Addis Ababa University
College of Health Sciences
School of Public Health

Ethiopian Field Epidemiology Training Program (EFETP)

Compiled Body of Works in Field Epidemiology

Prepared by: - Gizachew Yaregal

June 2017

Addis Ababa/ Ethiopia

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Prepared by: - Gizachew Yaregal

Advisors and Mentors

1: Professor Ahmed Ali

2: Mr. Yimer Seid

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By

Gizachew Yaregal Taye

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Approved by Examining Board

Chairman, School Graduate Committee

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Advisor

_____ _____

Examiner

_____ _____

I. Acknowledgment

I would like to thank my mentors and advisors Professor Ahmed Ali and Mr. Yimer Seid for their unreserved contribution during the preparation of this document (Body of Work). They also contributed a lot in all draft outputs by giving me constructive, valuable suggestions and comments and priceless guiding.

My gratitude also goes to dedicated residents supervisor and advisor (Mr. Mebratu Wondyirad and Mr. Getachew Abebe) for their continuous mentoring, advice and guidance. I highly acknowledge the Benishangul Gumuz Regional Health Bureau for providing technical and financial support.

I would like to acknowledge the Benishangul Gumuz Regional Health Bureau Public Health Emergency Management Case team staffs for their unreserved support.

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iv. Acronyms and Abbreviations

AAU	Addis Ababa University
AFP	Acute Flaccid Paralysis
ANC	Ante Natal Care
AR	Attack Rate
AURI	Acute Upper Respiratory Illness
AWD	Acute Watery Diarrhea
BCG	Bacillus Calmette-Guerin vaccine for Tuberculosis
BGRS	Benishangul Gumuz Regional State
BSC	Balance Score Card
CBO	Community Based Organization
CDC	Center for Disease Control and Prevention
CFR	Case Fatality Rate
CFU	Colony Forming Unit
CHD	Community Health Day
CI	Confidence Interval
CLRF	Case bases Laboratory Reporting Form
CM	Cent Meter
CRF	Case based Reporting Form
CRS	Congenital Rubella Syndrome
CSA	Central Statistical Agency
CTC	Cholera Treatment center
DHS	Demography and Health Survey
DW	Deep Well
EC	Ethiopian Calendar
EFY	Ethiopia Fiscal Year
EFETP	Ethiopia Field Epidemiology Training Program
EHNRI	Ethiopia Health and Nutrition Research Institute
EPHI	Ethiopia Public Health Institute
EPI	Expand Program on Immunization
ELISA	Enzyme-Linked Immunosorbent Assays
EPRP	Emergency Preparedness and Response Plan
FDRE	Federal Democratic Republic of Ethiopia
GC	Gregorian Calendar
HC	Health Center
HDW	Hand Dug Well
HEWs	Health Extension Workers
HIMS	Health Information Management System
HIV	Human Immunodeficiency Virus/AIDS
HP	Health Post
HSDP	Health Sector Development Plan
IDP	Internally Displaced People
IDSR	Integrate Disease Surveillance and Response
IEC	Information Education Communication

IgG	Immunoglobulin G
IgM	Immunoglobulin M
IRS	Indoor Residual Spray
ITNs	Insecticide Treated Nets
IV	Intravenous
KM	Kilo Meter
LLITN	Long Lasting Insecticide Treated Nets
LP	Lumbar Puncture
MAM	Moderate Acute malnutrition
MASL	Meter Above Sea Level
MDA	Mass Drug Administration
MoH	Ministry of Health
MMRV	Measles Mumps and Rubella Vaccine
MUAC	Middle Upper Arm Circumference
NFSDPPC	National Food Security and Disaster Preparedness and Prevention Commission
NMFR	Non Measles Febrile Rash
NGO	Non-Governmental Organization
NTDs	Neglected Tropical diseases
NTT	Neonatal Tetanus
OPV	Oral Polio Vaccine
OR	Odd Ratio
ORS	Oral Rehydration Salt
OTP	Oral Therapeutic Point
PCV	Pneumococcal Conjugate Vaccine
PENTA*	Diphtheria Pertussis Tetanus Hepatitis B Haemophilus Influenza Infection type B (* Five antigen in one vial)
PF	Plasmodium Falciparum
PHE	Public Health Emergency
PHEM	Public Health Emergency Management
PICT	Provider-Initiated Counseling and Testing
PMI	President Malaria Initiative
PMTCT	Prevention of Mother-to-Child Transmission
PNC	Post Natal care
PV	Plasmodium Vivax
PVP	Predictive Value Positive
PHS	Public Health Surveillance
RBM	Roll Back Malaria
RCV	Rubella Cognitive Vaccine
RDT	Rapid Diagnostic Test
REB	Regional Education Bureau
RFSDPPO	Regional Food Security and Disaster Preparedness and Prevention Office
RHB	Regional Health Bureau
RNA	Ribonucleic Acid

RRT	Rapid Response Team
RWMERDB	Regional Water, Mine and Energy Resource Development Bureau
SAM	Sever Acute Malnutrition
SARS	Sever Acute Respiratory Syndrome
SC	Stabilization Center
SDG	Sustainable Development Goals
SIA	Supplementary Immunization Activities
SPSS	Statistical Package for the Social Science
SW	Shallow Well
UN	United Nation
UNICEF	United Nation Children Fund
VCT	Vulnerary Counseling and Testing
VHF	Viral Hemorrhagic Fever
WFP	World Food Program
WHO	World Health Organization
WRF	Weekly Reporting Form

v. Executive Summary

During my field residency as EFETP resident I have conducted the following field activities in Benishangul Gumuz Regional State Health Bureau Field Base. Those included: Outbreak Investigations, Woreda Health Profile Description, Surveillance Data Analysis, Surveillance System Evaluation, Report on Meher Emergency Needs, Scientific Manuscript for Peer Review Journals, Abstracts for Scientific Presentation, Writing Protocol/Proposal for Epidemiologic Research Project; Water Quality Testing and Weekly Bulletins..

In general, my outputs of the two years field residency in the EFETP are presented precisely as follow:

Rubella Outbreak Investigation in Sherkole Woreda of Assosa Zone; Benishangul Gumuz Regional State-Ethiopia March 2017

A total of 155 cases and zero death (CFR=0) cases were line listed. The overall AR was 46 per 10, 000 population. The attack rate less than 5 year of age was 133 per 10,000. The median age was 6 years. 79 (51%) of cases were males. Sex specific AR was equal (46 per 10,000 populations). The cases were reported from four (22.2%) Kebeles. Sixty four percent of the cases reported from one Kebele. Nine samples were positive for Rubella IgM antibodies. Having contact history with rubella infected (AOR: 8.38; 95% CI 3.8 – 14.47; P <0.05) and having travel history to rubella affected Kebele/ area (AOR: 3.71; 95% CI 2.11 – 6.53; P <0.05) were statically associated with the rubella infections.

Acute Watery Diarrhea Outbreak Investigation in Sedal Woreda of Kamash Zone; Benishangul Gumuz Regional State-Ethiopia November 2016

A total of 154 AWD cases and 5 deaths were reported. Over all Attack Rate was 6.2 cases/ 1000 population (total Woreda population). Overall case fatality rate (CFR) in the Woreda was 3.2%. The median age of the case was 25 years. 50.6% of the cases were females. Sex specific AR was 18 per 1,000 and 17 per 1,000 Female and Male respectively. Eight out of 10 stool samples were positive for Vibrio cholera. The cases were reported from six (46.2%) Kebele. Fifty percent of the case reported from one Kebele. Seventeen (65.4%) of water points were contaminated with fecal coli forms. Twenty four (92.4%) of water points were risks for contamination. Risk factors were; drinking water source from river {AOR; 3.52, 95% CI (2.17 – 5.7), P-value <0.05; hand washing wish soap/ ash before meal, preparing food and latrine visit (at critical time) {AOR; 3.89, 95% CI (1.87 – 8.08), P-value <0.05} and Close contact with similar illness {AOR; 6.8, 95% CI (3.58 – 12.91), P-value <0.05} were significantly associated with acute watery diarrhea outbreak.

Health Profile Description of Menge Woreda of Assosa Zone, Benishangul Gumuz Regional State, Western Ethiopia/ March 2016

Menge Woreda Health Office received the second big slash of budget (17.78%) next to Menge Woreda Education, Capacity Building and Civil Service Office (36.74%).In the list of top ten diseases totally 24,886 patients were recorded in Menge Woreda. From those cases, Malaria covered 53.34%; followed by diarrheal diseases (14.54%) and acute febrile illness (9.84%) were recorded among the top ten causes of morbidity in 2007 EFY. Completeness and timeliness of Menge Woreda in 2007 EFY was d 96.7%. Although; the utilization rate of latrine data weren't available in the Woreda. In 2007 EFY, the latrine coverage reached 84%.

Malaria Surveillance Data Analysis of Benishangul Gumuz Regional State/ Western Ethiopia/ August 2016

A total of 790,047 malaria cases were reported in the past three years. Eighty five percent of the reported cases were parasitological confirmed. *Plasmodium falciparum* constituted 78.4% (522,667/667,044*100).The trend of malaria cases started to pick up from WHO Epi week of week-36 till WHO Epi week of week-52 again it started to up from WHO week-14 till WHO Epi week of week-26. All Woredas in the entire Region are high risk for malaria. Nevertheless, the highest prevalence rates of malaria cases were reported from Guba and Yasso Woreda respectively.

Evaluation of Malaria and Measles Surveillance System in Assosa Zone; Benishangul Gumuz Regional State; Ethiopia/ February 2017

All visited health institutions Focal persons; Woreda Health Officer PHEM officers and Zonal PHEM officers understood the case definitions of malaria and measles. All respondents suggested that data collection formats for weekly and immediately reportable diseases and conditions are clear and easy to fill. Case definitions are acceptable to all stakeholders and the flow of data is clearly indicated. Completeness and Timeliness of the Assosa Zone surveillance system was 95.5 % in the past one year (2008 EFY).

Scientific Manuscripts for Peer Reviewed Journals in Rubella outbreak Investigation

A total of 155 rubella cases were line listed. Fifty one percent of cases were male. Age ranged from three months to 19 years with a median of 6 years. Forty six percent were aged less than 5 years, while 83.2 % were aged less than 11 years. Statistically significant risk factors for rubella outbreak were exposure to a contact history with rubella infected sibling at home (OR: 13.037; 95% CI: 4.8165 – 40.396; P: <0.05), and had a travel history to rubella affected Kebele/ area (OR: 7.05; 95% CI: 3.042 – 16.723; P: <0.05) were statically associated

Abstracts

Surveillance Data Analysis of Malaria in Benishangul Gumuz Region State/ western Ethiopia from 8th July 2014 GC to 7th July 2016 GC; Rubella Outbreak Investigation in Sherkole Woreda of Assosa Zone; Benishangul Gumuz Region State-Ethiopia March 2017 and Acute Watery Diarrhea Outbreak Investigation in Sedal Woreda of Kamash Zone; Benishangul Gumuz Region State-Ethiopia November 2016 were prepared.

Report on Meher Emergency Needs of Benishangul Gumuz Regional State/ Ethiopia 1st January – 30th June of 2009 EC

The main objective of the assessment was to develop emergency preparedness and response plan for epidemic prone diseases of BGRS during the second half of 2009 EFY. The assessment was conductedfrom 10 – 30 December/ 2016 GC. Cross sectional survey study design was implemented. There was a functional multi-sectorial coordination forum with no regular frequency of meeting in all assessed woredas and zones. Malaria, Meningitis, measles, AWD outbreak and malnutrition condition were anticipated risks at regional level and at risk population groups identified. There wasn‘t emergency preparedness and response plan in the assessed Woredas and Zones supported by local government budget.

Assessment of Ownership and Factors Associated with Utilization of Insecticide Treated Nets at Household Level in Menge Woreda of Assosa Zone, Benishangul Gumuz Regional state, western Ethiopia

A community based cross sectional Study design will be conducted. Data collection will be started in August 2017 and the final study finding will be submitted in October 2017. The study subjects will be all Households who received Insecticide Treated Nets within the last three years in Menge Woreda. The study households shall be selected systematically from the source of the population. A total of 680 households will be proportionally selected. Both self-reported information and direct observations will be used to collect data. Data will be entered to the computer using Epi info Version 14 and will be analyzed by using SPSS version 20. Statistical significance of the variables will be evaluated by logistic regression analytical tests by using Odds ratio (OR), p-value of 0.05 and confidence interval 95%.

