive reviewe the overall outcome of the system was done. As reviewed from national database 17 maternal death reported from January 2017 to January 2018. According to reported maternal death from the region, Agnewak Zone was taken lead by reported which account 11(65%) followed by Mejengere Zone 3(27%). In district level, only 7(50%) the district of the region reported at least one maternal death in last one year the remaining districts were reported nothing at all. Furthermore, the highest MMR reported also from Agnewak which 230.8 per 100,000 live birth lowest were seen in Nuer zone which was 44.6 maternal death per 100,000 live birth. According to district level highest were seen from Jor district 547.9 followed by Gambella Zuria 314.9 and lowest reported from Etange special district which was 68.5 MMR reported in 2018. Overall the region only achieved 17(31%) from expected maternal death to be reported as regional level. This result is far beyond the 2016 EDHS maternal death estimation for Ethiopia, which is 412(C.I, 243-551) [9]. This obligates us to consider a severe underreporting of maternal death in the region.

It was also observed that most of the maternal death is reported in the postpartum period 10(59%) and in mothers with an age group of 25 to 29 7(41%), mothers delivered at hospitals account (94%). This result agrees with both African and local studies. For instance, a surveillance data analysis conducted in Morocco showed that 50% of the reported maternal death happened in an age group of 25 to 30 and 71.6% of maternal death happened at the hospital level. (13) a study conducted in Miza Tepi hospital also revealed that 74.8% of death occurred post-partum period [16].

In evaluated area maternal death is integrated into routine surveillance and reported for the next level. 36(71%) the respondent knows it reported immediately whereas, the remaining still reported weekly as the event occurred. 30(61%) different stakeholder also gets training on MDRS at least once. 75% studied area data compilation for MDRS and other surveillance did manually, and 70% selected area have a guideline for MDRS (not included health post). however, only 35% of studied area has basic reporting format. Two of six districts have a response plan based reported the maternal death.

Regarding data collection and reporting of MDRS in 55% respondent, any maternal death occurred in facility expected to by labour and delivery heads. Compilation and submission of case-based format 72% are done by surveillance officer and weekly reported to the next level in 83% health facility are done by specifically assigned surveillance officer.

Regarding integration of MDRS to routine surveillance majority of respondent agree that it is advantageous rather stand alone. Form component of MDRS identification is taken as easy whereas, notification and feedback, investigation, review, case-based report and response were taken as difficult as respondent (not included health post respondent). The Implementation manual recommends that at the health center there should be a rapid response team (RRT) that has the responsibility to investigate any suspected maternal death in the catchment. Nevertheless, the manual doesn't describe how the composition of the RRT should be (15). Based on our find all evaluated hospital have RRT but in health center level only 7/12 have it. But the composition of RRT is varied from facility to facility but in all observed health facility, those who have RRT included surveillance focal. Concerning to relation between MCH and surveillance officer on MDRS is very limited. Most they were involved only in a limited health facility in reviewing and investigation maternal death.

The PHEM manual also describes that feedback should be given for any maternal deaths report by the health authorities (District Health Office and regional Health Bureaus as well as with respective structure). In this study revealed that only 24% get feedback on MDRS among them 50% get the feedback in an irregular manner. This can reduce the interest and acceptability towards the system and compromise the continuous learning platform that can be developed by this system. At regional health Bureau level findings were disseminated through the weekly epidemiological bulletins to appropriate stakeholders: Whereas, (4/6) district health offices (12/16) health facility level there is no system to disseminate findings to external stakeholders.

Looking into the attributes of the surveillance system one them is the simplicity of a public health surveillance system refers to both its structure and ease of operation. Surveillance systems should be as simple as possible while still meeting their objectives. Simplicity is closely related to acceptance and timeliness. Simplicity also affects the number of resources required to operate the system (12. The cumulative average score for Simplicity is (3.71/5) .it different across a different group of the respondent it was (3.5/5) for health post, (3.6/5) districts health office and health center and (4.1/5) for the hospital. In order to understand the simplicity eight question were asked from 31(71%) respondent agree with MDRS need continues follow-up and 39(77%) MDRS needs special training in order to collect and interpreting finding. This may be MDRS have different component under it which totally different from routine surveillance.

A flexible public health surveillance system can adapt to changing information needs or operating conditions with little additional time, personnel, or allocated funds. Flexible systems can accommodate, for example, new health-related events, changes in case definitions or technology, and variations in funding or reporting sources. In addition, systems that use standard data formats (e.g., in electronic data interchange) can be easily integrated with other systems and thus might be considered flexible [12]. This study reveals that the flexibility of the system is (3.6/5) and five questions were used in evaluating it. The lowest flexibility is seen in the health post and health center level which was (3.4/5) and the highest score is in the hospital by scoring (3.8/5). In a study also revealed that the integrated of MDRS to PHEM system is not well harmonized this explained by 25(49%) respondent was stand side of strongly disagree to neutral.

Acceptability reflects the willingness of persons and organizations to participate in the surveillance system [12]. The cumulative acceptability score is (3.2/5) with a range of 3/5 which is form health center and 3.4/5 for health post level. This may explain that health professional was not comfortable to participate in suspected maternal death because most areas were hard to reach and there is no any means to transport, as well as no cost, is covered by health authorities. 26(46%) was stand in the line of strongly disagree to neutral as they asked about conformability of the system. There is also a limitation in the involvement of all stakeholder which contribution to the system. Furthermore, all concerned body were not reported continuously and regularly included the community. Regarding at hospital level, the major worries of responders were fear of using the data for punitive action. The effect of this worry is more reflected in the lower confidence of the participants on the ability of the system

identifies to identify the right cause of death. Even if the confidentiality of information collected in this system, anonymity and a “no blame” principles are described in the ministry of health MDSR guideline, the idea is not well understood at the implementing facilities level.

The sensitivity of a surveillance system can be considered on two levels. First, at the level of case reporting, sensitivity refers to the proportion of cases of a disease (or another health-related event) detected by the surveillance system. Second, sensitivity can refer to the ability to detect outbreaks, including the ability to monitor changes in the number of cases over time.

(12) The average score of sensitivity is (3.5/5) from a range of (3.2/5) health post level to maximum of (3.8/5) at the hospital level. Getting lower sensitivity at health post level may explain 33(65%) of respondent stand at a range of strongly disagree to neutral against to question the case definition at community level encourage to report and also 28(41%) don't agree with current MDRS system can easily capture maternal death at the community level.

According to the CDC update guideline representativeness of a surveillance system refers that accurately describes the occurrence of a health-related event over time and its distribution in the population by place and person Average score of positive predictive value and representativeness is (3.2/5) and (3.4/5) respectively. It indicates that the representativeness of lower than expected. this supported on evidence the region only reported 31% maternal death from expected to report according to the estimation of EDHS 2016.

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 [12]. The average score of Timeliness is 3.2/5 with the average stability of the system (2.5/5). The Public health emergency management MDSR implementation manual states that the death investigation of maternal death at facilities level should complete in 48 hours and a case-based report should be sent to the next level health authorities. For deaths happening at the community level, a verbal autopsy and review should be completed within a week period of notification and should be reported to the next level of health authorities. At the community level (health post and health centers) most of the responders do not agree that a week period is enough to perform verbal autopsy and review. The major reason identified was the difficulty of gathering data during the grieving periods of families of the deceased mother.

A public health surveillance system is useful if it contributes to the prevention and control of adverse health-related events, including an improved understanding of the public health

implications of such events [12]. In this study, most of the responders agree on the overall usefulness of the system. However, most of the responders are neutral about the usefulness of the system to indicate the actual cause of maternal death, stimulate hypothesis for future research and showing the effectiveness of prevention and control activity against preventing maternal death. Responders were also asked for their reason for the lower scores on the ability of the system to identify the causes of maternal death. Reason given includes since private facilities are not included in the system it is difficult to identify the causes of maternal death happening or passed through private facilities. Some of the responders at hospitals reported that fear of punitive action and poor medical recording reduce the ability of the system to identify the right causes of death. When deaths happen at higher facilities like hospitals, there is no regional death review committee that oversees and approves the possible cause of a death, which, makes the investigation to be dependent and influenced by a single attending senior physician at the hospital level. For regional site week engagement and involvement of the community is considered as a problem need to improve.

The federal public health emergency management guideline for implementation of maternal death recommends that for every maternal death, there should be a lesson to be learned and an official action plan should be developed. In this study, in all the studied facilities there was a response action plan for death happening at facilities and community level.

Data quality reflects the completeness and validity of the data recorded in the public health surveillance system [12]. The average completeness of maternal death case-based forms was 76.5%. this finding is line with a study conducted in Zimbabwe which was 76 % completeness (14). During data review place residence and history ANC follow up were missed in a most sent case-based format from the region. Regarding notification of maternal death, there is limitation more maternal death is reported through case-based format than IDSR.

Overall as regional PHEM stated unviability of MDRS printing maternal by the local language, lack close follows and supervision, lack of coordination among different stakeholder and lose involvement of community and inaccessibility take as a major challenge that makes surveillance weak.

Limitation of evaluation

The evaluation was conducted only a few selected areas of the region which can affect the generality of the find to the whole region. besides less use of FDG makes the evaluation ineffective in exploit problem of the system.

Conclusion

Generally, from this study maternal death were incorporated in routine surveillance as one event reported to the next level. MDRS is not well involved differ stakeholder in the system. Unavailability of training and reported formant was a problem which affected the implementation. Simplicity and flexibility are a strong component of MDRS in Gambella region. Acceptability, representativeness, and usefulness take as weaker component whereas, timeliness and stability took as weakest component demand improvement.

Recommendation

Based on the study findings the following major recommendations are forwarded Gambella region needs

- ✓ Train all actor of MDRS in order to increased stability of the system especially health extension worker because in this study only (1/10) get training on it.
- ✓ Gambella regional health bureau needs to availing guideline and reporting format if possible, job aids—regarding the practice of MDSR at all facilities as a result of majority respondent expect identification another component of surveillance were considered as difficult to carry out. Prepare guideline by local language for health extension worker and for the community in order to encourage community maternal death due to neither of the health posts was posted community case definition.
- ✓ Gambella regional health bureau should establish MDRS supervision to routine supervision because only 24% evaluated area get feedback in most of them got in an erratic manner.
- ✓ Gambella regional health bureau needs to establish RRT (maternal death review committee) in all health facility which hasn't RRT. Beside to this Ethiopian public health institute especially national PHEM need to revise the compassion of RRT (maternal death review committee) with a specific role.
- ✓ All health facility and district need to prepare a response plan for every maternal death and should follow the implementation status by the concerned body.
- ✓ The strength the collaboration of differ stakeholder in MDRS in order to improve the stability of the system
- ✓ Provide incentives, such as staff recognition, to motivate staff participation in the implementation of MDSR in order to increase the acceptability by a health professional

- ✓ Adopt a clear code of conduct to create “no blame” and encourage confidence in participating in review meetings.
- ✓ To further understand the magnitude and factors related to the low representativeness of the system a well-designed community-based study is recommend. Almost all death reported from health facility with no community maternal death.
- ✓ regional health office and respective reporting site should use an electronic form of reporting source may promote timeliness
- ✓ The Regional should improve mentioned weaker attribute to promote the usefulness of MDRS
- ✓ Regarding data quality, all maternal death sent by case-based formant need to notify by weekly reporting to the next level and the regional health bureau should improve validity and completeness the data

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Chapter Four- Health Profile Description

4.1 Health Profile Description of Dilla zuria District, Gedio zone, SNNP Region, Ethiopia, November 2018

Abstract

Introduction: - Health profile is a systematic and structured approach to assess the health status of a population in the world, country, and at the local level based on the health service given to the population and related socio-economic factors that contribute for the betterment of health. Current situation in regarding health profile preparation on different levels especially in sub-city and district level is not done sufficiently or were not well exercised due to different reasons like less attention is given to health profile preparation and manpower shortage, but the aim of the health profile is to know the health & health-related problems within the society, to set priorities, to take intervention measures for the betterment of health to the population in general.

Methods: The district health profile is consisting of direct and indirect activities of different ministry sector offices are participants. Standard questioners were developed to collect socio-economic, demographic, and health-related data. The descriptive study design was used for this study.

Result: - vital statistics deaths & births were not registered in the health institution, and it doesn't show the district CBR &, IMR, CMR, NMR and as well MMR. Immunization coverage under one-year is 1661 (82 %) against the plan. Family planning activities were delivered in different methods & contraceptive prevalence rate in the district is 1314 (65%). Leading causes of the outpatient visit are communicable diseases. Health service coverage is 100% by assuming that one health center for 15-25 thousand population. The safe water supply of the district 65% with latrine coverage of 94% and utilization of 45%. the theft was major committed crime and motorcycle also identified as a major cause of RTA.

Conclusion: The communicable disease was the main cause of morbidity in the district and with low latrine. Immunization coverage was performed well but needs an emphasis on TT vaccination in delivering for eligible women. Vital event registration was not conducted well. Gaps were identified in supporting and follow health extension workers. Revitalization of vital event registration is needed in monitoring the health status of the community.

Introduction

Health profile is presentation and discussion of health-related data and important health-related indicator to describe the health and related sociological factors in the geographical area under discussion. The primary objective of the health profile is to provide an overview of the social, economic, demographic and geographical health status of the area under description. The profile will be a living document, with a section of added to the health unit and allow for better response and changing demography and health of the resident of the area. Furthermore, health profile can be defined as an invaluable tool for every participant in healthy areas network. It provides a lively, scientific -based account of health in the area it stimulates public interest and political commitment; and it can identify a target for future and monitor progress towards them. The good profile describes activity and factor affecting in citizen's health in ways that they will instantly recognize and set out proportional for change that will generate enthusiasm and energy provide a focus for both community involvement and political support [1].

The main purpose of the city (district) health profile is stimulated action to improved health by providing accurate, up-to-date, unbiased and independent information about citizen's health. Analysis of the information with respect to its health impact on health. It will avail setting a target to many progress

Health profile is usually produced by a group of professionals in the city(area) in content should be usefully endorsed by policymakers and public as well as professional. It also valuable channel of communication between citizen, expert, and politician and facilitate open discussion on the health problem. Most common that faced in the area of health is lack of adequate information which can be used to source community interest and political commitment used as a vital source of information [1,2].

The analysis should lead logically to the identification of a possible area of action with some indication of relative priorities. The presentation of information and analysis should be compelling, so as galvanized the population and policymakers into acting.

The activity of the health profile is not a one-off document. It is series of the profile should be planned for publication at a regular time should procedures yearly based but where the resource is limited to two years' cycle is more appropriate. The regular publication enables target for progress to be set the implementation of the recommendation to monitor and achieved recorded and celebrated.

If all these aspects can be successfully incorporated city (district) health profile can become a valuable and powerful instrument of health strategy

While conducting health profile need to consider identifying a leading agency to manage the production of the city (district) health profile and need the involvement different take holder as well as set timely production of and dissemination of finding mandatory [2].

Health profile contains that reflect the availability of data and local priority concern. The first profile should they to as compressive possible. All profile should include a basic description of the population (number age structure) and vital statics (birth and death information). One of the areas for consideration for including health status, lifestyle, socio-economic condition, physical human and physical(social) infrastructure. The basic demographic and vital statics are so fundamental to descriptive of the district (city) that we would expect them to be included in statically sector of all profile. They are universally defined indicator need to include for compassion between cities.

Overall every health profile expected to address the following

Population:

The starting point for the health profile must be the size of the city and demographic description of the population avail from the regional or national census.

Health Status

Health status is a single indicator of a healthy population. Most measures morbidity and mortality rather positive health. The main area to be included is vital statics.

Lifestyle

They are good epidemiological evidence on the influence of lifestyle. Major cause morbidity and mortality across the district (city). This includes smoking, alcohol, excises, and diet.

Housing

Adequate housing has long been recognized as important pre-quest for health. The pattern of tenancy (home ownership, private and public rented house) information need to avail on several homeless people, physical characteristics of housing and density population.

Socioeconomic conditions

Living education is also affected by the socio-economic factor

- ✓ Education
- ✓ Employment
- ✓ Income
- ✓ Crime violence
- ✓ Cultural practice

Besides mentioned above health profile expected to include the physical environment, inequalities, and physical and social infrastructure.

Although no district (city) health profile will include compressive information on all these subjective, profiles which present some evidence. On most of them will give a good account of health status and factor that affect it will make power contribution to identify of health problem and development of the plan.

This assessment is important to understand the health status of the community & contributing factors like infrastructures, access to health institution, water and sanitation, schools and other mandatory governmental and social institutions for the improved health status in the community as well. On the bases of this assessment, it is possible to prioritize, plan, monitor & evaluate public health actions for intervention. These assessments were described the comprehensive health status & its contributing factors in the health profile in the year 2018 in Dilla Zuria district.

Statement of the problem

Dilla zuria district is one of the districts located in Gedio zone in SNNP region like another district in the country, there is a problem of data handling and utilizing inappropriate manner to address the problem of society. This is resulted from insufficient and less reliable health information /service data or profile at all level of the district system.

Even if the health service delivery expands, trained manpower and health infrastructure increases from time to time still there were problems with reliable data to start with. It also couldn't help as we need to indicate precisely where we are? and to plan where to reach in the health system, because we don't have a health profile at all level that indicates the present situation to plan.

Involving different stakeholder conducting profile district is crucial for providing timely, unbiased and reliable information in order to act accordingly. That is why this study suggests that health profile preparation at the lowest district level will result in with real problems and successes of health service at the zonal regional and national level in order to address the health problems of the population.

Rationale of the study

Ethiopian country-level health profile provides an overview of the situation of priority health problems and health system profiles. Curative and preventive components of health service have shown an improvement, meeting equitable and quality health care components. Indicators and information products considered as adequate, but data management is very poor. Health information system resources, dissemination, and use, as well as data source coverage, are also inadequate. The capital city of the institution to generate, analyze, disseminate and use health information is differing.

In the context of epidemiological transition in the country, a double burden of disease is already emerging the mix of persistent infectious disease and increase noncommunicable disease and injury. Noncommunicable disease and injuries are already major contributors to the high morbidity and mortality burden of the country are related to lifestyle changes that are due to unhealthy diet and poor physical activity. The physical environment, industrial waste, air pollution, household waste management, poor housing, food contamination, and vectors are the most common source of health problems. Communicable diseases are the main causes of a health problem for the country. It is the causes of most ten top diseases in the outpatient department.

Health Profile is crucial for prioritizing health and health-related problems of the community at any level, and data availability is a problem due to different reasons such as collection, handling or managing as well turn over of staffs who handle the data are among the main reasons behind at all levels. This might be a threat to get organized & updated data in the concerned offices or sectors. With all these conditions assessing and analyzing the health profile of the district is useful to give evidence-based information for prioritizing, planning and instituting appropriate public health interventions in the district.

Objectives

General objective

To assess health and health indicator of the district to identify in Dilla Zuria district, Gedio zone, SNNP region, Ethiopia ,2017

Specific objectives

- ✓ To describe the demographic characteristics of the population in Dilla zuria district
- ✓ To describe health delivery infrastructures and health delivery status in Dilla Zuria district
- ✓ To describe the health status of the population in Dilla Zuria district, using health and health-related indicators.
- ✓ To suggest the area of action to be improved health

Materials and Methods

Study area and Period

The Study area is Dilla Zuria district which is one of the six districts in Gedean zone in SNNP, Ethiopia. The study was conducted from 2/02/2018-13/02/2018.

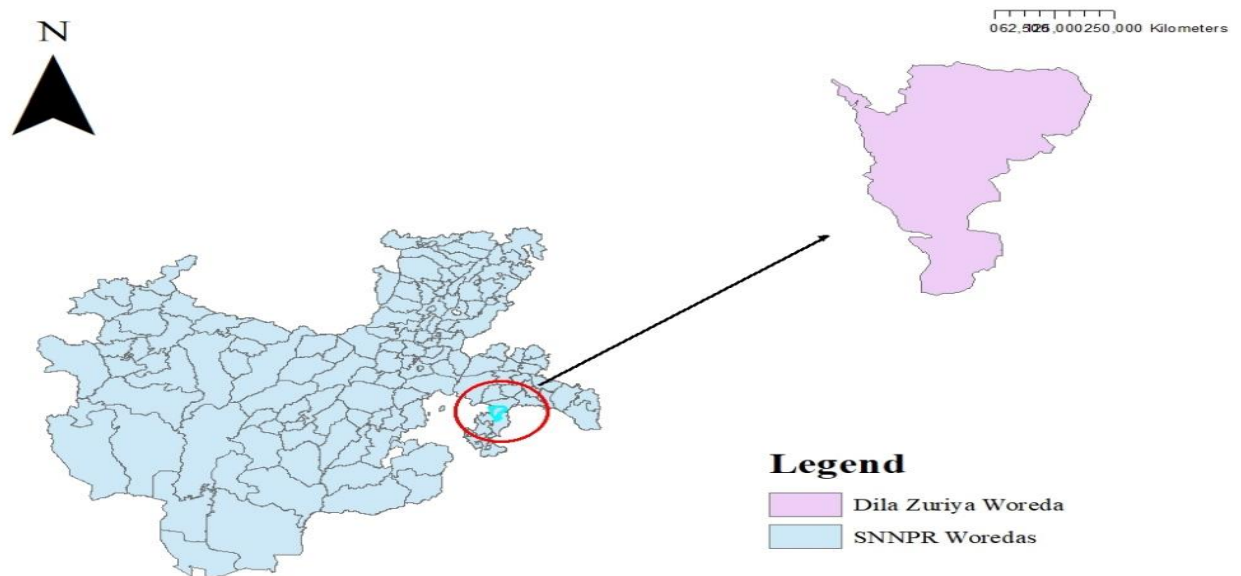


Figure 4.1 :Map of Dilla zuria district, Gedio zone, SNNP region, Ethiopia, 2018

Study design

Cross-sectional study with a retrospective review of data was applied to develop this health profile description

Data Source

To develop this health profile data was collected and reviewed from the following sources

- ✓ Dilla Zuria district Health Office, Plan, and Program Core Process
- ✓ Dilla Zuria district Education office
- ✓ Dilla Zuria district Bureau of Finance and Economic Development (BoFED)
- ✓ Dilla Zuria district Bureau of Water and Energy office
- ✓ Dilla Zuria district Social Affair office
- ✓ Dilla Zuria district Bureau of Women and Child Affair office
- ✓ Dilla Zuria district Bureau of Agriculture and Livestock office
- ✓ Dilla Zuria district Bureau of Road and transport office

Study variables (operational definition)

Source MOH health and health indicator report

Antenatal coverage: Proportion of pregnant women attended, at least once during the current pregnancy, by a health professional, for reasons related to pregnancy.

Antenatal care coverage – First visit: The percentage of women that received antenatal care at least once during the current pregnancy.

Antenatal care coverage – four visits: The percentage of women that received antenatal care four or more times during the current pregnancy.

Child mortality rate: The number of births occurring in 2009 per 1000 women in the reproductive ages (i.e. women aged 15-49).

Contraceptive acceptance rate: Proportion of women of reproductive age (15-49 years) who are not pregnant and are accepting a modern contraceptive method (new and repeat acceptors)

Contraceptive prevalence rate: Proportion of women of reproductive age (15-49 years) who are using (or whose partner is using) a contraceptive method

Crude birth rate: The number of births in a population during 2009 is divided by the number of person-years-lived by the population during the same period. It is frequently expressed as births per 1,000 populations.

Demography: The study of population and its characteristics, with reference to such factors: size, age structure, density, fertility, mortality, growth, and social and economic variables.

Disability is an impairment that may be cognitive, developmental, intellectual, mental, physical sensory or some combination of these. It substantially affects person life activities and may be present from birth or occur during a person's lifetime.

Full immunization coverage (< 1 year): Proportion of surviving infants who receive all doses of vaccines before their first birthday.

Infant Mortality Rate (IMR): The ratio of the number of deaths under one year of age occurring in 2009 to the number of births in the same year

Leading causes of morbidity: The frequently occurring causes of morbidity (10) among patients, of which the greatest number of cases have been reported during the year.

Maternal mortality rate: The number of maternal death while pregnant or within 42 days after the termination of pregnancy from any cause related to pregnancy or its management per 100,000 populations.

Orphan: Is someone whose parents have died, unknown, or have permanently abandoned them. It also can be the loss of one parent or both considered as an orphan.

Road traffic injury: which is physical damage of a person as a result of a road traffic crash is the major cause for traffic fatalities (any person killed immediately or dying within 30 days as a result of road traffic injury crash).

Tuberculosis (TB) case detection rate: Number of new smear-positive TB cases detected, among the new smear-positive TB cases estimated to occur in the district

TB cure rate: Percentage of a cohort of new smear-positive TB cases registered in a specified period that was cured as demonstrated by bacteriologic evidence (a negative sputum smear result recorded during the last month of treatment and on at least on one previous occasion during treatment).

TB death rate: Percentage of a cohort of new smear-positive TB cases registered in a specified period that died during treatment, irrespective of the cause.

TB defaulter rate: Percentage of a cohort of new smear-positive TB cases registered in 2010 that interrupted treatment for more than 2 consecutive months.

TB treatment success rate: Percentage of a cohort of new smear-positive TB cases registered in a specified period that successfully completed treatment. Successful completion entails clinical success with or without bacteriological evidence of cure

Results

Historical aspects of the district

Dilla zuria is established as a district in 2007 before that it was one part of Wonago district in Gedio zone. The name district gives because of Dilla Town with five-kilometre away and surrounded the district. The district also endorsed by a historical place in Wachamo kebele which called ANISHIMACHI the place was used as to get patients for sin and crime. Individual who were committed crime will be segregated and not involved in other social activity in the community if they do not pass through this process it also leads by an elder. Additionally, the district also has a standing stone which served as a tomb in ancient time

Geography & climate

The district is in south 385 KM away from the capital Addis Abeba and 100 km Hawwsa the Capital of SNNP regions. The district is boarded on south Wonego district, on North by Dilla Town, on East by Bule district and on West by Oromia Region. The district covers the surface area of 13684 ha. The annual rainfall is estimated with 1400-1700 mm and with average annual temperature were 26⁰ degrees Celsius but can vary from 22⁰-28⁰ in different season thought-out the year. Agroecological location of the district was Midland. Its climatic condition is 77% kebles were identified as Wonadega the remaining were Dega. The district is leveled at a range of 1350- 2600 M above the sea.

Administrative and Political structure

The district has 17 Kebeles and all of them were rural Kebeles. The district has its own council and all sector or ministry offices, social institutions, and NGOs are found in it.

Population

Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA) estimated projection, this district has a total population of 127022, of whom are 62241men and 64781women with sex ration of almost 1:1. Most of the population occurred at an age below 30 years account for 65 % of the total population. Among them near half population age lies between the 5-14 age group.

A high number of the population reside in three Kebeles of the district which account for 26% of total population namely Chuchi (8.9%), Gola (8.6%) and Tuticha (8.3%).

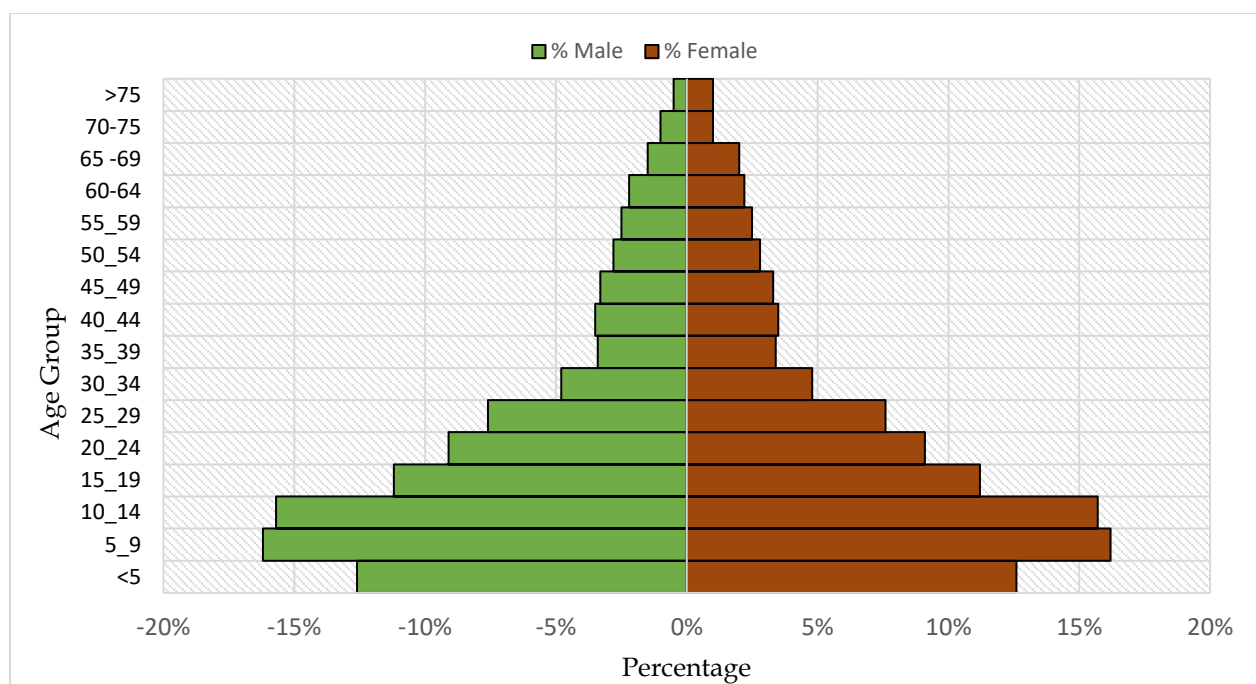


Figure 4.2: Population pyramid of Dilla zuria district, Gedio zone, SNNP Region, Ethiopian, November 2017

Table 4.1 : Distribution of the population in Dilla zuria district by Kebeles and sex in Gedio zone, SNNP region, Ethiopian, November 2017

S.NO	Name of Kebeles	population number		Total
		Male	Female	
1	Akesha	3794	3948	7742
2	Amba	4288	4463	8750
3	Anidida	3882	4041	7923
4	Audo	2775	2888	5663
5	Autlcho	3052	3176	6228
6	Ayxile -Suka	1721	1791	3512
7	Bontisibu	3573	3718	7291
8	Bula	4105	4273	8378
9	Chichu	5539	5765	11304
10	Girisa	1751	1823	3574
11	Gola	5339	5557	10896
12	Hoxicha	3153	3282	6435
13	Shakolla	3081	3207	6288
14	Sisota	4346	4524	8870
15	Shigedo	3660	3810	7470
16	Tumticha	5166	5377	10543
17	Wachamo	3016	3139	6155
Total		58447	64781	127022

In the district 80% of the population worship in Protestant religion followed by orthodox which account for 15% total population.

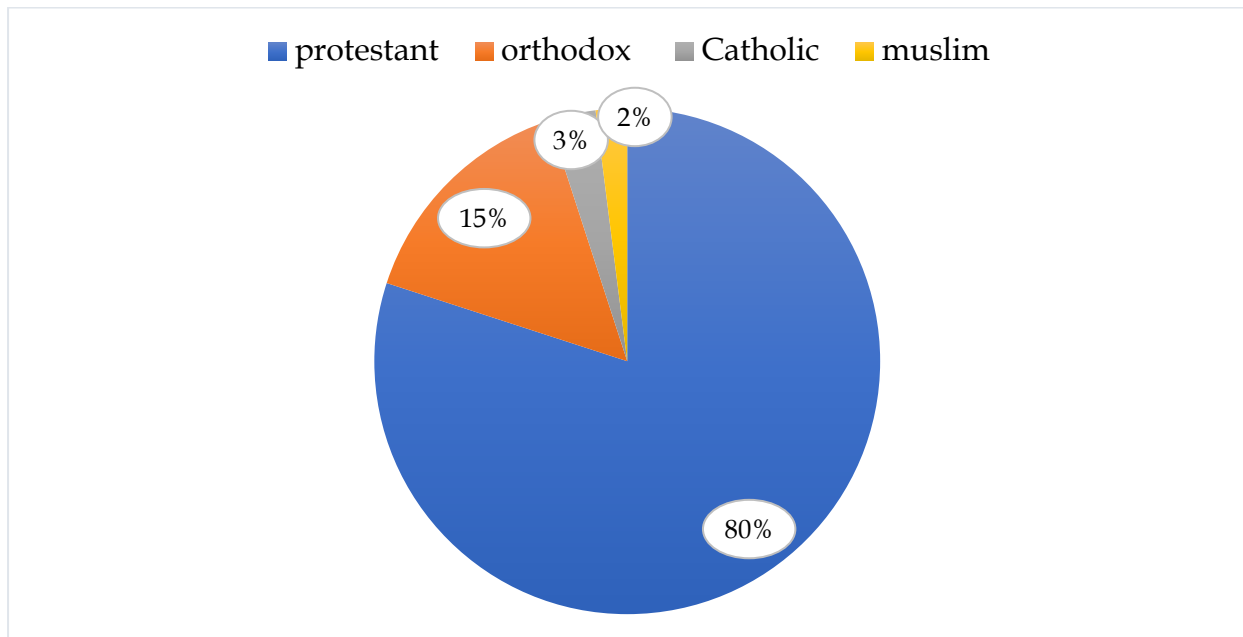


Figure 4.3: Distribution of worship religion in Dilla Zuria district, Gedio zone, SNNP region, Ethiopia November 2017

Geadeгна language was mostly spoken in district account 80% the population spoke it precede by Amharic which contributes 10% total population.

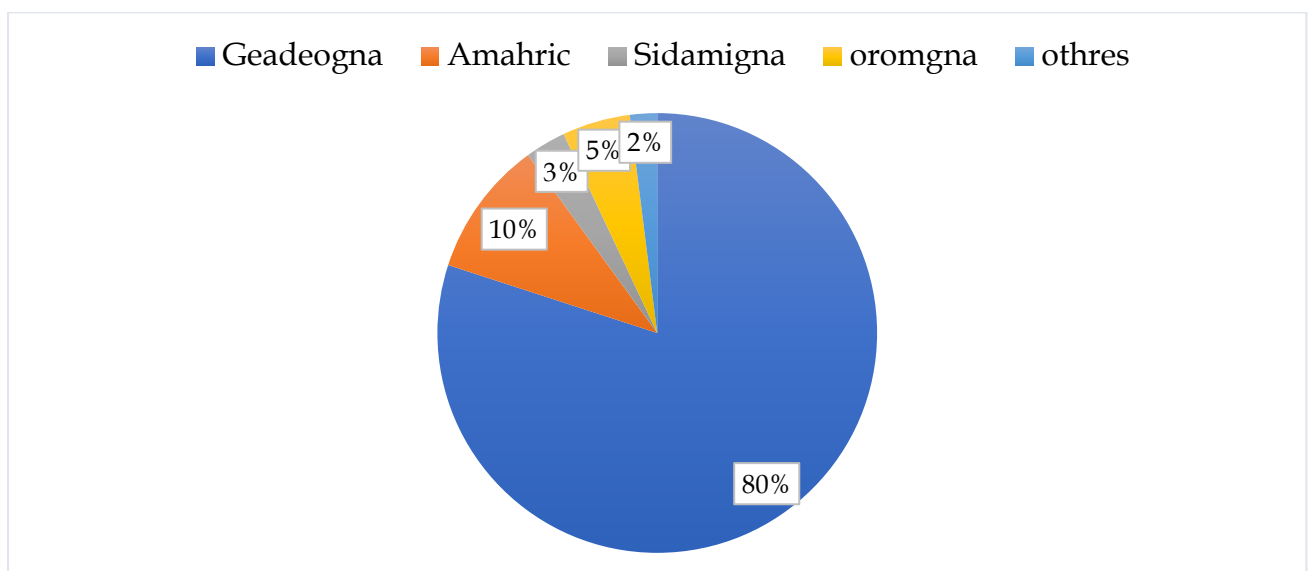


Figure 4.4: Distribution of linguistic in Dilla Zuria district, Gedio zone, SNNP region in Ethiopia, November 2017.

Within the district there are 25873 households are found & the average number of households 4.9.

Economy

The mainstay of the economy is based agro-pastoral which involve both agricultural as well as pastoral activity simultaneous. The report of district bureaus of agriculture indicates that 1865(55.7%) Hectar had covered by permanent crop and 1129(33.7%) hector was covered by yearly based crop from a total of 3348ha identified by the bureau.