Additional outputs

Water Quality Testing of Sedal Woreda, Kamash Zone of Benishangul Gumuz Regional State/ Ethiopia/ October 2009 EC

The findings verified that; out of 26; 4 (15.4%) of water schemes were contaminated with fecal coliforms and 13 (50%) water points also other organisms were isolated. The sanitary survey assessment confirmed that; out of 26 water points; 9 (34.6%) were very high risk of contamination and 15 (57.7%) were some risk of contamination. The bacteriological water assessment confirmed that; 17 (65.4%) water schemes were not bacteriological potable or against to the WHO standard of water supply and need very urgent water treatment.

Weekly Bulletin of WHO Epi Week of 30/ 3016 and 7/2017 GC

Weekly Bulletin of PHEEM case team were published and distributed for the respective governmental and partner bodies.

1.Outbreak Investigations

1.1. Rubella Outbreak Investigation in Sherkole Woreda of Assosa Zone; Benishangul Gumuz Regional State-Ethiopia March 2017

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Title: Rubella Outbreak Investigation in Sherkole Woreda of Assosa Zone, Benishangul Gumuz Regional State, Western Ethiopia March 2017

Authors Affiliation: [1]Ethiopian Field Epidemiology Training Program, Addis Ababa University School of Public Health, [2] Benishangul Gumuz Regional Health Bureau Public Health Emergency Management Case Team

Introduction: Rubella is a contagious disease, caused by rubella virus and transmitted via the respiratory route. Ethiopia does neither currently have a rubella immunization program nor a congenital rubella syndrome (CRS) surveillance system. To investigate rubella outbreak and identify risk factors associated with rubella outbreak in Sherkole Woreda of Assosa Zone; BGRS; Ethiopia

Method: An analytical case-control study supported by descriptive study was employed to investigate the outbreak. Matched (by sex, age and Kebele) case control study in the ratio of 1:2 (50 cases - 100 controls) was conducted. Case defined as any person with fever and maculopapular (nonvascular) generalized Rash and Cough, Coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects rubella. The measles case-based surveillance reporting form was used to identify rubella cases from 14th December 2016 to 7th January 2017. Epi Info ™ version 7 used to enter and analyze data.

Results: A total of 155 cases and zero death (CFR=0) cases were line listed. The overall AR was 46 per 10, 000 population. The attack rate less than 5 year of age was 133 per 10,000. The median age was 6 years. 79 (51%) of cases were males. Sex specific AR was equal (46 per 10,000 populations). The cases were reported from four (22.2%) Kebeles. Sixty four percent of the cases reported from one Kebele. Nine samples were positive for Rubella IgM antibodies. Having contact history with rubella infected (AOR: 8.38; 95% CI 3.8 – 14.47; P <0.05) and having travel history to rubella affected Kebele/ area (AOR: 3.71; 95% CI 2.11 – 6.53; P <0.05) were statically associated with the rubella infections.

Conclusion: We investigated an outbreak of rubella in which 97.4% of the cases were in children aged less than 15 years, with a median age of six years. A rubella specific case definition should be needed for early case detection because currently the case definition used to detect rubella is the measles suspected case definition.

Key Words: Rubella outbreak; Congenital Rubella Syndrome; Rubella Cognitive Vaccine

Introduction

Rubella also known as German measles or three-day measles [1] is an infection caused by the rubella virus [2]. This disease is often mild with half of people not realizing that they are sick [3] [4]. Rubella is a viral disease which is caused by the rubella virus, an envelope, positive-stranded RNA virus (family Togaviridae, genus Rubivirus) [1] [2]. It is a contagious disease, which is transmitted via the respiratory route. The average incubation period is 14 days, with a range of 7 to 21 days. Infection is up to five days after the onset of rash [2].

Rubella is usually spread through the air via coughs of people who are infected [2] [5]. People are infectious during the week before and after the appearance of the rash. Babies with Congenital Rubella Syndrome (CRS) may spread the virus for more than a year [4]. Only humans are infected [2]. Insects do not spread the disease [4]. Once recovered, people are immune to future infections. Testing is available that can verify immunity [2].

Rubella is preventable with the rubella vaccine with a single dose being more than 95% effective [2]. Often it is given in combination with the measles and mumps vaccine, known as the MMR vaccine [4]. With a population vaccination rate of less than 80%, however, more women might make it to childbearing age without developing immunity and issues could increase [2].

Rubella is a common infection in many areas of the world [6]. Each year about 100,000 cases of congenital rubella syndrome occur [2]. Rates of disease have decreased in many areas as a result of vaccination [3] [5]. There are ongoing efforts to eliminate the disease globally [2]. In April 2015 the World Health Organization declared the Americas free of rubella transmission [7] [8]. The name "rubella" is from Latin and means little red. It was first described as a separate disease by German physicians in 1814 resulting in the name "German measles"[4].

Rubella has symptoms that are similar to those of flu. In children rubella normally causes symptoms which last two days and include: Rash beginning on the face which spreads to the rest of the body [8]; Low fever of less than 38.3 °C (101 °F) [8]; Posterior cervical lymphadenopathy [9]. In older children and adults additional symptoms may be present including: Swollen glands [8]; Coryza (cold-like symptoms) [8]; Aching joints (especially in young women) [8]. Serious problems can occur including the following: Brain infections; bleeding problems; Birth defects (congenital); Cataracts; Glaucoma; Heart defects and Hearing loss [10].

Rubella can cause congenital rubella syndrome in the newborn. The syndrome (CRS) follows intrauterine infection by the rubella virus and comprises cardiac, cerebral, ophthalmic and auditory defects [11]. It may also cause prematurity, low birth weight, and neonatal thrombocytopenia, anemia and hepatitis. The risk of major defects or organogenesis is highest for infection in the first trimester [12]. About 100,000 cases of this condition occur each year [2].

The disease is caused by rubella virus, a togavirus that is enveloped and has a single-stranded RNA genome [13]. The virus is transmitted by the respiratory route and replicates in the nasopharynx and lymph nodes. The virus is found in the blood 5 to 7 days after infection and spreads throughout the body. The virus has teratogenic properties and is capable of crossing the placenta and infecting the fetus where it stops cells from developing or destroys them [14].

Rubella virus specific IgM antibodies are present in people recently infected by rubella virus, but these antibodies can persist for over a year, and a positive test result needs to be interpreted with caution [15]. The presence of these antibodies along with, or a short time after, the characteristic rash confirms the diagnosis [16].

Rubella infections are prevented by active immunization programs using live, disabled virus vaccines. Two live attenuated virus vaccines. Reductions were only achieved by immunization of all children. The vaccine is now usually given as part of the MMR vaccine. The WHO recommends the first dose be given at 12 to 18 months of age with a second dose at 36 months [17] [18].

There is no specific treatment for rubella; however, management is a matter of responding to symptoms to diminish discomfort. Treatment of newborn babies is focused on management of the complications. Congenital heart defect and cataracts can be corrected by direct surgery [19].

Surveillance for rubella or CRS does not exist in Ethiopia; however, the measles case-based surveillance system, established in 2004, includes laboratory testing for the detection of measles specific and rubella-specific antibodies. The measles case-based surveillance system has helped greatly in terms of documenting the epidemiology of measles in Ethiopia. However, little is known of the magnitude and distribution of Rubella cases. In African countries, including Ethiopia, CRS is widely under-recognized as a public health problem, and information on rubella and CRS epidemiology is very limited [20].

Objectives

General Objective

- To investigate rubella outbreak and identify risk factors associated with rubella outbreak in Sherkole Woreda of Assosa Zone; BGRS; Ethiopia

Specific objectives

- To confirm/verify the existence of the outbreak
- To describe the outbreak by person, place and time
- To identify potential risk factors of disease transmission

Methods and materials

Background of Sherkole Woreda

Sherkole Woreda is one of the seven woredas of Assosa Zone. It's far about 775 KM from Addis Ababa and 98 KM from Regional capital; Assosa town. Administratively the Woreda is divided into 19 (1 urban and 18rural) Kebeles (the lowest governmental structure). The Woreda is found at the border of Sudan. It is shares a bounder with Sedal Woreda North; Kurmuk in South; Sudan Woreda in East and Menge Woreda in West [28 and 29]. Geographically the altitude varies from 680 up to 1,450 meter above sea level. The annual average temperature ranges 30 – 45 degree centigrade.

Total population of Sherkole Woreda estimated to be 33,536 (projection based on 2007 census). Of these population; male 17,167 (5.119%) and female 16,369 (48.81%); children under 5 years of age 5,426 (16.18%); numbers of women of reproductive age (15-49) 6,935 (20.69%); numbers of pregnant women 1,144 (3.41%). There was no pastorals and internally displaced people (IDP) in the Woreda [30].

Regarding the Health service coverage, the Woreda has 1 Health Center 13 Health Posts which gives the potential health coverage reached above 95%. . In this district, 26 HEWs are deployed in health sector.

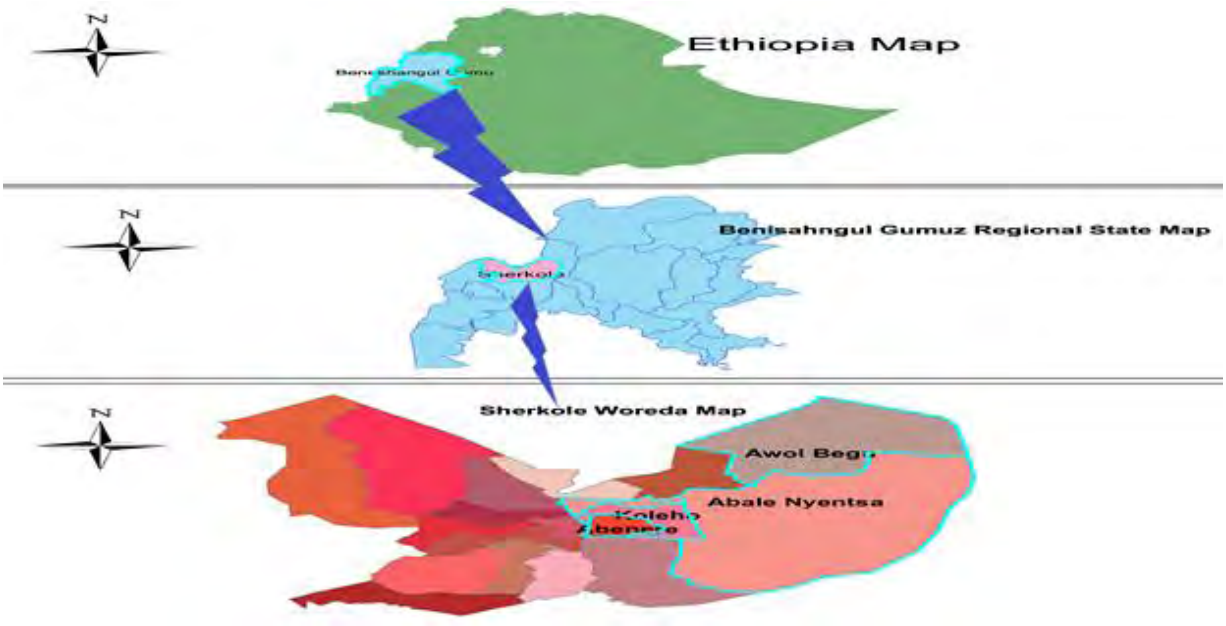

Figure 1*Map of Ethiopia, BGRS and Sherkole Woreda of Assosa Zone of Benishangul Gumuz regional state/ March 2017*

Note: - Awol Begu; Abale Nyentsa, Koleho and Abenare Kebeles of Sherkole Woreda were Rubella outbreak affected Kebeles

Rapid Response Team

Benishangul Gumuz Regional Health Bureau; Public Health Emergency Management (BGRHB PHEM) case team received report from Sherkole Woreda suspected measles cases seen on 19th November 2016 in Abale Nyentsa Kebele. The Regional Rapid Response team (RRT) deployed to the area to investigate and confirm the outbreak from 21th November 2016 to 7th January 2017.

Study Design

An analytical case-control study supported by descriptive study was employed to investigate the outbreak

Study Period

Line listed reported cases from 21th November 2016 to 7th January 2017. The case control study was done from 1st to 15th February 2017.

Source of Population

Total population of Sherkole Woreda was the source of the population, It estimated to be 33,536 (projection based on 2007 census).

Study Population:

The study population was selected from source population. All rubella affected Kebeles (four Kebeles) were selected purposively.

Sample Size

Matched (by sex, age and Kebele) case control study in the ratio of 1:2 (50 cases - 100 controls) was conducted.

Definition

Case: defined as any person with fever and maculopapular (nonvascular) generalized Rash and Cough, Coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects rubella.

Control: Any person in the village without sign and symptoms of rubella at the time of the study but matched with sex, age and living Kebeles.

Data Collection Method

Surveillance data of the Woreda Health Office was reviewed retrospectively to observe similar outbreak from the district and to set background status of the disease. Structured

questionnaire was used to interview cases and controls. Active search was conducted using line listing of cases. In addition to this we conducted formal discussions with different stakeholders about the overall outbreak situation and the control and prevention efforts undertaken in the Woreda.

Data Entry and Analysis

Collected quantitative data was checked and entered on a computer and analyzed using Microsoft office Excel and Epi Info 7.1

Laboratory Investigation

Blood specimens were collected from ten suspected rubella patient and sent to EPHI

Environmental Investigation

General housing condition sleeping room, housing ventilation and hygienic condition of the cases and controls were visual inspected.

Ethical issue

Informed verbal consent was taken informally from all respondents before interviews and all agreed to take part

Result

Descriptive Epidemiology

On 14th November; 2016 the first case (index) was registered and reported from Abale Nyentsa Kebele of Sherkole Woreda. It's far 12 KM from the Woreda center. The index case was male and 4 years old. A total of 155 rubella cases (9 confirmed and 146 Epi-linked) without death were reported from four kebeles of Sherkole Woreda. Out of 19 Kebeles; four Kebeles were affected. From the total cases (155); 63.9% were reported from Abale Nyentsa Kebele. The remaining 36.1% cases were reported from other three Kebeles.

The overall attack rate was 46 case per 10, 000. Case fatality rate was zero. The median age of the case was 6 years old with range of three month – 19 years. The attack rate among less than and equal to five years age group was 133 cases per 10,000 populations while 29 cases per 10,000 populations in the age of greater than five years. In addition, the attack rate between five and 15 years age was 83 cases per 10,000 populations. There was zero case fatality rate registered throughout the outbreak.

Ten samples taken for laboratory confirmation on Week-48 of 2016 (25th November 2016); Nine of the sample was positive for rubella IgM. Subsequently, a total of 155 rubella cases were line listed. The index case for this outbreak was believed to be a 4 year old child male. Although the index case was not laboratory-confirmed, ten cases developed rashes after contact with him, and were subsequently laboratory-confirmed. The peak of the outbreak occurred on in 25th November 2016 (WHO Epi week – 48 of 2016) and 27th December 28 (WHO Epi week – 1 of 2017). The shape of epidemic cover was propagated source and probable sporadic type of outbreak. The last case occurred on 7th January 2017 (WHO Epi week – 3 of 2017).

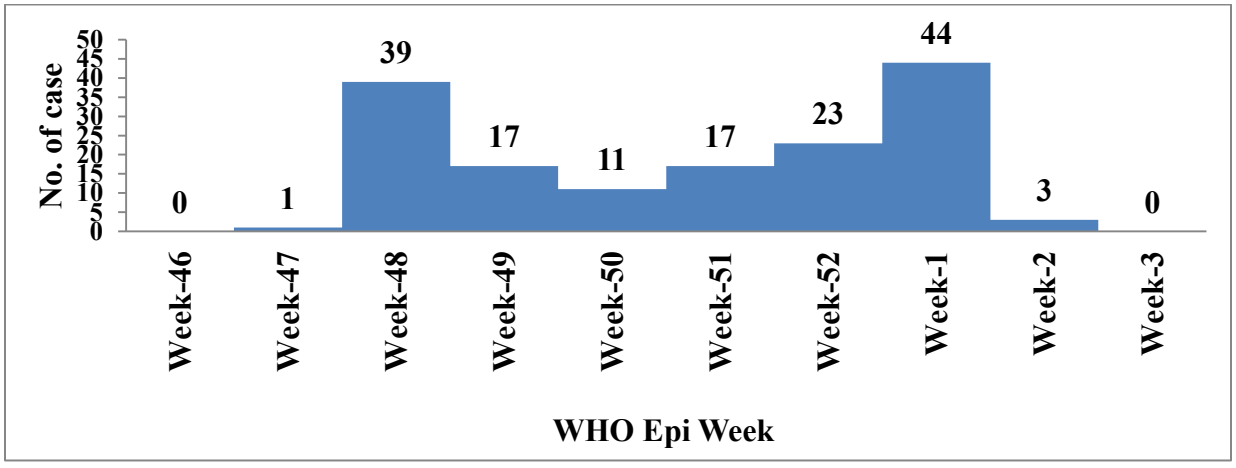

Figure 2: ***WHO Epi week of onset of Rubella sign and symptom from 23th November 2016 to 13th January 2017 of Sherkole Woreda; Assosa Zone of BGRS; March 2017***

Out of 19 kebeles in the Woreda; four Kebeles were affected by Rubella outbreak. Attack rate was highest in Abale Nyentsa Kebele (71 per 1,000 population), followed by Koleho Kebele (15 per 1,000 population), and least in Awol-Begu and Abenare Kebeles (4 per 1,000 population).

The outbreak started in one Kebele (Abale Nyentsa) but quickly spread to neighboring to four Kebeles. The number of reported cases ranged from 5 to 99 cases per Kebele. Sixty seven percent of children less than 5 years reported having been vaccinated against measles while none had been vaccinated against rubella. All cases were treated as outpatients and there was no death.

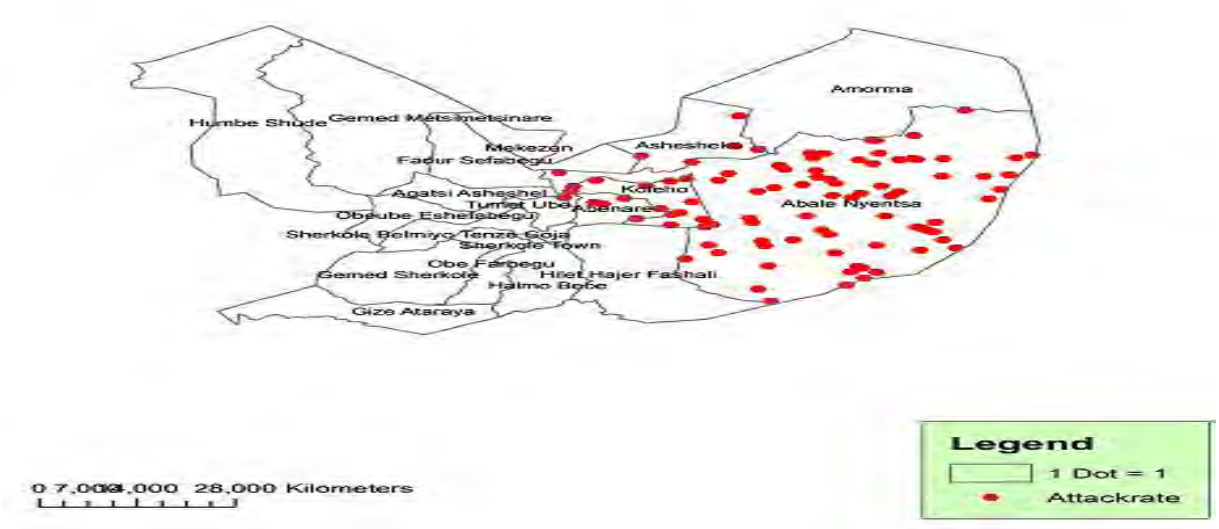

Figure 3 ***Attack rate of Rubella outbreak by 23th November 2016 to 13th January 2017by Kebeles in*** *Sherkole Woreda; Assosa Zone of BGRS; March 2017*

Rubella has similar symptoms with measles. The common sign and symptoms manifested in rubella cases were listed below; rash (100%); fever (98.1%), cough (52.9%), and Conjunctivitis (34.8%); Coryza (29) and headache (8.4%).

Table 1 ***Distribution of Rubella cases by sign and symptoms from 23th November 2016 to 13th January 2017 in Sherkole Woreda; Assosa Zone of BGRS; March 2017***

Sign and symptoms category	Yes	Percentage
Rash	155	100%
Fever	152	98.1%
Cough	82	52.9%
Conjunctivitis	54	34.8%
Coryza	45	29%
Headache	13	8.4%

Fifty one percent of all cases were males. Forty six percent of the cases were aged less than 5 years while 83 % were aged less than 11 years. A total of 4 cases (2.5% of all cases) occurred in women of reproductive age (>15 and <20). None of cases was reported above 20 years of age.

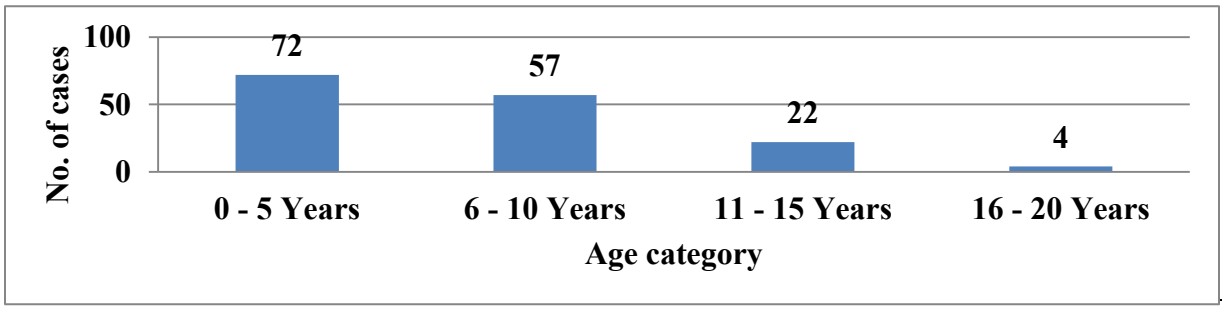

Figure 4 ***Rubella cases distribution by Age Category from 23th November 2016 to 13th January 2017in Sherkole Woreda; Assosa Zone of BGRS; March 2017***

Of the total affected cases; 79(51%) were males. Sex specific AR was equal (46 per 10,000 populations).

Table 2 ***Rubella cases distribution by sex 23th November 2016 to 13th January 2017in Sherkole Woreda; Assosa Zone of BGRS; March 2017***

Category	Population	No. of cases	Percentage	AR/10,000
Male	17,168	79	51%	46
Female	16,370	76	49%	46

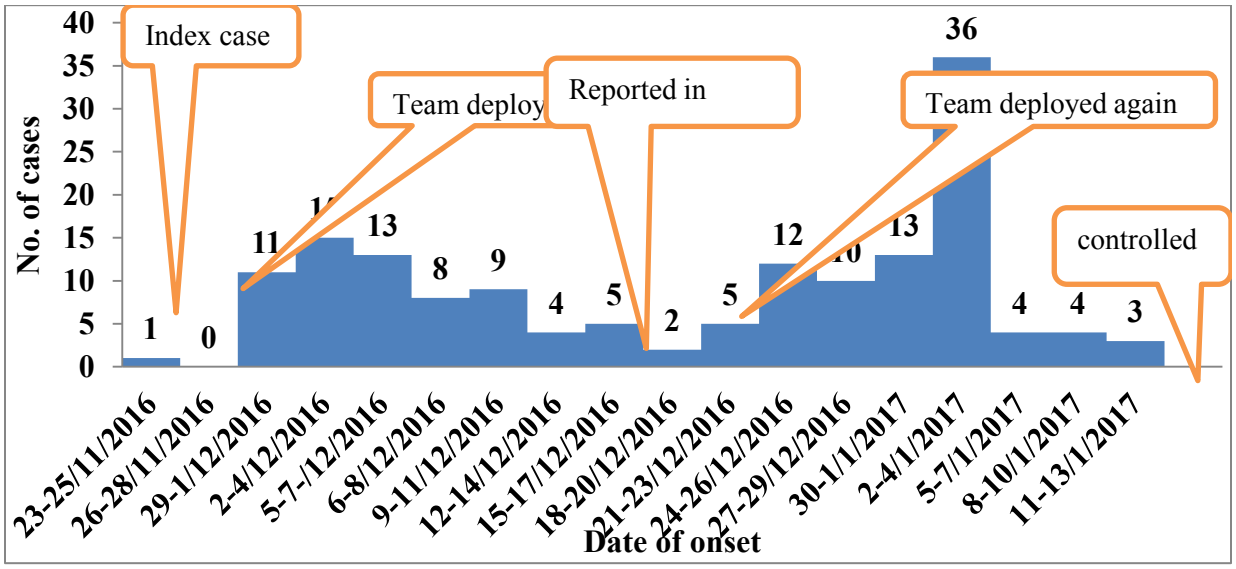

Figure 5 ***Rubella cases reported by date of onset of sign and symptom from 23th November 2016 to 13th January 2017*** *in Sherkole Woreda; Assosa Zone of BGRS; March 2017*

Laboratory Investigation

To identify the etiologic agent of the outbreak ten specimens were collected and sent to EPHI. Nine out of ten the specimens were IgM positive for Rubella. Therefore the Positivity rate was 90% for Rubella IgM.