Table 4.2: Land use and management of Dilla zuria district in Gedio zone, SNNP Region, Ethiopia, November 2017

S.no	Land management and use	Area covered	Percentage
1	Permanent crop	1865	55.7%
2	Yearly based crop	1129	33.7%
3	Land for grazing	23	0.7%
4	Forest	122	3.6%
5	Coffee	10.1	0.3%
6	Can't be used for agriculture	198	5.9%

Source: Dilla zuria bureau of agriculture and Livestock.

As depicted earlier the area also endorsed by cattle and livestock resource.

Table 4.3: Type of cattle and live stoke by sex and species in Dilla Zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

ORNN Region, Ethiopia, November 2017

Type of cattle and livestock	Species				Total
	indigenous origin		Foreign(hydrice) origin		
	Male	Female	Male	Female	
Milk-producing cow		2123		403	2526
Heifer		14104		97	14201
Ox	10075		83		10158
Bull	7254		180		7434
Calf	3365	5500	13	47	8925
Sheep	17015	29377			46392
Goat	1878	3843			5721
Hen		58124		44257	102381
Cock	34884		20257		55141
Horse	1549	753			2302
Donkey	622	172			794
Mule	739	753			1492
Bee flock					34808

Source: Dilla zuria bureau of livestock

Educational system

In the district, 25619 students were enrolled for 2010 E.C academic year within 24 schools from grade 1 up to 10. Among them, 56% were enrolled in first cycle student followed by a student from grade 5-8 which account 34% from the total enrolled a student. Additionally, 475 teachers were engaged in the learning process. 72% they were a male teacher and most the teacher were taught from grade 5-8 account for 48.5% of a total teacher in the district. Furthermore, 3339 school age children have identified district from them 81% (2691) began learning in 56 pre-elementary station in the district.

In the district, there were 18 elementary schools from them eight schools were a completely only first cycle (1-4) and three high schools were avail from this academic year. But there is no preparatory school as well as TVET colleges.

Table 4.4: Number of student and teacher by sex at a different educational level in Dilla Zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

S.no	Educational stage	Number of a student enrolled			Percentage (%)	Number of teachers			Percentage (%)	The ratio between teacher vs student
		Male	Female	Total		male	female	Total		
1	First cycle (1-4)	7896	6521	14417	56%	113	64	177	37%	1:100
2	From 5-8	4811	3974	8785	34%	186	46	232	49%	1:34
3	From 9-10	1389	1028	2417	9%	44	22	66	14%	1:34
Total		14096	11523	25619	100%	343	132	475	100%	1:50
Number of a student in pre-elementary school										
4	Identified school-age children	1613	1746	3359		—	—	—		—
5	Enrolled from identified children	1389	1302	2691	80.1	—	—	—		—

Source: Dilla Zuria district Education office

School dropout is main challenge identified in the district by affecting the learning and teaching process. In the last six months of 1685(7%) students were withdrawn from education. A higher number of school dropout were seen in a student from grade 5-8 account to 7.7% followed by a student from the first cycle accounts 6% from their respective total enrolled in each category

at begging of the academic year. Furthermore, from the total withdrawn student higher number of were seen among male student which account 943(56%).

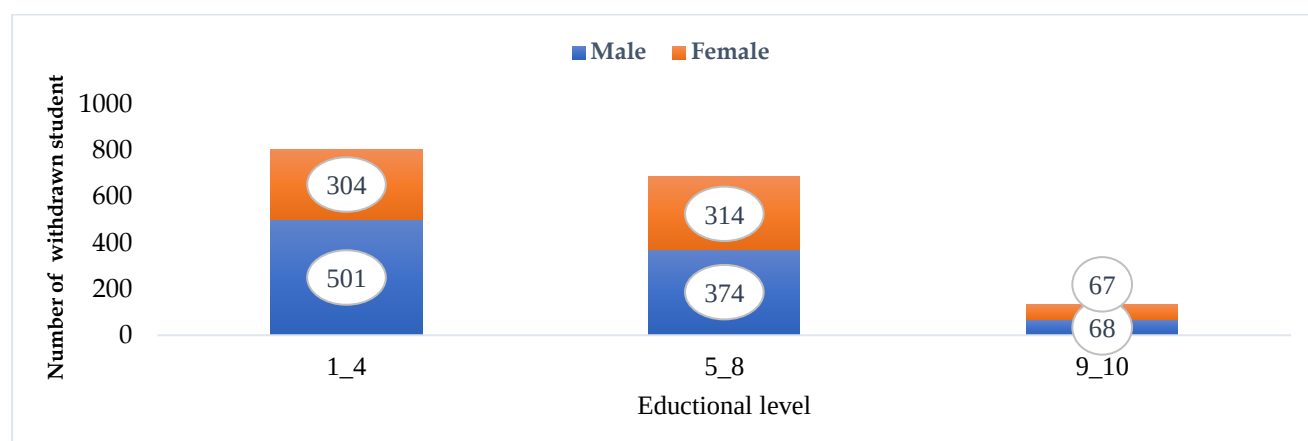


Figure 4.5: Distribution of school dropout by sex and educational level in Dilla Zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

Infrastructure

Telecommunication

Telecommunication data like having a cell phone, fixed or wireless telephone users are not found in any of concerned sector offices in the district and the regional branch of telecommunication office and it only occurred at the national database.

Transport

The main means of transportation infrastructure is a road. In Dilla zuria district the road coverage was 52.4%. among it, the all-weather road is covered 39.4 KM which have 74% coverage from the total expected. Beside to this 170 km, dry weather was available in the district and currently, there is new road construction in both dry and all-weather roads which enables to increase the coverage by 12.4%. All the kebeles in the district were interconnected and there is access to reach them. Three health centers were having access to the main road expect Sisota and Anidida health center. Moreover, there was a plan to construct a health facility in Hoxicha kebele is delayed due to having no access to all weather road.

Electric Power supply

Dilla district has access to 24 hr electrical power supply even if all kebeles have no access to it. According to Dilla district report, only 65% of the kebeles have access to power: even though, power interruption is a problem that is seen frequently. 27 % total population reside in five different kebeles (at household level 6684 house) in the district have no access for power

supply. Wood and charcoal are serving as the main source of energy for daily activity in both kebeles who has access and hasn't accessed to the power supply.

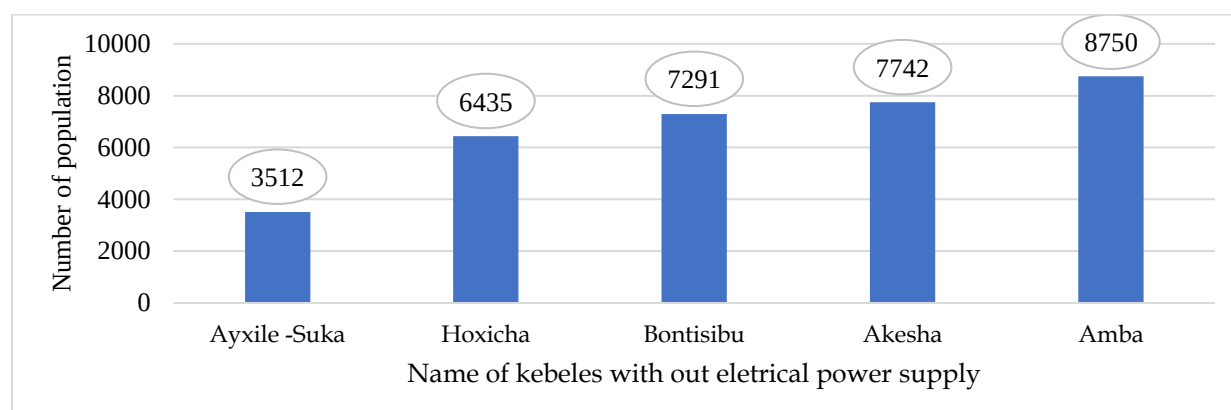


Figure 4.6: Kebeles without electrical power supply with a respective population in Dilla Zuria district, Gedio zone, SNNP Region, Ethiopia, November 2017.

Safe Water Supply

The average safe water supply of the district is 81924 (64%) population gets access for it. The average daily consumption one person is estimated 10 L per day. The source of water utilized in the district both groundwater including shallow-well, borehole and hand dug well as well as spring was used as a safe water supply source. In the district there is 192 different types of water schemes were availed for population among them 96% were functional and remaining were needed repair and maintenance: Furthermore, spring was a most common source of safe water supply services in the district which accounts 140(73%) for total water schemes. Even if the coverage of more than 50% but there are kebeles still coverage below half.

Table 4:5 Distribution of water access in Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

Ethiopia, November 2017										
Name of kebeles	Total population	Number of beneficiary	Type of water schemes							
			Spring	Shallow well		Borehole		Hand dug well		
Functional				Functional	Not functional	Functional	Not functional	Functional	Not functional	
Total schemes										
Kebeles water coverage										
functional water schemes (%)										

Akesha	7742	4162	10	4			1	1	16	54%	93.75%
Amba	8750	6837	11	1					12	78%	100%
Anidida	7923	5710	8	3	2			1	14	72%	86%
Audo	5663	3625	8					1	9	64%	100%
Autlcho	6228	4220	7	1					8	68%	88%
Ayxile -Suka	3512	1592	7	—	—	—	—	—	7	45%	100%
Bontisibu	7291	4366	11						11	60%	100%
Bula	8378	5030	4	1				2	7	60%	100%
Chichu	11304	8766	3	9		1		1	14	78%	100%
Girisa	3574	2130	9						9	60%	100%
Gola	10896	7639	12	13				1	26	70%	100%
Hoxicha	6435	2701	5						5	42%	100%
Shakolla	6288	2980	7					1	8	47%	100%
Sisota	8870	6410	12	2					14	72%	100%
Shigedo	7470	4354	8						8	58%	100%
Tumticha	10543	9042	14	2	2		1	2	20	86%	85%
Wachamo	6155	2360	4						4	38%	100%
total	127022	81924	140	1	35	4	2	10	192	64%	96%

Health Infrastructure, Health System, Health Care Services and Health Facilities

District health system

Dilla Zuria District has its own health department headed by an Executive District Officer. The officer was assisted by Deputy District Officer (DDO), Plan Officer, Human Resource, HMIS, Regulatory officer and secretary. Health Promotion Disease Promotion department had five departments under it and it is the main area of health service deliverer.

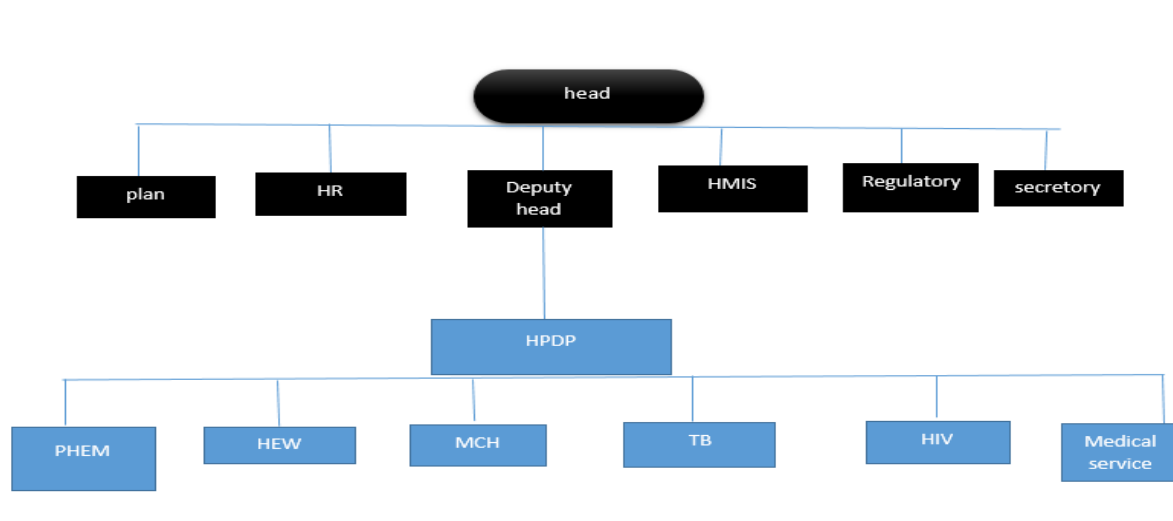


Figure 4.7: The health service structure of Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

There is one NGO work on health and health-related issues in the district. Currently, serve three kebeles of the district. it works on HIV/AIDS prevention and control by providing health education and work maternal and child health. furthermore, it also engaged and serve on environmental health.

Health Care Facilities/infrastructure

In the district, there is no hospital but there are five health centre and 27 health post are providing health service in the community with a ratio of 1:25404 and 1:4707 consecutively.

Table 4.6: Health facilities/ infrastructure located in the structure of Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

Type		Number	Total Number of beds	Health facility to population ratio
Government Hospital		–	–	–
Government Health centers	Type A	2	10	1:25404
	Type B	3	–	
	Total	5	–	
Private Health Facilities	Clinics (all type)	2		
	Diagnostic Laboratories	–	–	
	Drug stores	–	–	
	Pharmacies	1		
Government Health Posts		27		1:4704
Non-governmental organizations	Health Posts	–		
	Health centers	–		
	Hospitals	–		
	Clinics	–		
Facilities under construction	Health Posts	–		
	Health centers	–		
	Hospitals	–		

Type and Number of health professionals

In the district, there are 373 different health professional and the supportive staff was engaged in health service delivery.

Table 4.7: Type and number of health professional in of Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

Health Profession Specialty	Number of human powers by sex		Total	Health professional to population ratio
	Male (%)	Female (%)		
Specialist	–	–	–	
General Practitioner	–	–	–	
Health officer	20(63)	12(37)	32	1:3969
Nurses (both degree and diploma holders)	23(62)	14(38)	37	1:3433
public and compressive nurse	62(51)	61(49)	123	1:1032
Midwives (both degree and diploma holders)	–	19(100)	19	1:6685
Laboratory (laboratory technicians and technologists)	12(92)	1(8)	13	1:9770
Pharmacy (pharmacy technicians and pharmacists)	9(100)	–	9	1:14113
Environmental Health (both degree and diploma holders)		3(100)	3	1:42340
Health information technicians	–	–	-	
Health education	–	–	-	
RH	–	2(100)	2	1:63511
Health extension workers	–	60(100)	60	1:2217
Other staffs	41(55)	34(45)	75	1:1693
Total	132	171	373	

Causes of Morbidity, Admission, and Mortality

Causes of Morbidity in All age group

Typhoid fever and pneumonia were identified as the leading cause of morbidity in the district. Typhoid fever and pneumonia account for 25% and 17.8% respectively from all diagnosis patient in the last six months.in case of sex proportion, it was nearly equal in all aspect of diseased expect trauma in which male was more affected.

Table 4.8: Top 10 cause of morbidity at all age group in of Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

Rank	Description	Male	Female	Total	Percentage (%)
1	Typhoid fever	1581(46)	1874(54)	3455	25
2	Pneumonia	1423(54)	1104(44)	2527	17.8
3	Diarrhoea(non-bloody)	626(52)	586(48)	1212	8.6
4	Helminthiasis	549(46)	646(54)	1195	8.5
5	AFI	414(45)	498(55)	912	6.6
6	Malaria all type	365(56)	282(44)	647	4.6
7	Trauma	400(62)	242(38)	642	4.57
8	Urinary tract infection	292(50)	294(50)	586	4.2
9	parasitic infection	237(45)	288(55)	525	3.74
10	Diarrhea with dehydration	183(47)	203(53)	386	2.8
Total of above cause		6070(50)	6017(49)	12087	
Total of other cause		893(45)	1072(55)	1965	14
Total of all-cause		6963(49.8)	7089(50.2)	14052	

Causes of morbidity in the pediatric age group

Pneumonia and diarrhea were leading cause morbidity both they account for 82% total under-five children diagnosis in the last six months .in the case of patient sex almost similar in both sex in the overall top 10 diseases. Furthermore, malaria, acute upper respiratory infection and others also contribute a significantly higher number of cases as illustrate in the table below.

Table 4.9: Top 10 cause of morbidity pediatrics age group in of Dilla zuria district, Gedio zone, SNNP region, Ethiopia in, November 2017

Rank	Description	Male (%)	Female (%)	Total	Percentage (%)
1	Pneumonia	993(55)	802(45)	1795	42.0
2	Diarrhoea (with blood, dehydration, non-bloody)	856(51)	836(49)	1692	39.6
3	Malaria (all type)	75(57)	56(43)	131	3.07
4	Acute upper respiratory infection	70(58)	50(42)	120	2.81
5	Acute febrile illness	65(56)	52(44)	117	2.74

6	Helminthiasis	60(55)	50(45)	110	2.58
7	Eye disease	59(58)	43(42)	102	2.39
8	Otitis	52(63)	30(37)	82	1.92
9	Trauma	40(62)	25(38)	65	1.52
10	Infection skin and subcutaneous	35(64)	20(36)	55	1.29
Total of above cause		2305(54)	1964(46)	4269	91
Total of other cause		235(57)	175(43)	410	9
Total of all cause		2540(54)	2139(46)	4679	100

Cause of morbidity in the adult group

Typhoid fever also leading caused of the adult age of group account 40% followed by Helminthiasis which account for 12.5%.

Table 4.10: Top 10 cause of morbidity Adult age in of Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

Rank	Description	Male	Female	Total	Percentage (%)
1	Typhoid fever	1581(46)	1874(54)	3455	39.77%
2	Helminthiasis	499(46)	586(54)	1085	12.49%
3	AFI	413(48)	413(52)	795	9.15%
4	Pneumonia	410(56)	322(44)	732	8.43%
5	Malaria all type	336(52)	311(48)	647	7.45%
6	Trauma	385(60)	257(40)	642	7.39%
7	Urinary tract infection	287(50)	299(51)	586	6.75%
8	Dyspepsia	207(53)	183(47)	390	4.49%
9	Other (unspecified infectious and parasitic infection)	101(48)	209(52)	210	2.42%
10	Diarrhoea(non-bloody)	65(45)	80(55)	145	1.67%
Total above case		4284(49)	4403(51)	8687	92.68%
Total others case		364(49)	322(51)	686	7.32%
Total of all cause		4648	4725	9373	100.00%

Vital statistics & health indicators

Regarding vital statistics deaths & births are registered in the health institution, but it doesn't show crude birth & death rate, infant mortality rate, child mortality rate, neonatal mortality rate and as well maternal mortality rate. To some extent, the health extension workers start to register the data, but not continued. In the district, there are a vital events registration branch office assigned to perform these duties, but not performed as needed. Recently there is a

guideline sent from the district administration to start the registration from July 1st2016 Due to this reason, this vital statistics data couldn't be found.

MCH/FP

In Dilla zuria district there was 2022 mother who was intended to provide any means modern contraceptive in district but, only 65% of them used currently. among them, 82% of them used short-acting contraceptive methods the remaining were used long acting one. Overall, injectable means of conceptive more preferred account 42% total used followed by implant account 18% of total used conceptive in the district. The acceptance and tendency to use pill and IUD were observed very low in the district.

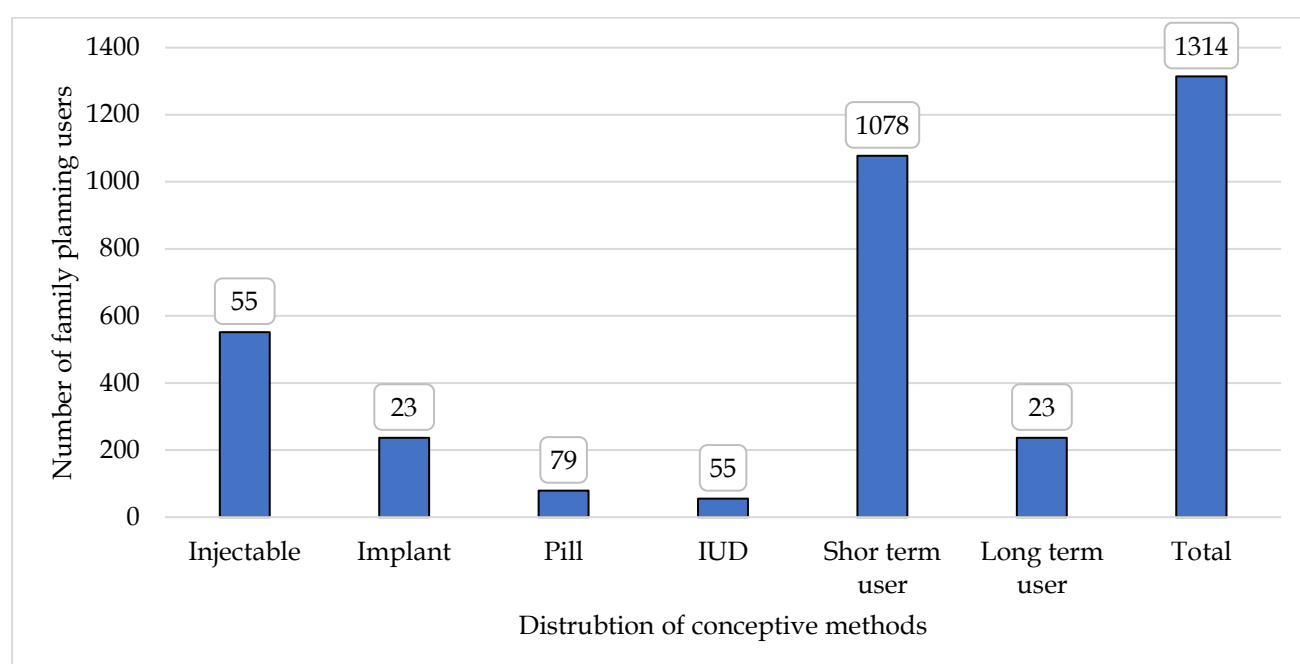


Figure 4.8: Family planning users by type in Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

In Dilla zuria district 4393, expected pregnancy with 4050 live birth is expected in this year. According to the district performs ANC1 1932(88%), ANC4 1371(62%) from their six-month plan. Intuitional delivery cascade in the district was 1023(46%) from the total expected in the last six months. For them 3 them identified as the low birth weight with no preterm and child, as well as maternal death, reported. Furthermore, in the district there is no traditional birth attended every pregnancy expected to give birth at a health facility. During ANC follow up 1858 (84%) test for HIV and 41% (896) mother were a test for syphilis and no case were found in each test analogs. The postal natal rate is 54% (1195) from the total expected to give service in the last six months.

Immunization

In the district, immunization coverage was 96% in the previous year. According to the 2010 half year plan as district there intended to provide immunization for 2025 children and women in each category summarized below.

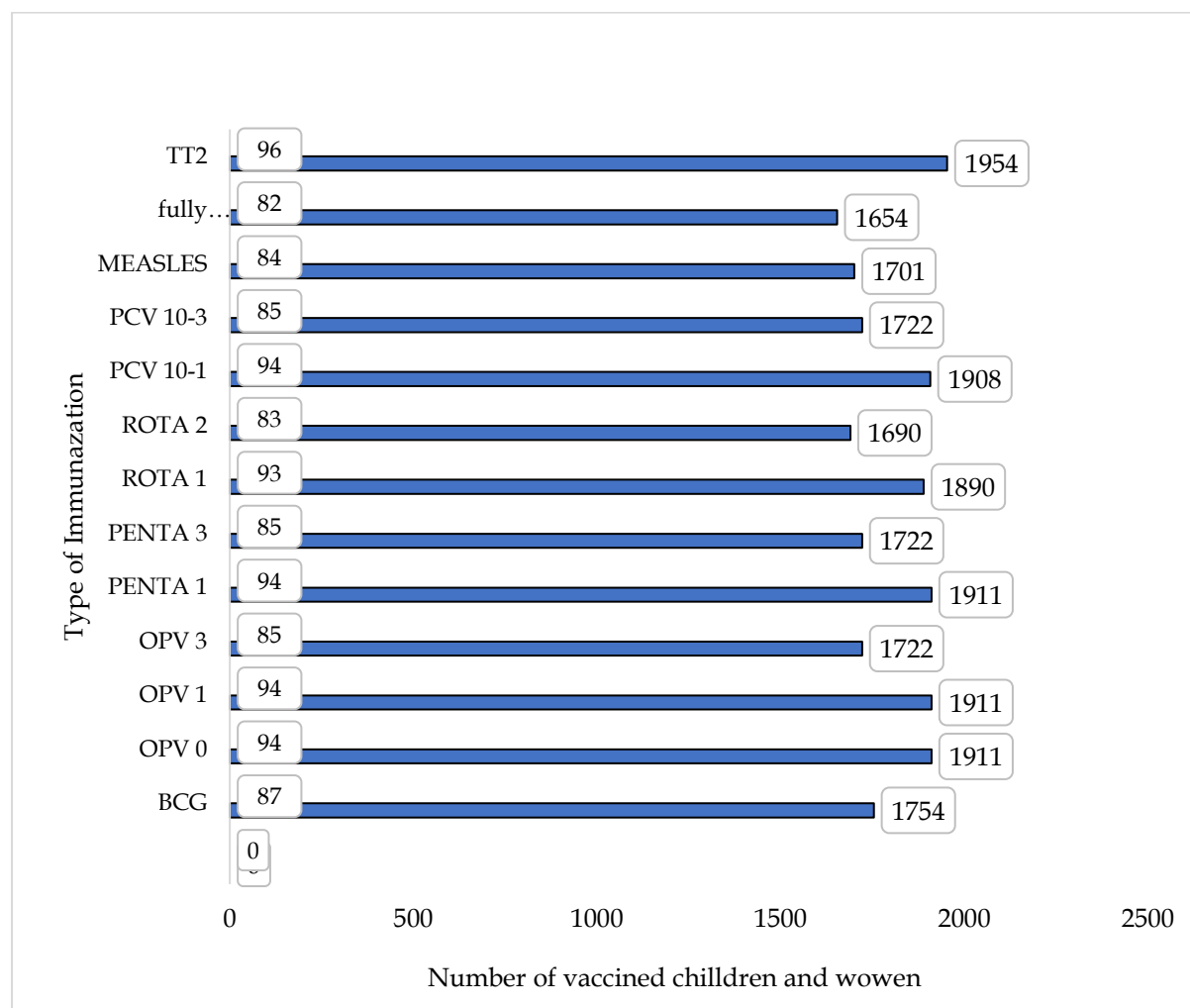


Figure 4.9: Vaccination of children's & mothers in Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

TB and Leprosy

The smear-positive pulmonary tuberculosis detection rate was 109/122(89%) and other TB indicators of the district are shown in the table below. Among the total number of TB cases MDR-TB, only one patient was identified. The most cases were treated as pulmonary TB case which accounts for 79% of total diagnosis cases. Furthermore, no leprosy case was reported inthe district in the last six months and in the last two years. The general objective of the TLCP is to reduce the incidence and prevalence of TB and Leprosy as well as the occurrence of

disability and psychological suffering related to both disease and the mortality resulting from TB to such an extent that both diseases are no longer a public health problem.

Table 4.11: TB indicators of the type in Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

No	Indicators	Coverage in number	Coverage in percent (%)
1	Tuberculosis case detection rate	109	89%
2	Pulmonary TB treatment success rate	102	93%
3	Pulmonary TB cure rate	87	80%
4	TB defaulter	3	3%
5	Total TB patient screened for HIV	92	84%
6	TB case-finding among people living with HIV	—	0%
7	Death on TB treatment	5	5%
8	Leprosy case detection rate	—	0%
9	Leprosy treatment completion	—	—

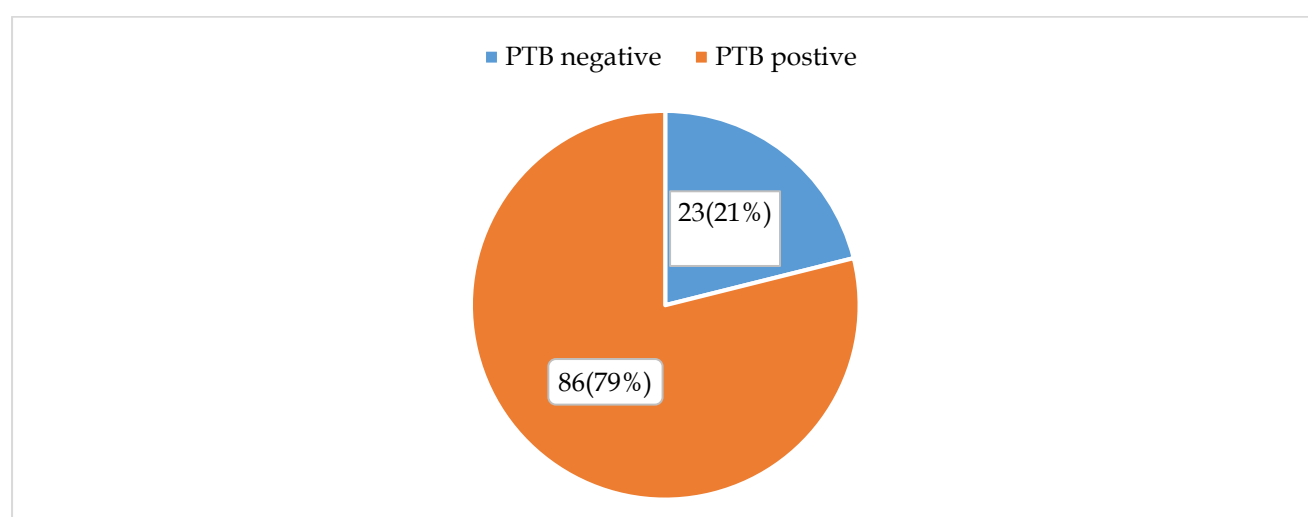


Figure 4.10: Distribution of TB cases based on location on the lung in Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

HIV/AIDs Prevention & Control

The prevalence of HIV in the district is 3.7%. During the year 2010E.C. 2790 individuals were screened for HIV, among these VCT takes 752 with new positive cases of 18, PMTCT 1858 with no new cases and PITC 180 with new cases of 4. This number indicates that the incidence rate in the district is 1.4 %. performance of VCT was low but good process was seen in condom distribution. seen detail illustration in the table below

Table 4.12: HIV prevention and control activity in Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

Activity	Eligible (planned)	Achievement	percentage
VCT	7692	752	10%
PICT	420	180	43%
PMCT	4393	1858	42%
Health education	5800	2829	49%
Condom user	85,000	50,000	59%

Hygiene & Sanitation/ Environmental Health

Safe drinking water is delivered to the community through groundwater and spring. As depicted earlier the water coverage of the district were 64%. Latrine coverage of the district were 67% among it 64.5 % were ventilated pit latrine and there reaming 2.7% were improved latrine with 45% utilization. but no data were available on solid and liquid waste management in district due lack of follow up and supervision towards health extension workers.

Endemic disease and disaster

Endemic disease

Malaria

Malaria is a major public health problem in Ethiopia. It has been consistently reported as one of the three leading causes of morbidity and mortality in the past years. Dilla zuria district is also one of Ethiopian district affected by malaria. according to the district health office, 4 hot spot kebeles were identified with a total population of 34852 which account for 27% of the overall population live in the district. Regarding ITN coverage, it was 100% and it was distributed to seven kebeles located in the district.it utilization was 20% due to a completed term of use since it was given in 2015 as well as its misused. As a district, they were intended to cascade ISR spray in four kebele but accomplished in three kebeles expect Gola kebele with a total household of number of 4834.

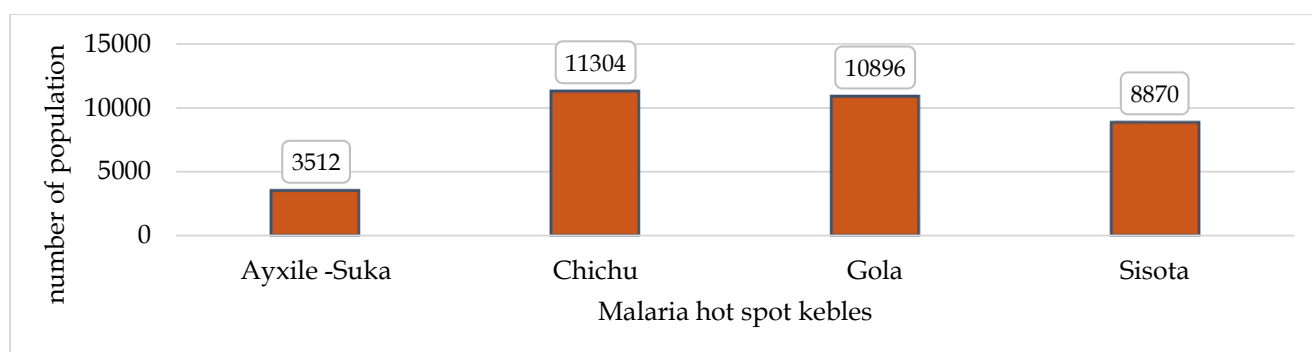


Figure 4.11: Distribution of population reside at malaria hotspot kebele in Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017.

In Dilla zuria district in 2017 around 8165 suspected malaria case was reported from each facility among them 36% (2912) examined for malaria. For examined individual only 327 (11%) positive for malaria. According to health officials report the positive rate does not exceed beyond 22% in 2017 from a total suspected patient, not all patient was examined for malaria through any means of confirmation this proved by a maximum of 60% patient were examined in the previous year. The positivity and examined rate vary from months to a month last year. The positivity rate was range from 3%-22% form examined individual. a higher number of malaria positivity rate was seen in the month of May, July and August it was 17%,20%, and 22% respectively. As the number of examining increase, the number of positivity rate increase even if in not proportional to the number of cases. Majority of the positive patient was diagnosed as positive for *P. falciparum* which accounts for 202(62 %) total positive case and remaining were positive for *P. vivax* which 110(34%) and mixed15(4%).