Public Health Intervention

The investigation team identified and characterized the rubella outbreak. Technical assistance was given for health workers on case management, recording and reporting situation. Cases were treated to prevent complication and further spread. Routine surveillance was enhanced. Health education was given for the community members to prevent the transmission of the disease, to motivate health seeking behavior and treatment if there is sign and symptoms of rubella. The Zone Health Department has started closely working with the affected districts and the entire neighboring districts to prevent/control the outbreak from spreading to these areas. Alarming the community, health extension workers and community leaders were implemented to strength the local surveillance system

Analytical Epidemiology

We compared 50 rubella cases with 100 community controls matched by sex, age and place of residence. Descriptive statistics and odds ratios (OR) with 95% confidence intervals (CI) were calculated to compare risk factors among cases and controls. Analysis was performed using Epi Info version 7.

Concerning the interviewed gender, out of the total 50 cases; 27 (54%) were females and out of the total controls 100; 52 (52%) were females. From all respondent 145 (96.7%) and 5 (3.3%) were married and widowed respectively

Ninety nine percent of inhibitors in Sherkole Woreda are Berta ethnic group. This study also verified that; all cases 50 (100%) and control 100 (100%) are Berta ethnic group.

Among all respondents, 102 (68%) can't read and write. Regarding occupation; from all respondents (case and control) were farmers. Those incomes were supported by traditional gold panning/ mining. This finding also verified that all respondents (case and control) were followers of Muslim religion.

Table 3 ***Distribution of respondents' socio-economic characteristic of Sherkole Woreda; Assosa Zone of Benishangul Gumuz regional state/ Ethiopia/ March 2017***

Variable	Category	Case N= 50		Control N=100	
		No.	Percentage	No.	Percentage
Marital Status	Married	47	94%	98	98%
	Widowed	3	6%	2	2%
Educational Status	Unable to read and write	38	76%	64	64%
	Can read and write	12	24%	36	36%
Ethnicity	Berta	50	100%	100	100%
Religion	Muslim	50	100%	100	100%
Occupation	Farmers	50	100%	100	100%

Multivariate analysis performed to determine the strength of association of potential risk factors for rubella cases as compared to controls. The statistically significant variables were found to be associated with rubella as listed below: had contact history with rubella infected person (AOR: 8.38; 95% CI: 3.8 – 14.47; P: <0.05), had a travel history to rubella affected Kebele/ area (AOR: 3.71; 95% CI: 2.11 – 6.53; P: <0.05); estimated area of the house <8m^2 (AOR: 2.93; 95% CI: 1.78 – 4.83; P: <0.05), family size above 4 (AOR: 3.55; 95% CI: 2.09 – 6; P: <0.05) were statically associated with the rubella infections. Further; Knowledge of rubella vaccine preventable (AOR: 0.58; 95% CI: 0.16 – 2.05; P: > 0.05) and distance of health facilities (AOR: 0.89; 95% CI: 0.33 – 2.36; P: <0.05) weren't associated with the rubella infections.

Table 4 *Bivariate and Multivariate analysis for different exposures 14th November 2016 to 7th January 2017 in* ***Sherkole Woreda; Assosa Zone of BGRS; March 2017***

Risk Factors	Exposure	Case (%)	Control (%)	Bivariate analysis		Multivariate analysis	
				COR	(95% CI)	AOR	(95% CI)
Having travel history to rubella affected area/ Kebele	Yes	38(76%)	31 (31%)	7.05	3.04 – 16.72	3.71	2.11 – 6.53
	No	12(24%)	69 (69%)				
Having contact history with rubella infected person	Yes	44(88%)	26 (26%)	20.8	7.96 – 54.67	8.38	3.8 - 14.47
	No	6 (12%)	74 (74%)				
Housing condition	Not Ventilated	36(72%)	37 (37%)	4.37	1.97 – 9.91	2.17	1.6 -4.59
	Ventilated	14(28%)	63 (63%)				
Estimated area of the house	<8m^2	34(68%)	29 (29%)	5.2	2.35 – 11.64	2.93	1.78 - 4.83
	>=8m^2	16(32%)	71 (71%)				
Nutritional status of the patient	Malnourished	11(22%)	9 (9%)	2.85	0.97 – 8.41	1.83	1.13 - 2.94
	Normal	39(78%)	91 (91%)				
Distance of health facility more than 5km from the house	> 5 KM	3 (6%)	7 (7%)	0.84	0.13 – 3.93	0.89	0.33 - 2.36
	<=5KM	47(94%)	93 (93%)				
Living in one house with more than four peoples	> 4 person	36(72%)	27 (27%)	6.95	3.04 – 16.05	3.55	2.09 -6
	< = 4person	14(28%)	73 (73%)				
Knowing rubella can be cured	Yes	26(52%)	49 (49%)	1.12	0.54 – 2.35	1.08	0.68 – 1.7
	No	24(48%)	51 (51%)				
Knowing Mode of transmission	Yes	4 (8%)	28 (28%)	0.22	0.05 – 0.7	0.32	0.12 – 0.82
	No	46(92%)	72 (72%)				
Knowing that rubella vaccine is preventable	Yes	2 (4%)	8 (8%)	0.47	0.04 – 2.54	0.58	0.16 - 2.05
	No	48(96%)	92 (92%)				
Educational level of the family	Illiterate	33(66%)	35 (35%)	3.6	1.76 – 7.36	2.34	1.43 - 3.81
	Not illiterate	17(34%)	65 (65%)				

Discussion

This study design has a potential for ascertainment bias, which was reduced by the use of case definitions. The epidemic curve has several peaks typical of a propagated outbreak, suggestive of person to person transmission.

Rubella cases captured by measles case-based surveillance system have been sporadic throughout the region. We attributed this outbreak to the fact that our does not currently provide RCV in the National Immunization Program; therefore; most of the children were susceptible to this disease. The results of the investigation revealed that of the total number of rubella (155), 100% had never been vaccinated against rubella infection. Studies in other countries not providing RCVs have also demonstrated widespread transmission and rubella outbreak [23, 24, 25].

Contact with rubella case during illness, thereby spreading the rubella infection to others in contact through sneezing and coughing. This finding is therefore biologically plausible considering that rubella is spread through respiratory secretions.

Household contact was a significant risk factor for rubella outbreak in Sherkole Woreda of Assosa Zone; Western Ethiopia. Children who contracted rubella from their village were spreading the disease to their siblings at home. This was consistent with the study done by Mpeta T et al in 2005 in Insiza District, Matebeleland Province and Muchedzi A et al in 2004 in Gweru district, Midlands Province where household contact was a significant risk factor for contracting rubella [26].

Having >4 family size in a household was a significant risk factor for contracting rubella, thus overcrowding was highlighted to be the driver of the current outbreak. This implies that having more children in the household increased the risk of being in contact with the infected child. This was consistent with a study done in 1999 on rubella outbreak investigation by Danovaro-Holliday et al in the United States whereby overcrowding in the work place and at home was a risk factor for contracting rubella [27].

Care givers perceived rubella as measles which are almost similar knowledge in terms of transmission; prevention and control; there was no significant difference in knowledge between cases and controls except for some signs and symptoms which were Fever, Rash, Cough and Coryza where there was a significant difference. This might be due to recall bias whereby caregivers of cases were more likely to know how their children presented than of controls. However caregivers did not know the importance of isolation of sick children both at home and at school, thus the quick outbreak spread.

Sherkole Woreda Health Office didn‘t respond timely to the outbreak due to same instability/ security problem. However; the health center and health posts daily line listed of cases were done; information, education and communication materials on rubella for community for sensitization was not available. This implies that community education wasn‘t adequate.

Strength and Limitation of the Study

Strength of the Study

- Regional Health Bureau, Public Health Emergency Management Case Team deployed RRTs to investigate and control the outbreak immediately (below 48 hours)

- Regional Health Bureau allocated necessary budget, drugs and medical supplies.

Limitation of the Study

- The sensitivity of this case definition is likely not high enough to identify all rubella cases. Case definition used to detect the rubella cases was designed for the measles case-based surveillance system.
- There was a possibility that controls could have been infected with rubella virus but not yet developed signs and symptoms of rubella during the investigation period. This could have introduced ascertainment bias which might have reduced the strength of associations;

Conclusion and Recommendation

Conclusions

- We investigated an outbreak of rubella in which 97.4% of the cases were in children aged less than 15 years, with a median age of six years.
- Abale Nyentsa and Koleho Kebeles were more affected Kebeles
- The outbreak was driven by contact sick sibling at home and spread into the other Kebeles through school children;
- We conclude the source of this outbreak was propagated type of outbreak (lead to multiple waves of infection) and the type of the outbreak was sporadic type of outbreak

Recommendations

- A rubella specific case definition is needed for early case detection because currently the case definition used to detect rubella is the measles suspected case definition and this may lead to unnoticed rubella outbreaks because the signs and symptoms of rubella are milder than measles.

- The Woreda Health Office should strengthen active surveillance system in order to detect case early as much as possible.

- Strengthen sensitization of health workers and health extension workers

- Continues Health Education of the community on Ways of transmissions and prevention activities

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1.2. Acute Watery Diarrhea Outbreak Investigation in Sedal Woreda of Kamash Zone; Benishangul Gumuz Regional State-Ethiopia November 2016

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Introduction: Cholera is an infection of the small intestine by some strains of the bacterium *Vibrio cholera*. Acute watery diarrhea (AWD) is becoming a big problem in Ethiopia as well in Benishangul Gumuz Regional State. The aim to investigate acute watery diarrhea outbreak and identify risk factors associated with acute watery diarrhea in Sedal Woreda of Kamash Zone; Benishangul Gumuz Regional State; Western Ethiopia

Method: Descriptive cross-sectional and Analytical study designs were used. The case control study conducted from 1st – 15th October /2009 EC.). The total numbers of people included in the study were 132 individuals. Data entered and analyzed using Epi -info version 7. Any person 5 years of age or more with profuse acute watery diarrhea and vomiting was suspected to AWD. Suspected case in which Vibrio cholerae O1 or O139 has been isolated from was confirmed case.

Result: A total of 154 AWD cases and 5 deaths were reported. Over all Attack Rate was 6.2 cases/ 1000 population. Overall case fatality rate (CFR) in the Woreda was 3.2%. The median age of the case was 25 years. 50.6% of the cases were females. Sex specific AR was 18 per 1,000 and 17 per 1,000 Female and Male respectively. Eight out of 10 stool samples were positive for Vibrio cholera. The cases were reported from six (46.2%) Kebele. Fifty percent of the case reported from one Kebele. Seventeen (65.4%) of water points were contaminated with fecal coli forms. Risk factors were; drinking water source from river {AOR; 3.52, 95% CI (2.17 – 5.7), P-value <0.05; hand washing wish soap/ ash before meal, preparing food and latrine visit (at critical time) {AOR; 3.89, 95% CI (1.87 – 8.08), P-value <0.05} and Close contact with similar illness {AOR; 6.8, 95% CI (3.58 – 12.91), P-value <0.05} were significantly associated with acute watery diarrhea outbreak.

Conclusion: This outbreak the overall case fatality rate (3.2%).*Both Vibrio cholera* 01 and 0139 serotypes were responsible for this acute watery diarrhea outbreak in Sedal Woreda. Emergency preparedness and response plan with drugs and supplies should be available in the Woreda.

Key words: Acute watery diarrhea, Vibrio cholera, Benishangul Gumuz

Introduction

The word cholera is from the Greek word; "bile". Cholera is an infection of the small intestine by some strains of the bacterium *Vibrio cholera* [1]. Symptoms may range from none, to mild and severe [2]. The classic symptom is large amounts of watery diarrhea that lasts a few days [3]. Vomiting and muscle cramps may also occur [2]. Diarrhea can be so severe that leads within hours to severe dehydration, electrolyte imbalance and death [3]. This may result in sunken eyes, cold skin, decreased skin elasticity, and wrinkling of the hands and feet [4]. The dehydration may result in the skin turning bluish [5]. Symptoms start two hours to five days after exposure [2].

Cholera is spread mostly by water and food that has been contaminated with human feces containing the bacteria [3]. Humans are the only animals affected. Risk factors for the disease include poor sanitation, not enough clean drinking water, and poverty [3].