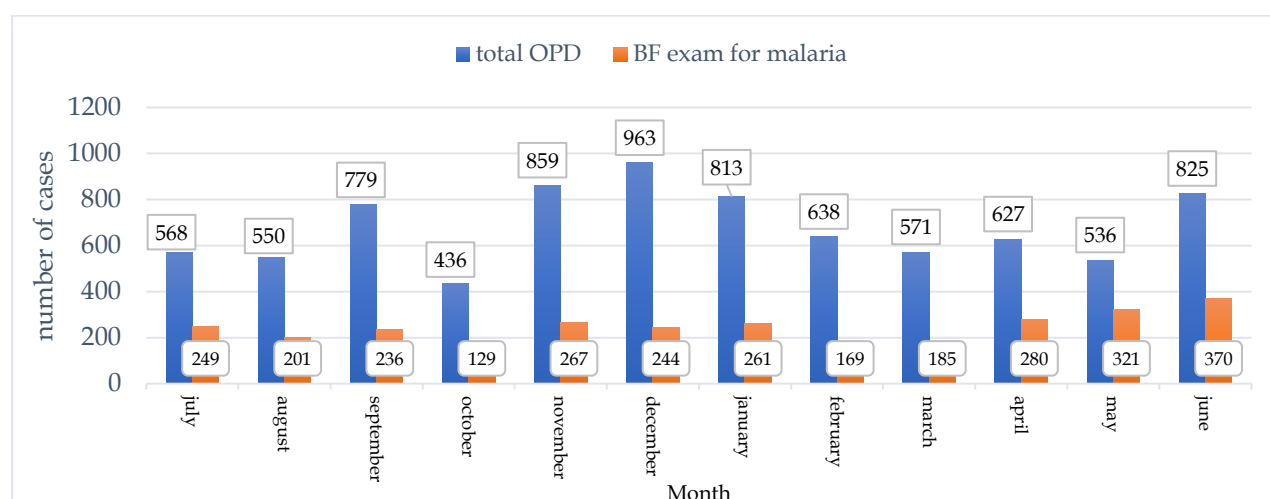


Figure 4.12: Number of total suspected and examine individual in Dilla zuria district, Gedio zone, SNNP region, from July- June 2017

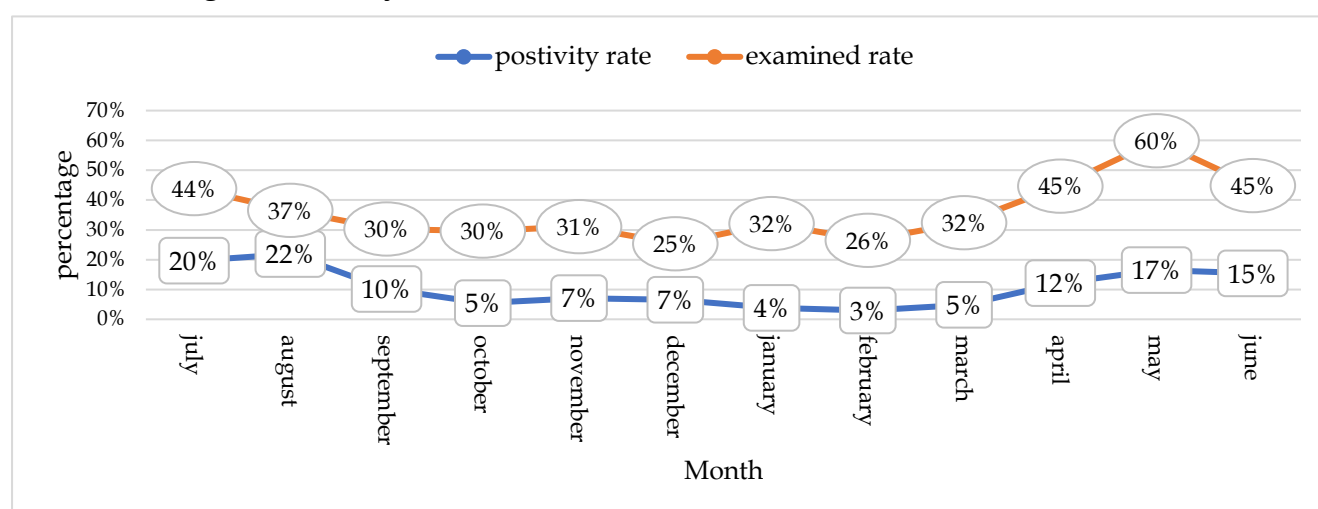


Figure 4.13: Positivity and examined rate of malaria cases in Dilla zuria district, Gedio zone, SNNP region, Ethiopia in from July- June 2017

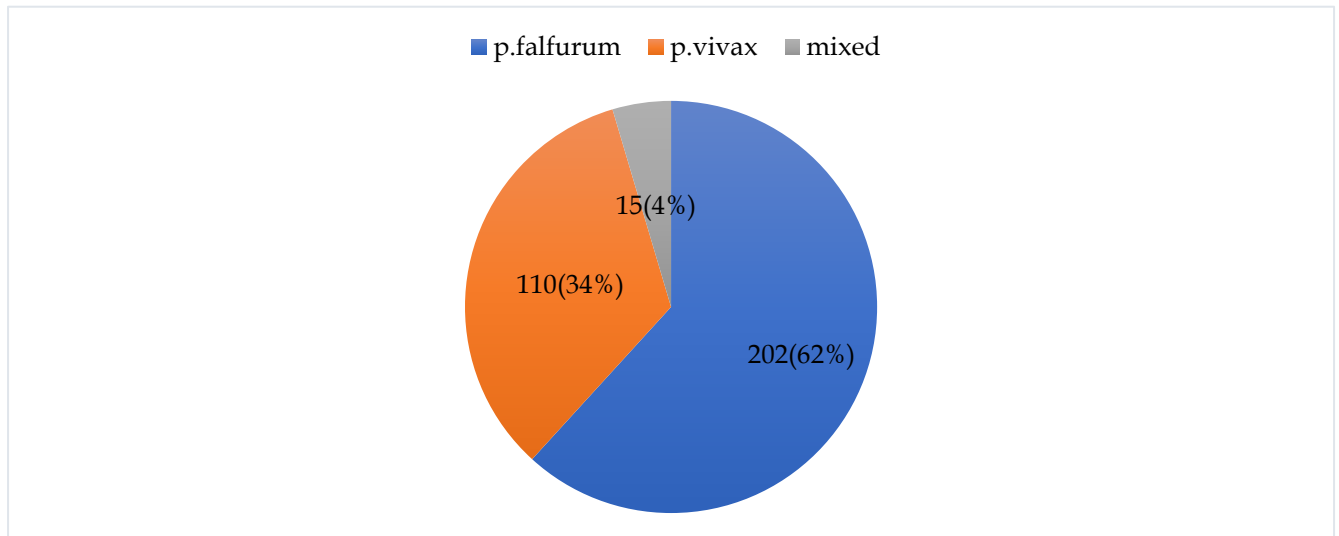


Figure 4.14: Distribution of malaria cases by species in Dilla zuria district, Gedio zone, SNNP region, Ethiopia, 2017

In Dilla zuria district there is five health center currently give service to the community. Chichu and Andida health center were reported majority malaria suspected case were examined as well as positive case was found form them which contributed 2236(92%) and 438(6%) respectively in last six months of 2017. majority of positive cases were diagnosed as *P. falciparum* which was 64% of total positive cases. Even if, *P. falciparum* main cause malaria but isn't similar across all health facility it exceptional for Tumaticha and Udo health center the lead was taken by *P. Vivax*: overall, can't conclude from here point of view it needs further investigation.

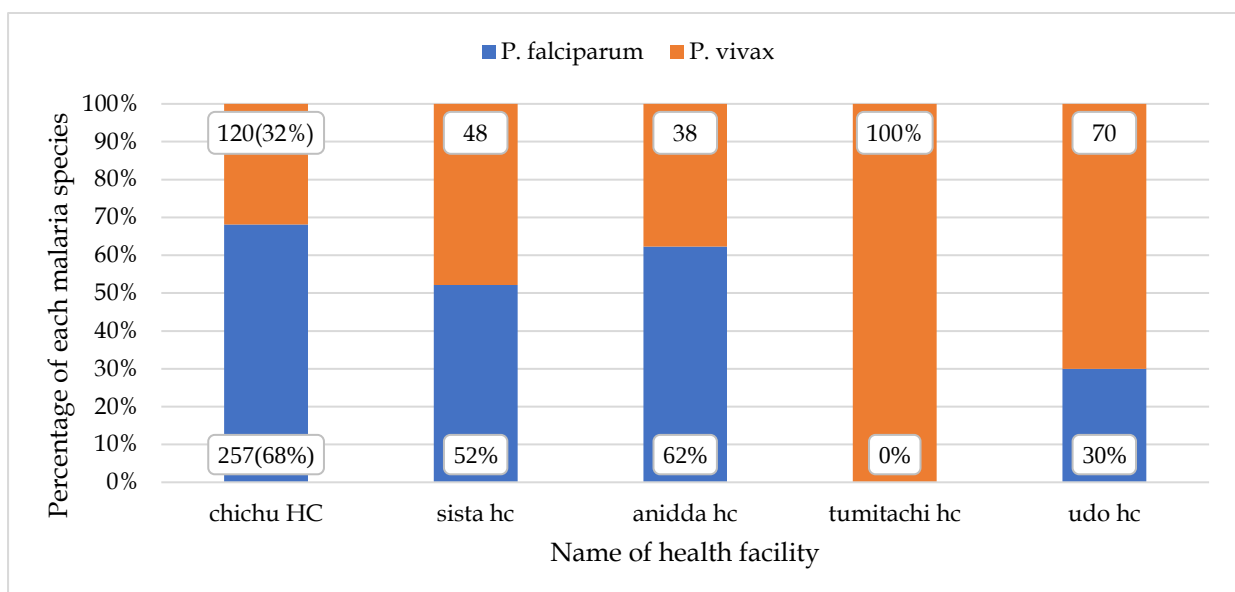


Figure 4.15: Proportion of malaria positive case by species in the health center at in Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

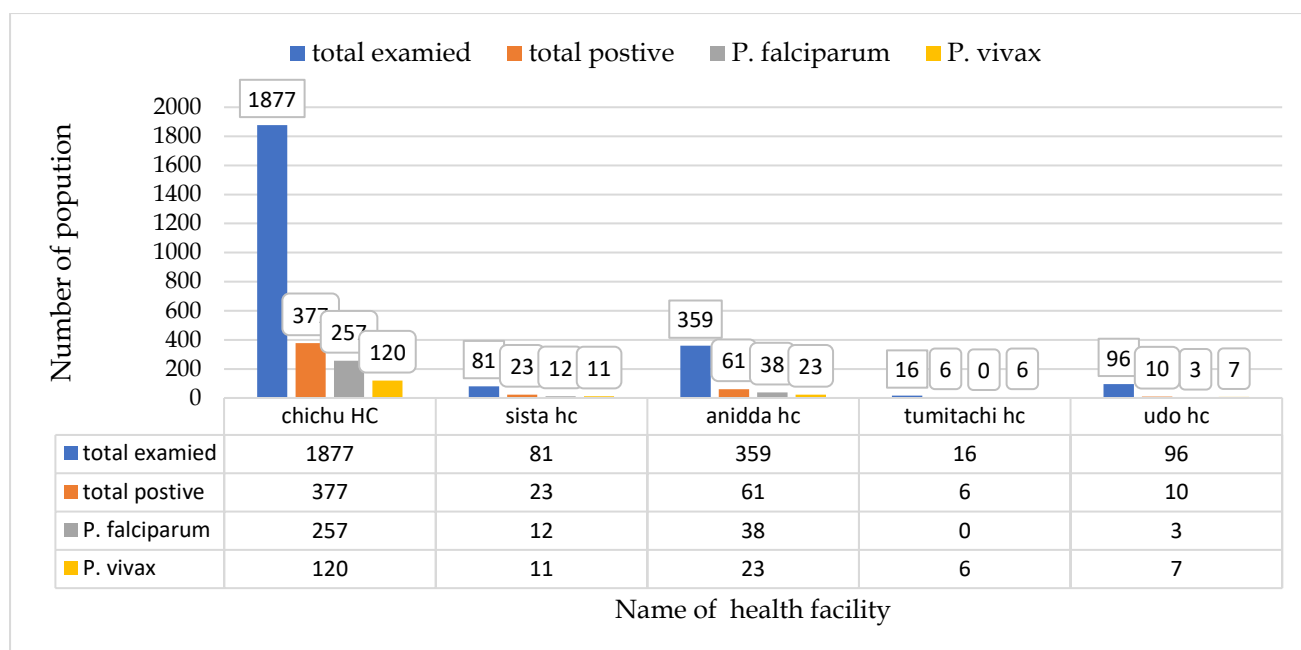


Figure 4.16: Performance of health center on malaria in the last six months in Dilla zuria district, Gedio zone, SNNP region, Ethiopia in 2017

Nutrition

In Dilla Zuria district there are 32 OTP Site from them 27 of them give service at health post level in order to close the community. There also five SC site in the district all were occurred health center level treat SAM cases with complication. In the district from (2012 -2017), 2479 case was got service in established OTP Site and majority caseload was seen 2014 and 2015 account for 65% from totally identified. Similarly, 1226 cases were treated in SC site in last five years 86% (1052) occurred in 2015 and it may explain due to Ellino effect.

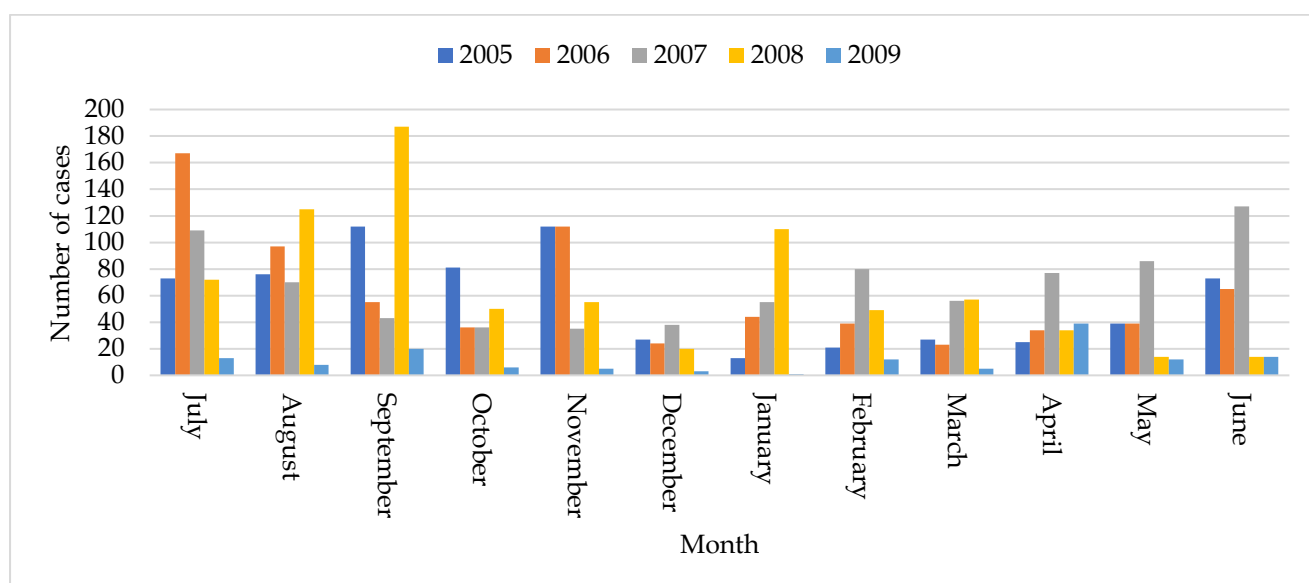


Figure 4.17: Trend of newly admitted OTP cases from (2013-2017) in Dilla zuria district, Gedio zone, SNNP region, Ethiopia

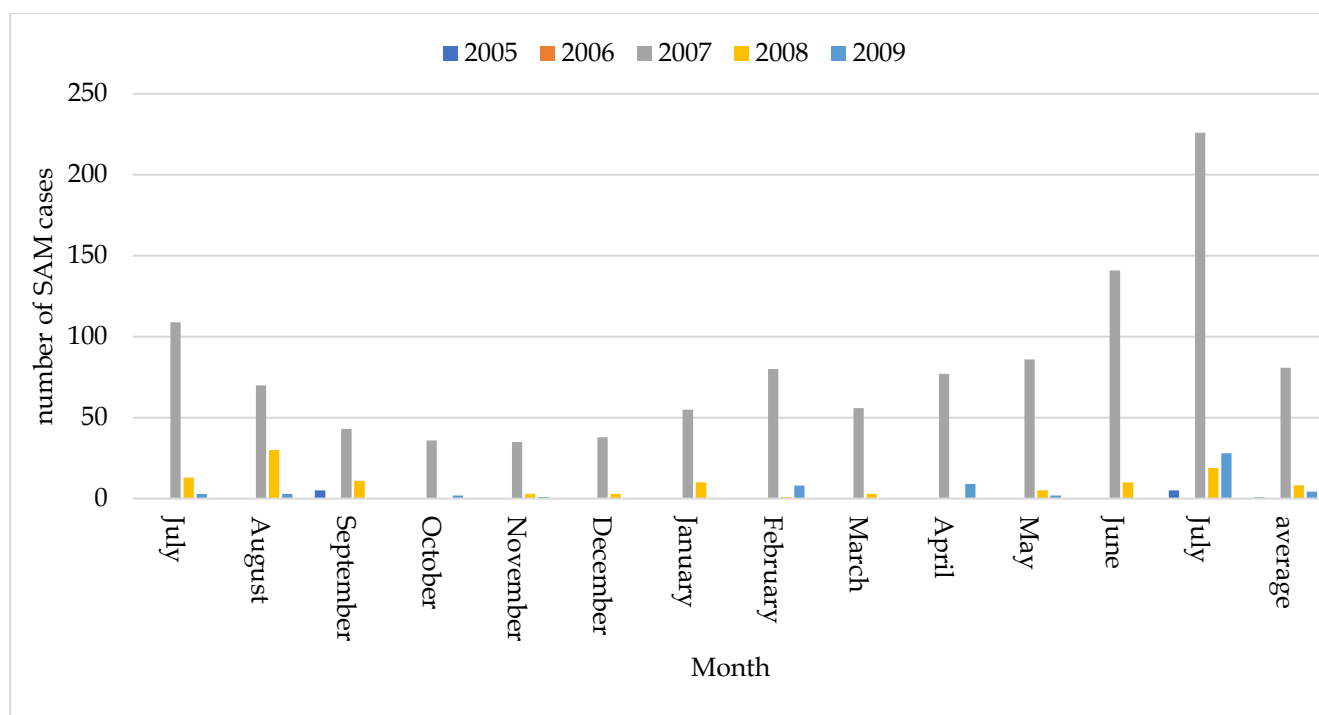


Figure 4.18: Trend of new admitted SAM case at SC in Dilla zuria district, Gedio zone, SNNP region, Ethiopia from (2013-2017)

Road traffic accident

Road traffic injuries are a major but neglected global public health problem, requiring concerted efforts for effective and sustainable prevention. Dilla zuria district also one of the districts which have a high burden of a road traffic accident. According to a road safety office report in 2010 E.C, there were seven car accidents were reported. From them one was a fatal injury, three of them was a serious injury and the rest were a minor injury with estimated property dame of 53,327 birr. One death reported due to the vehicle but the rest was aa result of two-wheel vehicle (motorcycle). The reported one death was pedestrian and the rest were drives of the motorcycle. Crash with an innate object and crash with other vehicles were contributed to the injury. The common cause accident was the failure of a driver like speeding and have no adequate skill, teenage driving and no licensee for driving. All drives have not used a helmet while driving and it increased the chance of severing accident.

Crime and violence

Violence can lead to premature death or cause non-fatal injuries. People who survive violent crime endure physical pain and suffering and may experience mental distress and reduced quality of life. Repeated exposure to crime and violence may be linked to an increase in negative health outcomes.

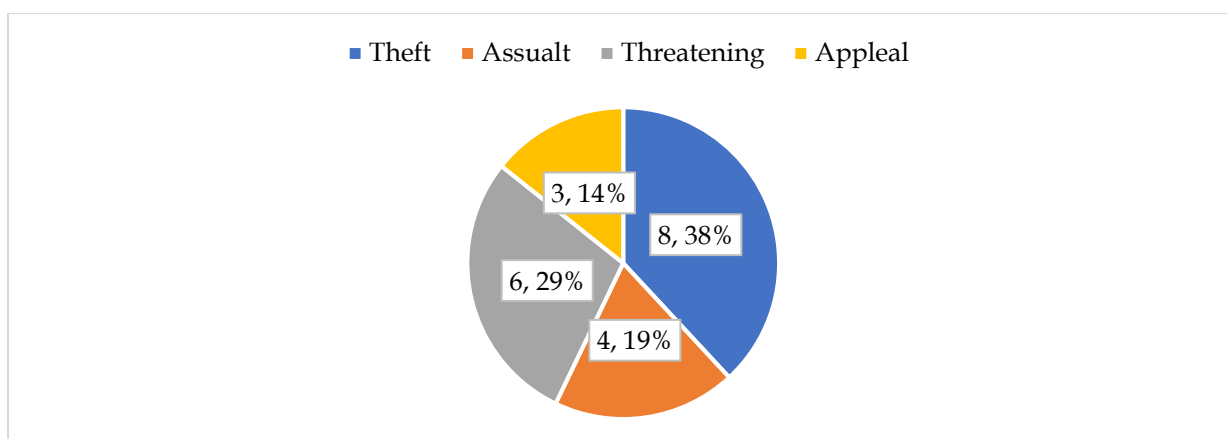


Figure 4.19: Type of crime committed in Dilla Zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

Social Inequality

Social inequality one of hinder from getting adequate health services this may be due to different disability and being orphan have an impact. People with disabilities experience inequalities – for example when they are denied equal access to health care, employment, education, or political participation because of their disability. In the district total, 697 orphans were identified with different age category and sex summarized in the table below with their respective location.

Table 4.13: Number of an orphan by kebele, sex and age group in Dilla zuria district, Gedio zone, SNNP region, Ethiopia, November 2017

Zone, SNNPR Region, Ethiopia, November 2017

S.no	Kebeles	Age group & sex								Sex		Total	Percentage
		<5		5_9		10_14		15_18					
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
1	Akesha	11	13	12	11	10	8	6	9	39	41	80	11%
2	Amba	19	5	8	6	4	3	3	3	35	17	52	7%
3	Anidida	14	15	13	12	12	10	15	12	54	49	103	15%
4	Autlcho	16	1	14	9	10	12	5	6	45	38	83	12%
5	Chichu	13	10	19	8	10	7	11	7	53	32	85	12%
6	Gola	16	13	12	11	10	12	10	8	48	44	92	13%
7	Hoxicha	10	12	7	9	4	8	4	8	25	37	62	9%
8	Sisota	8	12	7	9	3	9	6	10	26	38	64	9%
9	Shigedo	4	4	3	3	3	2	2	3	12	10	22	3%
10	Tumticha	6	9	8	10	7	6	5	3	26	28	54	8%
Total of each group		117	84	103	88	73	77	67	69	363	334	697	100%
Total		201		191		150		136		697			

Furthermore, in the district 294 disable individual were identified with their respective disability only from ten kebele of the district.

Table 4.14: Different type of disability by sex in Dilla zuria district, Gedio zone, SNNP region, Ethiopia in 2017

DISABILITY	TYPE OF DISABILITY	SEX		Total
mobility and physical impairment	upper limb disability	2	4	6
	lower limb disability	123	49	172
spinal cord disability	kyphosis	4	2	6
	spinal cord injury	2	3	5
hearing disability	hearing impairment(deaf)	8	8	16
vision disability	blind	6	4	10
	beside blind have another eye impairment	28	20	48
	speech disability	7	2	9
psychological disorder	Schizophrenia	16	6	22
Total		196	98	294

Discussion

Regarding outpatient and inpatient department this study shows that the leading cause of outpatient visit is a communicable disease, the non-communicable disease is also among the ten top causes of outpatient visited. Similar other study shows that communicable disease is the most causes of OPD visits and as a well noncommunicable disease also becomes a public health threat because of its increment from time to time. In this regard, both studies have similarity in indicating the pediatric age. Whereas, differ in all age morbidity. Typhoid fever and pneumonia where the leading cause of morbidity in all age group this study unlike to conduct by MOH lead was taken by acute upper respiratory infection and acute febrile illness. but this study finding morbidity in case of pediatric was a diarrheal disease which is non-bloody and pneumonia which make in line with a report by MOH in 2017 [3].

Regarding electricity on this study shows only 65% of the kebeles were had an electrical power supply but still the remaining kebeles were with no power supply. In line with this study, most of the rural area have no power supply. It also consistency with a current power supply of county which is 55% in 2015. furthermore, road coverage of the district was higher in both dry and all-weather roads compare to the national as well as region which was 37 % and 39 % respectively according to road authority report but in the assessed district, it was 52% road coverage [4,5].

In this study, the overall school enrolment of primary school in the district as compared to the total number of children under 14 years indicates that it is 80% whereas other studies show that it reaches to 90 %, that had a difference in the result. furthermore, school dropout also main challenging situation from total enrolled it account for 7% and there is no difference in sex student. this finding was constancy with another similar study conducted in SNNP was estimated school drop out was 9.6% in 2018. Similarly, the water coverage was 64% and the majority of the water schemes were protected spring. EDHS study also show consistency with this study the water coverage in a rural area was 57 % and most of them were used standpipe and protected spring. While dealing latrine coverage was 94 %and among it, 91.3% were used pit latrine without slab and remaining were pour flash latrine with the utilization of 45%. The previous study conducted in EDHS was contradicted with this finding [6,7].

Fully Immunization coverage in the district shows that 82% coverage and similar other studies done in EDHS-2016 shows 48.5% and 46.9% both the national and regional coverage., this may explain due to full access to a health facility, HEW continuous follow up maybe the

contribute for the discrepancy. The health service coverage in this study shows that as 100% by assuming that one health center for 15-25 thousand population and the population has access to the health facility not more than an hour walking distance. Other study shows that health service coverage is 85% that indicates some difference and the reason behind is an expansion of a health facility in the district. Furthermore, health post to population ratio was 1:5656 at the national level and it was 1:4986, at the regional level. Which was almost like this study found, the ratio was 1: 4704. Additionally; the health center population was 1:26736 and 1:26016 at regional and national level respectively. We also reveal that the ratio was 1:25404 [3,7].

Regarding health professional to population ration, it was 1:3969 for health officer, 1:3433 for the nurse. Furthermore, the ration for midwife and pharmacist was 1:6685 and 1:9970 respectively. According to MOH, health officer to population ratio at the regional level was 1: 10,911 and it was 1:10342 at national the district has lower ration according to report. Midwife to population ratio was 1:9225 and 1:12952 at national and regional level respectively. This ratio shows that the district has higher number of midwives as compare population. However, ration nurse was higher as compared to regional, which was 1:1166 and 1:1194 at the national level [3].

Only 65% of them used currently from planned to deliver with can consider as contraceptive acceptance rate. among them, 82% of them used short-acting contraceptive methods the remaining were used long acting one. Overall, injectable means of conceptive more preferred account 42% total used followed by implant account 18% of total used conceptive in the district. The acceptance and tendency to use pill and IUD were observed very low in the district. Unlike this study, modern contraceptive use at the national and regional level was 30% and 39.9% respectively according to EDHS 2016. this may explain as a result used only planned rather providing for all eligible women. Regarding the methods of conceptive like that of EDHS study. However, the report of MOH in health and indicator it was consistency with both to regional as well as the national level which 75% and 71 respectively [7].

Regarding ANC follow up ANC 1 and ANC 4 coverage was 88% and 62% among expected to deliver. additionally, PNC was also 54% from intended to deliver. Similarly, a study conducted in 2016 by EDHS shows that the performance district higher as compared to both national and regional. According to the report of MOH health and health indicator antenatal care 4th coverage, both national and regional level was higher to a study it was 76.6% and 86.9% respectively. Regarding early postal natal care, it was lower than both national performance, which was 81.6%, and regional coverage was 78.1 %. Possible may explain plan was not

targeted at all eligible women to deliver the service as well as lost follow up mother who were enrolled at the beginning of ANC service [3,7].

Regarding TB indicators, the district has following the performance on TB detection, success and cure rate of 89%, 93% and 80% consecutively. In a similar study conducted in 2017 by MOH, show that performance district was higher with as compare both national and regional within all indicator in TB detection rate but was similar in another indicator of TB performance [3].

The district also a performance on HIV control and prevention was lower as compared to intended to provide. Especially, the performance district was lower on activity VCT. They may affect by a factor like age group, place residence, and social-economic status and marital condition [8].

In this study, the vital statistics like NMR, IMR, CMR, CBR& CDR is not known, or the data is not kept well because of the gap in registration and absence of an accounted body. Still, the system is weak at the national level.

In case of malaria, the area was identified as hotspot district due to four kebeles of the district. Most cases were treated clinically whereas it expected to less than five percent. In study p. falciparum was the major cause followed by P.Vivax .the positivity rate also vary across the month of the year as well as increased when the examination rate goes up. Finding were a consistency to survey conducted in 2015 on malaria at the national level and to report of MOH in health and health indicator [3, 9].

Regarding Latrine coverage of the district were 94% this coverage higher according to MOH health and health indicator coverage in both national, which was 45.8% and regional level, was 64.7%. however, latrine utilization was 45% which was lower as compared to the coverage.

Concerning nutrition status, it was higher in both 2014 and 2015 both indicator of nutrition like SAM and OTP. A similar finding was found in an assessment conducted at the national and regional level [10].

In the study, also look at crime and violence, which has an impact on health by resulting in premature injury and mortality. The theft was a commonly committed crime in the district followed by threatening. Concerning to road traffic accident most common cause was a two-wheel vehicle (motorcycle) and almost all drivers have not used helmet this situation worse the scenario and prognosis after injury this find were an inline study conducted in a hospital set up

[11]. Social inequality issues like orphan and disability situation were assessed because they are denied equal access to health care, employment, education, or political participation.

Limitation

The limitation of this study focuses on two points. The first is data available in different sector offices within the district and the second is designated structure or office to collect data on vital statistics is not clearly known. These results of difficulty in getting and determining vital event statistics. Furthermore, any activity conducted by a health extension worker where not well registered and monitored.

Problem identification and priority setting

In the assessed district, we try to identify the following problem in order to act accordingly. It enables the district to make prioritized.

Social Infrastructure

- ✓ No preparatory school were available in the district
- ✓ 35% Kebeles of the district have no 24 hours' electricity power supply
- ✓ 34% population has not gotten access for safe water supply

General disease burden

- ✓ A communicable disease like typhoid fever and pneumonia were identified as leading cause besides diarrhea and pneumonia were the leading cause in under five children.

Vital event registration statics

- ✓ There is no registration vital event statics in the district in order to identify major health indicators.

MCH

- ✓ There is only 65% of women get access for contraceptive use from total planned to use.
- ✓ There is also a low level of ANC follow up as compared to ANC 1(first visit) which only 62%.
- ✓ Intuitional delivery was only 46% from expected to deliver and only 54% mother get postnatal service

HIV /AIDS prevention control

- ✓ Regarding HIV /AIDS prevention control activity like health education and condom distribution were performed as well as expected to be achieved. However, poor performance was seen in providing VCT service.

Hygiene and environmental health

- ✓ Latrine utilization was 45% even if there is high coverage which is 94%

Endemic disease

Malaria

- ✓ It is a leading cause of morbidity and four Kebeles of the district were identified as a hot spot
- ✓ unviability ITN were identified as majority problem in compact malaria and distributed ITN were ended their term of uses.
- ✓ Treated malaria clinically more than 5%

Health extension

- ✓ Even if there are health extension worker in the district but there no follow-up and support by district focal person assigned to follow their activity.

Essential drug supply

- ✓ There is a problem in refiling essential drug in a timely manner

Road traffic accident

- ✓ The motorcycle is the lead cause of road traffic accident in the district
- ✓ Unviability of the helmet for driver make worse the outcome of the injury

Social inequality

- ✓ Several orphans and disable were identified and needs Adequate support.

Table 4.55: **Priority setting for planning in Dilla Zuria district, SNNP Region, in 2017**

Identified problem during assessment	Magnitude (5)	Severity (5)	Feasibility (5)	Community concern (5)	Government concern (5)	Total (25)	RANK
No preparatory school	5	3	2	3	3	16	7 th
Kebeles without electrical supply	5	5	3	5	4	22	1 st
Kebeles without safe water supply	5	3	3	3	4	18	5 th
The leading cause of health problem was a communicable disease	5	3	3	4	4	19	4 th
No vital event registration	5	5	3	2	5	20	3 rd
Low contraceptive and family planning	3	4	4	3	5	19	4 th
Low ANC follow up	3	5	4	3	5	20	4 th
Lower intuitional delivery	5	5	4	3	5	22	1 st
Low postnatal service	5	5	3	3	5	21	2 nd
Lower performance of health education	3	5	4	4	4	20	3 rd
Lower performance in distribution of condom	4	4	4	4	4	20	3 rd
Lower latrine utilization	5	4	5	3	4	21	2 nd
End up of term of use ITN distributed	5	5	5	3	4	22	1 st
Loss of follow up of health extension worker	4	4	3	3	3	17	6 th
Delay in refilling essential drug	4	4	4	5	5	22	1 st
Unviability of drug administration guideline	4	4	3	4	3	18	5 th
Not used helmet by motor bicycle driver	4	5	4	4	4	21	2 nd
Lack of attention for social inequality	3	5	4	4	5	21	2 nd

Conclusion

The communicable disease was identified as a leading cause of morbidity in both adult and pediatric age group. Contraceptive acceptance was good and performance in ANC 4 follow up was lower as compared to ANC 1. Full immunization activity was performed well but there is a problem in availing tetanus toxoid vaccination for eligible women. Malaria also identified as a major public health threat in the district. Nutritional support was given through SAM and OTP service. Besides this, social inequality like an orphan and disabled people need support and enhanced them to equal health service and others.

Recommendation

- ✓ Vital event or statistics registration needs attention in order to plan activities to be done effectively and efficiently.
- ✓ Activities like HIV prevention and control as well as family planning use the was a lower performance to as compare to the target to be achieved, but had a great effect on the community in different aspects, so that it needs attention to tackle the consequence beyond
- ✓ More 5 % malaria case was treated clinically it needs to improve. since there is an available confirmatory mechanism like RDT as well as microscopy confirmation at the health center and above.
- ✓ Give emphasis on tetanus toxoid vaccination in availing for eligible women settled standard.
- ✓ Increased number of nurse and pharmacist in a health facility. It was lower below the national and regional stated proportion in recent year.
- ✓ Improve latrine utilization even if there is high coverage since it has a positive impact by reducing disease transmitted due to hygiene and sanitation problem.
- ✓ Strict follow-up and continued support are needed towards health extension worker.
- ✓ Improve water coverage and avail access to Kebeles which has no current safe water supply and needs repairing not functional water schemes which do not give service to the community.
- ✓ Helmet vacation is needed for the driver of the two-wheel vehicle (motorcycle) due to the positive potential effect by reducing morbidity and mortality as a result of road traffic injury.
- ✓ Give adequate support and attention to social inequality like an orphan and disable individuals due to denial of equal access to health care, employment, education, or political participation.
- ✓ The details of the action plan are presented on the annex part of this document

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CHAPTER FIVE- Scientific Manuscript

5.1 A five-year retrospective study on Magnitude and Causes of Maternal Death in Ethiopia, 2019

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Background: Maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. Ethiopia is one of the countries with the highest maternal mortality ratio per year with an estimated ratio of 412 per 100000 live birth. The study was conducted with the aim of estimating the magnitude and potential factors associated with maternal death in Ethiopia.

Methods: A retrospective data analysis was conducted on maternal death surveillance reports collected from October 2013 to December 2017 from all region using Epi-Info version 7.2 after obtaining ethical approvals from Ethiopian Public Health Institute.

Result: A total of 2714 maternal death was reported: 782(28.8%) were at age of 25 to 29, 1570(60%) illiterate and 438(80%) resided in a rural area. Most maternal deaths were occurred in hospital setup 1686(62%) and 1726 (64%) maternal death occurred after delivery. The leading cause of maternal death was hemorrhage 1225(45.1%), Anemia 451(16.3 %) and 412 (15.1%) were due to hypertension disorder pregnancy. The summary of the findings has shown that the overall maternal mortality ratio was 22.2 per 100,000 live birth with the maximum at Dire Dawa 333.8 deaths and the minimum was at SNNP 15.4 deaths per 100,000 live births

Conclusion: The current maternal death surveillance can't estimate the true magnitude of maternal deaths. The top three common causes of maternal deaths (haemorrhage, anemia, and pregnancy-induced hypertension) were identified. The engagement of higher official to promote the importance of MDSR system to improve the commitment towards the system is needed. More focus should be given for a major cause of maternal death to improve the outcome.

Keyword: maternal death, Ethiopia, surveillance, magnitude

Word count = 292

Introduction

Maternal mortality ratio is considered as a primary and important indicator of the country over the health status as well as the quality of life. Globally, the maternal mortality ratio is decreased from time to time. For instance, maternal mortality during 1990 was 532000(496000-590000) to an estimate of 303000(291000-34900) in 2015. Developing regions account for approximately 99% (302 000) of the global maternal deaths in 2015, with sub-Saharan Africa alone accounting for roughly 66% (201 000), followed by Southern Asia (66 000) At the country level, Nigeria and India contribute one-third of all maternal death in 2015, an approximate 58000 maternal deaths (19%) and 45000 maternal deaths (15%) respectively [1].

Ethiopia is one of the countries with high maternal mortality per year. Even if, there is progress to decrease maternal rate, still; it is remaining high. For previous EDHS report, it shows it was higher 600 deaths per live birth. For instance, previous 2000 it was 873(703-1039), in 2005 it was 673(548-799), in 2011 it was higher than 2005 676(541-810) and very recently it was estimated 412 (273-551) in 2016 per live birth [2].

Reported maternal mortality underestimates the true magnitude by up to 30% worldwide and by 70% in some countries [3]. Inadequate measurement contributes to a lack of accountability and in turn to a lack of progress by investigating a woman's death, MDSR inherently places value on her life which creates an important form of accountability for families and communities. Ethiopia also has no vital registration system it is difficult to ascertain the magnitude of maternal mortality in the community. In addition, estimations conducted by different organizations regarding magnitude and causes of maternal death significantly varies among each other and the recently implemented MDSR system is believed to have a great role in estimating the magnitude and causes of maternal death in Ethiopia [4]. However, there is no study conducted MDSR system regarding the estimation of the magnitude and causes of maternal death in Ethiopia. Therefore, this study will assess the burden and distribution of maternal death, related contributing factors and causes identified

Methods

Study area

According to the latest United Nations estimates the current population of Ethiopian is esteemed 106387602 with annual growth of 3.4% and contributes 1.39% of the total world population. Among them, 24,894,699 (23.4%) are female at reproductive age with estimated annual growth of 3.4% per year.

Study design and period

A cross-sectional study was conducted by using retrospective data analysis of MDSR reports collected the start of the implementation of the system (October 2013) to December 2017 defined period. The study was conducted from 3/02/2018-12/02/2018

Population under surveillance

All women at the reproduction age group

Data type and source

Secondary data was used from the Ethiopian public health institute (EPHI) specifically from PHEM unit.

Data analysis and presentation

Data were analysed using Epi –info version 7.2.

Ethical Clarence

A formal letter was submitted to the data manager at EPHI in order to access the data and for sake of confidentiality personal identifiers were not used in the study. As this study used secondary data consent and other ethical measures were not applicable.

Result

A total of 2714 deaths were reported in the period between Oct 2013 to Dec 2017 using case-based reporting format

Social demography

Most the death report in last five was as described in the table below most of the deaths 782(28.8 %) occurred in the age group between 25 to 29, 2516(96 %) of mothers were married and 1590(59%) of mothers were illiterate. Moreover; most mothers 438(70 %) dwelled rural part of the county. The mean age at death was 29 ± 6 year with a range of 14 up to 49 age.

Table 5.1: socio-demographic status of mothers who were died in the period between Oct 2013 to Dec 2017 in Ethiopia

characteristics	Category	Frequency	percentage
Age group (Year)	10_14	3	0.10%
	15-29	154	5.70%
	20-24	462	17.0%
	25-29	782	28.8%
	30-34	595	21.9%
	35-39	490	18.1%
	40-44	110	4.1%
	45-49	22	0.8%
Marital status	Single	55	2.1%
	Married	2516	96.1%
	Widowed	4	0.2%
	Divorced	30	1.2%
Level education	Illiterate	1590	59%
	read and write only	251	9%
	Elementary	276	10%
	High school	139	5%
	College and above	89	3%
	I don't know	330	12%
Place of residence	Rural	438	70%
	Urban	184	30%

Place of death

Amhara and Oromia regions were contributed 1554(57 %) all reported maternal together using cased formant. Lowest maternal death reported from Gambella (1%), Harari, afar and Benishangul Gumuz were contributed 2% each. In Contrary; Ethio –Somalia region has no any contribution still 2017 using MDRF. The overall estimated maternal death was 22.2 maternal death per 100,000 live birth.

Table 5.2: Distribution of maternal death by reporting Region in the period between Oct 2013 to Dec 2017 in Ethiopia

Place of residence	Report (%)	reported MMR (100,000 live birth)
Addis Ababa	129 (5)	42.3
Afar	59 (2)	29.4
Amhara	761(28)	27.4
Benishangul Gumuz	49 (2)	35.2
Dire Dawa	141(5)	338.8
Gambella	24 (1)	47.7
Harari	53 (2)	183.1
Oromia	793 (29)	16.7
SNNP	394 (15)	15.4
Somali	0 (0)	0
Tigray	311(11)	44.3
total	2714	22.2

Considerable number of maternal death occurred in hospital setup 1686 (62%) followed by home 433(16%) and during a referral to the next level which was 354(16%) of the total reported.

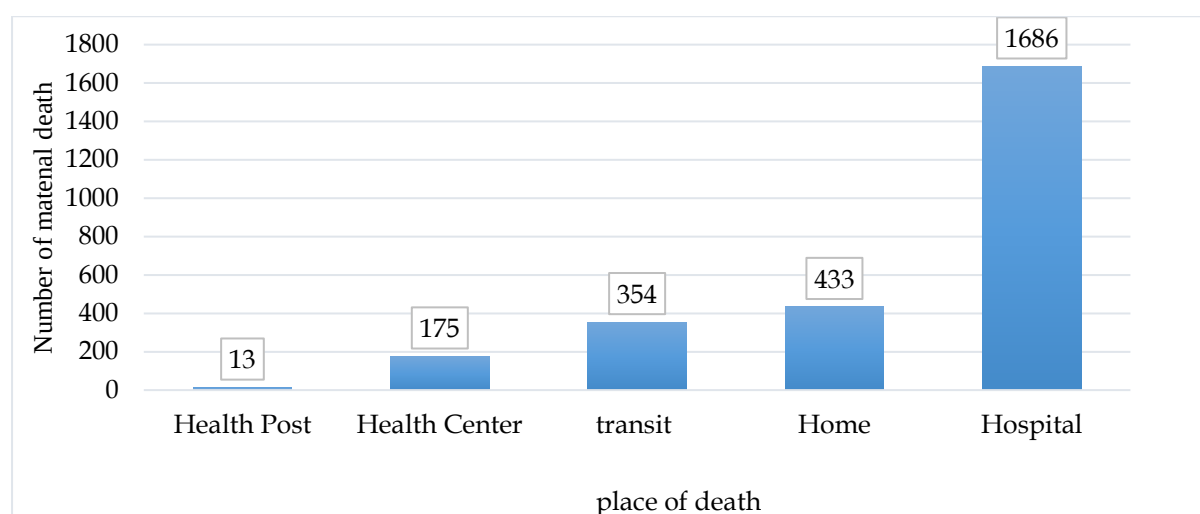


Figure 5.1: Frequency distribution of maternal death by place of death from Oct 2013 to Dec 2017, Ethiopia

Maternal death by a person

From reported maternal death 1014 (37.4%) were had gravidity between two and four with parity of zero up to one were 982(36%) besides 42% mother had no antenatal follow up.

Table 5.3: Personal characteristics from reported maternal death Oct 2013 to Dec 2017, Ethiopia

Personal character	Classification	Number	Percentage
Gravidity	0_1	772	28%
	2_4	1014	37.4%
	5 and above	928	34.2%
parity	0_1	982	36%
	2_4	970	36%
	5 and above	762	28%
Antenatal care	yes	1475	58%
	no	1085	42%

Maternal death by the time

Regarding the time of death, most deaths occurred during post-partum (after delivery) which account for 1,724(64%) among them 1,064(63%) occurred with the first day after delivery. The detail is illustrated in the figure below.

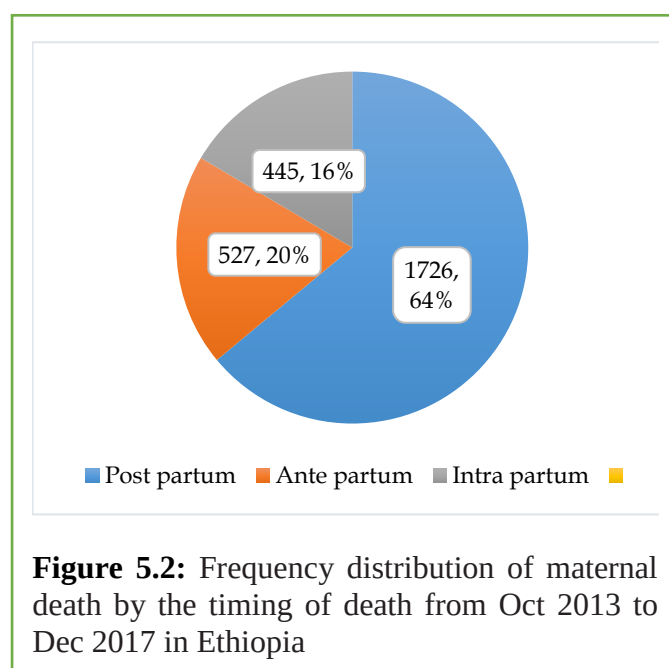


Figure 5.2: Frequency distribution of maternal death by the timing of death from Oct 2013 to Dec 2017 in Ethiopia

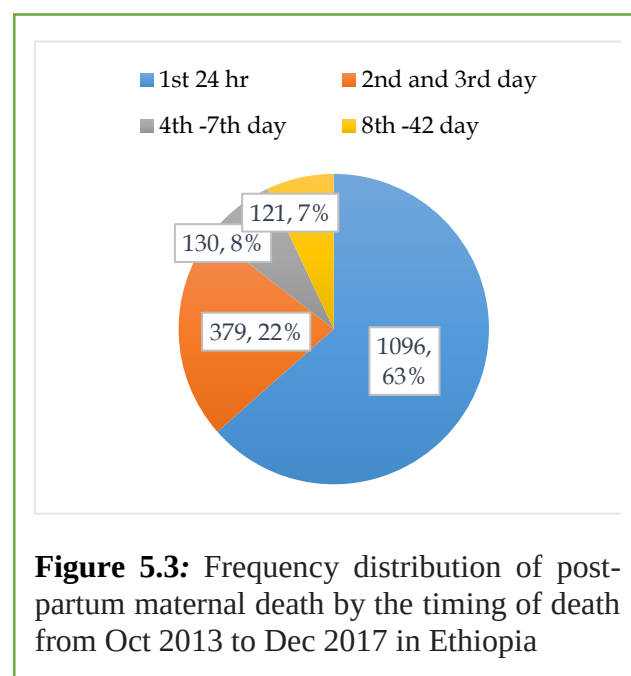


Figure 5.3: Frequency distribution of post-partum maternal death by the timing of death from Oct 2013 to Dec 2017 in Ethiopia

Cause of Maternal Death

From the total maternal death, 1,981(73%) were occurred due to a direct cause. Besides as described in the table below near half of the maternal deaths that are categorized as direct obstetric causes are identified to be caused by hemorrhages.

Table 5.4: Frequency Distribution Cause of maternal death Oct 2013 to Dec 2017 in Ethiopia

Cause of death	Frequency	Percentage	Cumulative percentage
Direct cause maternal death			
Haemorrhage	1225	45.1%	45.1%
Obstructed labour	194	7.1%	52.3%
Hypertensive disorder pregnancy	411	15.1%	67.4%
Abortion	58	2.1%	69.6%
Sepsis	251	9.2%	78.8%
Total	2139		
Indirect cause of maternal death			
Anaemia	442	16.3%	95.1%
Cardiopulmonary complication	44	1.6%	96.7%
Malaria	47	1.7%	98.5%
HIV	31	1.1%	99.6%
TB	11	0.4%	100.0%
Total	575		

Discussion

Different kinds of literature show that the age of a pregnant woman affects her chances of dying from the maternal cause. Based on this study most of the deaths (49%) happened on the upper age groups 25up to34 with an overall mean age of 28.6 years (+/- 6years). In each age group, the number reported maternal death increased from year to year expected in the age group 10-14 years. Age is one of the biological factors that have an influence on the occurrence of maternal death. This is due to a range of biological and social factors. For instance, young women may be at increased risk of obstructed labor, if their pelvis is not mature. Older women may have accumulated health problems like hypertension and diabetes which cause obstetric problems. Beside to This the rate of relatively low in highest age group even though the risk high due to medical complication because of few births occurred at those ages similar also for the lower age group. This finding is supported by a study done in 38 counties which assess maternal morality pattern according to age and assessment of risk factor maternal mortality conducted in Tanzania [5,6,7,8].

Most of the deaths reported in the study periods were in mothers with lower literacy level, with and those who reside in the rural part of the country. This is also observed in a maternal death surveillance data analysis conducted in the southern part of Ethiopia, Morocco and China reveal that their higher maternal deaths were seen in the rural area [9,10,11,12]. A relatively higher number of deaths at rural setup can be explained by the combined effect of literacy status, lack of information and the physical difficulty of accessing health facilities as well as inequality health service. Literacy status or Education is a distant factor which offers the possibility of affecting the magnitude of maternal mortality in a number of different ways. One is the well-known effect of education on lowering fertility. If women get pregnant less and bear fewer children, they are less at risk of maternal death. Women's social status, self-image, and decision-making powers may all be increased through education, which may be key in reducing their risk of maternal death, resulting from early marriage and pregnancy or lack of information about health services [13,14].

From the total of 11 regions and city administration in the country, 10 of them reported maternal death through the MDSR system. More than half of the maternal deaths (58%) were reported from Amhara and Oromia region and followed by SNNP and Tigray reported (15%) of each region. The high number of maternal death report from both regions can be due to a relatively high number of livebirths is expected as compared to other region. In contrast, to

above Ethio-Somalia region weren't used the above system for the last five years. Furthermore, there is a big disparity of maternal mortality may show as much of the maternal deaths are not reported under the MDSR system and the huge variation among regions since the recent estimation of WHO and EDHS was 353 and 412 maternal deaths for 100000 live birth respectively. This may indicate a difference in the strength of the system and the focus given to maternal death surveillance.

Overall greater number of death were occurred in hospital setup 1686 (62%) followed by home 433(16%) and during referral to next level which was 354(16%) similarly same study conducted in Morocco and Algeria show that comparative 76 % and 93% of death were reported from public hospital respectively ,12% were also reported during transit and 17 %were at home in Morocco [5,15]. This may explain due to the fact most severe and complicated referred to hospital for further management and treatment and unavailability of basic obstetric care during referral while they are in ambulance also mentioned.

Significant number of maternal death was seen after delivery(post-partum) which is 63% and the death was before delivery (antepartum) and during delivery (intrapartum) account 20% all and 16% respectively. Among mothers who were died during post-partum 63% death occurred in the first 24 hrs followed by 22% which were died within two up to three days later after delivery. The comparative similar finding was reported in meta-analysis study conductive between the USA and developing nation in 1996 as well as in the study conducted by WHO in 2006 and study conducted in Ethiopia in Meza tepi hospital in 2018 show almost all similar finding with this study [15,16,17]. This may explain due to poor management of active third stage labor.

Regional estimates show that hemorrhage and hypertension are among the top three causes of deaths in both South Asia and Sub-Saharan Africa, where most maternal deaths occur. In this study, it is shown that 73 % of the deaths caused by direct obstetric cause and from which nearly half of the death is caused by hemorrhage and 24 % of the deaths are caused by sepsis and hypertensive disease of pregnancy. It is also possible to see that hemorrhage is a single major factor which accounts for 45.1% of the total death. This finding is also supported by the MDSR data analysis conducted in Morocco which shows that Haemorrhage is the first direct obstetric cause (33% of all deaths). The second leading cause was pre-eclampsia/eclampsia (18%) followed by infections (8%). In Ethiopia, the cause of maternal death studied in different setup and time by different scholars. All study concluded that most deaths occurred as a result of the direct obstetric cause even if leading cause different in a different study. In a study

conducted in 2013 revealed that abortion and infection have declined meaningfully in the last decade. obstructed labour is still the leading cause of maternal death. Death due to hypertension disorder and hemorrhage increased trend in recent year.in contrast to this study piloted in a hospital set up post-abortion sepsis, PPH and rupture uterus principal cause of maternal death under the direct cause of maternal death whereas, malaria and hepatitis leading cause in early 1980 but shift to TB and pneumonia after 1990 foremost cause of maternal death under indirect cause [8,18]. As a conclusion, almost half of the maternal death was reported from mothers with the upper middle age group. A significant number of maternal deaths is reported from mothers residing in rural parts of the country and with illiterate educational status. Most of the maternal deaths are reported in the post-partum period due to hemorrhage (bleeding) and most of the mothers died during their first pregnancy and after they became grand para. The current surveillance system can't capture estimated maternal death. The study has limitation in generality since not all the region wasn't reported and engaged well in the surveillance system. As a recommendation, much focus should be given to the top three common causes of maternal deaths (bleeding, anemia and hypertensive disease of pregnancy) to improve maternal outcomes.

Acknowledgment

We would like to acknowledge Ethiopian Public Health Institute (EPHI) for the permission to access the data.

Conflict of Interest

We declare that there is no conflict of interest in this research.

Contribution of Authors: Neamin. T: raised the research idea, wrote the first proposal, as well as manuscript draft. Ayele B , Wondmu A. and Negga .A reviewed and finalized them. Abdulafiz H. Supported the statistical analysis.

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5.2 Outbreak investigation of *Paederus dermatitis* in three districts of Ethiopian metropolitan city, case-control study August 2018

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Abstract

Background: *Paederus dermatitis* is irritant contact dermatitis caused by an insect of *genus Paederus* due to crushed on the skin by realizing vesicant toxin called pederin. In Ethiopia, *paederus dermatitis* has not been reported previously in Addis Ababa: On July 28, 2018, district health office has received a report of cases with erythema, itching, burning sensation after contact with the insect. The investigation was conducted with the aim of confirming and identify the factor associated with the outbreak.

Methods: Case finding was done using data from Bole sub-city health offices and the case-control study was conducted from August 10-22, 2018 in district 10,11 &15 of Bole sub-city, Addis Ababa. Cases were defined as District 10,11&15 residents of bole sub city and who has contact with the insect after confirmation of the insect was responsible for the outbreak. Controls were selected from the community persons without any signs and symptoms who were the neighbor of cases, unmatched with a ratio of 1:2. Demographic and clinical data was abstracted from questioners and analyzed in SPSS version 23. Bivariate and multivariate was done by using $p < 0.05$ to be significant.

Results: A total of 122 case-patients; 87(71%) were female and 35(29%) were 15-44 age. The interview was taken from 75 cases and 150 controls. Cases were more likely to have contact with insect in presence of outdoor light (AOR=12.9, 95% CI 4.22-39.5, $P = 0.003$) and in presence excess vegetation in accommodation area (AOR 10.4 95% CI (2.8- 38.7) $p=0.001$). Usage of soap after contact reduces risk of dermatitis (AOR=0.04,95% CI 0.01-0.13, $p=0.002$).

Conclusion: Presence of outdoor light, excess vegetation in accommodation area and usage of soap after contact with insect were associated with the outbreak. Reducing burning outdoor light, clean excess vegetation and use soap after contact with beetle can be recommended as the preventive measure.

Introduction

Dermatitis linearis refers to an acute skin condition caused by exposure to the potent toxin pederin, found in certain species of the subfamily Paederina in the staphylinidae family of beetles in the class of Insecta. Paederus beetles are relatively slender and can be uniquely identified by their size (1.5 mm wide and 7–10 mm in length) and colouring (black head with red, russet or orange thorax). The typical red or orange colouring is aposematic, warning predators that the beetle is toxic. The Paederus genus has approximately 622 species, 30 of which have been shown to cause lineal dermatitis or to contain the pederin toxic agent [1].

Pederin ($C_{25}H_{45}O_9N$) is amide with two tetrahydropyran rings the toxin constitutes only 1% of the total insect body weight, pederin is incredibly potent even in small concentrations, with the ability to totally inhibit cell growth at concentrations as low as 1.5 Nano grams per millimetres. recently, the production of pederin is depended on the actives of an endosymbiont with Pederin [1,2].

Paederus dermatitis is an acute irritant contact dermatitis caused by pederin, a hemolymph fluid released when Paederus beetles are crushed against the skin. The dermatitis is characterized by erythematous-bullous lesions of sudden onset in exposed areas of the body. the neck was the most common site involved followed by the face. A periorbital predilection was present in 75 percent of the facial lesions. The vesicles dry out over about 8 days, exfoliate to leave smooth, linear hyperpigmentation with wrinkling of the affected skin areas that can persist for a month or more; In severe cases, erythema, blisters, and pigmented scars usually are more extensive due to crushing several Paederus on the skin. In one outbreak attributed to the species *P. columbinus*, headache, fever, arthralgia, neuralgia, and nausea were also reported. Additionally, Epiphora, or excessive watering of the eye, and conjunctivitis have been reported in cases where the eye itself has been exposed to pederin. There is also a possible secondary infection with residual pigmentation [1,3,4].

Since then Outbreaks of PD have been reported in several countries including Africa, South America, Turkey, Iran, and Asia. A major outbreak involving 2,000 cases of vesicular dermatitis was reported in Okinawa in 1966 [5]. However, an Ethiopian, there is no reported and documented outbreak as well as epidemiological data that shown as the prevalence and which used as a reference.

Seasonal influence and human activity are identified as risk factor expose for dermatitis. The investigation was conducted with the aim of confirming and identify factor associated with the outbreak in three districts of bole sub city Ethiopia.

Methods and material

Study Area and Period

The Investigation is conducted in Addis Ababa city administration, in Bole sub-city, three districts of the sub-city. Based on the information from the local authority; the sub-city has 328,900 populations from which 154,542 were male and 174,358 were female with a population density of 122.85 sq. km. The study was conducted from 10/07/2018-22/07/2018.

Study Design

A descriptive analysis of the collected line list of cases was applied followed by unmatched case-control study with a case to control ratio of 1:2, in order to identify the possible risk factors of the outbreak.

Source population

The source population this study resident of Bole sub-city who resides in district 10,11and 15.

Target population

The population who resides in three districts of the sub-city

Sampling Method

Selected 75 cases were included which were cases recently history of the illness and those who were active during the investigation and using a 1:2 case to control ratio 150 were selected controls randomly from the same village where cases are identified.

Sample size determination

The sample size was determined using EPI-info version 7 by means of *STATACALC*. The following assumption was used: two side confidence level of 95% with a power of 80%. The percent of control exposed was 30% and percent case with exposure was 49.1 % with minimum expected odd ratio was 2.25 obtain from Malaysia study [18].

Sampling procedure

Since the study was community-based case and control were selected using neighbour methods. Control was selected who was the neighbouring case reside in the left and right of the case.

Data collection procedure (Case definition and selection of cases and controls)

Working case definition

Any person with itching, burning sensation, blister or any other lesion who have contact with beetle and resides in three districts of bole sub-city (10,11&15) during the study period

Cases- Are individuals, which fulfils the above criteria and all reported cases were included in the study

Controls- Are individuals, who don't fulfil the above criteria and selected from the similar village where cases were identified

Data processing and analysis

Different data analysis software was used in the analysis process from Microsoft Excel version 2016 to SPSS version 23.

Data Quality Assurance

Before the start of data collection, a brief orientation was given for data collectors. Each completed questionnaire was daily reviewed by the principal investigators to monitor the data quality. Before analysis, data were also cleaned for any missing and logically inconsistent values.

Ethical consideration

Before the filed investigation, a formal letter was written by Ethiopian Public Health Institute (EPHI) to Bole sub-city health officials to get permission and facilitate the investigation process. During data collection, oral informed consent was taken from all respondent cases as well as controls. Furthermore, any information related to personal identification was not used on the report.

Result

Overall description of the outbreak

The outbreak was started to report from 08/06/2018: however, the notification to the concerned body very late. It was affected three districts of the sub-city within the month of June and July 2018. A total of 122 cases were reported as sub-city with no death.

Description by person

Regarding the personal element of the outbreak 87(71%) were female and 63(77%) were at the age group of 15-44.

Distribution by place

Three districts of the sub-city were affected by the outbreak 60(49%) cases were reported from district 10 followed by district 11 by reporting 45 (37%) of total cases. The total attack rate was 2.3 per thousand populations the highest attack rate was in district 15(4.9/1000) and the lowest was seen in district 10(1.5/1000).

Distribution by time

Starting from 8/06/2018 122 cases were reported in the sub-city and 74(61%) cases reported during June.

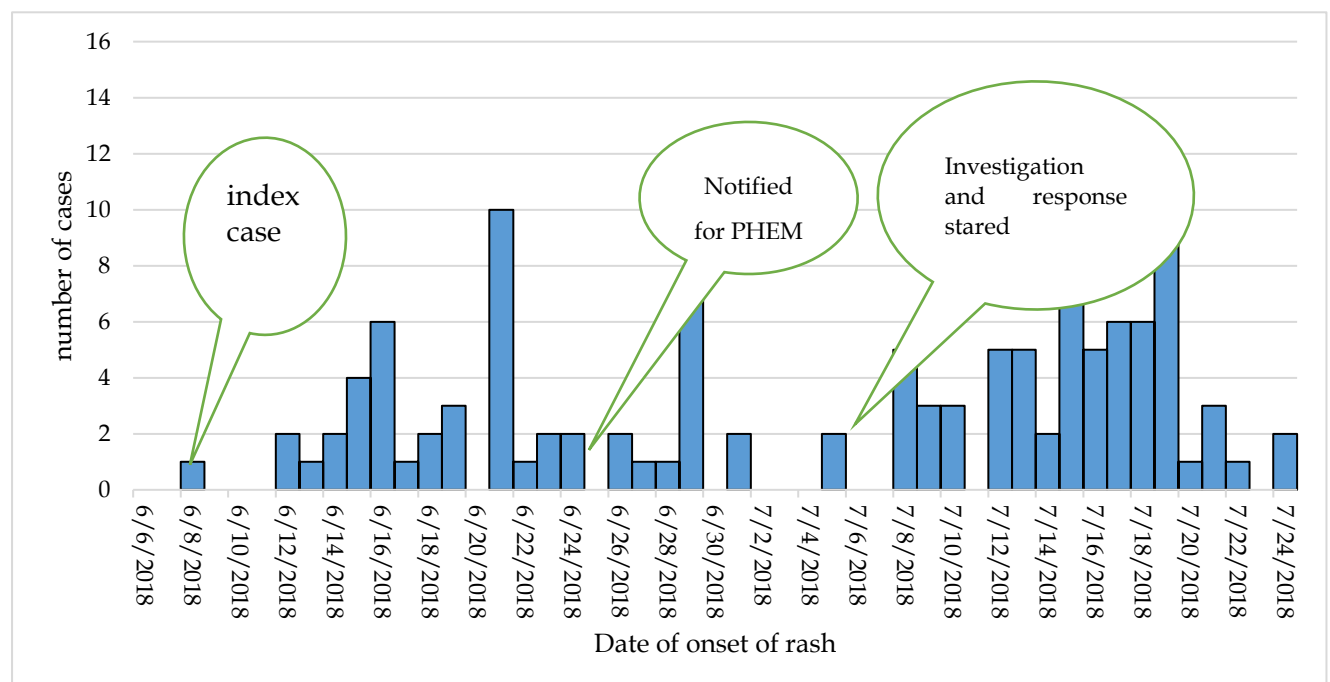


Figure 5.4: Epi-curve of Paederus dermatitis in bole sub city, Addis Ababa, Ethiopia 2018

Description of an outbreak investigation

Socio-demographical characteristics

Seventy-five cases and one hundred fifty controls were taken for further investigation of the outbreak. From total cases 55(77.3%) were female, 24(32%) were have Oromo ethnicity, with 45(60%) orthodox religion follower. The mean age of cases was (22.9±16.9) with a minimum of 6 months and with a maximum of 70 years. The detail presented in the table below.

Table 5.5: Socio-demographic characteristics of case and control in bole sub city, Addis Ababa, Ethiopia 2018

Social demographic characterizes	Case (%)	Control (%)
Sex		
Male	20(26.7)	34(22.7)
Female	55(73.3)	116(77.3)
Ethnicity		
Oromo	24(32)	40(26.7)
Amhara	15(20)	30(20)
Tigraway	21(28)	42(28)
Gurage	12(16)	16(10.6)
Others	3(4)	22(14.7)
Religion		
Orthodox	45(60)	83(55.3)
Muslim	15(20)	28(18.7)
Protestant	12(16)	37(24.7)
Catholic	3(4)	2(1.3)
Educational status		
Illiterate	6(8)	0(0)
Read and write	4(5.3)	1(0.7)
Primary	36(48)	44(27.3)
Secondary	18(24)	61(44)
Above secondary	11(14.7)	42(28)
Marital status		
Single	34(45.3)	59(39.3)
Married	34(45.3)	80(53.3)
Divorced	4(5.3)	7(4.7)
Window	3(4)	4(2.7)
Place of residence		
District (10)	28(37.3)	48(32)
District (11)	11(14.7)	26(17.3)
District (15)	36(48.6)	76(50.7)
Place of resident floor		
Ground floor	6(8)	15(10)

First floor	18(24)	35(23.3)
Second floor	7(9.3)	17(11.3)
Third floor	16(21.3)	47(31.3)
Fourth floor	28(37.3)	36(24)

Characteristics of the illness

The characteristics of the illness will explain in term of the incubation period, site of the lesion, type of lesion, number of lesions with the extent of complication will be illustrated in the table below.

Table 5.6: Frequency distribution of the illness Characteristics of among case in bole sub city, Addis Ababa, Ethiopia, August 2018

Characteristics of the illness	Count(N=75)	Percent (%)
Incubation period		
One day	10	13.3
Two day	59	78.9
Three day	6	8
Number of lesions		
One lesion	60	80
Two lesions	12	16
Three lesions	3	4
Sign and symptom		
Itching	74	98.7
Pain	72	96
Fever	6	8
Vomiting	0	0
Burning sensation	70	93.5
Site of lesion		
Face	52	69.3
Back	11	14.3
Back of neck	7	9.3
Shoulder	4	5.3
Lower Limb	5	6.7
Upper limb	7	9.3
Lesion feature		
Erythema	75	100
Linear lesion	46	61.3
Vesicles	32	42.3
Pustules	14	18.7
Erosion	38	50.7
Kissing lesion	7	9.3
Treatment took		
Tropical steroid	30	40
Anti-bacterial	23	30.7

Antihistamine	11	14.7
NSAID	6	8
Tropical anaesthesia	0	0
Local treatment	20	20.7
Complication		
conjunctivitis	7	9.3
Temporal blindness	6	8
Residual pigmentation	24	32.0
Secondary infection	11	14.6

Risk factor

On bivariate analysis risk factor variables such as open window during night (COR 12.45 95% CI (6.43-24.20), $P=0.003$), rotten leave (COR 7.10 95% CI (3.60 -13.86), $p=0.002$) and presence of outdoor light COR 6.00 95% CI (3.26 – 11.04), $p=0.0013$) and other twelve factors have significantly associated factor with the illness.

However, six study variables were found independently significant in multivariate analysis from the variable which was significantly associated with the bivariate analysis. Presence of outdoor light has the risk of (AOR 12.9 95% CI (4.22-39.5), $p=0.003$) and presence rotten leave in the surrounding area has the risk of (AOR 20.4 95% CI (2.8-28.7), $p=0.001$). regarding protective risk factor use soap after contact has (AOR 0.04 95% CI (0.01-0.13), $p=0.002$). The detail is illustrated table below.

Table 5.7: Multivariable analysis of risk factors for paederus dermatitis outbreak in the district (10,11 and 15), Bole sub-city, Addis Ababa, Ethiopia August -2018

	Yes/No	Case (%)	Controls (%)	COR (95%CI)	AOR (95% CI)	p-value
Presence of outdoor light	Yes	53	42	6.00(3.26-11.04)	12.9 (4.22-39.5)	0.003
	No	22	107	*1*	*1*	
Presence of rotten leave	Yes	61	57	7.10(3.64-13.86)	10.4 (2.8- 38.7)	0.001
	No	14	93	*1*	*1*	
Wear proactive cloth	Yes	42	108	0.49(0.27-0.88)	0.051 (0.01-0.23)	0.004
	No	33	42	*1*	*1*	
Use soap use	Yes	24	87	0.28(0.16-0.51)	0.04 (0.01-0.13)	0.002
	No	51	63	*1*	*1*	
Sleep on floor	Yes	36	40	2.53(1.42-4.53)	25.3(6.9-92.6)	0.002
	No	39	110	*1*	*1*	
Use repellent	Yes	8	44	0.29(0.13-0.65)	0.09 (0.03- 0.33)	0.003
	No	66	106	*1*	*1*	

Discussion

The outbreak of dermatitis in the bole sub city is characterized by an unusual increase in the the population of *Paederus* species as well as several cases of dermatitis in a different district that is located adjacent to farmland area. Most cases were reported from district 15 which surrounded by farmland and forest. The increase in the population of the *Paederus* species was found with an invasion of these beetles in the houses [1].

Regarding social demographic characteristics case, 87(71%) were female and 77(63%) were at the age group of 15- 40. The mean age of cases was (22.9 ± 16.9) with a minimum of 6 months and with a maximum of 70 years. It reveals that all sex and age group are susceptible regardless of their social demographics character the only thing that matter for dermatitis is contacted with beetles [6].

The attack rate of sub-city was 2.3/1000 population the highest was seen in district 15 with an attack rate of 4.9/1000 and lowest was seen in district 10 with attack rate 1.5/1000. The reported case also varies from month to month 48(39%) were reported during June and 74(61%) case was reported during July which revealed that slight increment case as compare to the previous month. During the heavy season, it showed significant both density and case were revealed in the study conducted military campus. This explains that due to insect are highly sensitive to a disturbance. Habitat disturbances generally pose a serious threat to insects and trigger dispersal that results in the infestation of human settings [3,5].

The average duration of dermatitis was 1.9 ± 0.5 days after the contact of the beetle. The incubation period ranges from one day to three days. Fifty-nine (78.9%) cases were reported dermatitis after two days and ten (13.3%) develop dermatitis with the first-day contact. A similar study conducted Malaysia also shown incubation period were lasted from one up to four days [7].

The number of lesions is determined by the number of contacts with beetle 60 (80%) cases were presented with one lesion and 12 (16%) cases also presented with two lesion and reaming cases were also presented with three lesions at a time. A similar study conducted in Iran revealed that most cases were presented with multiple lesion (>3) at a time. Inconsistency of this study carried out in India revealed that most cases were presented with a single lesion at a time. This explained that the number of lesion is limited to number contact with beetle at the time [8,9].

The sign and system were determined by a substance called pederin which toxic occurred by beetle after crushing result in inflammation. The cases were presented with itching, pain, burning sensation and fever which was a common sign and symptom in 98.7%,96.6%,93.5% and 8% cases respectively. A study conducted in the hospital of Sri Lanka publicized that most common symptom of cases was parallel with our study [10].

Regarding site lesion all part of body expects (palm and sole) can be presented and matter on site of contact. Faces were a most common site which affects 52(69.3%) cases followed by back which account 11(14.3%) cases. A study conducted in Iraq, Malaysia and Sri Lanka also shown a comparable result. this explained most uncovered part of the body usual like faces and neck are more vulnerable [10,11,12].

The lesion features also differ from patient to the patient from erythema up to erosion. all case was had erythema, forty-six (16.3%) cases were a linear lesion, thirty-two case also presented with vesicles. Besides case also presented with a pustule, erosion and kissing lesion at the proximal part of the body in 18.7%, 50.7%, and 8.3% cases respectively. A similar study conducted in Sri Lanka also revealed that most cases have similar lesion feature but in some case, regional lymphadenopathy was reported [10]. beside comparative finding was occurred in India study the most common morphology of lesion was erythema with that of vesicles and bullae [13]. The extent morphology is determined by the dose of toxin which contacts with our body.

The treatment of paederus dermatitis traditionally considers as a palliative; concerning the treatment was taken by the patient it comprises from local treatment to extent tropical steroid treatment. 40 %, 30.7%, 14.7%, 8% and 20.7% cases were taken tropical steroid, anti-bacterial, antihistamine, NSAID and local treatment was respectively. Low-potent or mid-strength topical steroids and oral antihistamines reduce the swelling, the pain and the healing time. Antibiotics are usually not recommended, but in our series, we added fusidic acid 2% cream twice daily for a week, as we experience a high infection rate of Gram-positive in skin diseases in Luanda. In the case of general malaise, fever and headache, NSAIDs and analgesics should be prescribed. Systemic corticosteroids are reserved for patients with high exposure to pederin [14]

our study revealed that the presence of outdoor light has a risk with the odds ratio of 12.9 (95% CI (4.22-39.5) (p=0.003) as comparing those have no outdoor light. A comparative study conducted in Sri Lanka, Panama, Malaysia also revealed that artificial light is one contributor

that increases the chance of contact with the beetle. This explains that *Paederus* species are attracted by artificial light which is commonly located in the inhabitant of human and this increased the chance of contact with beetle inadvertently. Reducing burning light and use mesh (net) at light has a significant effect in reducing the number of cases [10,15].

Presence of rotten leave also one factor which increased the risk for dermatitis. our study revealed that presence of rotten level including vegetation near the house has a risk with odds ratio 10.4 (95%CI (2.8-38.7) ($P=0.001$) as compared to those have no rotten leave to the surrounding. A comparative study conducted in India, Malaysia also revealed that the presence of rotten leave including vegetation and the presence of stagnant water and building under construction was related to the outbreak. This explained such sites were potential harborage and breeding site for the beetles and their larvae. Besides normally the beetle was an inhabitant in the farmland area, but urbanization makes the flight to human residency area [5,15,16].

Sleeping on the floor also one the factor which identified in this study and a person who was slept on the floor has a risk with odds ratio 25.3 (95%CI (6.9-92.6) ($P=0.002$) as compared to those who didn't sleep on the floor. A study conducted in a closed population set up like (military camp) and nut farmer of Turkey also indicated that sleep on the floor is a possible risk factor. This due to the increase the risk contact with beetle since they prefer to walk rather fly [4].