Cholera affects an estimated 3–5 million people worldwide and causes 58,000–130,000 deaths a year as of 2010 report [3 and 7]. While it is currently classified as a pandemic, it is rare in the developed world. Children are mostly affected. Historical descriptions of cholera are found as early as the 5th century BC in Sanskrit [4]. The study of cholera by John Snow between 1849 and 1854 led to significant advances in the field of epidemiology [4] [8].

In the early 1980s, death rates were believed to have been greater than 3 million a year [2]. It is difficult to calculate exact numbers of cases, as many go unreported due to concerns that an outbreak may have a negative impact on the tourism of a country [14]. Cholera remains both epidemic and endemic in many areas of the world [9].

The primary symptoms of cholera are profuse diarrhea and vomiting of clear fluid [9]. These symptoms usually start suddenly, half a day to five days after ingestion of the bacteria [10]. The diarrhea is frequently described as "rice water" in nature and may have a fishy odor [9]. An untreated person with cholera may produce 10 to 20 liters (3 to 5 US gal) of diarrhea a day [9]. Severe cholera, without treatment, kills about half of affected individuals [9]. If the severe diarrhea is not treated, it can result in life-threatening dehydration and electrolyte imbalances; which result in complications like Hypoglycaemia, Acute pulmonary oedema, renal failure (anuria) and Hypokalaemia [9]. Estimates of the ratio of asymptomatic to symptomatic infections have ranged from 3 to 100 [11]. Cholera has been nicknamed the "blue death" because a person's skin may turn bluish-gray from extreme loss of fluids [12]. Fever is rare and should raise suspicion for secondary infection or comorbidity.

Transmission is usually through the fecal-oral route of contaminated food or water caused by poor sanitation [3]. Most cholera cases in developed countries are a result of transmission by food, while in the developing world it is more often water [9].

About 100 million bacteria must typically be ingested to cause cholera in a normal healthy adult [9]. This dose, however, is less in those with lowered gastric acidity (for instance those using proton pump inhibitors) [9]. Children are also more susceptible, with two- to four-year-olds having the highest rates of infection [9]. Individuals' susceptibility to cholera is also affected by their blood type, with those with type O blood being the most susceptible [9]. Persons with lowered immunity, such as persons with AIDS or children who are malnourished, are more likely to experience a severe case if they become infected [9].

A rapid dipstick test is available to determine the presence of *V. cholerae*. Stool and swab samples collected in the acute stage of the disease, before antibiotics have been administered, are the most useful specimens for laboratory diagnosis [14]. In epidemic situations, a clinical diagnosis may be made by taking a patient history and doing a brief examination. Treatment is usually started without or before confirmation by laboratory analysis.

Prevention involves improved sanitation and access to clean water [4]. Cholera vaccines that are given by mouth provide reasonable protection for about six months. They have the added benefit of protecting against another type of diarrhea caused by *E. coli*. The primary treatment is oral rehydration therapy the replacement of fluids with slightly sweet and salty solutions [3]. Zinc supplementation is useful in children [8]. In severe cases, intravenous fluids, such as Ringer's lactate, may be required, and antibiotics may be beneficial.

Objectives

General Objective

- To investigate acute watery diarrhea outbreak and identify risk factors associated with acute watery diarrhea in Sedal Woreda of Kamash Zone; Benishangul Gumuz Regional State; Western Ethiopia

Specific objectives

- To verify the suspected acute watery diarrhea outbreak in Sedal Woreda;
- To describe the suspected acute watery diarrhea outbreak in terms of person, place and time;
- To identify risk factors associated with the suspected acute watery diarrhea outbreak;

Methods and Materials

Investigation Area and Population

Benishangul Gumuz Regional State /BGRS/ is one of the nine Regional States that constitute the Federal Democratic Republic of Ethiopia /FDRE/ [15]. It located in western of the country. BGRS covers only 0.9%of FDRE population size [16]. The region is divided into 19 Administrative Woredas including three Zones (Assosa, Kamash and Metekel); one Town Administration and one Special Woreda.

Sedal Woreda is among one of the 5 Woredas of Kamash Zone. It's located 152 KM from the Regional capital (Assosa) and about 628 KM from Addis Ababa. The Woreda is newly emerged in 1987 EC and changed its name from Seribabay to Sedal. Meaning dancing of Abay River in Afan Oromo language. Sedal Woreda shares a border with Wombera in the East; Oda Bilidigilu in West; Mendi Woreda of Oromiya Region in the South and Sudan in the North. Based on the 2007 census population projection; the total population of the Woreda reached 24,465.

Sedal Woreda comprises of 12 rural and 1 urban Kebeles (the lowest governmental structure). All Kebeles of Sedal is found in the Gorge of Abay River. Among those Kebeles; 6 Kebeles were affected by acute watery diarrhea/ suspected cholera outbreak. The Woreda had 10 health posts; 1 health center and 2 drug vendors. The potential health coverage of the Woreda reached 87%.

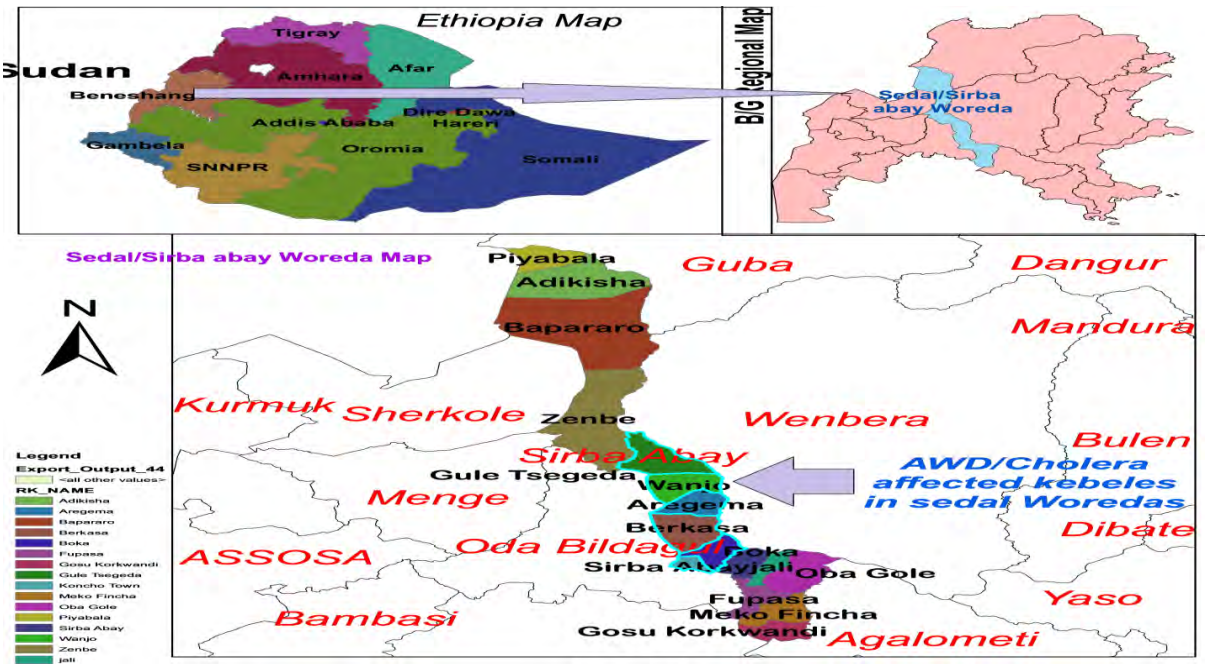

Figure 6 *Map of Sedal Woreda of Kamash Zone of Benishangul Gumuz Regional State/ October 2016*

Study Design

Descriptive cross-sectional and Analytical (case and control) study designs were used.

Study Period

Descriptive data were analyzed from line listed reported cases since 1st August 2016 till the last line listed case reported on 29th September 2016. The case control study conducted from 11th – 25th October /2016.

Source of population

Total population of Sedal Woreda was the source of the population, it estimated to be 24,465 (projection based on 2007 census).

Study population:

The study population was selected from source population. All AWD affected Kebeles (six Kebeles) were selected purposively.

Sample Size

Matched (by sex, age and Kebele) case control study in the ratio of 1:2 (44 cases - 88 controls) was conducted.

Definition

Suspected Case Definition of AWD

In an area where the disease is not known to be present; a patient aged 5 years or more develops severe dehydration or dies from acute watery diarrhea; and in an area where there is cholera epidemic; a patient aged 5 years or more develops acute watery diarrhea, with or without vomiting [17 and 18].

Community Case Definition of AWD: any person 5 years of age or more with profuse acute watery diarrhea and vomiting [17 and 18]

Confirmed Case: Suspected case in which Vibrio cholerae O1 or O139 has been isolated from their stool in culture or immunochromatograpic rapid visual antigen detection [17 and 18]

Case Definition: Any person greater than 5 years of age with history of onset of acute watery and/ or vomiting sign and symptom observed from August – September2009 E.C. in Sedal Woreda;

Control Definition: Any person greater than 5 years of age without sign and symptom of suspected cholera at the time of the study similar with age, sex and place of live;

Severe Case of Cholera: Severe dehydration with or without severe vomiting receiving treatment in cholera treatment center or hospitalization area;

Moderate Case of Cholera: No dehydration or mild dehydration and watery diarrhea with or without moderate vomiting; only treated with oral rehydration salt (ORS);

Cholera Outbreak: A suspected case in which *Vibrio cholerae O1 or O139* has been isolated from his/ her stool and eight RDT positive out of ten suspected cases [17 and 18].;

Epidemiologically Linked Case: A suspected case of cholera living in the same or in an adjacent district/ Kebele with a laboratory confirmed cholera case [17 and 18].

Cholera Death: For surveillance purposes; any death from the area of confirmed case or epidemiologically linked case of cholera within 5 days of onset of watery diarrhea with or without vomiting;

Action Threshold Level of Cholera (Threshold Levels for Declaring an Epidemic for Cholera): Single suspected or confirmed cholera case [17 and 18].

Operational Definition

Potable Water Supply: - water which is free from biological contaminants which may not harm the consumer‘s health;
Water Quality Testing: is the process of determining the bacteriological parameter of water supply in compliance with the WHO water supply guideline [19].

Coli form Bacteria are defined as gram negative, rod shaped, and capable of growing in the presence of bile salt or other surface active agent like broth [19]

Data Collection Method

Surveillance data of the Woreda Health Office was reviewed retrospectively to observe similar outbreak from the district and to set background status of the disease. Structured questionnaire was used to interview cases and controls. Active search was conducted using line listing of cases. In addition to this we conducted informal discussions with different stakeholders about the overall outbreak situation and the control and prevention efforts undertaken in the Woreda.

Data Entry and Analysis

Collected quantitative data was checked and entered on a computer and analyzed using Microsoft office Excel and Epi info 7.1

Laboratory Investigation

Samples of stool collected from patients with suspected AWD. *Immuno chromatographic* rapid visual antigen detection test for *Vibro cholera* were done to verify the type of serotype.

Environmental Investigation

The bacteriological analysis of water can confirm whether a water supply has been fecal contaminated or not. To search directly in a water sample for the presence of specific or individual enteric pathogen is impractical for routine controls [19].

Fecal coli form test is more appropriate for monitoring of pollution. The most important member of this group is *escherica coli,* which has been used as indicator of fecal pollution. Various genera of E. coli are the origins of diarrhea diseases in children and infants. It concern about environmental problem [19]. When no normal fecal bacteria detected in the sample, it is probable that enteric pathogen (usually present in much smaller number) are also absent. The vice versa is also true [19].

We conducted bacteriological water quality test for fecal coliforms and sanitary survey/ assessment for water schemes were done in collaboration with Regional Water, Mine and Energy Resource Development Bureau.

Ethical issue

Informed verbal consent was taken informally from all respondents before interviews and all agreed to take part

Result

Descriptive Epidemiology

On 1st August 2016 the first case (index) was registered and reported from Estegeda Kebele; which was one of the hardest to reach Kebele in Sedal Woreda. The index case was male; 35 years old. Throughout the outbreak period; a total of 154 cholera cases and 5 community deaths were reported from 25th July 2008 EC – 20th September 2009 EC from six Kebeles (out of 13 Kebeles) in the Sedal Woreda of Kamash Zone (Figure-8). From the total cases (154); 77 (50%) were reported from Etsegeda Kebele. The remaining 77 (50%) cases were reported from other five Kebeles.

The case fatality rate (CFR) was 6.5% in Etsegeda Kebele. Overall CFR in the Woreda was 3.2%. The mean age of the cases was 27 years of age, with a median age of 25 years and range from 5 to 70 years. Of the total affected cases; 78(50.6%) were females. Fourteen (9.1%) cases were severely dehydrated and treated in the Cholera Treatment Center (CTC). A total of 8 cases were positive for immunochromatograpic rapid visual antigen detection and two samples were sent to Nekemte Regional Laboratory for confirmatory test. The result was negative (those sample was collected after receiving antibiotic).

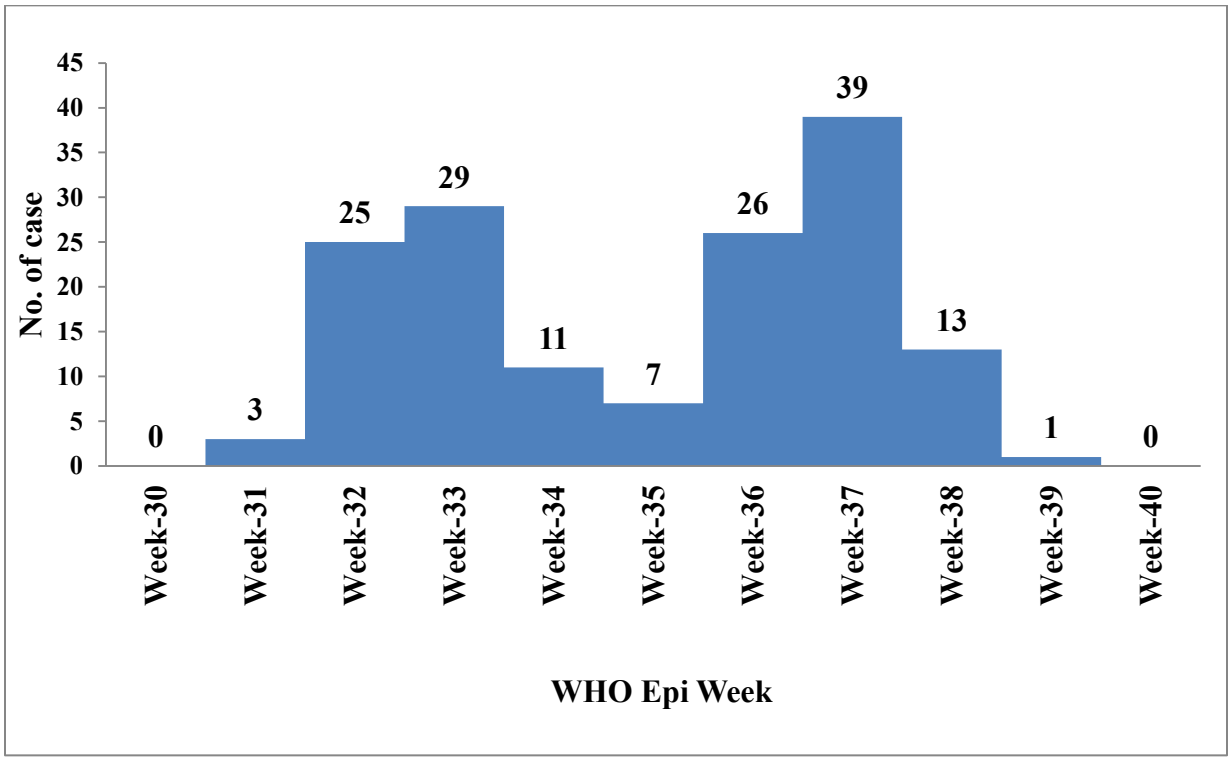

Figure 7 ***WHO Epi week of onset of AWD sign and symptom from 1st August – 29th September 2016 Sedal Woreda; Kamash Zone of Benishangul Gumuz Regional State/ Ethiopia/ October 2016***

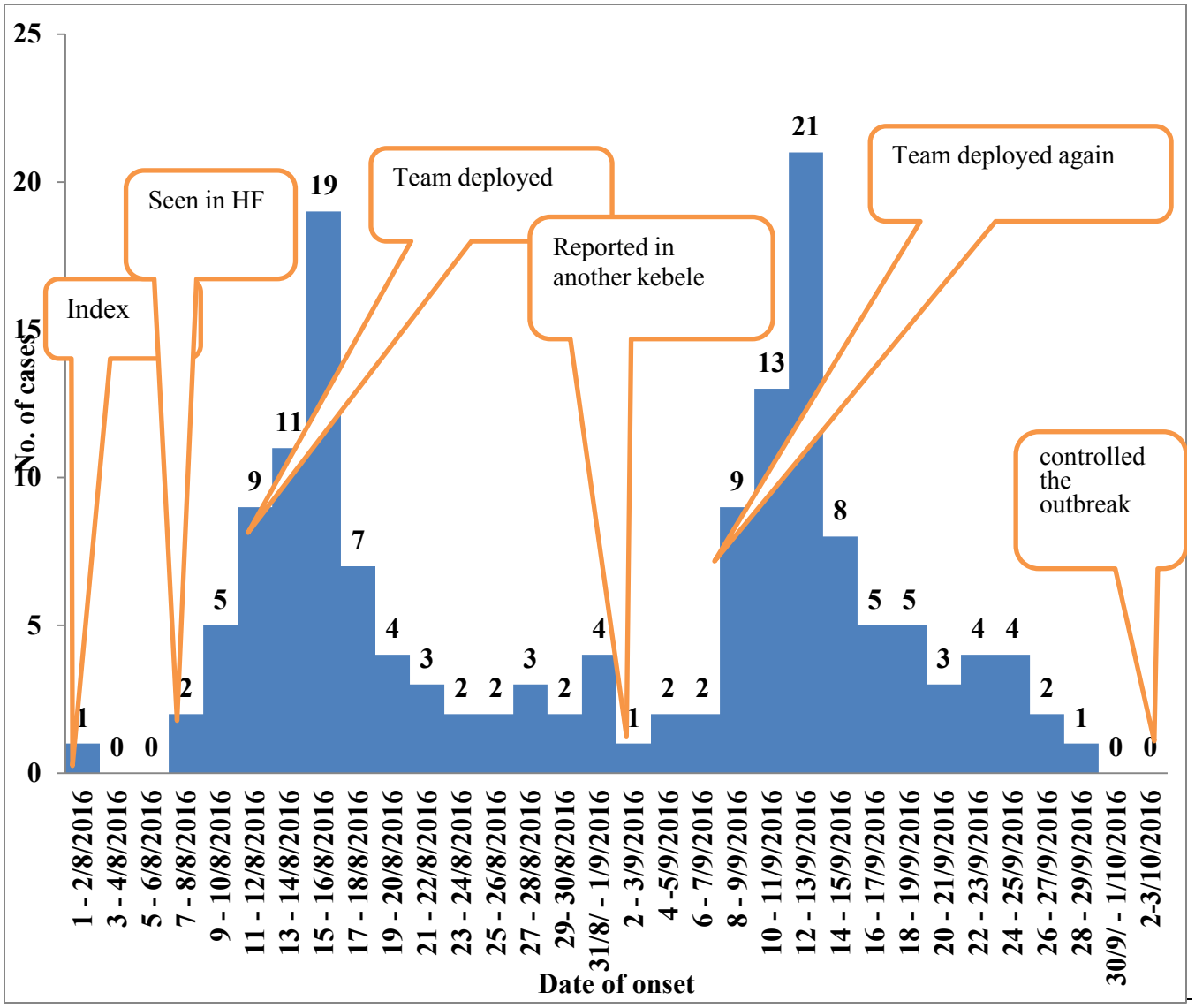

Figure 8 *AWD cases reported by date of onset of sign and symptom from* ***25th July 2008 EC – 20th September 2009 EC*** *in Sedal Woreda; Kamash Zone of Benishangul Gumuz Regional State/ Ethiopia/ October 2006*

Table 5 *Distribution of AWD cases by sign and symptoms* ***from 1st August – 29th September 2016*** *in Sedal Woreda; Kamash Zone of Benishangul Gumuz Regional State/ Ethiopia/ October 2016*

Sign and symptoms category	Number of cases 154			
	Yes	**Percentage**	**No**	**Percentage**
Diarrhea	154	100%	0	0%
Vomiting	113	73.4%	41	26.6%
Abdominal pain	39	25.3%	115	74.7%

Table 6 ***AWD cases distribution by sex from 1st August – 29th September 2016 in Sedal Woreda; Kamash Zone of Benishangul Gumuz Regional State/ Ethiopia/ October 2016***

Sex category	Number of cases 154			
	Population	No. of cases	Percentage	AR/100
Male	4399	76	49.4%	1.7
Female	4277	78	50.6%	1.8

Sedal Woreda has 13 Kebeles (12 rural and 1 urban); all Kebeles founded in the gorge of Abay river. Among those Kebeles; the severely affected Kebele was Estegeda which reported 77 cases (50% of the total cases). Etsegeda Kebele was not accessible with car or motorbike. It is 62 km far from the Woreda center and takes 13 hours to reach it on foot.

Figure 9 ***AWD cases distribution by Kebeles from 1st August – 29th September 2016 in Sedal Woreda; Kamash Zone of Benishangul Gumuz Regional State/ Ethiopia/ October 2016***

Age distribution verified that; 31 (20.2%); 104 (67.5%) and 19 (12.3%) were reported from <5 to 14 years; 5 to 14 years and above 44 respectively.

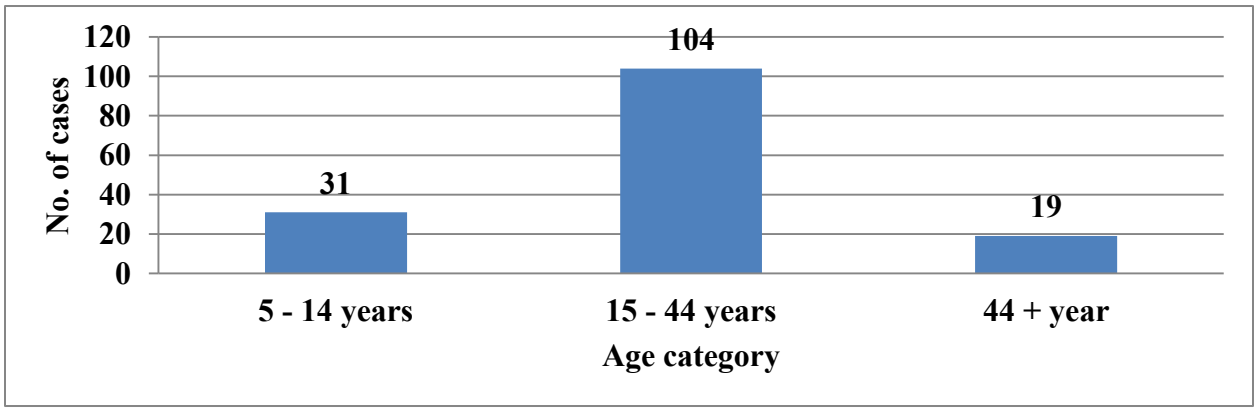

Figure 10 ***AWD cases distribution by Age Category from 1st August – 29th September 2016 in Sedal Woreda; Kamash Zone of Benishangul Gumuz Regional State/ Ethiopia/ October 2016***

Table 7 ***Distribution of AWD attack rate and case fatality rate from 1st August – 29th September 2016 in Sedal Woreda; Kamash Zone of Benishangul Gumuz Regional/ Ethiopia/ October 2016***

Affected Kebeles	Population at Risk	No. of Cases	Attack rate/ 100	No. of Deaths	Fatality rate/ 100
Etsegeda	780	77	9.9	5	6.5
Medale	1,106	53	4.8	0	0
Diza	3,692	8	0.2	0	0
Chesega	1,193	6	0.5	0	0
Tinga	1,122	5	0.4	0	0
Gechijel	783	5	0.6	0	0

Note: - population <5 years of age was excluded from risk population; Etsegeda kebebe case fatality was based on community death report.

Table 8 ***Distribution of AWD cases by drinking water source from 1st August – 29th September 2016 of Sedal Woreda; Kamash Zone of Benishangul Gumuz Regional State/ Ethiopia/ October 2016***

Drinking Water Source	Cholera Cases	
	Number	Percentage
Hand dug well (HDW)	7	4.5%
Shallow well (SW)	12	7.8%
Other rivers (Abay river tributary)	58	37.7%
Abay river	77	50%

Laboratory Investigation

Ten sample of stool collected. Immunochromatographic rapid visual antigen detection test (RDT for vibrio cholera) was done for ten suspected cholera cases. Among those cases, eight cases were positive for Immunochromatographic rapid visual antigen detection test. To identify the etiologic agent of the outbreak two specimens were collected and sent to Nekemte Regional Laboratory (culture isolation). Its result was negative (those samples were collected after receiving antibiotic).