Wearing protective cloth (a cloth which has long sleeves) has a protective effect for dermatitis. this study revealed that wear protective cloth during the night has a risk with an odds ratio of 0.05(95%CI 0.01-0.23) ($P=0.004$). it means a person who wasn't wearing proactive cloth has 20 times at risk of developing as compared to those who were protective cloth. A similar study conducted in India also shows an effect in reducing contact dermatitis [13]. This explains due to most affected part of our body which uncovered are more susceptible to dermatitis, so it helps by reducing coincidental interaction with the beetle.

Use repellent during the night is also found as one protective mechanism for dermatitis's. our study revealed that use repellent during the night has a risk of dermatitis with an odds ratio of 0.09(95%CI 0.03-0.33) ($P=0.003$), it interpreted those who wasn't used repellent has 11 times likely to exposed to beetle as compared to those who use repellent. a different study conducted in Angola, Malaysia, and other literature review use repellent has positive impact reducing dermatitis: repellent like neem oil, common oil and use greasy ointments (which commonly used by our study participant) has a protective effect to dermatitis. This may explicate due

repellent provides a protective layer for toxic which contact with our body [6,10,14]. Finally, in this study using soap after contact with beetle was shown protective effect with an odds ratio of 0.04 (95% CI 0.01-0.13) (P=0.002), it means those who weren't used soap after contact has 25 times likely to develop dermatitis after contact as compared to those who used soap after contact. A study conducted in Panama also reported that removing the irritant by washing the area with soap and water has the potential to reduce the development of dermatitis. regarding health information and guidance on Nairobi, fly stated that pederin slowly acting toxin which can reduce and prevent dermatitis by washing with water and soap immediately after contact (crash) the beetle on the body [17,18].

The study has limitation in determining the type of *paederus* species responsible for the outbreak. The study revealed that every individual without age and sex difference can possible developed the inflammation. As a recommendation, reduced burning outdoor light, Clear excess and decomposing plants and foliage (rotten leave) around your accommodation and work areas and Wearing appropriate clothing i.e. Long-sleeved tops and long trousers in outdoors and indoor activity during the high-risk season can reduce the chance contact with a beetle.

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Conflict of Interest

We declare that there is no conflict of interest in this research.

Contribution of Authors Neamin. T: raised the research idea, wrote the first proposal, as well as manuscript draft. Ayele B, Wondmu A., and Negga.A reviewed and finalized them. Abdulafiz H. Supported the statistical analysis.

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CHAPTER SIX- Scientific Abstract

6.1 Improving Maternal Health services in Ethiopia: Evidence from MDSR Surveillance data analysis, 2016 - 2017

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Background: - Ethiopia is one of the countries reported high maternal mortality with the 2016 Ethiopian demographic and health survey estimate of 412/100,000 live births per year. Nationally, one of the challenges is the absence of information that effectively shows the true magnitude and causes for maternal deaths. Therefore, the study aimed at determining the distribution and determinants of maternal death in Ethiopia.

Methods: - A retrospective cross-sectional data analysis was done for case-based maternal death reported from eight regions and two city administrations (Except Ethiopian Somali region because of failing to report by using case-based format the notified maternal death) from Hamle 2008 to Ginbot 2009 E.C. Descriptive analysis was done for socio-demographic characteristics, causes, contributing factors and preventability of deaths. The top three causes of deaths were cross-tabulated and presented for some selected socio-demographic characteristics, causes and contributing factors.

Result: -A total of 820 (8% total expected maternal deaths), were reported nationally. Almost half 428 (53.4%) of maternal deaths occurred in the 25-34 years' age group. A 66.4% (168) were rural resident, 96.7% (767) were married and 54.5% (439) were not attended formal education. From 73% (580) facility deaths, 66% (531), 6.1% (49) of deaths were reported from hospitals and health centers respectively. Home-based death accounts for 14% (113) deaths. Form reported maternal death 36% (295) women has parity ranges from two to four. Three-fourths of maternal deaths were attributed to direct causes. Hemorrhage (38%), a Hypertensive disorder of pregnancy, HDP, (14%) and anemia (13%) were leading causes of deaths. Fifty-three percent of deaths resulted from delay one with lack of decision to go to a health facility (18.8%), a delayed referral from home (15.5%) and failure to recognize the problem (13.3%) being the top. Delay two and three contributed 24% and 23% respectively. Delay one factors contributed to 54%, 52% and 53% for deaths occurred due to hemorrhage, HDP and anemia respectively.

Conclusion: -The figure underestimates the true magnitude of maternal deaths because of the surveillance is incapable in capturing the expected maternal death estimated by Ethiopian demographic and health survey. Majority of deaths occurred during the postpartum period and from direct causes. Hemorrhage, HDP, and anemia were the top three leading causes. More deaths were reported from rural residency and hospitals setups. Delay one factor was the leading contributing factor reported.

Keywords: Maternal death surveillance, maternal death, contributing factors, causes of maternal death, delays

Word count: 381

6.2 The first outbreak of *Paederus dermatitis* in three districts of Ethiopian metropolitan city, August 2018: a case-control study

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Background: *Paederus dermatitis* is irritant contact dermatitis caused by an insect of *genus Paederus* due to crushed on the skin by realizing vesicant toxin called pederin. In Ethiopia, *paederus dermatitis* has not been reported previously in Addis Ababa: On July 28, 2018, district health office has received a report of cases with erythema, itching, burning sensation after contact with the insect. The investigation was conducted with the aim of confirming and identify the factor associated with the outbreak.

Methods: Case finding was done using data from Bole sub-city health offices and the case-control study was conducted from August 10-22, 2018 in district 10,11 &15 of Bole sub-city, Addis Ababa. Cases were defined as District 10,11&15 residents of bole sub city and who has contact with the insect after confirmation of the insect was responsible for the outbreak. Controls were selected from the community persons without any signs and symptoms who were the neighbor of cases, unmatched with a ratio of 1:2. We abstracted demographic and clinical data from questioners and analyzed in SPSS version 23. Bivariate and multivariate was done by using $p < 0.05$ to be significant.

Results: We identified 122 case-patients; 87(71%) were female and 63(71%) were 15-44 age. The interview was taken from 75 cases and 150 controls. cases were more likely to have contact with insect in presence of outdoor light (AOR=12.9, 95% CI 4.22-39.5, $P = 0.003$) and in presence excess vegetation in accommodation area (AOR 10.4,95%CI (2.8- 38.7) $p=0.001$), Usage of soap after contact reduces risk of dermatitis (AOR=0.04,95% CI 0.01-0.13, $p=0.002$).

Conclusion: Presence of outdoor light, excess vegetation in accommodation area and usage of soap after contact with insect were associated with the outbreak. Reducing burning outdoor light, clean excess vegetation and use soap after contact with beetle can be recommended as the preventive measure.

Keyword: *Paederus dermatitis*, Metropolitan City, Ethiopia **Word count:** 295

6.3 Measles outbreak investigation in a remote part of Ethio- Somalia region: case-control study, October 2018

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Background: Measles is a vaccine-preventable viral infection of humans causing a rash, respiratory symptoms, and, rarely, death. Despite the availability of measles vaccine in Ethiopian several outbreaks reported each year. During late of 2018, an outbreak of measles occurred in Mubarak district, Somalia region, Ethiopia. The investigation was conducted to describe and determine the cause of the outbreak in Mubarak district.

Methods: A case-control study was conducted from October 1-13, 2018 in Oda Dima and Biridu village of Mubarak district. Cases were laboratory-confirmed measles by IgM and who has epi-link with confirmed measles cases; who resided in the two villages. Controls defined with no history of signs or symptoms of measles resides in the same villages. case-patients and controls were interviewed using a standardized questionnaire. Data were double-entered Excel and analysed in SPSS version 23 to identify factors associated with the outbreak. Univariate and multivariate analyses were done using the factors of $p < 0.05$ to be significant.

Result: A total of 35 cases were identified. five cases patient (12.5%) died with an attack rate of 5.7/1000 population. The mean age cases were (12.1±11.5). The most affected age group were <1 with (AR 32.8 per 10000 population). Among the cases, only 9(24.7%) are vaccinated. We compared 35 cases to 70 controls. Being vaccinated against measles (AOR 0.19 95%CI (0.04-0.81), $p = 0.03$), know the mode of transmission of measles AOR=0.06 95%CI (0.01-0.37), $P = 0.003$) are a protective factor for measles. Contact with the affected person in neighbor (AOR 7.23 95%CI (1.32-39.6), $p = 0.001$) significant risk factors for contracting measles.

Conclusion: Being unvaccinated, unaware of the mode of transmission, have contact with measles case were associated with the outbreak. Improved the vaccination coverage via routine and catch up immunization and providing of health promotion information with messages emphasizing measles prevention are recommended.

keyword: Measles, Case control, Somalia region, Ethiopia **word count:** 291

6.4 Evaluation of Maternal Death Surveillance and Response (MDSR) System in Gambella Region, western Ethiopia

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Background: Maternal mortality ratio is considering as a primary and important indicator of the country over the health status as well as the quality of life. Ethiopia is one of the countries with the highest maternal mortality per year with an estimated ratio of 412 (273-551) per 100000 live birth in 2016. Ethiopian Ministry of Health started to implement maternal death surveillance and response (MDSR) system as a weekly reportable event since October 2013. The objective of this evaluation is to assess the efficiency and effectiveness of the current MDSR system in Gambella Region.

Methods: a descriptive data analysis was used on the MDSR report of the region followed by a cross-sectional study of selected health facilities and key informants. The data was entered and analyzed using Epi info version 7.2.

Result: The attributes score of the system in Gambella region: stability (scored 2.5/5), timeliness (score 3.1/5), acceptability and usefulness (score 3.2/5) and representativeness (3.4/5) were identified as areas demanding improvement. There is a big disparity between the estimated number of maternal deaths and deaths reported through the surveillance system, which was 17/55(31%) reported by the system. Poor coordination, unavailability of training, guideline and feedback were the reason for poor implementation of the system.

Conclusion: Stability and timeless was the weakest attributes of the system in the Gambella region. Gambella Health Office should give focus to attributes that identified as areas' demanding improvement, guidance and follow up are recommended to improve the usefulness of the system.

Keyword: evaluation, maternal death surveillance and response, Gambella

Word count: 242

CHAPTER Seven- Narrative Description of Disaster Situation

7.1 Rapid Health Needs Assessment on Internally Displaced Population, Amhara Region, February 2019

Executive summary

Background

An internally displaced people (IDP) are individuals or groups who are forced to leave their homes but remain inside the borders of their own country. Amhara region currently hosted 80000 IDP in a different corner of the region. The aim of this assessment was to identify health and health-related risk in the selected site of the region to respond accordingly.

Methods

The assessment was conducted in three zones in four IDP site namely Finto Selam, Wenberima, Chagni and Aymba from February 13-19/2019. Semi-structured questionnaire and site observation were used to extract the data. The data cleaning and analysis was conducted using Microsoft Excel version 2016.

Results

A total of 51,064 were reported in the assessed site from them central Gonder were hosted 44633(87.3%) IDP from assessed site followed by East Gojam which account 5883(11.5%). Aymba, Tkl dngay and Chilga 1 were contributed 32,401(60.5%) from total thirteen IDP site of assessed place. A total of 1,083 cases were treated in Aymba mobile clinics but no record was found others assessed IDP site. 102 latrines were availed for the IDP community. Unavailability of regular nutritional screening, mass vaccination for epidemic-prone illness and Well prepared EPRP is seen in all site. Poor coordination among sector (expect the regional level) and limited involvement partner were observed which result in deteriorated the humanitarian situation in the region.

Conclusion

An incensement of the IDP population became the priority of humanitarian response. Weak coordination and limited involvement of differ sector including partner was observed. Improve the level of coordination below the regional level and engagement of different stakeholder in response activity can improve the current situation.

Introduction

Background

Internally displaced people (IDPs) are individuals or groups who are forced to flee their homes, for reasons usually associated with political issues or natural disasters, but who remain inside the borders of their own country [1]. Featured are the most vulnerable populations - namely women and children – who have fallen through the cracks [2]. Much of internal displacement comes as a result of prolonged conflict and violence within a country [3]. This is particularly true for vulnerable groups such as women, children, and the elderly and disabled. Females in particular present a challenge for the humanitarian community – it is estimated that about 80 % of internally displaced populations consist of women and girls.

Forced displacement of those communities and being acquired habitants of newly made temporary areas requires a serious look over their health-related issues which may otherwise inflict epidemics of serious and hazardous health problems. Similarly forced abductions will make the new habitats prone to following problems:[4]

- ✓ Lack of shelter
- ✓ Lack of food facilities
- ✓ Lack of health services
- ✓ Social injustice
- ✓ Sexual assaults
- ✓ Physical attacks
- ✓ Psychological stresses like depression, anxiety, stress
- ✓ Socioeconomic deprivation socio-cultural changes
- ✓ More abduction and Most importantly educational disturbances

Ethiopia is one the country the that faced political instability since 2015 due to this number of Ethiopian were displaced due to their ethnicity and a significant number of individuals also were displaced because of fear (lack of trust) in the situation to a different part of the country. Amahra region also one of the regions that were challenged by the situation. Currently, the region hosted around 80,000 populations as IDP among the half were people recently displaced from central Gonder region following violence allegedly involving Amhara and Qimant Communities which make deteriorated the humanitarian situation in the region [5]. The rapid needs assessment helps to identify major gap and challenges as well the best practice needs to flourish up to other IDP site of the region.

Objectives

General objectives

To identify health and health-related risks and respond accordingly among internally displaced the population found in Amhara region

Specific objective

- ✓ To describe type, impact and possible evolution of the health emergencies
- ✓ To measure present and potential health impacts of the emergency
- ✓ To ensure the provision of appropriate health care for the displaced community
- ✓ To assess the adequacy of existing response capacity and immediate additional needs

Methods and Material

Study area and period

The rapid health assessment was conducted in Amhara region four IDP site the region namely, Finote Selam, Chagni, Wenberama and Imba from February 13-19/2019.

Study design

Community based descriptive cross-sectional study design was implemented to assess the health status and health intervention with the IDP sites.

Data collection tool and procedure

The data were collected from a key informant from each IDP sites and concerned government officials including district health office and zone health department using semi-structured questionnaire. Site visit/ observation was also one of the data collection method used to determine the environmental condition of the collective centers and to ensure the existence of health care delivery in the IDPs collective centers.

Data analysis, presentation, and dissemination of the report

The data collected from IDPs were entered to and analyzed by micro soft excel 2016 and presented by narrations and tables. This final assessment and response report were disseminated to EPHI/PHEM, FMoH, and Amahra regional PHEM

Results

Population description of IDP site

The IDP site was dispersed in three zones of the region namely East Gojam, Awi and central Gonder from them central Gonder were hosted 44633(87.3%) IDP from assessed site followed by East Gojam which account 5883(11.5%). Aymba, Tkl dngay and Chilga 1 were contributed 32401(60.5%) from total IDP thirteen site of assessed place. The source of data from the population was DRMC of each district. currently, the movement of the population seems stable expect from other visited site expect central Gonder due to the conflict. The relation between the host community the IDP seems positive so far. The organization of settlement varied from camp in a rural area (wnberima s and Aymba site), camp in an urban area (Finto Selam and chagni) whereas, the remaining IDP in central Gonder stayed with host families in both urban and rural setup.

Table 7.1: Number of the internally displaced population in the assessed area of Amhara region, Ethiopia , February 2019

zone	IDP site	frequency	Percentage
East Gojam	Wenberma	568	1.1 %
	Finto selam	3115	6.1 %
	Sekela	600	1.2 %
	Jawi	1600	3.1 %
Sub-total		5883	11.5%
AWI	Chagni	548	1.1 %
Sub-total		548	1.1%
Central Gonder	Imba	9809	19.2 %
	Tkl Dngay	9137	17.9 %
	Chilga 1	13455	26.3 %
	chanka	914	1.8 %
	Chindiba	3615	7.1 %
	Chawit	5610	11.0 %
	Koladiba	1029	2.0 %
	Arbaba	1064	2.1 %
Sub-total		44633	87.4 %
Grand total		51064	

Shelter and essential non-food items

Shelter quality

Concerning the sheltering quality, the shelters were poor in the following parameter has in all assessed site expected Aymaba site it some better in the first two listed indicators.

- ✓ no enough protection from cold, heat, wind
- ✓ privacy
- ✓ personal security and security belonging
- ✓ protection from fire
- ✓ covered space for essential household activities

The average number of people sleeping in the shelter ranges from 10 -50 according to assessed site.

Accessing to essential Non -food items

During the assessment, there was no record showing in the proportion of clothing, blanket and bedding and cooking utensils. The main type of fuel used for cooking and heating was firewoods.

Unavailability of matters and cooking utensils were expressed as priority concerning shelter and non-food items.

Water supply, sanitation, and Hygiene

Water supply

The water supply of each site was availing using water tracking in order to facilitate it four water container which has 5000ml capacity each was distributed. Two of them were located in central Gonder in Aymba site where avail water supply service: whereas, water container in Finto selam which isn't given service due to the interruption water supply for more than two weeks and water Container in Chagni weren't contain water (malfunction). Regarding the average water consummation in the assessed site was below two liters per person per day. The average time taken to collect water in each site were taken 30-60 minutes.

Sanitation

It is defined and managed defecation area for all IDP site expect Wenberima site. all of them were public toilet (pit latrine). but there is no family toilet and a shared family toilet. The average number of users per functional toilet was above per 100. A total number functional

latrine was 102 and 90 were in Aymba site and the remaining was in Finto selam and Chagni. There is separated for female and male in Aymba site, but it is not available in another site. Regarding the opening size, it wasn't small enough to prevent children from falling. All the latrine has adequate lighting.

Concerning presence human faces on the ground and round site, there were a substantial presence of close the shelter in Finto selam and Wenberima site and but there was no any substantial presence near to water source but there might link to the river since the toilet located in Finto selam and Chagni were built near to crossing river.

Hygiene

In all site, no soap was distributed. regarding in impregnated mosquito net it was distributed in Wenberima site which was 235 in number and a narrow-necked water container (jerrycan) was distribute for Aymba site 41 and 165 buckets were distributed.

Food security and nutrition

Management of severe acute malnutrition was linked to the near health facility in all assessed site and management of moderate malnutrition was carried out using selective supplementary feeding. but so far, the micronutrient supplementation program was conducted. Regarding food, distribution was carried out by RDMC of the region. The amount of food that people are eating has increased due to increasing the number of IDP. the average time the food stocked stay in the household was between one up to two weeks according to the community. Expect Wenberima site all site has access to the functional market.

The live hoods in the assessed area were an agriculturalist. The crisis has an impact on lives hoods and markets and food stock by the means of lives hoods disrupted as well as food stocks are depleted. The most population affected was vary from site to site it affected all age group and sex.

Health risk and health status

Morbidity

Regarding common illness seen in IDP only registered in Aymba site but there is no record found in other visited site. Aymba site starring from 15/01/2019-10/02/2019 around 1083 case were treated in mobile clinics which is in the average forty-five case is seen in the facility. Upper respiratory illness was the leading case for visiting the mobile which contributes

259(25%) of the total reported followed by scabies account 142(13) from reported total cases in the last one month.

Table 7.2: Disease burden in Aymba mobile clinic from 15/01/2019-10/02/2019, central Gonder, Amhara region, Ethiopia

S.no	Disease in population	Cases in the last 24 days		
		Male	Female	Total
1	URTI	103	156	259
2	Scabies	88	54	142
3	AFI	55	66	121
4	Intestinal parasite	43	55	98
5	conjunctivitis's	43	53	96
6	Diarrheal disease (both bloody and non-bloody	36	30	66
7	Dyspepsia	19	38	57
Total		387	452	839

Outbreak

Currently, there is no confirmed outbreak in assessed IDP site (unusual incensement of the case or rumor of outbreak)

Chronic disease

One of the problems face Internally displaced population is an interruption of therapy for chronic diseases which could fatal. However, the data registration mechanism for chronic illness was implemented in another site expect Imba. so far two cases of epilepsy were reported with no cases of hypertension, insulin dependent diabetic and kidney disease (in need of dialysis)

Few reports of sexual reported in some of the assessed IDP sites in the level of rumor without aver evidence. Besides, there is an exception of psychosocial trauma due to displacing from they belong before: however, there is no such report so far.

During the assessment, there was no report of non-infectious risk (radiation, poison, and toxin) and hazardous substance use.

Disease prevention and control

The public health surveillance was integrated to all IDP site with routine surveillance system: however, there is a problem in disaggregated the number of the case reported in IDP site alone expect Aymba site.

Regarding daily reporting selected event including zero reported weren't initiated in any of the assessed IDP sites. Preparing EPR were carried out at the regional level but it wasn't in place at the district level in customizing different risk according to their respective environment setup expect central Gonder zone.

Concerning coordination since the activity of IDP weren't cascaded alone within one sector office. Therefore, there is an established a task force for political decision and technical working group for technical assistance at regional. but the same replica wasn't available in zone and district level (coordination some better in central Gonder).

Involvement of partner

The involvement of a partner is limited to the regional level only WHO and UNICEF was involved so far. There is better involvement of partner and stakeholder in central Gonder in providing medical supply and logistics. UNICEF, MSF, University of Gonder and ICRC were partner engaged health intervention by availing medical supply. Whereas, there is no partner involved in the remaining IDP site.

Nutritional screening

Nutritional screening is one of the mechanisms maintains the health of the IDP community. From the assessed site, only Aymba site was carried out nutritional screening. A total of 287 were screened from them six of them classified as MAM and four of them identified as SAM cases. regarding PLW a total of 19 women were screened from them 12 they were identified as case among them ten they were MAM case the remaining were SAM cases.

Immunization and deworming

Immunization is one of the means provides protection for an outbreak in such a vulnerable population. In the assessed site, no vaccination was carried out in form of the campaign but there was a linkage of the eligible individual to routine immunization in order to reduce the chance of drop out before being fully vaccinated. East Gojam in Wenbera and Jawi 46 children were identified and linked to continuing their vaccination. Deworming also carried out in central Gonder for 161 children whose age lay between two up to five.

Maternal health

Maternal health service is one of health component needs to be considered during health intervention in minimum in providing ANC follow up and post-natal care. So far, such record wasn't found in all assessed IDP site.

Health facility assessment

Five health facility was shut down due to the conflict in central Gonder since the health professionals who work in that facility was a victim of the conflict.

mobile clinic

There is one functional satellite clinic in Aymba (central Gonder) with three nurses mobilized from the near health facility of Imba district. however, for the other IDP site, there is linkage with a near health facility.

Strength

- ✓ Avail health service for all IDP site
- ✓ Have linkage with nearby health facility for further diagnosis and treatment

Weakness

- ✓ There is no mechanism to monitor the disease burden in IDP site expect in Aymba (central Gonder) which enable them to request the drug logistics as needed
- ✓ unavailability of health professional in Mobile clinic specifically for Finto Selam IDP site
- ✓ unavailability of psych-social support service

Challenges

- ✓ the unattainability of dedicated ambulance service for the purpose of referral linkage

AYMBA mobile clinics

IMBA mobile clinic is the only functional Mobile clinics which give health service for the IDP community with three nurses mobilized from a nearby health facility.

Available service

- ✓ collection of vital statics the community (registry of pregnant women and newborn)
- ✓ child health (make vaccination, treatment of common illness of childhoods like AFI/pneumonia, dehydration due to acute diarrhea)
- ✓ nutrition (screening of acute malnutrition, follow up of children enrolled in supplementary/therapeutic feeding)
- ✓ integrated management childhood illness

unavailable health service

- ✓ not access to free condom
- ✓ no community leader involvement on STI/HIV
- ✓ unavailable of information, education, and communication (IEC) material on
 - prevention and control of STI/HIV
 - locally priority disease
 - danger sign of pregnancy and promote breastfeeding
 - hygiene promotion and water sanitation and vector control
- ✓ providing follow up for chronic health problem including mental health

Discussion

An internally displaced person (IDP) are individuals or groups who are forced to flee their homes but remain inside the borders of their own country. Much of IDP comes from the result of prolonged conflict and violence with the country. Ethiopian also one of the countries faces prolonged conflict due to political instability. Amhara region is one of the regions who currently hosted more than 80,000 IDP with the region. One the unique feature of IDP response needs multi-sectorial collaboration and coordination among sector for a common goal.

Four IDP site were assessed located in the different zone of the region. A total of 51064 IDP were reported in assessed IDP site from them 44633(87.4%) were in central Gonder due to intra ethics conflict between Amhara and Qimant. Aymba were the only IDP site who live camp the remaining IDP was live with the host community in the rural and urban setup as subtenants. In all assessed site, the relation between the IDP community and host community seems positive which can be taken as a guarantee for the IDP community in term of security.

Regarding the housing condition of the IDP, housing condition was poor as a result of the following parameter no enough protection from (cold, heat, wind), privacy, personal security and security belonging, protection from fire and covered space for essential household activities. Besides the rainy season is coming to the currently available shelter can't provide protection and site selection also has a problem in prone them to floods especially for Chagni and Finto selam sites.

Water supply was given for all assessed site expected Finto Selam and Chagni site due to interruption of water supply by the municipality and malfunction of the water container in above-mentioned site respectively. Furthermore, the distribution of water chemical and water quality audit wasn't carried out so far it needs to consider in the upcoming intervention. Regarding sanitation, the latrine was built in all IDP site expect Wenberima site. moreover, the currently constructed latrine wasn't adequate and most of them haven't separation for male and female. Hygiene also one of Wash component during the assessment no soap were distributed but limited jerrycan and the mosquito net was distributed in Aymba and Wenbirema site respectively.

Food security and nutrition mainly deal with assuring food security and treatment of Malnourished individual. In all assessed site, there is referral linkage for managing acute malnutrition and food were serve in a monthly manner by RDRMC. Regarding coordination (there is better coordination in the regional level, but the replica wasn't available below the

regional level) and involvement of partner (limited involvement of the partner in the regional level, it seems better in central Gonder zone).

Regarding health profile record specific for IDP site were avail Aymaba site and in the site, respiratory tract infection was leading cause followed by scabies case. In all site, no outbreak was reported (rumour of outbreak or usual incensement of cases). Immunization wasn't conducted in the form of the campaign but there is a linkage of an eligible individual to routine immunization in all site.

They were reported two satellite clinics in Finto Selam and Aymba site. However, there was no clinic in Finto Selam IDP site. Aymba mobile clinics were the only functional mobile clinics in the assessed site.

Conclusion

The unique feature of IDP response needs multi-sectorial collaboration and coordination among sector for a common goal. But there is poor coordination and limited involvement of the partner was observed in the assessment.

Unavailability of mechanism in which monitoring the diseased burden was a gap in order to refill drugs supply as needed. Mass vaccination was not conducted for epidemic-prone illness also mentioned a gap.

Regarding the surveillance and response, daily reporting including zero reports wasn't initiated in all site and EPR were prepared only at the regional level. Regarding Wash, currently available latrine service and water supply are not enough for IDP community.

Concerning Health service, all site was linked within the nearby health facility, but the unavailability of ambulance service was hinder for the referral linkage. As health intervention Mental health and phycho-social weren't addressed well so far.

Recommendation

- ✓ Consider other site selection for Finto Selam and Chagni IDP site since they settled in floods prone area
- ✓ Improve coordination of among sector below the regional level and involvement of the partner in response activity
- ✓ Prepare EPR plan for every site in ways customizing the environment and location of the site
- ✓ Develop a mechanism to monitor the disease burden of each site
- ✓ Initiative daily zero reports in each site in considering potential epidemic prone illness
- ✓ Conducted nutritional screening in a regular manner and conducted mass vaccination for selected epidemic prone illness
- ✓ Assure the water supply to a minimum level by increasing the number of water tracking per day and at meantime control the water quality by providing water chemical and conducting water quality audit
- ✓ Wash, increased the number of latrine and washing facility since it below the minimum standard
- ✓ Avail ICE material on prevention and control of STI/HIV, locally priority disease, danger sign of pregnancy and promote breastfeeding, hygiene promotion, and water sanitation and vector control
- ✓ Consider mental and Phyco-social support as one part of health intervention

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CHAPTER Eight - Epidemiological Project Proposal

8.1 Assessment on Level of preparedness in managing obstetrics complication in Ethiopia, 2019

Proposal Summary

The maternal mortality ratio is considered as a primary and important indicator of the country's development. Globally, each day around 830 women die from preventable maternal death cause by pregnancy and childbirth; from this, almost all death occurs in a developing country. The maternal death ratio is 240 per 100000 in a developing country and 16 per 100000 lived birth from a developed country. Ethiopia is one of the countries with high maternal mortality rate per year. Even if, there is progress to decrease maternal death still; it is remaining high. The 2000 Ethiopian demographic and health survey report shows 600 deaths per live birth. For instance, before 2000 it was 873(703-1039), in 2005 it was 673(548-799), in 2011 it was higher than 2005 676(541-810) and very recently it was estimated 412 (273-551) in 2016 per 100000 live birth. Ethiopian set of an objective to reduced maternal death by 300 per 100,000 live birth in millennium development goal in 2015 and the requisite strengthening of the health system to provide quality EmONC at the hospital and health center level. However, Ethiopian hasn't achieved a reduction of maternal death as stated by MDG and can't avail quality EmONC since the initiative takes place in 2008. Besides most of the maternal death were reported due to delay three which is in receiving adequate health care due to Poor facilities and lack of medical supplies, inadequately trained and poorly motivated medical staff and inadequate referral systems. Therefore, the major aim of this study to assess the level of preparedness in managing obstetric complication among health facility.

The study will conduct at national in selected 1094 health facility which is selected based on managing authority, type health facility, and region. The sample health facility will select using simple random sampling method with health randomly generated number which given for each health facility located in master facility list. The study will stay for twenty months and an estimated cost of £1,161,620 is needed.

Introduction

Background

The maternal mortality ratio is considered as a primary and important indicator of the country's development. Maternal deaths arise from the risks attributable to pregnancy and childbirth as well as from the poor quality care from health services [1].

Globally, each day around 830 women die from a preventable cause of pregnancy and childbirth; from this, almost all death occurs in a developing country [1]. The maternal mortality ratio is 240 per 100000 in a developing country and 16 per 100000 live birth for a developed country. Even if, the maternal mortality ratio is decreased from time to time: in 1990 it was 532000(496000-590000) to an estimate of 303000(291000-34900) in 2015. Developing regions account for approximately 99% (302 000) of the global maternal deaths in 2015, with sub-Saharan Africa alone accounting for roughly 66% (201 000), followed by Southern Asia (66 000). At the country level, Nigeria and India contribute one-third of all maternal death in 2015, an approximate 58000 maternal deaths (19%) and 45000 maternal deaths (15%) respectively. Eighteen other countries, all in sub-Saharan Africa, are estimated to have a very high maternal mortality ratio in 2015, with estimates ranging from 999 down to 500 deaths per 100 000 live birth. Among them, the highest was in the central Africa Republic and the lowest was Kenya [2].

Ethiopia is one of the countries with high maternal mortality ratio per year. Even if, there is progress to decrease maternal mortality rate, still; it is remaining high. For 2000 previous EDHS report, it shows it was higher 600 deaths per live birth. For instance, previous 2000 it was 873(703-1039), in 2005 it was 673(548-799), in 2011 it was higher than 2005 676(541-810) and very recently it was estimated 412 (273-551) in 2016 per 100000 live birth [3].

Traditionally the cause of maternal death around 70%- 80% due to direct cause and the rest 20-30% death was linked to indirect causes. Most deaths were occurred during childbirth and after pregnancy. The majority complication that accounts for 80% of all maternal death is; severe bleeding, infection, high blood pressure, and unsafe abortion. In Ethiopia abortion and obstructed labour was the leading cause of mortality in 1980-1990 which contribute 31% and 29% respectively followed by infection (21%) and hemorrhage (22%). However, after millennium also obstructed labour is account (36%) and followed by hemorrhage (22%), a hypertension-related complication of pregnancy (19%) and infection (13%) were seen the top four causes maternal mortality [4].

Ethiopian set of an objective to reduced maternal death by 300 per 100,000 live birth in millennium development goal in 2015 and the requisite strengthening of the health system to provide quality emergency obstetric and neonatal care at the hospital and health center level [5]. In addition, to gauge national progress in the reduction of maternal mortality, strategy documents proposed that a national indicator regarding the availability of EmONC services be included in the health management information system and analyzed regularly. However, Ethiopian hasn't achieved a reduction of maternal death as stated by millennium development goal and can't avail quality EmONC since the initiative takes place in 2008 [6].

Good quality maternal health services are those which, among others, are readily accessible; are safe, effective, acceptable to potential users and are staffed by technically competent people; provide prompt comprehensive care and/or linkages to other reproductive health services; provide continuity of care, and where staff are helpful, respectful and non-judgmental [7]. The concept of readiness is at the core of handling any medical emergency since survival is often highly dependent on timing. Readiness is defined by achieving and maintaining a state of preparedness in the facility to provide quality EmONC. This includes sufficient numbers of staff available with requisite skills and a willingness to respond to clients 24 hours a day, 7 days a week, available and functional equipment and supplies, and adequate infrastructure. World health organization and United nation children fund recommend that for every 500,000 people, there should be at least one comprehensive and four basic EmONC facilities; 15% of all births should take place in EmONC facilities; 100% of obstetric complications should be treated; 5-15% of all births are by Caesarean sections; and the case fatality rate of obstetric complications should be less than 1% [8].

There are many factors that affect the outcome of pregnancy from the onset of any obstetric complication. The outcome is most adversely affected by delayed treatment. Delay in treatment is the result of many factors. These delays are described as the three phases of delay. Generally, the quality of service matter on the existence of service, number availed of trained medical staff, availability of drugs and level of skill needs to consider mostly related to delay three which is delaying in receiving adequate and appropriate care. The general service readiness refers to the general capacity health facility to provides health services. any services readiness comprises tracer items for the following major domains: infrastructure/amenities, basic supplies/ equipment including small surgery standard precautions, laboratory test medicines and commodities. service-specific readiness refers to the capacity of health facilities to provide a specific service, measured through the presence of tracer items that include trained staff,

guidelines, equipment/supplies, diagnostic capacity, medicines, and commodities. The quality the service also needs to consider as one part of readiness since it comprised the following aspect like human & physical resources referral system and use of appropriate technologies. Service availability and readiness are prerequisites to quality services but do not guarantee the delivery of quality services [9,10].

Majority of the maternal deaths occur during pregnancy, labour and within 24 hours of the post-partum period. In the most developed county, apart from medical causes, there are numerous socio-cultural factors which delay care seeking and contribute to these deaths. Most often the delay is due to a) Identifying the complication, b) Deciding to seek care c) Identifying and reaching the health facility and d) Receiving adequate and appropriate treatment at the health facility. Reduction in maternal mortality rate cannot be achieved unless we considered all these factors are considered [11].

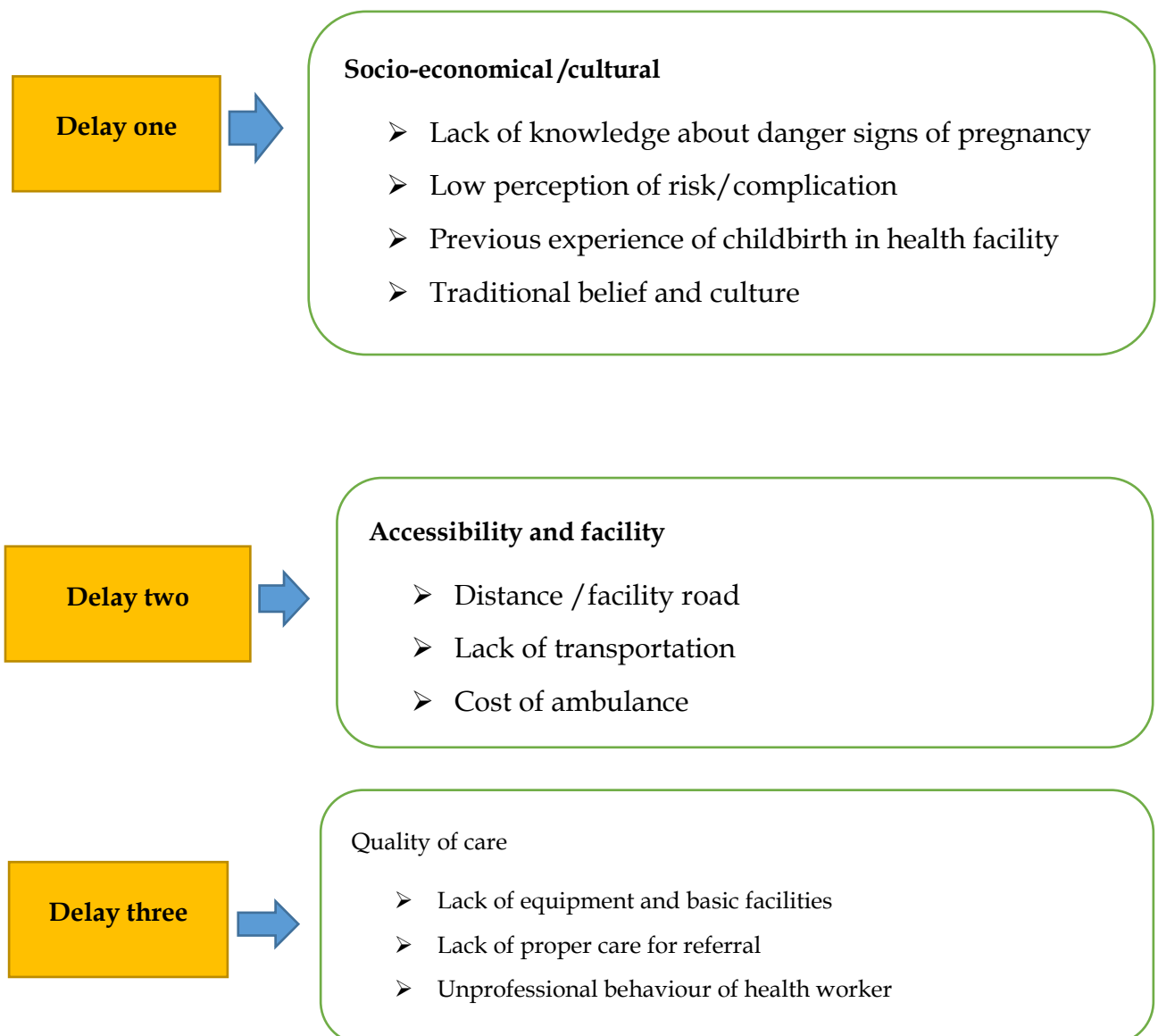


Figure 8.1 : Diagrammatic presentation of delay which affects the maternity outcomes

The purpose of this study is to understand the current status of readiness among health facility reported maternal death. It is hoped that the results of the study will provide a chance for policymakers to improve the level of preparedness and it can also use as an important tool for future possible intervention.

Statement of the problem

Ethiopia is one of the countries with a high maternal mortality rate. According to EDHS 2016 the maternal mortality of the country 412 maternal deaths per 100000 live birth which show that it needs effort to reduce because it also indicates over health and development status of the country. In 2015 in Ethiopia were intended to reduce maternal death up 350/100000 live birth in order to achieved MDG, however, it wasn't achieved as expected. The factor that contributes for low-level achievement is mentioned due to low-level readiness for combating obstetric complication since the common cause for maternal death was bleeding and related complication (delay three, which is delaying in availing adequate services, assigned skillful professional). This study will help by identifying the level of readiness among health facility reported through the surveillance system and it will pave to insight the status of preparedness in order to act accordingly.

Justification of the study

The maternal mortality ratio is considered as a primary and important indicator of the country's overall health status as well as the quality of life. Maternal health is among the top priorities of the health system in Ethiopia. A different intervention was taken to reduce maternal mortality so far, even if there is significant reduction maternal death from 1225 before 1990 to 412 in 2016 per 100000 live birth since the country was had planned to 300 maternal death per 100000 live birth in 2015 but fail to achieve it. One of the main reason is the unavailability of quality health services that can be managed obstetric complication.

This study will address and improve the level of preparedness in managing obstetric complication by in sighting the current status of the health facility.

Literature review

A review of the literature suggests that in developing countries, the use of modern health care such as maternal health services can be influenced by the sociodemographic characteristics of women, the cultural context, and the accessibility of these services.

Millennium development goal had planned to reduce maternal death by 75% from 1990 to 2015. However, from 95 countries only nine countries were achieved. Suitable development goal has a plan to reduced maternal mortality to 70 per 100000 live birth.to achieve such extended plan needs universal coverage of delivery in health facilities where birth complication can be detected and treated. The positive association between volume of deliveries and improved maternal and new-born baby outcomes has been well established in high-income countries more adverse maternal outcomes than hospitals and providers with higher delivery volumes. Whereas low-quality care Where found in low-income countries, particularly in primary care facilities with a low delivery volume. Primary care facilities had a mean score of 0.38 out of 1 on the basic maternal care quality index. This score indicates crucial deficiencies in staffing, infrastructure, referral systems, and routine and emergency care practices [12].

Proper knowledge about identification signs, emergency measures to be taken and the well-equipped obstetric unit can reduce maternal mortality by almost 35-40. Regular assessment of awareness & preparedness for obstetric emergencies would be desirable to optimize the overall delivery outcomes especially at peripheral rural centers where nurses are primarily involved in the care of laboring women [13].

The global pattern of in availing emergency obstetric care revealed that EMoNC service wasn't well distributed and more favored for urban set up which mean majority women live rural area hasn't access for the services. The following problem was identified to provide the services like difficulty of maintaining equipment and supplies in relatively more rural locations, and difficulty in retaining qualified staff in smaller facilities. In addition, government regulations and policies often make it difficult for a facility without a physician present to perform certain signal functions [14].

The study conducted India regarding the level of preparedness in managing PPH and eclampsia revealed that unavailability of skilled personnel, key equipment, and drug were hinder for effective preparedness. Meanwhile, quality of maternal service was poor both in public and private health facility like lack of essential drug and use of an inappropriate procedure that is not evidence-based. Pakistan study revealed that poor referral linkage, lack of 24 hr services

most major barrier for effective service delivery regarding maternity service. A similar study conducted by WHO show that unable to provide emergency obstetric care due to lack of good management system to ensure continues availability of drugs and supplies [10,15,17].

Several studies conducted in sub-Saharan Africa region did not achieve the MDGs of 75% reduction in maternal mortality by the end of 2015. This might be attributed to the poor utilization of emergency obstetric care as reported from different developing countries. Factors including unavailability of EmONC signal functions at health facilities lack awareness about pregnancy complications poor educational status, and lack of media exposure are reported to affect access to and utilization of EmONC services among women in need of it. In developing countries, different socio-cultural and economic factors, as well as poor health infrastructure, are contributing to the poor access and utilization of EmONC service [18,19].

In a study conducted in four east Africa countries show that Lack of basic infrastructure such as electricity, water, communication, means of referrals, adequate staff quarters, and poor security especially at night and for female staff was the main obstacles to running 24-h quality EmONC services. These problems were especially acute in remote and rural areas [20].

The availability of service used for managing obstetric care in Kenya the quality of EmONC was compromised due to lack of essential equipment and supplies, skilled trained personnel other support services are in short supply especially in maternity facilities located within the slums. There is also little supervision to ensure adherence to standards especially among the small private maternity facilities also contributed poor services. Similarly, a study conducted in Malawi revealed that There is a shortage of qualified staff and unequal distribution with more staff in hospitals leaving health centers severely understaffed [21,22] .

The first assessment of EmONC service was conducted in 2008 at the national level the result of revealed that EmONC facilities were well functioned in the central part of the countries the remaining failed to maintain the minimum acceptable level. The services like cesarean section weren't availed adequately due to unavailability of sustainable blood transfusion and it was unacceptability low in the rural area. According to the 2014 Ethiopia Service Provision Assessment (SPA) Plus Survey report, nearly 65 percent of all facilities, excluding health posts, offer normal delivery service. Almost all (99 percent) government-managed facilities offer routine delivery services while only 27 percent of private-for-profit facilities and 69 percent of nongovernment organization (NGO) facilities provide this service. However, only 3 percent of facilities, predominantly hospitals, provided cesarean delivery service [23].

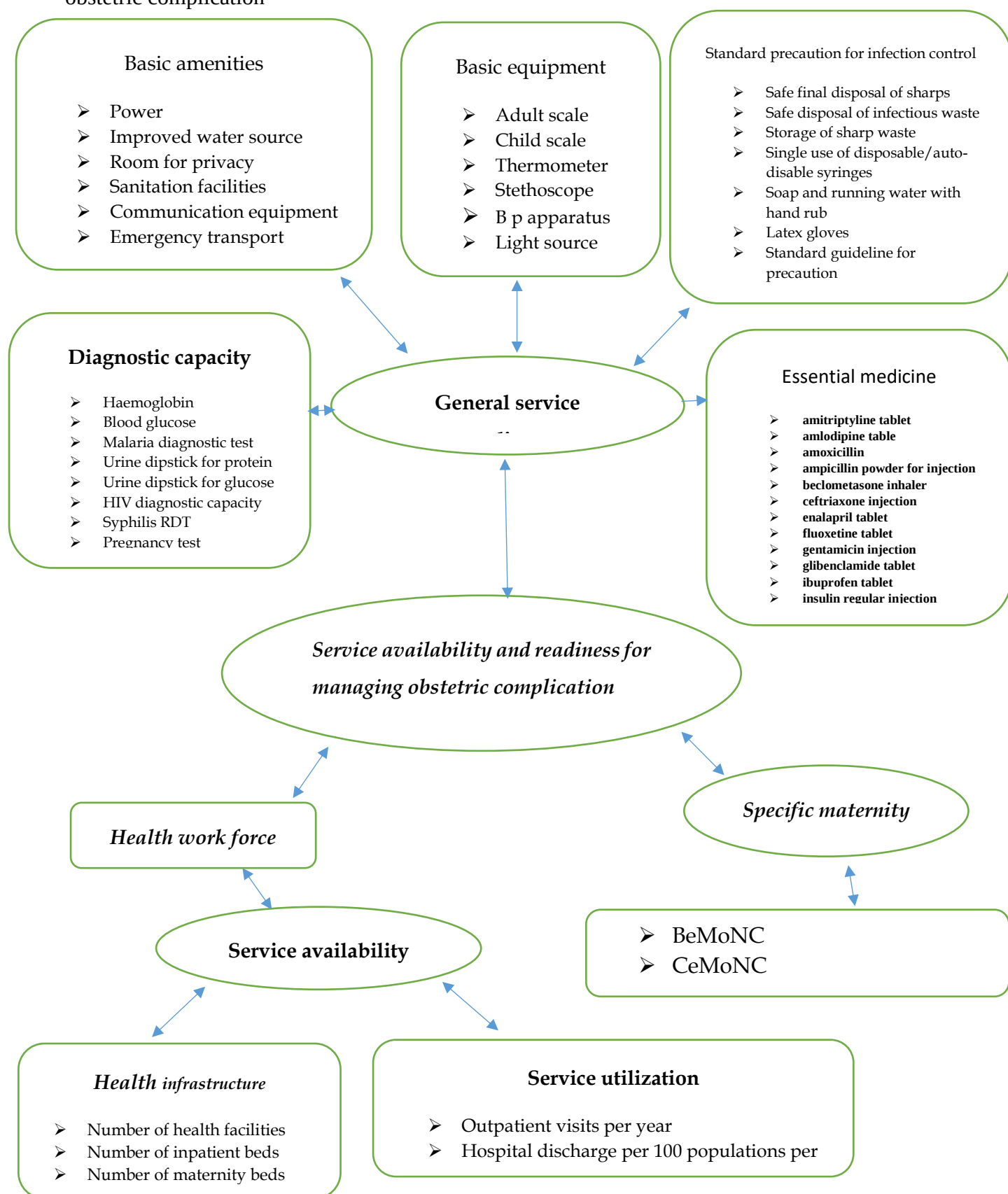
According to the national assessment on EmONC services show improvement by national coverage from 11% in 2016 to 44%. The met for EmONC were below 50% in all region. besides it was less 3 % in Gambella, Somalia, Dire Dawa. Regarding indicator to readiness and coverage revealed that substantial decline was observed in availing parenteral antibiotics. Besides signal function was undermined due to the gap of drug and equipment expect manual removal of placenta and vaginal assisted delivery [23,24].

According to 2016 assessment on maternity services, the number of bed and ratio revealed that there is near adequate bed according to the type of health facility to the given standard set by FMoH in 2012. However, there is a shortage in availing materiality bed and couches to given standards. Regarding physical infrastructure, most of a health facility has a room separate from maternity services. According to the assessment near 90 % of health, facility has electric power supply: the highest occurred in Addis Ababa which was 100% and the lowest was seen in Somalia region only 37% assessed health facility has to access for it. Water supply also one the basic amenity for health services but during 22% health facility had no water source. Regarding Health information system, the HMIS system was installed in 97% of the assessed health facility 90% facility has report monthly manner Regarding infection prevention and control, to ensure the prevention of infection, reprocessing of instruments and equipment should be carried out in an effective way: cleaning instruments and equipment immediately after use to remove all organic matter and disinfection (by heat and water or chemical disinfectants) or sterilization are very important. According to the assessment, only 51% has functional autoclave services was found in the assessment conducted at the national level [23].

A similar study conducted in Dire Dawa showed that there is one functional CEmoNC facility in the town. However, only three were fully functional in availing BEmoNC services from a total of nine health center. parenteral anticonvulsants, manual removal of placenta and assisted vaginal delivery were listed performed signal functional. In the hospital level, blood transfusion and manual removal of placenta were least performed [25].

A similar study conducted in 138 health facility indicated that a lack of transportation and communication infrastructure, overcrowding at the referral hospital, insufficient pre-service and in-service training, and absence of supportive supervision as key barriers to the provision of quality emergency obstetric care. Similarly, the requirement of multiple referrals, the absence of care provider and type of delivery were identified as a barrier for effective obstetric care. [26,27,28].

Figure 8.1: Conceptual frame Service availability and readiness assessment on managing the obstetric complication



Objectives

General objectives

To assess the level of preparedness in managing obstetric complication among health facility in Ethiopia, 2019

Specific objectives

- ✓ To measure the general service's readiness among health facility
- ✓ To determine services availability across the health facility
- ✓ To evaluate the signal function of obstetric care in a health facility

Method and material

Study Area and period

The study will be conducted in Ethiopia at a national level. the current population of Ethiopia is 109,337,322 as of Thursday, March 14, 2019, based on the latest United Nations estimates. Ethiopia population is equivalent to 1.43% of the total world population. Ethiopia ranks number 12 in the list of countries (and dependencies) by population. The population density in Ethiopia is 110 per Km² (285 people per mi²). The total land area is 1,000,000 Km² (386,102 sq. miles) 21.1 % of the population is urban (23,220,976 people in 2019). The median age in Ethiopia is 18.8 years. Currently, Ethiopia has 40,773 health facilities (only public health facility) from them 33015 were health post, 7222 health center with that of 486 hospitals. The study period will be from March 2019 to September 2020.

Study Design

Facility-based crossed sectional study will be conducted

Population

source population

master list of the facility which is all of the health facility located in the country comprise differ type and managing authority.

Study population

Selected health facility located in the different corner of the country which avail health service currently

Sample Size Determination

The sample size determination techniques were adapted from the WHO guideline of service availability and readiness assessment tool.

Using the following formula:

$$n = [(z^2 * p * q) + ME^2] / [ME^2 + z^2 * p * q / N] * d$$

where:

n = sample size

z = confidence level at 95% (1.96)

ME = margin of error (15%)

p = the anticipated proportion of facilities with the attribute of interest (0.47)

q = 1-p

N = population size

d = design effect

Determine the sample size for primary level facilities based on the total number of facilities in the sampling frame and the strata of interest. Based on this sample size were determined according to managing authority and facility type. The final sample size is 208.

Table 8.1: Sample determination based on the type of health facility and managing authority in Ethiopia, March 2019

type of health facility/ managing authority	total number of facilities	total sample size	Oversampling of strata
public -hospital	486	40	40
private hospital	75	28	30
private- (clinics)	3474	43	43
public -health centre	7272	43	43
Ngo- (hospital)	14	11	14
Ngo- (HC)	282	38	38
total	11603	203	208

Since the sample was stratified by type health facility and managing authority the sampling procedure needs further classification based on regional administration.

Table 8.2: Number of health facility on type of health facility, managing authority and regional location in Ethiopia, March 2019

	Addis Ababa	Afar	Amhara	Benishangul	Dire Dawa	Gambella	Harari	Oromia	SNNPR	Somali	Tigray
public -hospital	18	12	135	6	4	7	4	147	101	19	33
private-hospital	22	1	10	1	1	0	2	22	13	0	3
private- (clinics)	194	12	789	53	28	0	27	808	55	0	120
public -health centr	1579	181	1689	85	30	54	16	2788	1423	348	464
Ngo- (hospital)	2	0	3	1	0	1	0	2	3	0	1
Ngo- (HC)	19	2	19	17	6	1	3	124	81	2	12
	1834	208	2645	163	69	63	52	3891	1676	369	633

The final sample size was 973 health facilities were selected from the different region of the country based on managing authority and facility type.

Table 8.3: Sample determination based on the type of health facility, managing authority and regional location in Ethiopia, March 2019

	Addis Ababa	Afar	Amhara	Benishangul	Dire Dawa	Gambella	Harari	Oromia	SNNPR	Somali	Tigray	total
public-hospital	13	10	33	5	4	6	4	34	31	13	19	171
private-hospital	15	1	8	1	1	0	2	15	10	0	3	56
private- (clinics)	36	10	41	24	17	0	17	41	25	0	32	243
public-health centr	42	35	42	29	18	24	12	43	42	39	40	367
Ngo- (hospital)	2	0	3	1	0	1	0	2	3	0	1	13
Ngo- (HC)	13	2	13	12	5	1	3	32	29	2	10	123
total	121	57	141	73	45	33	37	167	139	54	104	973

Oversampling of strata where there is most likely to be variations (strata with less than 30 facilities) should be done. This will give the final sample size and sampling proportions for the sample. The final sample size is 1094 to adjust to minimum strata.

Table 8.4:Oversampling of strata based on the type of health facility, managing authority and regional location in Ethiopia, March 2019

	Addis Ababa	Afar	Amhara	Benishangul	Dire Dawa	Gambella	Harari	Oromia	SNNPR	Somali	Tigray	total
public-hospital	18	12	33	6	4	7	4	34	31	19	30	197
private-hospital	22	1	10	1	1	0	2	22	13	0	3	75
private- (clinics)	36	12	41	30	27	0	27	41	30	0	32	276
public-health centr	42	35	42	30	30	30	16	43	42	39	40	390
Ngo- (hospital)	2	0	3	1	0	1	0	2	3	0	1	13
Ngo- (HC)	19	2	19	17	6	1	3	32	30	2	12	143
total	139	62	149	85	68	39	52	174	149	60	118	1094

Sampling procedure

Once the sampling fractions for each stratum have been determined, the facilities from each stratum should be selected using a probability sampling method. the list frame should be partitioned according to the chosen stratification, and within each stratum, the facilities to be included in the sample should be selected by simple random sampling

First select the facilities to be included in the sample from the MFL in excel. Use the following formula to assign a random unique number of each facility.

“IF (\$B\$1, TRUNC (RAND () *(1000000-1) +1), A2)”

Then filter the data so that the column Random is in descending order, from the largest to the smallest. Take all facility according to each stratum required number will have done.

Data collection methods

The questioner was adopted for WHO service availability and readiness assessment tool in addition to this specific to maternity services readiness tool were adopted from Colombia university work through the tool (WTT) in which the initiative was led by a program called averting maternal death and disability.

Study variable

The inventory questionnaire will be organized into the following three modules:

(1) Module 1: elicits information on service availability.

(2) Module 2: collects information on general facility readiness. Seven sections cover topics such as facility infrastructure (sources of water, electricity, etc.), staffing, health management information systems, health statistics, processing of instruments for re-use, health care waste management, availability of basic supplies and equipment, laboratory diagnostic capacity, and medicines and commodities.

(3) Module 3: solicits information on service-specific readiness. This section dealt with the availability of maternity services

Data collection procedures

electronic data collection template will be developed using CSPro 6.1. The modules will be administered directly using a tablet, called the CAPI (computer-assisted personal interviewing) mode.

Data quality control

Quality assurance involved multiple steps along a continuum of training, data collection in the field, and data processing at the central level, especially during the first weeks of data collection, with experienced trainers accompanying the teams to mentor and this will help problem solve as early as possible. Quality assurance will begin with the recruitment of data collectors and team leaders with a health background. Data collectors will take pre- and post-tests to assess their learning and knowledge of the assessment guidelines and standards for data collection

The entered data will be checked by the team leader on the team's tablet. and will make accessible to the regional coordinator and the central survey coordinators when there is an internet connection. The regional coordinator checked for completeness, consistency, and errors. After this review, the teams will send the data to the EPHI Central Office. Further data quality audit will be done by the central assign data manager.

Data processing and Analysis

Data cleaning ranges checking, data structure, and a selected set of checks for internal consistency. All error detected during data editing will be corrected. Prior to analysis, further

steps will be taken to ensure unique identification. numbers, validation of location of health facility, and the recording of “other” responses. All data management will be done using CSPro 6.1 programming. The data will be exported to SPSS and STATA for analysis. ArcGIS ArcMap 10.4.1 software will be used to create maps.

Four common stratification variables will be used throughout the report: namely region, facility type, managing authority and location (urban vs rural).

Operational definition

EMoNC: Emergency obstetric care (EmONC) refers to the care of women and newborns during pregnancy, delivery, and the time after delivery (postpartum period) if or when a woman or her new-born experiences serious complications.

Master facility list: It is a complete listing of health facilities in a country (both public and private) and is comprised of a set of administrative information and information that identifies each facility (unique ID). This list needs to have a schedule for updating. An MFL is important in monitoring the health infrastructure and the services provided to the population and it assists in calculating the percentage of facilities that are included in routine health data collection.

Ethical consideration

EPHI and the Ministry of Health will be written a letter to all the Regional Health Bureaus requesting their support in the national maternity service assessment. Regional Health Bureaus subsequently will write to supporting letters to their lower level Zonal and District Health Offices to ensure that the data collection ran smoothly

Dissemination of Result

The result will be shared with different stakeholder which will be involved like MOH, EPHI and regional health bureaus.

Work plan and budget

Research project budget

Budget summary

Proposal title: Assessment of preparedness Level in managing obstetrics complication in Ethiopia 2019

Duration of project: 20 months

Expected sample size: 1094

Fees	£22,902
Expenses	£1,666
Data collection	£799,254
Other direct project costs	£93,000
Travel for the project team	£233,928
Overhead	£10,871
Total budget	£1,161,620

Budget break down

fees for project personnel					
	Role	Number of days	Daily rate (£)	Total cost (£)	Justification
principle and co-investigator	lead investigator	570	16.6	9462	co-ordinate the over project
other project staff	project data manager	420	16,60	6720	perform data analysis and produce data for the report
	research assistance	420	16,60	6720	
	subtotal			22902	
subtotal fee (£)					22902

Data collector						
	description of item	quantity	Dailey rate (£)	number of day	total cost (£)	justification
field / survey staff salaries	salary per month	146	8.42	120	147518.4	actual data collector on site
	periderm	146	16.6	120	290832	
regional co-coordinator	salary per month	13	14.81	120	23103.6	co-ordinate each region data collection with quality assurance
	periderm	13	16.6	120	25896	
field staff travel	rental car	60	43.32	120	311904	travel

	description item	quantity	cost per unit (£)	total cost (£)	justification
material	tablet	159	49.5	7870.5	to conduct the actual data collector
	sleeping bag	100	30	3000	for personal safety
training	accommodation for training for 10(162 trainee/ 4 trainer	166	500	83000	to provide data collection training for data collector
	validation workshop (4 days)	50	200	10000	to announce the result for stakeholder
dissemination cost	Wi-Fi router	90	18.51	1665.9	

Work plan

	2019											2020							
Timeline of Activities	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep
Preparation																			
Data collector training																			
Field work																			
Data entry																			
Data management																			
Preliminary analysis																			
Final analysis & report writing																			
Validation workshop																			

N.B: The survey will be conducted with co-operating PHEM and Health system department of EPHI. The budget will be covered by the following listed partner with the link of the minister of health (MOH) used for programmatic response and preparedness.

- ✓ **United nation population fund (UNFPA)**
- ✓ **World health organization (WHO)**
- ✓ **Evidence for action (London school of hygiene)**

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Chapter Nine: Additional Outputs

9.1 Weekly epidemiological bulletin

Opening paragraph

PHEM weekly report is one of indicator-based surveillance use as an early warning system in selected priority disease /condition/ event notification in a weekly base. This weekly bulletin is supposed to address the Oromia region in week 29, 2019 according to WHO week format. It enables them to act according to respective analysis.

Introduction

Indicator based surveillance refers to structured data collected through routine integrated disease surveillance, nutritional and laboratory surveillance. Therefore, priority should be given to those diseases that are of interest at national and international levels. In Ethiopia 20 diseases (13 are immediately reportable whereas 8 are weekly reportable) are selected to be included in the routine surveillance.

Methods

Data were collected starting from the community by means of the health post. It became complied at the district level and proceeded zone came to a regional level. It expected arrived in weekly based at the federal level.

Result

The high light of the week

- ✓ Completeness and timeliness rate were 85%.
- ✓ Data quality was good.
- ✓ four cases of suspected AFP were reported
- ✓ Ten maternal deaths were notified
- ✓ Thirteen suspected case of measles was reported
- ✓ No sample was received at EPHI.
- ✓ Completeness rate was above the minimum requirement

Surveillance Report Completeness

The regional completeness was 85% which is above the minimum requirement. However, the following city administration and zone were achieved below the minimal requirement there is a list in ascending order with their respective completeness. Woliso town (50%), North Shoa (62%), Assella Town (67%), East Wollega (71%), West Guji (72%), Arsi (73.7%) and East Hararge (73.8%).

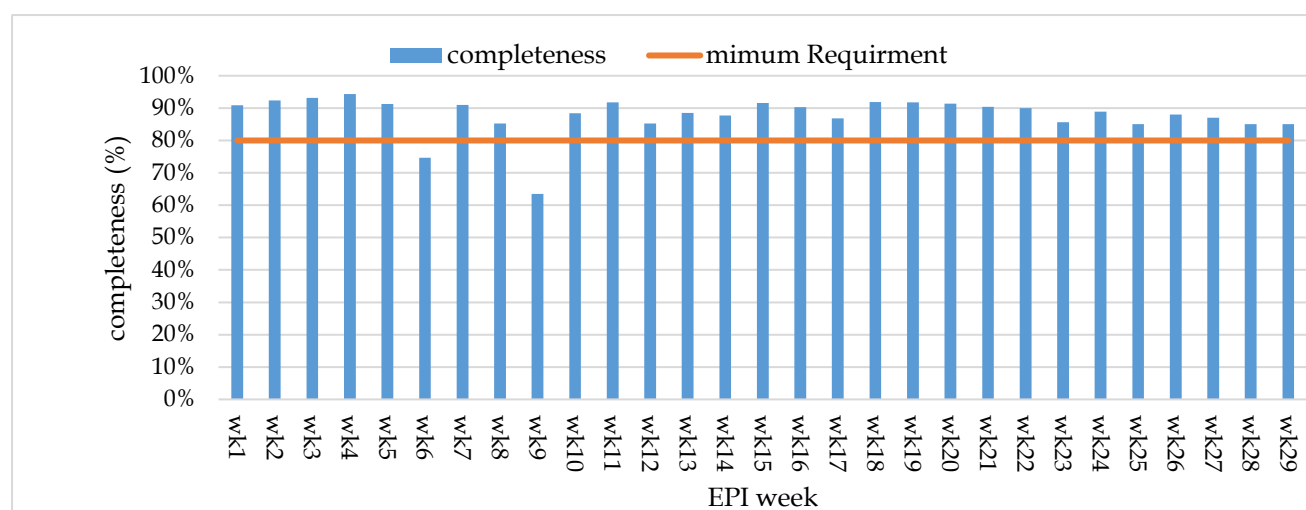


Figure 1: Weekly report completeness, Oromia region, week 1- 29/2018

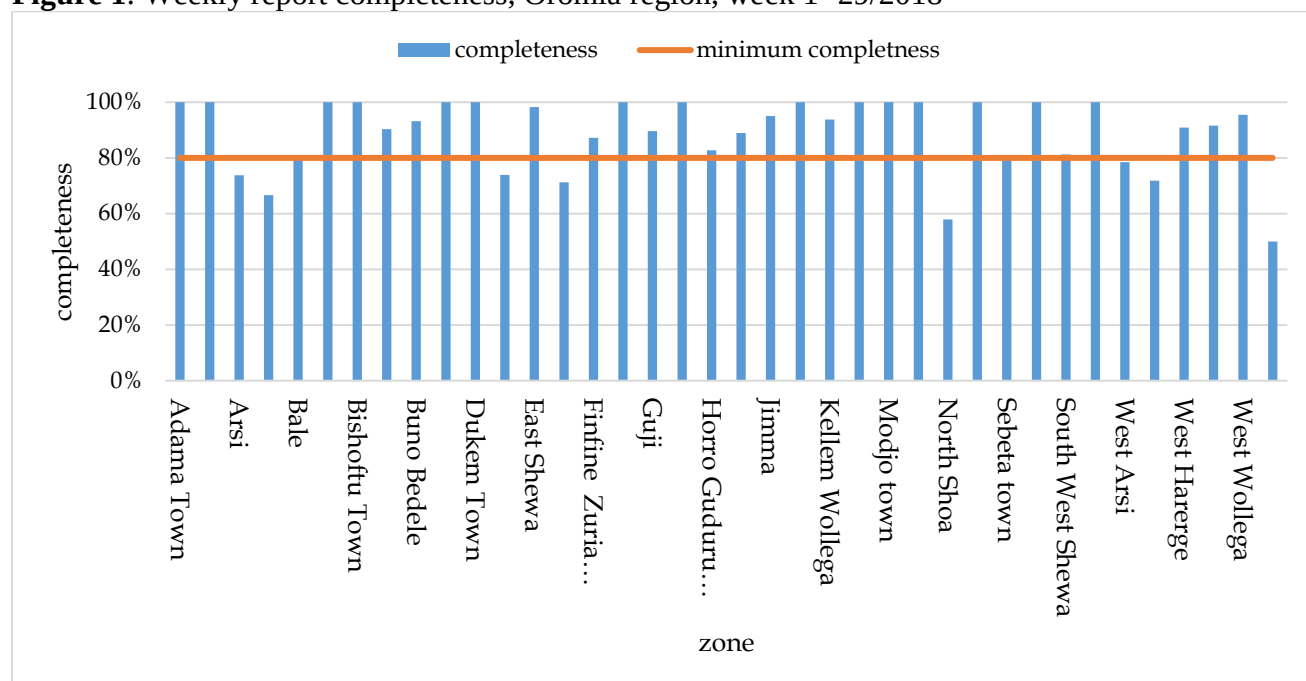


Figure 2: Weekly report completeness by zone Oromia region, week 29/2018.

Moreover, thirty-five reporting area was identified with zero(0%) completeness in week 29,2018.

Table 1 : Districts with (0%) completeness with their respective zone in Oromia region, week 29,2018

zone/district/health facility	reported	expected	completeness
Adama Town			
Adama Town	0	8	0%
Arsi			
Bele Gesgar	0	20	0%
Diksis	0	18	0%
Seru	0	17	0%
bale			
Agarfa	0	28	0%
Dinisho	0	13	0%
Buno Bedele			
Meko	0	13	0%
East Hararge			
Bisidimo Hospital	0	1	0%
Kumbi	0	10	0%
Meyu Muluke	0	19	0%
East Shewa			
Olaniciti Hospital	0	1	0%
East Wollega			
Ebantu	0	23	0%
Gobu Seyo	0	11	0%
Gudeya Billa	0	19	0%
Sebu Sere	0	26	0%
Finfine Zuria Oromia Special Zone			
Mulo	0	10	0%
Holeta Town			
Holeta Town	0	10	0%
North Shoa			
Kuyu Hospital	0	1	0%
Gerar Jarso	0	20	0%
Hidabu Abote	0	25	0%
Kuyu	0	30	0%
Yaya Gulale	0	21	0%
South West Shewa			
St.Luke Hosp.	0	1	0%
West Arsi			
Gambo Hospital	0	21	0%
Kokosa Hospital	0	1	0%
Loke Hada Hospital	0	1	0%
West Guji			
Bule Hora Hospital	0	1	0%
Melka Soda	0	18	0%
West Harerge			
Bedesa town	0	1	0%
West Wollega			
Aira hospital	0	1	0%
Ghimbi Adv.hospital	0	1	0%

2. Surveillance Report Timeliness

The report timeliness rate was 85% which is received on Thursday at EPHI.

3. Data Quality

- Data quality was good
- Reporting date concise with an epidemiological week

4. Immediately reportable diseases /conditions

AFP (Acute Flaccid Paralysis)

Two suspected case of AFP were reported in week 28 from Gumay (Jimma) and St.Luke hospital (South West Shoa).

Measles

Sixteen cases of measles reported in week 28 among the four cases reported from Woliso Town.

Table 2: Measles reported area in week 28,2018, in Oromia region.

Reporting site	frequency	percentage
Woliso Town	5	38.5 %
Fitche Town	2	15.4 %
Sadan Sodo	1	7.7 %
St.Luke Hosp.	1	7.7 %
Asella Town	1	7.7 %
Burayu Town	1	7.7 %
Shashamene	1	7.7 %
Gursum	1	7.7 %
Total	13	

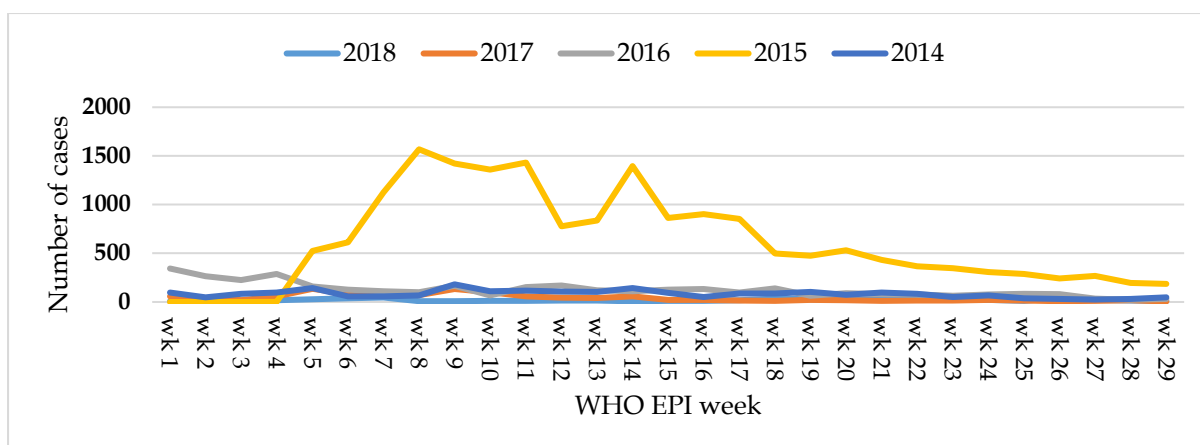


Figure 3: Trends of measles cases, Oromia Region, week 1-28, 2014-2018

Maternal death

Ten maternal death was reported from different district of the region. The detail is illustrated in the table below.

Table: 3: Reported maternal death in different district of Oromia region with their respective zone, wk. 29, 2018.

Reporting site(Zone)	reported maternal death
Fedis(East Hararge)	1
Gida Ayana(East Wollega)	1
Haro Limu(East Wollega)	1
Boset(East Shewa)	1
Jima Ganati(Horro Guduru Wollega)	1
A/Sachi(Illuababora)	1
Abaya(West Guji)	1
Suro Barguda(West Guji)	2
Chiro Hospital(West Harerge)	1

Neonatal tetanus

One neonatal tetanus death was reported from Kuyu Hospital (North Shoa)

Rabies

Three suspected case rabies reported among them two of them were reported from J/Arjoo (East Wollega) and remaining case was from Ghimbi Adv hospital (West Wollega).