Environmental Investigation

Bacteriological water quality test and sanitary survey for 26 water schemes, including river and unprotected spring were conducted. Almost all drinking water sources had fecal coliforms (numerous to count fecal coliforms) and fecal coli forms were grow.

The sanitary survey or assessment of drinking water source revealed that; out of 26 drinking water source; 9 (34.6%) were very high risk of contamination and 15 (57.7%) was some risk of contamination.

Twenty five water supply systems (hand dug well and shallow well) were treated with 5% of sodium hypochlorite concentration (usually named Barachina) and 70% of calcium hypochlorite concentration (usually named chlorine). 11,749 household level water treatment chemical called water guard of 1.5% of 150ml usually named ―Wuha agar" distributed for almost all Kebeles of the Sedal Woreda.

Public health action

The public health emergency response focused on rapid assessment of outbreaks, outbreak investigations, implementing control and prevention measures, and monitoring of the interventions.

During the epidemic control activates: we got the following outputs:-

- A total of 140 moderately dehydrated cases treated with ORS and 14 severely dehydrated cases with intravenous (IV) antibiotics bases on national cholera treatment protocol;
- 159 new traditional pit latrine built in those affected Kebeles;
- 1,749 water gaud of 1.5% of 150ml ―Wuha agar" were distributed;
- 26 water schemes tested for bacteriological (fecal coliforms) and conducted sanitary survey;
- A total of 3,859 people participated on information, education and communication about cholera disease in schools, health institutions, Kebele meetings and sanitation campaigns sites.
- 25 times radio spot on air through regional FM radio and 5 live informing, education questioning and answering about acute watery diarrhea through regional FM radio;
- 2,500 brushers and leaflets were distributed in Sedal Woreda;
- The school community received health education during national Flag Day;

Analytical Epidemiology

We compared 44 suspected AWD cases with 88 controls matched by sex, age and place of residence. Descriptive statistics and odds ratios (OR) with 95% confidence intervals (CI) and p-value were calculated to compare risk factors among cases and controls. Analysis was performed using Epi Info version 7.

Concerning the interviewed gender, out of the total 44 cases; 23 (52.3%) were males while the remaining 21 (47.7%) were females and out of the total controls 88; 46 (52.3%) were males while the remaining 42 (47.7%) were females. From all respondent 10 (7.6%), 120 (90.9%), and 2 (1.5%) were single, married, and widowed respectively.

Education is the process by which human transmit his/her experience, new findings and value accumulated over the years. It enables individuals and society to make all rounded participation in the development process by acquiring knowledge, ability, skills and attitudes. Among all respondents, 102 (77.3%) can‘t read and write any other language, 16 (12.1%) primary level; 10 (7.6%) secondary and 4 (3%) tertiary.

The 2007 CSA report indicates that Berta, Gumuz, Amhara and Oromo are the majority inhibitors in Benishangul Gumuz regional state. The available data hasn‘t update using the ethnic composition in Woreda level. Nevertheless these; majority inhibitors of Sedal Woreda is Gumuz ethnic group. This study verified that; from the cases 41 (93.2%) and control 79 (89.8) are Gumuz ethnic group; the remained case 3 (6.8%) and control 9 (10.2%) was other ethnic group.

Regarding occupation; from all respondents (case and control); 115 (87.1%); 7 (5.3%); 6 (4.6%) and 4 (3%) were farmers, small traders (merchant), students and civil servants respectively.

Regarding religion; from all respondents (case and control); 114 (86.4%) were followers of Protestant; the remained 10 (7.6%) were Muslim and 8 (6%) orthodox Christina.

Table 9 ***Distribution of respondents' socio-economic characteristic of Sedal Woreda; Kamash Zone of Benishangul Gumuz regional state/ Ethiopia/ October 2016***

Variable	Category	Case N=44		Control N=88	
		No.	Percent	No.	Percent
Marital Status	Single	3	6.8%	7	8%
	Married	40	90.9%	80	90.9%
	Widowed	1	1.5%	1	1.1%
Educational Status	Unable to read and write	35	79.5%	67	76.1%
	Primary level	6	13.7%	10	12.1%
	Secondary level	2	4.5%	8	7.6%
	Tertiary level	1	2.3%	3	3%
Ethnicity	Gumuz	41	93.2%	79	89.8%
	Oromo	2	4.5%	5	5.7%
	Amhara	1	2.3%	4	4.5%
Religion	Protestant	39	88.6%	75	58.2%
	Muslim	3	6.8%	7	8%
	Orthodox Christian	2	4.6%	6	6.8%
Occupation	Farmers	41	93.2%	79	84.1%
	Small trader	1	2.3%	6	6.9%
	Students	2	4.5%	4	4.5%
	Civil servants	0	0%	4	4.5%

Note: - illiterate (Unable read and write); 1 – 8 grade (Primary level); 9 – 12 grade (Secondary level) and College/ University graduator (Tertiary level)

During observation; 16 (36.4%) cases and 58 (65.9%) controls had traditional pit latrine and the rest 28 (63.6%) and 30 (34.1%) cases and controls had not traditional latrine respectively. About 7 (15.9%) of AWD cases and 8 (9.1%) controls ate raw meat/ vegetation and the remained 37 (84.1%) and 80 (90.1%) cases and controls weren't ate raw meat/ vegetable in the last one week respectively. 4 (9.1%) of the cases and 4 (4.5%) of controls were a travel history of the ongoing AWD epidemic Kebele in the last one week. Close contact with similar illness verified that; 35 (79.5%) of the cases and 13 (14.8%) of controls had a contact history with similar illness. Regarding to the Knowledge of cholera transmission and prevention of the respondents; it revealed that; 24 (54.5%) of the cases and 27 (30.7%) of controls did not knew the mode of cholera disease transmitted from person to person and how to prevent it.

Risk factors were; drinking water source of river {AOR; 3.52; 95% CI (2.17 – 5.7), P-value <0.05}; hand washing wish soap/ ash before meal, preparing food and latrine visit {AOR; 63.89; 95% CI (1.89 – 8.08), P-value < 0.05}; Close contact with similar illness {AOR; 6.8, 95% CI (3.58 – 12.91), P-value <0.05} and knowledge of AWD transmission from person to person and way of prevention {AOR; 2.45, 95% CI (1.41 – 4.26), P-value <0.05} were significantly associated with AWD outbreak

Hand washes only with water before meal and preparing food {AOR; 1, 95% CI (0.19 – 5.04)} and hand washes only with water after latrine visit {AOR; 0.8, 95% CI (0.29 – 2.18)} weren't association factors. This outbreak investigation verified that all cases and controls were practice water treatment in home level and their water transport and storage item was jar can Demographic date were no statistical significant difference both cases and controls.

Table 10 *Bivariate and Multivariate analysis distribution of matched Cases and Controls of suspected AWD outbreak* ***of Sedal Woreda; Kamash zone of BGRS/ October 2009 EC***

Exposure	Yes/ No	Case n=44	Control n=88	Bivariate analysis		Multivariate analysis	
				COR	95% CI	AOR	(95% CI)
Hand wish soap/ ash before meal, preparing food and latrine visits	Exposed	37 (84.1%)	39 (44.3%)	6.64	2.67 – 16.51	3.89	1.87 – 8.08
	Not exposed	7 (15.9%)	49 (56.7%)				
Access to latrine	Exposed	28 (63.6%)	30 (34.1%)	3.38	1.58 – 7.2	2.23	1.34 – 3.71
	Not exposed	16 (36.4%)	58 (65.9%)				
Traveling history	Yes	4 (9.1%)	4 (4.5%)	2.73	0.49 – 8.82	1.55	0.74 – 3.24
	No	40 (90.1%)	84 (95.5%)				
Close contact with similar illness/	Yes	35 (79.5%)	13 (14.8%)	22.43	8.76 – 57.42	6.8	3.58 12.91
	No	9 (20.5%)	75 (85.2%)				
Eat/ drinking in another home	Yes	19 (43.2%)	28 (31.8%)	1.63	0.77 – 3.43	1.32	0.85 – 2.21
	No	25 (56.2%)	60 (68.2%)				
Raw meat/ vegetable eat	Yes	7 (15.9%)	8 (9.1%)	1.89	0.55 – 2.21	1.47	0.8 -2.69
	No	37 (84.1%)	80 (90.1%)				
Knowledge of transmission and prevention	Haven‘t knowledge	31(70.5%)	34(38.6%)	3.78	1.74 – 8.23	2.45	1.41 – 4.26
	Have knowledge	13 (29.5%)	54 (61.4%)				
Knowledge of treatment option of the case	Haven‘t knowledge	24 (54.5%)	27 (30.7%)	2.71	1.28 – 5.71	1.9	1.18 -3.07
	Have knowledge	20 (45.5%)	61 (69.3%)				
Water source	River	27 (61.4%)	14 (15.9%)	8.39	3.64 – 19.31	3.52	2.17 – 5.7
	HDW	17 (38.6%)	74 (84.1%)				
Hand washes only with water before meal and preparing food	Yes	1 (2.3%)	2 (2.3%)	1	0.08 – 11.33	1	0.19 -5.04
	No	43 (97.7%)	86 (97.7%)				
Hand washes only with water after latrine visit	Yes	3 (6.8%)	8 (9.1%)	0.73	0.18 – 2.18	0.8	0.29 -2.18
	No	41 (93.2%)	80 (90.1%)				

Discussion

The Crystal VC® test has limited utility for the diagnosis or management of the individual patient because its sensitivity (93%–98%) and specificity (67%–96%) are less than. If the cause of the outbreak is cholera, most (an estimated 8 to 9) of the rapid test results from the 10 individual patients will be positive; if the outbreak is the result of another cause, most of the rapid test results an estimated 6 to 7 will be negative[17].

The onset date of the first case was on 25th July 2008 EC and on 3rd August in Medale Kebele, and then within two weeks the outbreak attacked six Kebeles out of 13 Kebeles. The rapid spread to the outbreak likely due to the proximity and frequent movement of communities from one village to the other for traditional gold mining.

The overall attack rate (AR) and case fatality rate (CFR) was 1.8% and 3.2% respectively (total affected Kebeles population for AR and total cases for CRF were taken as denominator); which is almost some difference Epidemiology of Acute Watery Diarrhea Outbreak and Challenges of Control—Afar, Ethiopia, 2009 (AR 0.9% and CFR 4.4 %). The CFR was high as compared to the WHO guideline; which was supposed to be less than 1 % (WHO, 2004). This could be less attention given Woreda Health Office. However when we compare with outbreaks occurred in other African countries, such as in Nigeria 6.1% (ANON, 1985), 5.1% in Lusaka (14), 4% in Kenya (Acosta et al., 2001), and 3% in Burundi (Yvan et al., 2003) our case fatality rate became median value.

The highest attack rates were occurred in Etsegeda (9.9) and Medale (4.8) Kebeles (Table 8). This might also be due to; those two Kebeles there are high people movements for traditional gold mining site. Those Kebeles are potential gold sites

The Epi-curve has many peaks which showed a progressive person to person transmission, this could be due to weak response activity of the districts epidemic task force. One of the risk factor was drinking of river water directly without any treatment. This study identified that; the community used rivers water as the source of drinking water {AOR; 3.52, 95% CI (2.17 – 5.7), P-value <0.05}; and hand washing wish soap/ ash before meal, preparing food and latrine visit or at critical time {AOR; 3.89, 95% CI (1.87 – 8.08), P-value <0.05 } Close contact with similar illness {AOR; 6.8, 95% CI (3.58 – 12.91), P-value <0.05} were significantly associated with acute watery diarrhea outbreak. But Hand washes only with water before meal and preparing food and Hand washes only with water after latrine visit were protective associated.

The bacteriological analysis of water can confirmed that; out of 26; 4 (15.4%) of water schemes were contaminated with fecal coliforms and 13 (50%) water points also other organism was isolated/ grow. Those water schemes were against the WHO guideline for drinking water quality standards [19]

Strength and Limitation of the Study

Strength of the Study

- Regional Health Bureau, Public Health Emergency Management Case Team deployed RRTs to investigate and control the outbreak immediately (below 48 hours)
- Regional Health Bureau allocated necessary budget, drugs and medical supplies.