Other immediately reportable diseases/conditions

Others were reported as zero

5. Weekly Reportable Diseases /conditions

Malaria

Total of cases 1925 with two inpatient case and with no death was reported. From the reported cases 99.9 % cases were confirmed. Top five high cases reporting zones were: West Guji (26.1%), East Shewa (13.4 %), Guji (6 %), Borena (4.8%) and Jimma (4.6%).

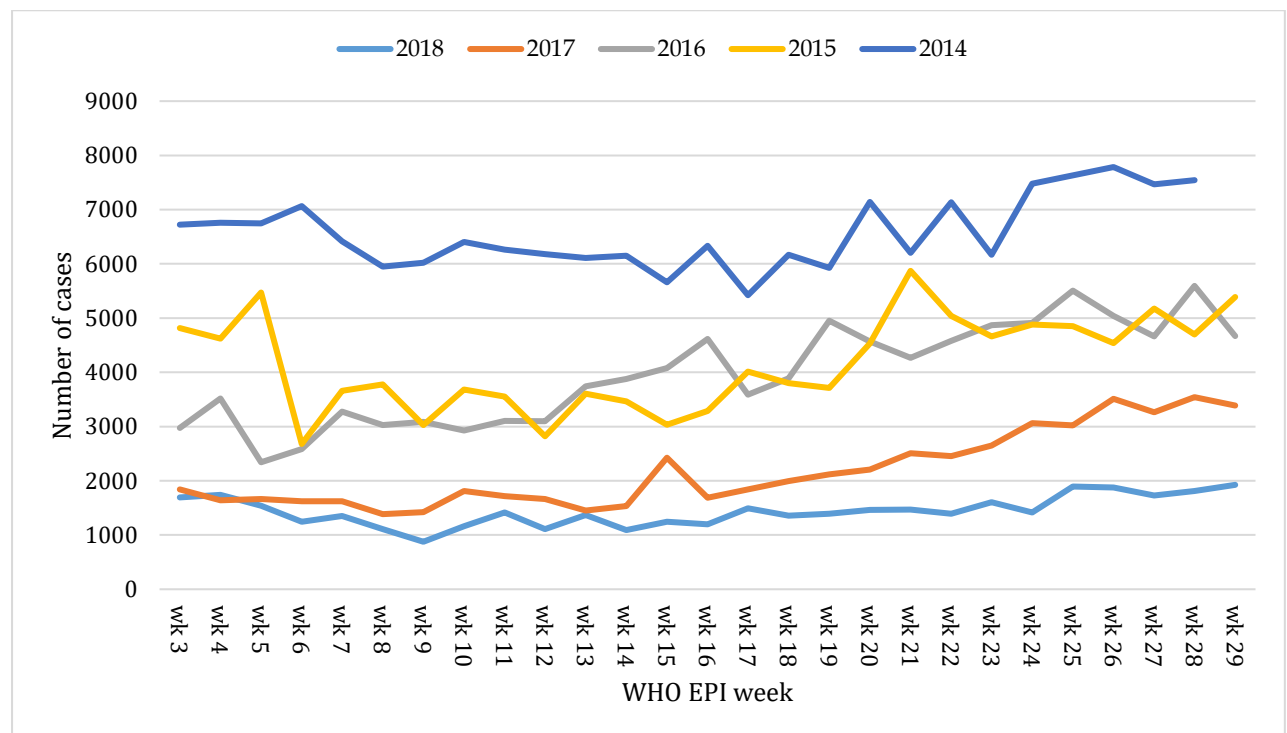


Figure 4: Trends of malaria cases, Oromia region, from week 1-29, 2014-2018

One thousand seven hundred fifty-two (91 %) case reported from seventeen zones of the region. It depicted is figure below.

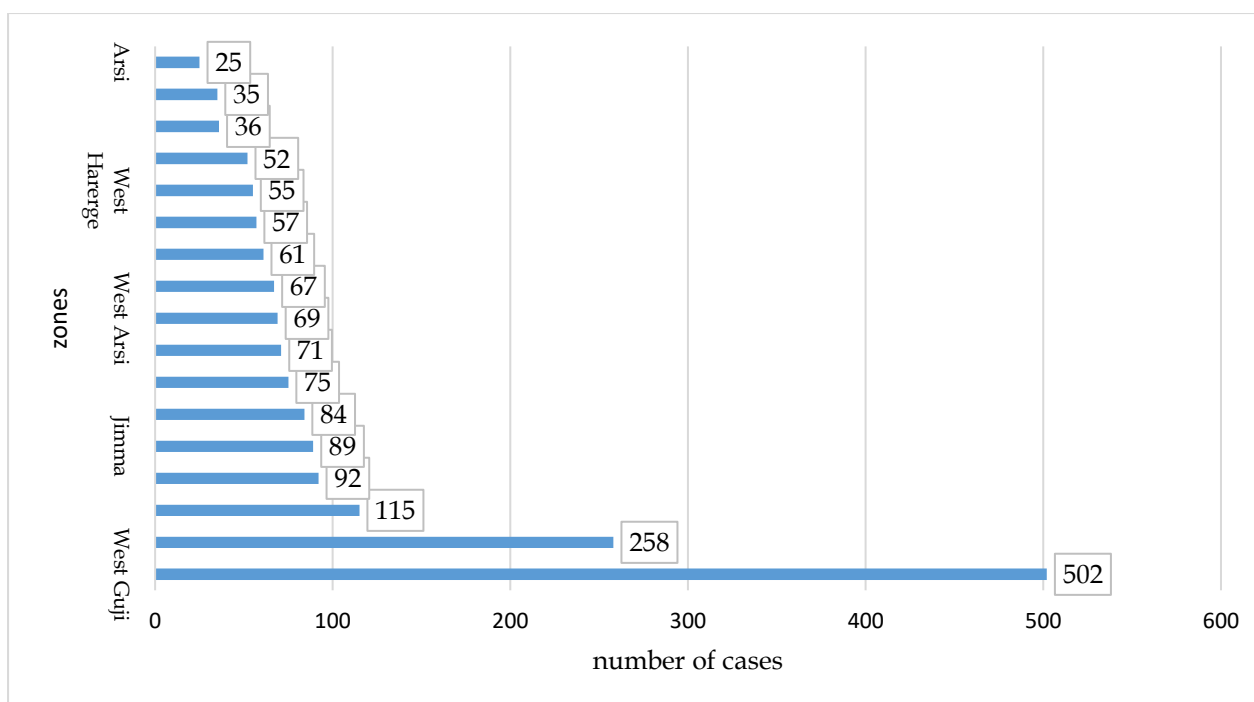


Figure 5: Malaria cases by zone, Oromia Region, week 29, 2018

Furthermore, 44% case was reported from ten districts of the region.

Table 4: Top 10 districts of Oromia region in reporting malaria case in week 29, 2018

woreda	reported cases	percentage	cumulative frequency
Abaya	259	35%	35%
Gelana	110	15%	50%
Adama	69	9%	59%
Fantale	57	8%	67%
Metehara T	51	7%	74%
Teltele	46	6%	80%
Boset	40	5%	85%
Odo Shakiso	38	5%	90%
Adamitulu jido	37	5%	95%
Suro Barguda	34	5%	100%
total	741		

Malnutrition

Total of cases 2218 with 329 inpatient case and with no death was reported. Top five high cases reporting zones were: East Hararge (31%), West Hararge (23%), West Arsi (9%), Bale (7%) and Jimma (5%).

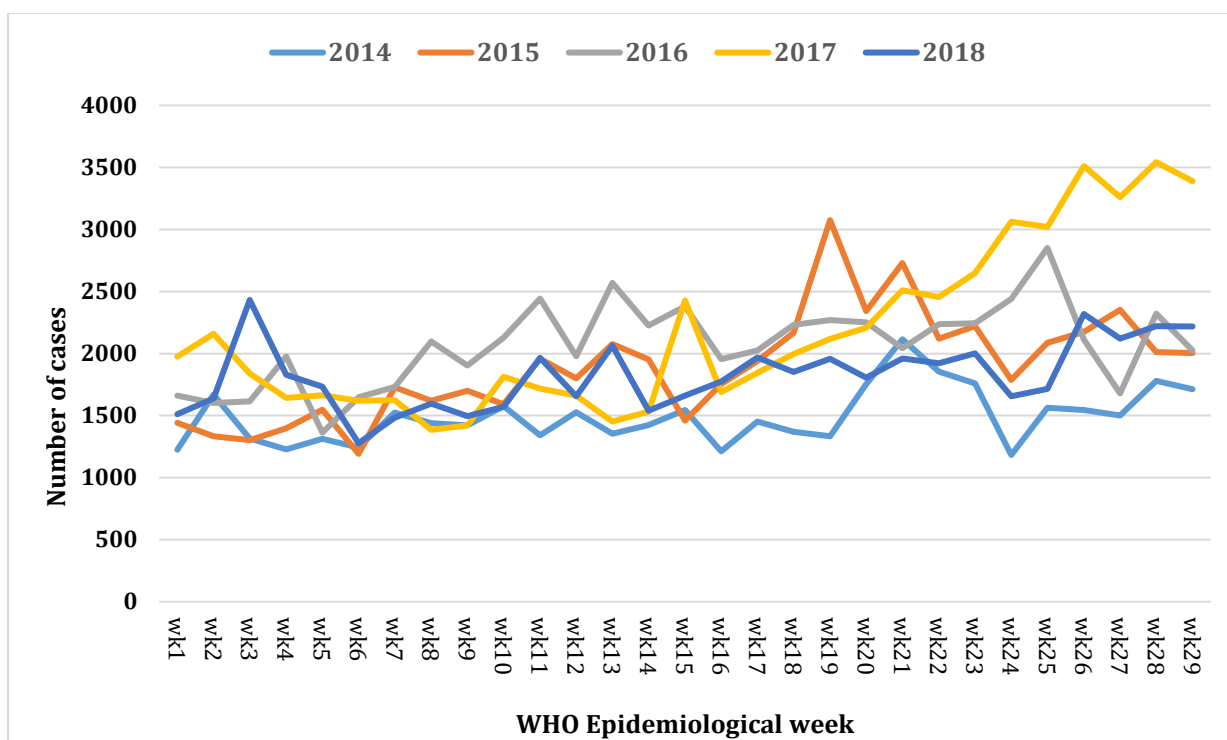


Figure 6: Trends of malnutrition cases, Oromia Region, week 1-29, 2014-2018

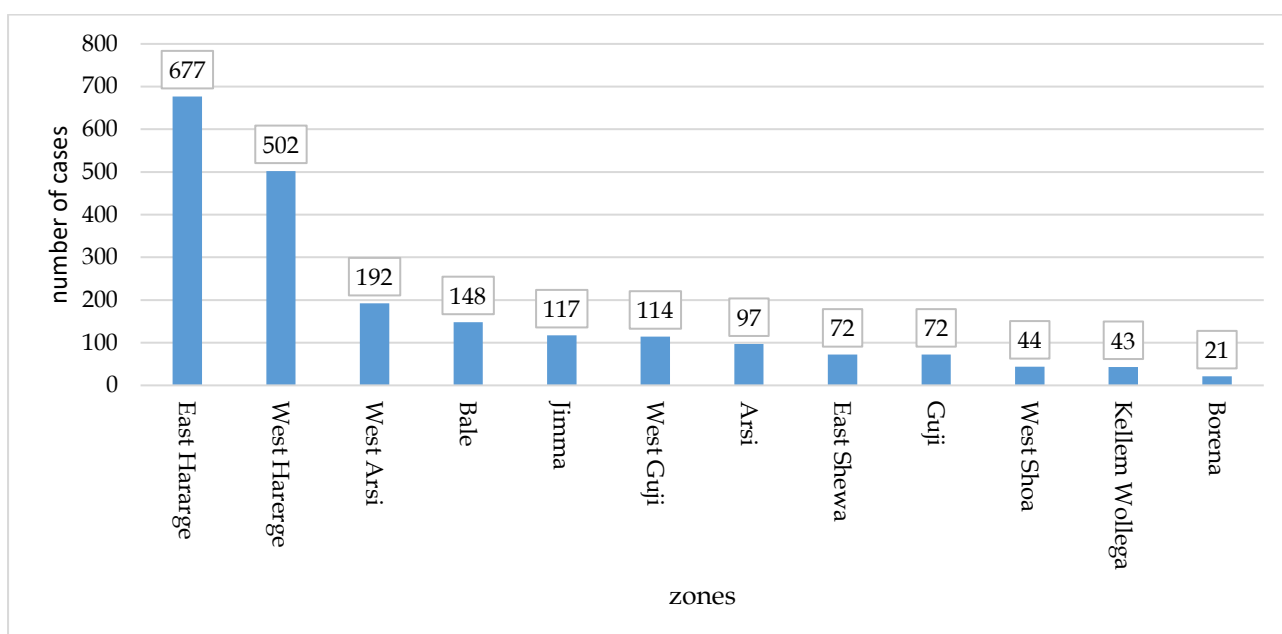


Figure 7: Malnutrition cases by zone, Oromia Region, week 29, 2017

Seven hundred seventy-six (35%) cases reported from ten zones of the region. It depicted is figure below.

Table 5: Top 10 districts of Oromia region in reporting malnutrition case in week 29, 2018

Reporting site	Frequency	Percentage	Culumative frequency
Bedeno	102	13%	13%
Fedis	102	13%	27%
Siraro	95	12%	39%
Habro	94	12%	52%
Haramaya	81	11%	62%
Shalla	69	9%	71%
Gursum	61	8%	79%
Kersa	55	7%	86%
Chiro Rural	55	7%	94%
Oda Bultum	48	6%	100%
total	762	100%	

Meningitis

Thirteen suspected meningitis case was reported as a region in week 29, 2018.

Table 6: Reported suspected meningitis case in Oromia region, week 29, 2018

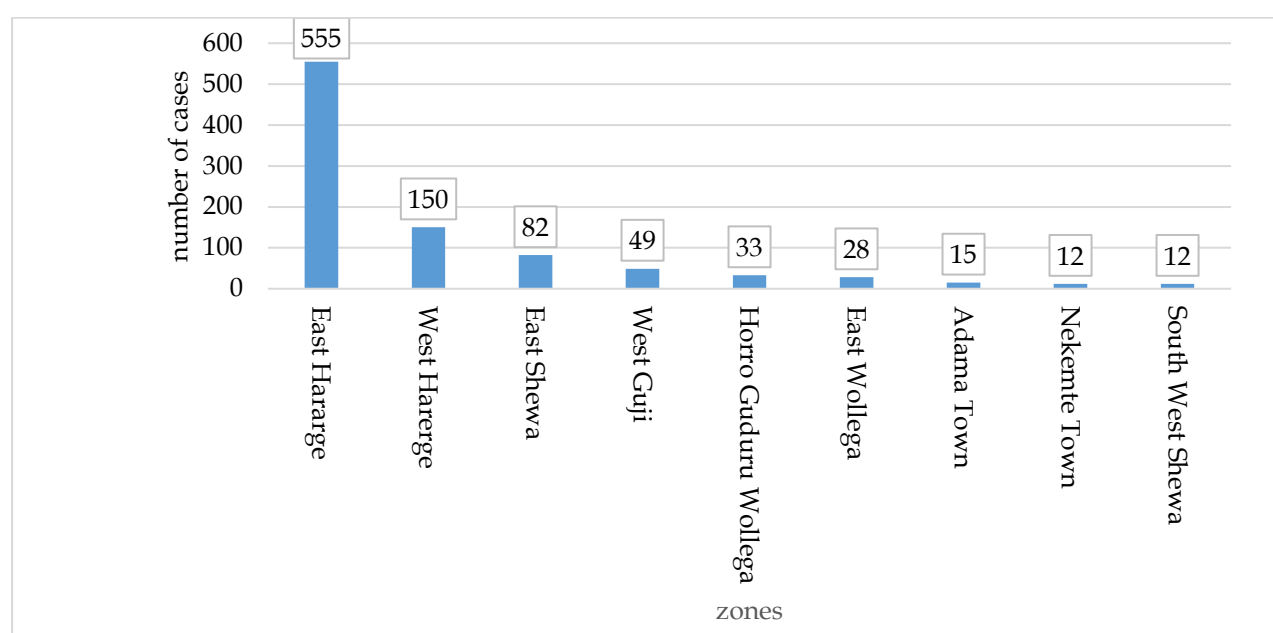
zone/ reporting site	outpatient	inpatient
Arsi		
Merti	0	3
Bale		
Ginir Town	0	2
Guji		
Adola Hospital	0	2
Bore Hospital	2	0
Horro Guduru Wollega		
Shambu Hospital	0	1
Jimma		
Agaro hospital	0	1
Limu Hospital	0	1
Kellem Wollega		
Kake Hosp.	0	1

Scabies

As region 965 case scabies were reported from them 758 (79 %) cases were reported from ten districts of the region. East Hararge, West Hararge, and East Shewa were reported 791(82 %) of the case from the region among them East Hararge contributes 559 (58 %) alone.

Table 7: District reporting a high number of scabies cases in Oromia region, week 29, 2018

Woreda	frequency	Percentage	Cumulative percentage
Fedis	215	28%	28%
Kersa	83	11%	39%
Dugda	82	11%	50%
Jarso	69	9%	59%
Babile Woreda	68	9%	68%
Doba	55	7%	75%
Gursum	54	7%	83%
Abaya	46	6%	89%
Oda Bultum	46	6%	95%
Gumbi Bordede	40	5%	100%
Total	758	100%	

**Figure 7:** Scabies cases by zone, Oromia Region, week 29, 2017**Typhoid fever**

A total of 6837 new cases were reported which five times higher than last week.

Dysentery

A total of 1374 new cases were reported.

Endemic typhus

A total of 1844 new cases were reported.

Relapsing fever

One case was reported from Robe town

6. Laboratory

No sample was received at EPHI

7. Recommendations

- ✓ Completeness rate was above the minimum requirement, should be maintained and further improved,
- ✓ Regular monitoring is mandatory for zones and district who have not achieved the minimum requirement.
- ✓ All notified maternal death should send the next level through the case-based format.
- ✓ A new area of the region was affected by scabies needs to attention before it becomes spread in a remaining area of the region.

9.2 Training

9.2.1 First-round front-line field epidemiology Training of for District Public health emergency management office, for the selected district of Oromia region, 2018

Executive summary of the training

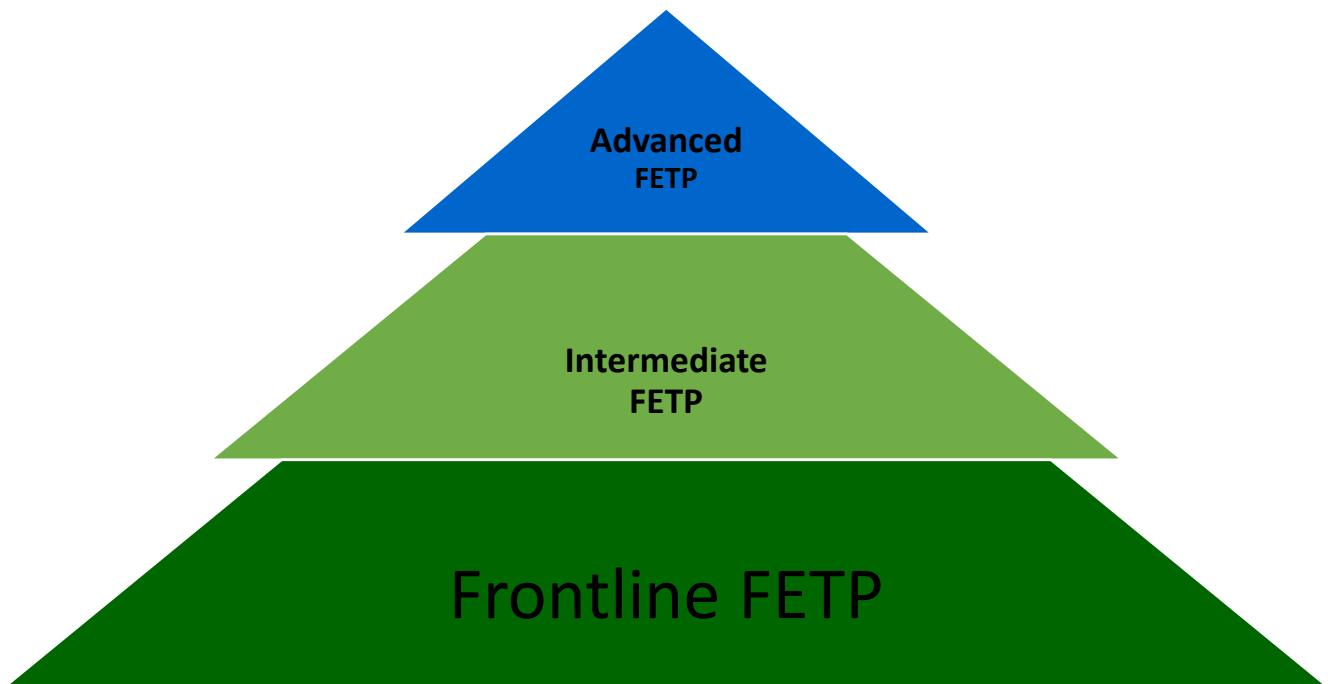
The aim of training is envisioned in order to established and enhance epidemiological capacity of public health workforce and increased the use science and data to appropriate response to public health threat.by consider this public health emergency management officer for selected district for round get training for five data in Dire internal hotel Adama town, Ethiopia,2018.it was started by giving pre-test and making baseline assessment each district officer before moving ahead to the core session of the training. The training was given in two syndicates expected during opening and closing remark. The training was compressive and participatory in both lecturing and during the exercise session. As feedback example (scenarios) weren't customized to our set only directly adopted from CDC.

Background

FETP is an applied public health training program FETPs are established to enhance the epidemiologic capacity of the public health workforce and increase the use of science and data to appropriately respond to public health threats. FETPs help countries to meet their core capacity requirements for surveillance and response under the revised International Health Regulations (IHR, 2005). FETP Is an in-service training program Adopted from CDC, EIS-program, Part of many FETPs, globally, regionally (TEPHINET, AFENET), Zimbabwe (2003), Kenya (2004), Uganda (2005), SA (2006), Tanzania (2008), Ethiopia (2009), EFETP/EFELTP.

FETP has three levels on which started with front line training goes up to an advanced level. The purpose of having different level is proposed to do the following

- ✓ Need more PH staff skilled in epidemiology at every level
- ✓ Strengthen operational epidemiology capacity across the public health system
- ✓ Applicants to 2-year FETP often do not have prerequisite skill sets needed at the advanced level
- ✓ Improves the quality of applicants as they progress to the next program



Basically, frontline epidemiology training is intended to strengthen the district level PHEM capacity in a way to come with a multi-hazard approach. Whereas advance training expected at the regional and federal level.

The overall goal of the training

- ✓ Increased capacity among staff to recognize PH priority problems pertinent to the population

Objectives

- ✓ Increased completion and accuracy of surveillance data reporting and analysis at all levels
- ✓ Increased capacity among staff to provide a descriptive analysis of a PH problem
- ✓ Stronger culture of data-based decision making
- ✓ Have a network of well-trained surveillance officers in the country
- ✓ Improve the quality and use of surveillance data for PHEM

Participants:

A total of 57 participants has attended the training from the different zone of Oromia region. The training is organized by WHO incorporating with EPHI and it cascaded from September 17 to 17, 2018 in Adama town, Dire international hotel. The training was given in two different syndicates to ease the facilitation of the training and ensure active participation of the trainees.

For the well-coming, opening and final discussion and disclosure sessions of the training, all the participants were collected and done in one room.

Training session highlights:

Day One:

The welcoming speech was done by Mr. Dachanaw Alemu (PHEM officer at Oromia regional state) and the training was officially opened by Mr. Tolicha Kebede (delegate individual from WHO) and Yohhanis dugasssa from Ethiopian public health institute then followed by the introduction of participants as well as a trainer and the facilitator. After pre-test was given for participants, general introduction about front line field epidemiology training overview was given by Mr. Tolicha for all the participants before the tea break. The participants were grouped into two (based on the zonal they represented) after that facilitator was assigned for each syndicated room with their respective trainer. *Module 1:* was emphasized on the introduction of PHEM. The session was begun with the introduction and definition of PHEM .it progress to the basic difference between IDSR and PHEM. The later module was finalized by explaining the mandated of national PHEM, type of surveillance that is needed for multi-hazard approach. *Module 2* was dealt with PHEM data collection and introduction IHR. The module was concerned on the source of PHEM data and the role of zero reporting in PHEM. Regarding IHR it more focuses on criteria for reporting any public event which considers as an international concern. *Module 3:* it was dealt with introduction case definition used in PHEM system and familiarization of PHEM reporting format that used in different occasion. *Module 4:* it was the final topic day one training there were exercise and discussion on the topic presented in the whole day.

Day Two:

Day two training was launched by giving daily quiz followed by recap the yesterday topic. After that discussion on yesterday, topic was continued which wasn't finalized by day one session. *Module 5:* for day two the training session was propelled by topic of PHEM data quality. The module basically dealt with the main problem of data quality issues encountered during data collection and entry. It was tried to stress on the impact of poor data quality how affected the entire surveillance cycle. *Module 6:* this module was dealt with fundamental descriptive statics used in PHEM system. Its begums with by defining count, ratio, proportion, and rate. later, it focusses on a measure of central tendency (mean, mode and median) and

measure of disease frequency (incidence, prevalence, some basic mortality rate). Eventually, the training was closed by doing exercise on each topic.

Day Three:

Day three training was started by giving a daily quiz followed by recap the yesterday topic. Subsequently, *module 7*: for day three underway on issue MS excel and word with some basic feature that used for their expected output and make them qualified for the next round of the training. *Module 8*: it focusses in the way of data presentation(displaying). Data can be organized through the creation of tables, graphs, charts, and maps. More emphasis was given on the purpose of creating these visual displays of data is to verify and analyze the data, explore patterns and trends, and to communicate information to others. *Module 9*, it deals on data interpretation which on the component of the surveillance cycle. Data must be interpreted for it to be useful. Data interpretation in comprises the following item like explain epidemiologic and statistical results in plain language. In case surveillance and outbreak data, compare what you observe with what you expect.it needs to consider the quality of the data as well. Finally, there was excise on data interpretation.

Day four:

Day four training was started by giving daily quiz followed by recap the yesterday topic. *Module 10*: a case study on dengue fever surveillance take the whole day it enables the participate recapitulation on lesson cover so far starting from day one. *Module 11*: communication and acting which is the one expected component of the surveillance. The following action can take like Setting Priorities, Planning, Implementation, and Evaluation of disease programmed.

Day five:

Day five training was started by giving a daily quiz followed by recap the yesterday topic. *Module 12*, the topic was dealt with monitor and evaluation .it make stress how to use basic indicators to monitor surveillance and response activities at the district level. Enables to Identify targets and indicators for their belonging district. *Module 13*, shoring brief on given on current major public health threat both at national and international on the topic of AWD and EVD respectively. *Module 14*, field briefing was done on expected output during their attachment. Introducing the mentor with their respective mentis to have discussion time for further progression. Lastly, post-test was given in order to evaluate the overall impact of

training then on conversation take place with regional offices to deal with the administrative matter and closed speech also held at the end of the discussion.

Feedbacks from Participants:

- ✓ Content of training was very relevant and can help to achieve the objectives stated for training
- ✓ The facilitators were well prepared and knowledgeable about the subject matter
- ✓ Case scenarios and exercises prepared to facilitate the training needs to be revised and better if they are prepared and customized to our setup.
- ✓ The training was good, attractive & informative, appreciated the overall process of the training
- ✓ The venue of the training and the hotel accommodations were very good and suitable
- ✓ Even though there were some participants raised on the shortness of time allocated for the training, majority of the participants agree that the time allocated for the training is enough

Annex's

1. Annex: Questioner for Paederus Dermatitis outbreak investigation in district 10,11 & 15 Bole sub city, Addis Ababa 2018

A. Identification

Interviewer name _____ phone _____

Date of data collection _____

Region _____ sub city _____ district _____

B. Socio demographic information

1. Age in years _____ or in month _____
2. Sex ☐ male ☐ female
3. Name the condominium _____
4. numbers of Building block the condominium _____
5. number of floors they reside ☐ 1st ☐ 2nd ☐ 3rd ☐ 4th ☐ ground floor
6. Occupation status ☐ student ☐ government employee ☐ housewife
☐ businessman other (specific) _____
6. ethnicity ☐ Oromo ☐ Amhara ☐ Tigraway ☐ others (specific) _____
7. religion ☐ orthodox ☐ Muslim ☐ protestant ☐ catholic
☐ Others (specific) _____
8. educational status ☐ Illiterate ☐ read and write ☐ Elementary
☐ Secondary ☐ Above secondary
9. marital status ☐ single ☐ married ☐ divorced ☐ widowed

C. Questions related to knowledge of respondents about the disease

1. Do you know what Paederus dermatitis? ☐ Yes ☐ No
2. what is cause of dermatitis ☐ insect ☐ Curse ☐ parasites
☐ witchcraft ☐ I don't know ☐ others _____
3. How do you think the dermatitis is transmitted? (you can pick more than answers)
☐ By direct skin to skin contact with an ill person
☐ Direct contact with the inset without crashing

☐ Direct contact with crashing insect on body

☐ Others _____

4. where do you go, we you get dermatitis?

☐ Health facility ☐ use home-made remedy ☐ traditional healer

☐ Holy water ☐ others (specify)_____

5 How do you think dermatitis can be cured?

☐ Using modern medicine ☐ Using traditional Medicine

☐ Holly water ☐ nutritious foods

☐ Keeping the sick person indoor ☐ Other (Specify) _____

D) Previous medical history of cases

Do you have Diabetes mellitus? Yes ☐ No ☐

Do you have hypertension? Yes ☐ No ☐

Do you have known allergy? Yes ☐ No ☐

Do you have tuberculosis before? Yes ☐ No ☐

E) Clinical features & management of the disease (for cases ONLY)

1. admission status ☐ outpatient ☐ inpatient

1. How many days take to develop sign and symptom after contact with an insect?

☐ One day ☐ two days ☐ three day

2. number lesion due to diseases ☐ 1 ☐ 2 ☐ 3 ☐ 3and above

Symptom of disease

3.Itching Yes ☐ No ☐

4. burning sensation Yes ☐ No ☐

5. neuralgia (pain) Yes ☐ No ☐

6. fever Yes ☐ No ☐

7. vomiting Yes ☐ No ☐

Site of lesion

1. Faces Yes ☐ No ☐

2. Back Yes ☐ No ☐

3. Back of neck Yes ☐ No ☐

4. Neck Yes ☐ No ☐

5. Shoulder Yes ☐ No ☐

6. Lower Limb Yes ☐ No ☐

7. Upper Limb Yes ☐ No ☐

8. Genital area Yes ☐ No ☐

Lesion feature

1. Erythema	Yes	☐	No	☐
2. Linear lesion	Yes	☐	No	☐
3. Vesicles	Yes	☐	No	☐
4. Pustules	Yes	☐	No	☐
5. Erosion	Yes	☐	No	☐
6. Kissing lesion	Yes	☐	No	☐

Treatment took

1. Tropical steroid	Yes	☐	No	☐
2. Antihistamine	Yes	☐	No	☐
3. Nonsteroid anti-inflammatory	Yes	☐	No	☐
4. Topical anesthetize	Yes	☐	No	☐
5. Anti-bacterial treatment	Yes	☐	No	☐

Out comes the cases

☐ Subside ☐ residual pigmentation ☐ secondary infection

☐ Temporal blindness ☐ kerta conjunctivitis

F. Questions related to risk factors

1. Did you travel outside of your village prior to developing the disease?

Yes ☐ No ☐

2. If the answer is no for question number 1, where have you been?

District _____ Keble _____ Got _____

3. Is there in farmland area in your surrounded?	Yes	☐	No	☐
4. Are you nut farm worker?	Yes	☐	No	☐
5. Do you sleep on the floor?	Yes	☐	No	☐
6. Does the window are open during the night?	Yes	☐	No	☐
7. Do you close the windows before switching on the light?	Yes	☐	No	☐
8. Do sleep with artificial light in the bedroom?	Yes	☐	No	☐
9. Do use a fluorescent lamp in the home?	Yes	☐	No	☐
10. Do use the incandescent lamp in your home?	Yes	☐	No	☐
11. Is there rotten leave in your surrounding area?	Yes	☐	No	☐
12. Do you use pesticides?	Yes	☐	No	☐
13. Do you use repellent during sleep?	Yes	☐	No	☐
14. Do you wear protective close (close with long sleeve)?	Yes	☐	No	☐
15. Do use bed net in your bedroom?	Yes	☐	No	☐
16. Do you blow beetle from your body?	Yes	☐	No	☐
18. Do you check the ceiling and surrounding before getting sleep?	Yes	☐	No	☐
19. Do you wash your hand by soap after making contact with a beetle?	Yes	☐	No	☐
20. Do you have outdoor light in front of house?	Yes	☐	No	☐

2. Annex: Questioner use for measles outbreak investigation in Mubarak district, Dawa Zone, Somalia region, Ethiopia

Patient Name _____ Respondent Status: A. Case B. Control

Date of data collection _____

Region _____ Zone _____ District _____ Kebele _____

Got _____ Phone _____ Location: Longitude: _____ Latitude: _____

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	1. Farmer 5. Daily laborer 2. Housewife 6. Merchant 3. Student 7. Gov't employee 4. Unemployed 8. Other (specify) _____
1.4	Family Occupation	1. Farmer 5. Daily laborer 2. Housewife 6. Merchant 3. Student 7. Gov't employee 4. Unemployed 8. Other (specify) _____
1.5	Educational level of the patient	1. Illiterate 4. Secondary 2. Read and write 5. Above secondary 3. Elementary 6. Under school age
1.6	The educational level of the family	1. Illiterate 4. Secondary 2. Read and write 5. Above secondary 3. Elementary
1.7	Marital status of the patient	1. Single 4. Widowed 2. Married 5. Separated 3. Divorced
1.8	Family size	_____
1.9	Is there any sick person with rash, fever, running nose In the family?	1. Yes 2. No
1.10	If yes, number of sick person	

II. Clinical History of Diseases:

2.1	What was the symptom?	1. fever 2. Rash 3. cough 4. coryza (runny nose), 5. Conjunctivitis (red eyes) 6. Others _____
2.2	ONLY if complication	a) Pneumonia: 1. yes 2. no b) Cornea: 1. yes 2. no c) Blindness: 1. yes 2. no d) Convolution 1. Yes 2. no e) Otitis media (ear discharge): 1. yes 2. no f) Diarrhea: 1. yes 2. no g) Feeding problem 1. Yes 2. no
2.3	Date of onset of rash	____/____/____
2.4	Duration of rash _____	
2.5	Date seen at health facility	____/____/____
2.6	Illness duration before visiting the health facility	_____ in days/hours
2.7	Did you (he/she) take treatment?	1. Yes 2. No
2.8	If yes, treatment taken	1. ORS 2. Antibiotics 3. Vitamin A 4. Supplementary food 5. TTC ointment 6. Anti pyretic 7. Others given _____
2.9	Did you recover after the treatment?	1. cure 2. partially 3. deteriorated/ disabled 4. death

III. Risk factor

3.1	Did you ever vaccinate for measles?	1. Yes 2. No 3. Unknown 4. Not applicable
	Is there vaccination card	1. Yes 2. No
	If yes last vaccination date	1. patient recall ____/ ____/ ____ dd/mm/yy 2. Vaccination card ____/ ____/ ____ dd/mm/yy 3. I don't remember
3.2	Number of vaccine doses received	1. one dose 2. two doses 3. three and above
3.3	Age at first vaccination.	_____
3.4	If not vaccinated why?	1. lack of knowledge about vaccination campaign, 2. absence during vaccination campaign, 3. Religious exemptions 4. other, specify
3.5	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) place of travel	1. School 2. Neighbor 3. Market 4. Other _____
3.6	Did you contact with a person with measles symptoms within the last 2- 3 weeks?	1. Yes 2. No
3.7	Do you have any travel history four days before and after rash onset	1. Yes 2. No If Yes where _____
3.8	Do you have any contact history with someone else four days before and after rash onset	1. Yes 2. No If Yes with whom _____
3.9	Do you know modes of transmission for measles?	1. Yes 2. No 3. If yes specify _____
3.10	Nutritional status of the cases/control	1. Normal 2. Moderate 3. Severely malnourished

3.11	What is the estimated area of the house?	_____
3.12	House condition?	1. ventilated 2. not ventilated
3.13	Distance from house to HC?	1. greater than 5 km 2. equal or less than 5 km
3.14	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) _____
3.15	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. Other (Specify) _____
3.16	Do you Know measles is vaccine preventable?	1. Yes 2. No 3. Don't Know
3.17	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): _____
3.18	How do you think measles can be cured?	1. Using modern medicine 2. Using traditional Medicine 3. Holy water 4. By feeding nutritious foods 5. Keeping the sick person indoor 6. Other(Specify) _____

3. Annex; number of vaccinated individuals in different age group in Mubarak, from October to November 2018

SN	Woreda	kebele	Target Population				No. vaccinated for Measles							
			6-11 months	12-59 months	60-179 months	Total	6-11 months		12-59 months		60-179 months		Total vaccinated for measles	Coverage %
							Vaccinated before	Not vaccinated before	Vaccinated before	Not vaccinated before	Vaccinated before	Not vaccinated before		
1	Mubarak	CHILANKO	228	1581	3897	5706	112	99	2311	0	3012	0	5534	97.0
2	Mubarak	MUBARAK 02	109	755	1861	2725	52	40	1032	2	1490	0	2616	96.0
3	Mubarak	JAARA	93	646	1592	2331	50	30	692	3	1416	0	2191	94.0
4	Mubarak	MALKA MARI	17	120	296	433	10	8	126	0	264	0	408	94.2
5	Mubarak	WARWALU	37	254	627	918	17	13	287	0	564	0	881	96.0
6	Mubarak	EYMOOLE	30	211	519	761	16	10	180	0	509	0	715	94.0
7	Mubarak	ANDARAK	22	149	367	538	12	8	189	2	295	0	506	94.1
8	Mubarak	MALKA WILLA	45	310	765	1120	18	17	345	4	702	0	1086	97.0
9	Mubarak	HAWAN	117	811	1999	2927	65	40	940	6	1671	0	2722	93.0
10	Mubarak	GALGALU	211	1459	3598	5268	97	88	1850	9	3066	0	5110	97.0
11	Mubarak	HAYGUDA	50	348	858	1256	25	19	431	5	713	0	1193	95.0
12	Mubarak	LIIBAN TULICHA	26	180	443	649	12	10	208	6	387	0	623	96.0
13	Mubarak	ELYAABO	40	275	678	993	16	14	355	4	544	0	933	94.0
14	Mubarak	ODA DIMA	36	249	615	900	15	13	284	3	531	0	846	94.0
15	Mubarak	BIDIRU	32	222	546	800	14	10	265	4	475	0	768	96.0
16	Mubarak	Total	1093	7569	18663	27324	531	419	9495	48	15639	0	26132	96.0

4. Annex: vaccine wastage and rate for measles and number of AEFI in Mubarak district, from October to November ,2018

SN	Woreda	kebele	Vaccine wastage rate for measles					No. of AEFI					
			No. of measles vial received	No. of measles vial used	No. of measles vial unused due to VVM change	No. of vial returned unused & in good condition	Wastage rate	1	2	3	4	5	6
1	Mubarak	CHILANKO	614	590	2	22	6.5						
2	Mubarak	MUBARAK 02	290	277	1	12	5.9						
3	Mubarak	JAARA	243	232	1	10	6.0	1					
4	Mubarak	MALKA MARI	45	43	1	1	7.3						
5	Mubarak	WARWALU	98	93	1	4	6.3						
6	Mubarak	EYMOOLE	79	77	1	1	8.3						
7	Mubarak	ANDARAK	56	54	0	2	6.3						
8	Mubarak	MALKA WILLA	121	115	0	6	5.6						
9	Mubarak	HAWAN	302	289	1	12	6.1						
10	Mubarak	GALGALU	567	542	1	24	5.9						
11	Mubarak	HAYGUDA	132	126	0	6	5.3	1					
12	Mubarak	LIIBAN TULICH	69	66	0	3	5.6						
13	Mubarak	ELYAABO	104	99	0	5	5.8	1					
14	Mubarak	ODA DIMA	94	90	0	4	6.0						
15	Mubarak	BIDIRU	85	81	1	3	6.3	1					
16	Mubarak	CHILANKO	2899	2774	10	115	6.1	4	0	0	0	0	0

5. Annex: Facility-based ward notification form and Facility based abstraction form

Notification (section one)		
1.	Name of the deceased	
2.	Medical Record Number/ Client Card Number:	
3.	Household address:	District/Sub city _____ Kebeles _____ Gott _____ HDA team _____ house number: _____
4.	Date of the woman's death	DD/MM/YYYY ____/____/____
5.	Time of the woman's death	
6.	Date of Notification:	DD/MM/YYYY ____/____/____
7.	WARD on which death occurred	
8.	Name of the person reporting death:	
9.	Signature	

Reporting Facility Information						
Reporting Health Facility: _____				District: _____		
Zone : _____		Region: _____		Date of Reporting DD/MM/YYYY ____/____/____		
Deceased Information						
Deceased ID: _____		Date of Death DD/MM/YYYY / ____/____			Age at death: ____ Years	
Place of Death	1. at home 2. at health post 3. at health center		4. at Hospital 5. on transit 6. Other specify _____			
Marital status	1. Single 2. Married		3. Divorced 4. Widowed			
Religion: _____		Ethnicity: _____				
Level of Education	1. Illiterate 2. No formal education but can read and write 3. Elementary school		4. Highschool 5. College and above 6. I do not know			
Gravidity _____		Parity _____				
Timing in relation to pregnancy		1= Antepartum		2= Intrapartum		3= Postpartum
Antenatal Care (ANC)						
Attended ANC?		1. Yes 2. No 3. Not known				
If yes, where is the ANC?		1. Health post 3. Hospital 2. Health center 4. Other(specify) _____				
If yes, number of ANC visits		_____				
Basic package of services provided on ANC (Tick ALL that apply)		☐ RPR ☐ U/A Hgb, BP measurement during the follow up Blood group, Fefol supplementation HIV status, TT immunization				
Cause of death						
Direct obstetric	1= hemorrhage	2= obstructed labor	3= HDP	4=abortion	5= sepsis	6. Others
Indirect obstetric	1=anemia,	2= malaria	3= HIV	4= TB	5. Others _____	
If delivered, what is the outcome?		1. Live birth 2. Stillbirth				
Is the death preventable?		1= Yes 2= No		3= I do not know		
Contributory factors (Thick all that apply)						
Delay 1	☐ Traditional practices ☐ Lack of decision to go to health facility Family poverty Delayed referral from home Failure of recognition of the problem					
Delay 2	☐ Delayed arrival to referred facility ☐ Lack of transportation Lack of roads No facility within reasonable distance Lack of money for transport					
Delay 3	☐ Delayed arrival to next facility from another facility on referral Delayed or lacking supplies and equipment's(specify) Delayed management after admission Human error or mismanagement					

ii	Antenatal/ intranatal problems/risks (Tick ALL that apply)	Pre-eclampsia / eclampsia Placenta Previa Previous Caesarean Section Multiple gestation Abnormal lie/presentation	Anemia Malaria UTI/pyelonephritis Unintended pregnancy Other (specify)
9	State of pregnancy at the time of death	1. Antepartum 2. Intrapartum 3. Postpartum	4. Post abortion 5. Ectopic
10	If delivered, what is the outcome?	1. Live birth 2. Stillbirth	
11	Date and place of delivery	Date: _____	
12	Place of delivery: _____	1. Health post 2. Health center	3. Hospital 4. Other (specify)
13	Gestational Age at the time of death in antepartum and /or intrapartum events (specify time period in months & weeks)		
14	If the death was post-partum or post abortion, after how many days did the death occur?	days	
IV. Facility Episode			
1	Date and time of admission	Date _____ Time _____	
2	Day of admission	1. Working days 2. Weekends 3. Holiday	
3	Main reason/symptom for admission		
4	Is it a referred case? <i>If "No" to question number 5 go to number 9</i>	Yes	No
5	Referred from (Name of health facility)		
6	Reason for referral		
7	Comment on referral - Accompanied by HCWs - Appropriate management		
8	Summary of management at hospital		
9	Qualification of the most senior attending health professional(s)		
10	Primary cause of death		
11	Is this preventable death?		
12	If preventable maternal death, specify factors according to the three-delay model		
i	Delay in seeking care		
ii	Delay in reaching at right facility		
iii	Delay within the facility (diagnostic and therapeutic)		

6. Annex: Action Plan Developed Based on Major Problems Identified on Health Profile Assessment of Dilla Zuria district

Identified Problems	Ordered Solutions	Possible Responsible Body	Time Frame
1. infrastructure			
Lower coverage of water supply and inaccessibility for 24-hour electrical power supply	Considering maintenance and repair of useless water schemes as well as expanding new water schemes	Dilla zuria district water energy and offices	Juan 30/2018
	Availing power supply for kebeles has no current supply	Dilla district, south region	Juan 30/2018
no preparatory school	Constructing preparatory school	SNNP education offices	JULY 2019
2. vital event registration			
No vital event registration	Aware importance vital event registration for the public	Gedea zone vital event registration office	Continues
	Monitoring and follow-up the process by higher official continuously	Gedea zone vital event registration office	Routine
3. general disease burden			
High burden of pneumonia and diarrheal disease both in under 5 and typhoid fever and Helminthiasis general population	Health education on prevention and control of respiratory disease, hygiene and sanitation practices	Dilla zuria district health offices	Routine
	Improve latrine utilization using health extension worker	Dilla zuria district health offices	Routine
4. Reproductive and Maternal Health			
Low Contraceptive acceptance rate	Integrated assessment on reasons for lower maternal health coverage	Dilla zuria district health offices	Juan 30,2018
	Supportive supervision on health facilities that	Dilla zuria district health offices	routine

	provide family planning services		
	Health promotion activities on family planning and options of contraceptives	Dilla zuria district health offices	Ongoing

Low ANC 4 Coverage	Integrated assessment on reasons for lower maternal health coverage	Dilla zuria district health offices	December 2018
	Increases awareness of mother using the nearby structure as well as a health worker	Dilla zuria district health offices	Routine
Lower intuitional delivery	Encourage intuitional delivery by providing good serving for pregnancy	Gedio zone health office and Dilla zuria district	Ongoing
Lower postal service	Increase aware of pregnancy mother about the advantage of the service	Gedio zone health office and Dilla zuria district health offices	Ongoing
Loss of following in TT vaccination and documentation	Aware mother about TT vaccination	Dilla zuria district health offices	Routine
	Monitoring and follow up service by woreda using EPI team	Dilla zuria district health offices	Ongoing
5.TB and HIV			
Low performance in conducting HIV/AIDS prevention and controlling activity	Increase the accessibility to get the service like school and market	Dilla zuria district health offices	Ongoing
	Improve the aware of the disease using local media	Gedio zone health office and Dilla zuria district health offices	Ongoing
6. Endemic disease			
End up of the term use of malaria bed net	Considering availing new impregnated bed net for hot spot Kebeles	SNNP region and Gedio zonal health offices	Juan /2018
Treat more than 5 % malaria case clinically	Follow up and monitoring to act according	Dilla zuria district health offices	routine
7.drug supply			
Delay in refiling of essential drug	Early need assessment and planning of Pharmaceutical in the district	Dilla zuria district health offices	August 30
	Purchase of tracer drugs	PFSA	Oct 20
Unavailability of drug administration guideline	Availing guideline for all health facility	SNNP Region health offices	August 30

8. Road traffic			
not used helmet by motorcycle driver the district	Enforce by law to use as mandatory	Dilla zuria road traffic and safe authority	Ongoing
	Improve aware of the community using local media	Dilla zuria road traffic and safe authority	Routine
9.others			
Loss of following of the health extension worker	Monitoring and evaluation the activity health routinely using assigned individual of districts	Dilla zuria district health offices	Routine
	Including Supervision of districts to evaluate the activity health extension	Gedio zonal health offices	Routine
Lack of attention for social inequality	Organized and compiled the special need community data of the district	Dilla zuria social affair officer	August 30
	Create a connection for who was interested in this area	Gedio zone social affair offices	Ongoing
	Facility important item need for them	SNNP region social affair offices	Ongoing

7. Annex: for questioner The Services availability and readiness assessment questioner for managing obstetrics complication

Section one _ cover page

	Question	Result		
SECTION 1:1 COVER PAGE				
INTERVIEWER VISITS				
001	Facility number			
002	Is this a supervisor validation check of a facility?	Data collection for facility assessment..... supervisor validation.....		1 2
Date Interviewer Name	1	2	3	Final visit Day Month Year Int. number

Section 1.2 - facility IDENTIFICATION

003			
004	Location of facility		
005	Region/Province		
006	District		
007	Type of facility	Referral hospital	1
		District/provincial hospital ...	2
		Health center/clinic	3
008	Managing Authority	Government/public	1
		Ngo/not-for-profit	2
		Private-for-profit	3
009	Urban/Rural	Urban.....	1

		Rural	2
010	Outpatient only	Yes	1
		No	2

	I have a few questions on staffing for this facility. Please tell me how many staff with each of the following qualifications are currently assigned to, employed by, or seconded to this facility. Please count each staff member only once, based on the highest technical or professional qualification. For doctors, I would also like to know, of the total number, how many are part-time in this facility	A) assigned/ employed/ seconded (including part-time)	B) part-time
01	Generalist (non-specialist) medical doctors		
02	Specialist medical doctors		
03	Non-physician clinicians/paramedical professionals		
04	Nursing professionals		
05	Midwifery professionals		
06	Pharmacists		
07	Laboratory technicians (medical and pathology)		
08	Community health workers		
09	Health officer		

SECTION 3: INPATIENT AND OBSERVATION BEDS

3.1	Excluding any delivery beds, how many overnight/inpatient beds in total does this facility have, both for adults and children?		
3.2	Of the overnight/inpatient beds in this facility, how many are dedicated maternity beds? THIS DOES NOT INCLUDE DELIVERY BEDS		

SECTION 4: infrastructure
_Communication

4.1	Does this facility have a functioning landline? a telephone that is always available to call outside client services are offered? Clarify that if the facility offers 24-hour emergency services, then this refers to 24-hour availability	Yes..... 1 No.....2
4.2	Does this facility have a functioning cellular telephone or a private cellular phone that is supported by the facility?	Yes..... 1 No.....2
4.3	Does this facility have a functioning short-wave radio for radio calls?	YES..... 1 NO..... 2
4.4	Does this facility have a functioning computer?	YES..... 1 NO..... 2
4.5	Is there access to email or the internet within the facility today?	YES..... 1 NO..... 2

Ambulance/ transport for emergency			
4.6	Does this facility have a functional ambulance or another vehicle for emergency transportation for clients that are stationed at this facility or operates from this facility?	Yes..... 1 No.....2	→ 4. 8
4.7	Does this facility have access to an ambulance or another vehicle for emergency transport for clients that is stationed at another facility or that operates from another facility in near proximity?	YES..... 1 NO..... 2	
4.8	Is fuel for the ambulance or another emergency vehicle available today?	YES..... 1 NO..... 2 Don't know...3	

Power supply			
4.9	Does your facility have electricity from any source (e.g. electricity grid, generator, solar, or other) including for stand-alone devices (EPI cold chain)?	YES..... 1 NO..... 2	
4.10	What is the electricity used for in the facility?	Only stand-alone electric medical devices/appliances (e.g. EPI cold room, refrigerator, suction apparatus, etc.) 1 Electric lighting (excluding flashlights) and communications 2 Electric lighting, communications, and 1 to 2 electric medical devices/ appliances..... 3 All electrical needs of facility.....4	
4.11	What is the facility's main source of electricity?	Central supply of electricity (e.g. National or community grid).... 1 Generator (fuel or battery-operated generator) ... 2 Solar system ... 3 Other _____ (specify)96	
4.12	Other than the main or primary source, does the facility have a secondary or backup source of electricity? IF YES: What is the secondary source of electricity?	No secondary source 0 Central supply of electricity (e.g. national or community grid).... 1 Generator (fuel or battery-Operated generator) ... 2 Solar system 3 Other _____ (specify)	
4.13	During the past 7 days, was electricity available at all times from the main or any backup source when the facility was open for services?	Always available (no interruptions)..... 1 Often available (interruptions of less than 2 Hours per day) 2 Sometimes available (frequent or prolonged Interruptions of more than 2 Hours per day) 3	
	Check q411 and q412: The facility has a generator ("2" circled for Either question)	The facility does not have a generator ("2" not circled for both questions)	
4.13	Is the generator functional?	Yes..... 1 No..... 2 Don't know 98	
4.14	Is there fuel or a charged battery available today?	Yes..... 1 No..... 2 Don't know 98	

4.15	Check q411 and q412: Facility has a solar system ("3" circled For either question)	The facility does not have a solar system ("3" not circled for both questions)	
4.16	Is the solar system functional?	Yes, functioning..... 1 Partially, battery needs Servicing/replacement 2 No, not functional 3 Don't know 98	
BASIC CLIENT AMENITIES			
4.17	On average, how many hours per day is this facility open?	4 hours or less..... 1 5 to 8 hours 2 9 to 16 hours 3 17 to 23 hours4 24 hours 5	
4.18	What is the most commonly used source of water for the facility currently ?	Piped into facility 1 Piped onto facility grounds ... 2 Public tap/standpipe 3 Tube well/borehole 4 Protected dug well 5 Unprotected dug well 6 Protected spring 7 Unprotected spring 8 Rainwater collection9 Bottled water 10 Cart w/small tank/drum 11 Tanker truck 12 Surface water 13 Other _____ (specify) 96 Don't know..... 98 No water sources..... 00	
4.19	is a water outlet from this source available within 500 meters of the facility?	YES 1 NO 2	
420	Is there a room with auditory and visual privacy available for patient consultations?	Auditory privacy only 1 Visual privacy only 2 Both auditory and visual Privacy 3 No privacy 4	
421	Is there a toilet (latrine) in a functioning condition that is available for general outpatient client use? if yes: what type of toilet?	Flush toilet..... 1 Ventilated improved pit latrine (VIP) ... 2 Pit latrine with slab 3 Pit latrine without slab/open Pit 4 Composting toilet 5 Bucket 6	

	if multiple toilets are available, consider the most modern type.	Hanging toilet/ hanging Latrine 7 No facilities/ bush/field 8					
INFECTION CONTROL							
422	Does this facility have any guidelines on standard precautions for infection prevention?	Yes 1 No 2					
	Please tell me if the following items used for processing of equipment for reuse are available and functional in the facility today.	A) AVAILABLE		B) FUNCTIONING			
		YES	NO	YES	NO	Don't Know	
01	Electric autoclave (pressure & wet heat)	1 → B	2 02	1	2	8	
02	Non-electric autoclave	1 → B	2 02	1	2	8	
03	Electric dry heat sterilizer	1 → B	2 02	1	2	8	
04	electric boiler or steamer (no pressure)	1 → B	2 02	1	2	8	
05	Non-electric pot with cover for boiling/ steam	1 → B	2 02	1	2	8	
06	Heat source for non-electric equipment 1 → B	1 → B	2 02	1	2	8	
HEALTH CARE WASTE MANAGEMENT							

4.24	Now I would like to ask you a few questions about waste management practices for sharps waste, such as needles or blades. How does this facility finally dispose of sharps? waste (e.g., filled sharps boxes)? Probe to arrive at the correct response. Note: if any of the responses 2-9 take place outside The facility, then the correct response to circle Will be in the category of "remove offsite"	burn incinerator 2-chamber industrial (800-1000+° C). 2 1-chamber drum/brick 3 OPEN BURNING Flat ground - no protection 4 Pit or protected ground 5 DUMP WITHOUT BURNING Flat ground - no protection 6 Covered pit or pit latrine 7 Open-pit - no protection 8 Protected ground or pit 9 REMOVE OFFSITE Stored in covered container 10 Stored in other protected Environment 11 Stored unprotected 12 Other _____ (SPECIFY) 96 Never has sharp waste 9	
4.25	Now I would like to ask you a few questions about waste management practices for medical waste other than sharps, such as used bandages. How does this facility finally dispose of medical waste other than sharps boxes? probe to arrive at the correct response. note: if any of the responses 2-9 take place outside the facility, then the correct response to circle will be in the category of "remove offsite"	same as for sharp items 1 burn incinerator 2-chamber industrial (800-1000+° c) 2 1-chamber drum/brick 3 open burning flat ground - no protection 4 pit or protected ground 5 dump without burning flat ground - no protection 6 covered pit or pit latrine 7 open-pit - no protection 8 protected ground or pit 9 remove offsite stored in covered container 10 stored in other protected environment 11 stored unprotected 12 other _____(specify) 96 never has medical waste 95	
4.26	Check q424 and q425: incinerator used (either "2" or "3" circled)	Incinerator not used (neither "2" nor "3" circled)	
4.27	Is the incinerator functional today	Yes..... 1 No 2 Don't know 98	
4.28	is fuel for the incinerator available today?	Yes..... 1 No 2 Don't know 98	

SUPERVISION						
4.29	When was the last time this facility received a supervision visit from the higher level (DHMT or other)	THIS MONTH..... 1 IN THE LAST 3 MONTHS..... 2 MORE THAN 3 MONTHS AGO 3 DON'T KNOW 98				
4.30	During the supervision visit, did the supervisor assess the following?	YES	NO			
01	Drug stock out and expiry	1	2			
02	Staff availability and training	1	2			
03	Data completeness, quality, and timely reporting	1	2			
General outpatient section						
Basic equipment						
5.00	Please tell me if the following basic equipment and supplies used in the provision of client services are available and functional in this facility today	A) AVAILABLE		B) FUNCTIONING		
		YES	NO	YES	NO	DON'T KNOW
01	Adult weighing scale	1 → B	2 01	1	2	8
02	Child weighing scale- 250-gram gradation	1 → B	2 02	1	2	8
03	infant weighing scale - 100-gram gradation	1 → B	2 03	1	2	8
04	Measuring tape-height board/stadiometer	1 → B	2 04	1	2	8
05	Thermometer	1 → B	2 05	1	2	8
06	Stethoscope	1 → B	2 06	1	2	8
07	Blood pressure apparatus (may be digital or manual sphygmomanometer with a stethoscope)	1 → B	2 07	1	2	8
08	Light source (flashlight acceptable)	1 → B	2 08	1	2	8
09	Oxygen concentrators	1 → B	2 09	1	2	8

010	Oxygen cylinders	1 → B	2 010	1	2	8	
011	Intravenous infusion kits	1 → B	2 011	1	2	8	
6, INFECTION CONTROL PRECAUTIONS							
6.00	Please tell me if the following resources/supplies used for infection control are available in the general outpatient area of this facility today	AVAILABLE		NOT AVAILABLE			
01	Clean running water (piped, bucket with a tap, or pour pitcher)	1		2			
02	Hand-washing soap/liquid soap	1		2			
03	Alcohol-based hand rub	1		2			
04	Disposable latex gloves	1		2			
05	Waste receptacle (pedal bin) with lid and plastic bin liner	1		2			
06	Sharps container ("safety box")	1		2			
07	Environmental disinfectant (e.g., chlorine, alcohol)	1		2			
08	Disposable syringes with disposable needles	1		2			
	Auto-disable syringes	1		2			
7, Diagnostic capacity							
01	Hemoglobin	1		2			
02	Blood glucose	1		2			
03	Urine dipstick - protein	1		2			
04	Urine dipstick - glucose	1		2			
05	HIV diagnostic cap	1		2			
06	Malaria diagnostic capacity	1		2			

07	Syphilis RDT	1	2	
08	Urine pregnancy test	1	2	
8, Essential Medicines				
01	Amitriptyline tablet	1	2	
02	Amlodipine tablet or an alternative calcium channel blocker	1	2	
03	Amoxicillin syrup/suspension or dispersible tablet	1	2	
04	Amoxicillin tablet	1	2	
05	Ampicillin powder for injection	1	2	
06	Beclometasone inhaler	1	2	
07	Ceftriaxone injection	1	2	
08	Enalapril tablet or alternative ACE inhibitor e.g. lisinopril, ramipril, perindopril	1	2	
09	Fluoxetine tablet	1	2	
010	Gentamicin injection	1	2	
011	Glibenclamide tablet	1	2	
012	Ibuprofen tablet	1	2	
013	Insulin injection	1	2	
014	Metformin tablet	1	2	
015	Omeprazole tablet or alternative such as pantoprazole, rabeprazole	1	2	
016	Oral rehydration solution	1	2	
017	Paracetamol tablet	1	2	
018	Salbutamol inhaler	1	2	
019	Simvastatin tablet or other statin e.g. atorvastatin, pravastatin, fluvastatin	1	2	
020	Zinc sulfate tablet or syrup	1	2	
Section 5 - AVAILABLE SERVICES				
Maternity services				

9, ANTENATAL CARE SERVICES				
9.00	Does this facility offer antenatal care (ANC) services?	YES 1 NO 2		
Ask to be shown the location in the facility where antenatal care services are provided. Find the Person most knowledgeable about antenatal care services in the facility. Introduce yourself, Explain the purpose of the survey and ask the following questions.				
9.01	Do ANC providers provide any of the following services to pregnant women as part of routine ANC services?	YES	NO	
01	Iron supplementation	1	2	
02	Folic acid supplementation	1	2	
03	Intermittent preventive treatment in pregnancy (IPTp) for malaria	1	2	
04	Tetanus toxoid immunization	1	2	
05	Monitoring for hypertensive disorder of pregnancy	1	2	
06	Provision of misoprostol tablets for home births	1	2	
7.02	Please tell me if the following documents are available in the facility today:	YES	NO	
01	National ANC guidelines	1	2	
02	ANC checklists and/or job-aids	1	2	
03	IPTp guidelines, checklists and/or job-aids (including wall charts) acceptable if part of ANC guidelines.	1	2	
04	have you or any provider(s) of ANC services:	YES	NO	
05	Received any ANC training in the last two years?	1	2	

06	Received any training in IPTp in the last two years?	1	2	
10, FAMILY PLANNING SERVICES				
10.0	Does this facility offer family planning services?	YES 1 NO 2		
Ask to be shown the location in the facility where family planning services are provided. Find the person most knowledgeable about family planning services in the facility. Introduce yourself, explain the purpose of the survey and ask the following questions.				
01	does this facility provide or prescribe any of the following modern methods of family planning	YES	NO	
02	Combined estrogen progesterone oral contraceptive pills	1	2	
03	Progestin-only contraceptive pills	1	2	
04	Combined estrogen progesterone injectable contraceptives	1	2	
05	Progestin-only injectable contraceptives	1	2	
06	Male condoms	1	2	
07	Female condoms	1	2	
08	Intrauterine contraceptive device (IUCD)	1	2	
09	Implants	1	2	
010	Cycle beads for standard days method	1	2	
011	Emergency contraceptive pills	1	2	
012	Male sterilization	1	2	
013	Female sterilization	1	2	
014	Does this facility provide or prescribe any of the following modern methods of family planning for unmarried adolescents?	YES	NO	
015	Combined estrogen progesterone oral contraceptive pills	1	2	
016	Male condoms	1	2	

017	Emergency contraceptive pills	1	2			
018	Intrauterine contraceptive device (IUCD)	1	2			
019	Please tell me if the following documents are available in the facility today:	YES	NO			
020	National family planning guidelines	1	2			
021	Family planning checklists and/or job-aids	1	2			
022	Have you or any provider(s) of family planning services:	YES	NO			
022	Received any family planning training in the last two years?	1	2			
023	Received any training in adolescent sexual and reproductive health in the last two years?	1	2			
024	Does this facility stock contraceptive commodities at this service site?	YES 1 NO 2				
025	Are any of the following reproductive health medicines and commodities available in this service site today? Check to see if at least one of each Medicine/commodity is valid (not expired)	OBSERVED AVAILABLE		NOT OBSERVED		
		At least one valid	Available Nonvalid	Reported Available But not Seen	Not Available Today	Never Available
026	Combined estrogen progesterone oral contraceptive pills	1	2	3	4	5
027	Progestin-only contraceptive pills	1	2	3	4	5
028	Combined estrogen progesterone injectable contraceptives	1	2	3	4	5
029	Progestin-only injectable contraceptives	1	2	3	4	5
030	Male condoms	1	2	3	4	5
031	Female condoms	1	2	3	4	5

032	Levonorgestrel implant	1	2	3	4	5	
033	Etonogestrel implant	1	2	3	4	5	
034	Levonorgestrel tablet (emergency contraceptive)	1	2	3	4	5	
035	Ulipristal acetate tablet (emergency contraceptive)	1	2	3	4	5	
036	Mifepristone tablet 10-25 mg (emergency contraceptive)	1	2	3	4	5	
037	Intrauterine contraceptive device (IUCD)	1	2	3	4	5	
	For each of the following items, please check in the facility records if there has been a stock out in the past 3 months:	Stock out in The past 3 Months	no stock out in Past 3 Months	Not Indicated	Product Not Offered	Facility Record Not Available	
01	Female condoms	1	2	3	4	5	
02	Levonorgestrel implant	1	2	3	4	5	
03	Etonogestrel implant	1	2	3	4	5	
04	Levonorgestrel tablet (emergency contraceptive)	1	2	3	4	5	
05	Ulipristal acetate tablet (emergency contraceptive)	1	2	3	4	5	
06	Mifepristone tablet 10-25 mg (emergency contraceptive)	1	2	3	4	5	
07	OBSTETRIC AND NEWBORN CARE SERVICES						
08	Does this facility offer delivery (including normal delivery, basic emergency obstetric care, and/or comprehensive emergency obstetric care) and/or new-born care services?	YES..... 1 NO 2					
09	Ask to be shown the location in the facility where obstetric and newborn care services are Provided. Find the person most knowledgeable about obstetric and newborn care services in The facility. Introduce yourself, explain the purpose of the survey and ask the following questions.						
010	Does this facility routinely administer oxytocin injection immediately after birth to all women for the prevention of post-partum hemorrhage	YES..... 1 NO 2					

011	Please tell me if any of the following interventions for the management of complications during and after pregnancy and childbirth have been carried out in the last 12 months by providers of delivery services as part of their work in this facility.	YES		NO			
012	Parenteral administration of antibiotics (IV or IM)	1		2			
013	Parenteral administration of oxytocic for treatment of post-partum hemorrhage (IV or IM)	1		2			
014	Parenteral administration of magnesium sulphate for management of preeclampsia and eclampsia (IV or IM)	1		2			
015	Assisted vaginal delivery	1		2			
016	Manual removal of placenta	1		2			
017	Removal of retained products of conception	1		2			
018	Caesarean section	1		2			
019	Blood transfusion	1		2			
020	Are the following documents available in the facility today	YES		NO			
021	National guidelines for Integrated Management of Pregnancy and Childbirth (IMPAC)	1		2			
022	Checklists and/or job-aids for IMPAC	1		2			
023	Have you or any provider(s) of delivery services:	YES		NO			
024	Received training in Integrated Management of Pregnancy and Childbirth (IMPAC) in the last two years	1		2			
025	Ever received training in new-born resuscitation	1		2			
	would like to know if the following basic equipment items are available in this service area today. For each equipment or item, please tell me if it is available today and functioning	A ,available		B, not available			
		Yes	No	Yes	No	I don't Know	

01	Examination light (flashlight ok)	1 → B	2 01	1	2	8	
02	Delivery pack	1 → B	2 02	1	2	8	
03	Cord Clamp	1 → B	2 03	1	2	8	
04	Episiotomy scissors	1 → B	2 04	1	2	8	
05	Scissors or blade to cut the cord	1 → B	2 05	1	2	8	
06	Suture material with a needle	1 → B	2 06	1	2	8	
07	Needle holder	1 → B	2 07	1	2	8	
08	Manual vacuum extractor	1 → B	2 08	1	2	8	
09	Vacuum aspirator or D&C kit	1 → B	2 09	1	2	8	
010	Incubator	1 → B	2 010	1	2	8	
011	Disposable latex gloves	1 → B	2 011				
012	Blank partograph	1 → B	2 012				
013	Delivery bed	1 → B	2 013	1	2	8	
014	resuscitation table (with heat source) (for new-born resuscitation)	1 → B	2 02	1	2	8	
015	New-born bag and mask size 1 for term babies (for new-born resuscitation)	1 → B	2 015	1	2	8	
016	New-born bag and mask size 0 for pre-term babies (for new-born resuscitation)	1 → B	2 016	1	2	8	
017	Electric suction pump (for suction apparatus)	1 → B	2 017	1	2	8	
018	Suction catheter (for suction apparatus)	1 → B	2 018	1	2	8	
019	Suction bulb, single use (for suction apparatus)	1 → B	019	1	2	8	
020	Suction bulb, sterilizable multi-use (for suction apparatus)	1 → B	020	1	2	8	

021	Does this facility stock any medicines for obstetric care in this service site?	YES..... 1 NO 2					
	Are any of the following medicines and commodities available in this service site today? Check to see if at least one of each Medicine/commodity is valid (not expired)	Observed Available		not observed			
		At least one Valid	Available non valid	Reported Available But Not See	Not available Today	Never Available	
01	Antibiotic eye ointment for new-born	1	2	3	4	5	
02	Gentamicin injection 40mg/ml in 1ml or 2ml ampoules	1	2	3	4	5	
03	Gentamicin injection 20mg/ml in 1ml ampoules	1	2	3	4	5	
04	Gentamicin injection 10mg/ml in 1ml ampoules	1	2	3	4	5	
05	Ampicillin powder for injection	1	2	3	4	5	
06	Hydralazine injection	1	2	3	4	5	
07	Metronidazole injection	1	2	3	4	5	
08	Metronidazole injection	1	2	3	4	5	
09	Azithromycin cap/tab or oral liquid	1	2	3	4	5	
010	Cefixime cap/tab	1	2	3	4	5	
011	Benzathine benzyl penicillin powder for injection	1	2	3	4	5	
012	Nifedipine cap/tab	1	2	3	4	5	
013	Methyldopa tablet	1	2	3	4	5	
014	Calcium gluconate injection	1	2	3	4	5	
015	Magnesium sulphate injectable	1	2	3	4	5	
016	Skin disinfectant	1	2	3	4	5	
017	Chlorhexidine 4% gel or solution	1	2	3	4	5	
018	Intravenous solution with infusion sets	1	2	3	4	5	
019	Sodium chloride injectable solution	1	2	3	4	5	
020	Betamethasone injection	1	2	3	4	5	
021	Dexamethasone injection	1	2	3	4	5	
022	Oxytocin injection	1	2	3	4	5	
023	IF OXYTOCIN IS OBSERVED AVAILABLE (Q-022 is "1" OR "2")	IF OXYTOCIN IS NOT OBSERVED AVAILABLE (Q-022 is "3", "4", OR "5")					

024	Is the oxytocin stored in cold storage?	YES..... 1 NO 2	
025	is the product stored so that identification labels and expiry dates and manufacturing dates are visible?	YES..... 1 NO 2	
026	Check the expiry dates of the stored product. Are they stored in first-to-expire, first-out (FEFO) order (i.e. the stock that will expire first is the closest to the front)? Check the expiry dates of the stored product at the front and at the back of the shelf. If the Product at the front expires first, answer “yes”. If the product at the back expires first, answer “no”.	YES..... 1 NO 2	
CESAREAN SECTION			
01	Check q1002_08: cesarean section offered	CESAREAN SECTION NOT OFFERED	
02	Do you have the national guidelines for Comprehensive Emergency Obstetric Care (CEmOC) available in this facility today?	YES..... 1 NO 2	
03	Have you or any provider(s) of delivery service received any training in Comprehensive Emergency Obstetric Care (CEmOC) in the last two years?	YES..... 1 NO 2	
04	Does this facility have a health professional who can perform cesarean section present in the facility or on call 24 hours a day (including weekends and on public holidays)?	YES..... 1 NO 2	
05	Does this facility have an anesthetist (or doctor with anesthetics training) present in the facility or on call 24 hours a day (including weekends and on public holidays)?	YES..... 1 NO 2	

8.Annex: Pre and post test result of the participants in frontline field epidemiology training for district PHEM officer located in Oromia region, 2018

Score	Result (%)	
	Pre-test	Post Test
Minimum	6.00	0.00
Average	50.07	63.63
Maximum	75.00	85.0
Median	49.25	63.75