Limitations

- We could not include Estegeda Kebele's case for case control study due to limited access;
- The case definition used to detect the suspected cholera cases was designed by exclusion of < 5 years of age children.
- The Crystal VC® test has limited sensitivity (93%–98%) and specificity (67%–96%) are less optimal to verify and determine AWD outbreak as cholera

Conclusion and Recommendation

Conclusion

- This outbreak the overall case fatality rate (3.2 %) was higher than the WHO‘s recommendation;
- Both *Vibrio cholera* 01 and 0139 serotype were responsible for the acute watery diarrhea outbreak in all six Kebele of Sedal Woreda;
- Isolated organisms like *Escherchia coli* and other faecal coliform bacteria from drinking water sources could also support the cause for the situation in the area;
- The source of the illness was most probably water related; mode of transmission seems fecal-oral and Kebeles without hand pumps were more affected (87.7% of AWD cases were drinking rivers water directly without any treatment).
- Etsegeda and Medale kebeles were more affected Kebeles
- Age groups from 15-44 years of age was the most affected age groups (this age groups many more mobile than others and can have chance of getting unsafe water sources like rivers during traditional gold mining and hunting)

Recommendations

- Reactivation of rapid respond team (RRT) should be done;
- Heath workers and health extension workers should be train case investigation and case management.
- Restocking emergency drugs and supplies at Woredas levels.
- Perform a regular water quality testing and conduct regular sanitary survey of public drinking water supply systems and treat and correct it accordingly.
- Social mobilization and campaigns with coordination and collaboration of partner and stakeholder should be done by coordinating with other concerned stakeholders and partners.
- The Woreda Health Office should strengthen active surveillance system in order to detect case early as much as possible.

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2.Health Profile Description

Health Profile Description of Menge Woreda of Assosa Zone, Benishangul Gumuz Regional state, western Ethiopia/ March 2016

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Introduction: - Health profile is a system of collecting and organizing or summarizing health and other health related events to describe health conditions, demographic, socio-economic, political, cultural and other aspects of a particular population in the specific geographic area. It is crucial to prioritize health and health related events in the area. The summarized and prioritized health and health related information is basic for planning and for appropriate intervention; and is an entry point for operational research.

Objective: - The study was aimed to describe health and health related information and to identify health and health related problems for priority setting of Menge Woreda of Assosa Zone; Benishangul Gumuz regional state, Western Ethiopia

Method: - Health and health related performance of 2007 EFY, socio-economic, administrative setup and cultural aspect data were collected from 17th – 26th February GC. Descriptive cross sectional study was conducted using standard questionnaire. Hard copy and softcopy for different health and health related data were reviewed. During data collection, semi-structured questionnaire was used at district level. Interview was conducted with selected district offices focal persons using the questionnaire. Data were compiled and analyzed using Microsoft Excel software.

Result:- Menge Woreda Health Office received the second big slash of budget (17.78%) next to Menge Woreda Education, Capacity Building and Civil Service Office (36.74%).In the list of top ten diseases totally 24,886 patients were recorded in Menge Woreda. From those diseases, Malaria covered 53.34%; followed by diarrheal diseases (14.54%) and acute febrile illness (9.84%) were recorded among the top ten causes of morbidity in 2007 EFY. Completeness and timeliness of Menge Woreda in 2007 EFY was d 96.7%.Even if the utilization rate of latrine data weren't available in the Woreda; the numbers of households with latrines in 2007 EFY was reached 9,491(84%).

Conclusion: - Malaria and diarrhea diseases burden were leading health problem in the Woreda. Information of utilization rate LLITNs and latrine were not available in the Woreda. The Woreda should access and avail the LLITNs and latrine utilization data for immediately follow up of the priority diseases in the area;

Introduction

Health profile is a system of collecting and organizing or summarizing health and other health related events to describe health conditions, demographic, socio-economic, political, cultural and other aspects of a particular population in the specific geographic area. It is crucial to prioritize health and health related events in the area. The summarized and prioritized health and health related information is basic for planning and for appropriate intervention; and is an entry point for operational research. It is very vital for prioritizing prominent health and health related problems of the community at any level [1 and 2].

A situation analysis for a health district describes and analyses the situation regarding the health status and health services of a district. Information about different aspects of health and the health services is collected, in order to provide an overall picture of the district. At the district level, the situation analysis is primarily an assessment of the extent to which health services address health needs [3 and 4].

It aims to describe an analysis of the situation, to explain what is happening and to identify factors which are facilitating or preventing progress in the district health condition. As a result, it will also identify and highlight the priority problems and needs of the district so that plans and strategies for addressing these issues can be developed, and help to form part of a District Health Plan. Eventually, the situation analysis forms the basis of the District Health Profile document [5].

This document displayed comprehensive health and health related information; identified and prioritized health and health related problems and recommend appropriate public health interventions for Menge Woreda of Assosa Zone.

Rationale

Health profile description is a program to improve availability and accessibility for health and health-related information in Ethiopia. Health profiles description gives a snapshot overview of health for each local authority. Annual based health profiles description of each local authority is a corner stone for health program planners, implementers‘ and evaluation.

In Benishangul Gumuz Regional State, particularly at the district level; organized based description of health and health related information will help the local government and health services decision makers and planers to improve local people's health status and reduce health inequalities at all level.

Menge Woreda Health Profile Description wasn‘t done before and also there was no organized health and health related information about it. Therefore, this health and health related profile description will help Menge Woreda for prioritizing health and health related problems in the Woreda.

Objectives

General objective

- To describe health and health related information and to identify problems for priority setting of Menge Woreda of Assosa Zone of Benishangul Gumuz regional state, Western Ethiopia

Specific objectives

- To assess the health and health related conditions of the Woreda
- To identify and prioritize health and health related problem of Menge Woreda
- To describe health status and health indicators of Menge Woreda
- To deliver health and health related information in accessible for concerned bodies

Method

Study Area

Benishangul Gumuz regional state /BGRS/ is one of the nine regional state that constitute the Federal Democratic Republic of Ethiopia /FDRE/. It located in western of the country. The region is divided into 19 administrative Woredas; three Zones, one special Woreda and one town administration [5].

Menge Woreda is one of 7 Woreda's of Assosa Zone with high prevalence malaria throughout the year. The Woreda has 24 Kebeles. It is located 735 KM far from Addis Ababa at Western direction and 56 KM North directions from regional capital city of Assosa. Menge Woreda shares boarders with; Sherkole Woreda in the North; Assosa and Homosha Woreda in the South; Oda-Bilidigilu Woreda in the East and Kurmuk in the West [7].

The total population of Menge Woreda reached 54,683 according to the 2007 Central Statistics Agency population census projection [6]. All Population are living in malarious are. The total number of households is estimated to be 11,393 with the assumption of average household size of 4.8 [7]. The main incomes of Menge Woreda population are agriculture, cattle breeding and traditional gold panning/ digging, as well as small trading. Menge Woreda had 2 health centers and 17 health posts

Map of Menge Woredas of Assosa Zone; BGRS; Ethiopia; March 2016

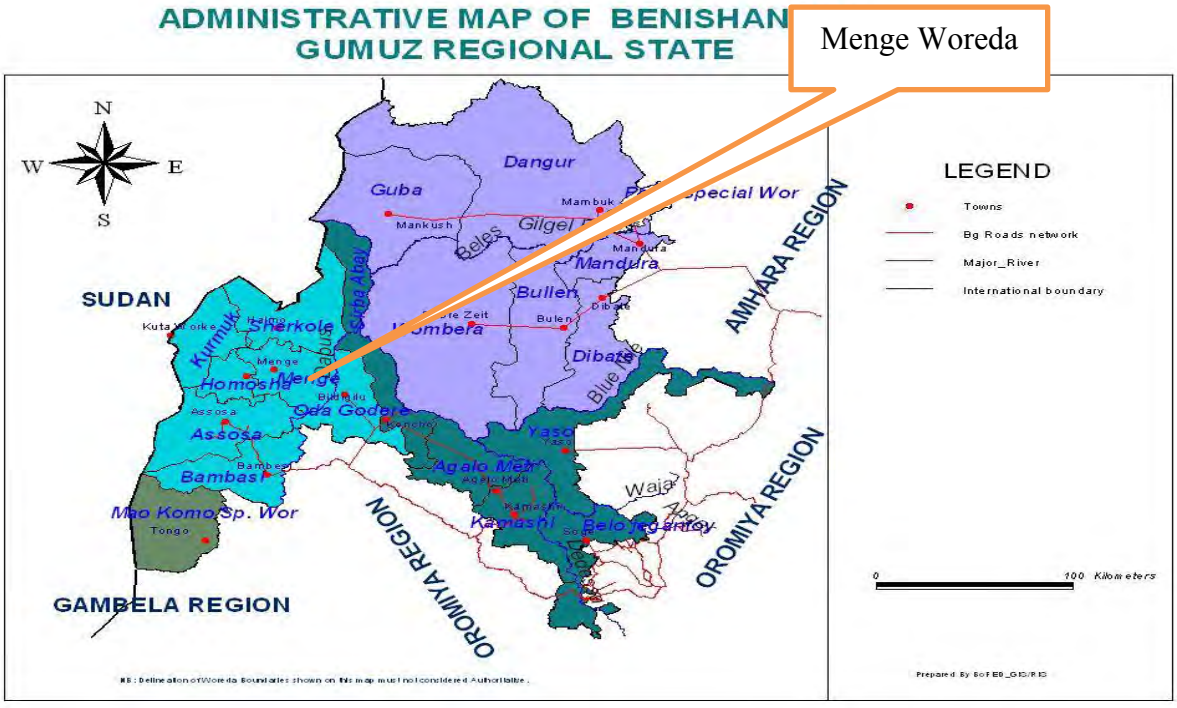

Figure 11 ***Map of Menge Woredas of Assosa Zone; BGRS; Ethiopia; March 2016***

Study Period

Health and health related performance of 2007 EFY, socio-economic, administrative setup and cultural aspect data were collected from 17th – 26th February 2016 GC.

Study Design

Descriptive cross sectional study was conducted using standard questionnaire. Hard copy and softcopy for different health and health related data were reviewed.

Study Units: - Woreda health office and facilities, and other responsible sectors in the Woreda

Data Collection Method: - Structured questioners were developed and used to collect primary and secondary data. Interviews were conducted with relevant officers of the Woreda health, education, water, Agriculture, administrative and others offices based on need data

Data Analysis: - Using Microsoft Excel

Results

Historical Background of Menge Woreda

The name Menge derived from Arabic word of ‗Ma Ja‘‘ which means ―Who is coming" and in Amharic ‗Man Meta‘‘. Based on oral literature and Menge Woreda Governmental Communication, Culture, Tourism and Sport Office Head said ―During Emperor Milnilik II era; the warriors of Emperor Milnilik II reached this area and called the traditional leader to meet him. The messenger reached the traditional leader and delivered the message to the respected traditional leader ―you are called by new face person". The traditional leader said ―who is coming or ―Ma Ja"? Then; the warriors of Emperor Milnilik II waited place called ―Ma Ja". Non Arabic speakers were can‘t pronounced as it is and called Menge.

The remained rural Kebeles name origin and its similar or equivalent meaning is attached in annex-1

Geography and Climate

Menge Woreda is one of the 19 Benishangul Gumuz National Regional State. It‘s far about 735 KM from Addis Ababa and 56 km from Assosa Town (which is capital of the Region). The total area of Menge Woreda had about 154,775 hectare.

Menge Woreda is characterized under the tropical rainy climate with mono-modal rainfall of six months that starts in May and ends in October. The vegetation cover is characterized with tall grass intermingled with trees. The highest rainfall occurs in the months of July, August and September. Average daily temperature of Menge Woreda is between 24^{o}c to 38^{0}c.

The elevation of Menge Woreda varies from 620 meter above sea level in Ferdose Kebele (this Kebele community was resettled in other Kebele due to the Great Ethiopian Reissuance Hydroelectric Dam) to 2,150 meters above sea level in Undulu Oria Kebele.

Administrative and Political Structure

Benishangul Gumuz Regional State /BGRS/ is one of the nine regional state that constituted the Federal Democratic Republic of Ethiopia /FDRE/. It is located in the Western part of the country. The Region is further divided into three Zones, one Town Administration, nineteen Woredaas and one Special Woreda. Menge Woreda is one of the seven woredas found in Assosa Zone. Menge Woreda has 24 (1 urban and 23 rural) Kebeles. Kebele is the smallest administrative unit that further divided into villages for development activities and administrative purpose. Menge Woreda shares boarders with; Sherkole Woreda in the North; Assosa and Homosha Woreda in the south; Oda-Bilidigilu Woreda in the East and Kurmuk in the West.

Demographic Characteristic

Population Characteristic

Total population of Menge Woreda estimated to reach 50,974 in 2008 EFY (projection based on 2007 census). Of these population males 26,093 and females 25,441; children under 5 years of age 8,248 numbers of women of reproductive age (15-49) 10,547; numbers of pregnant women 1,738 [6]. There was no pastorals and internal displaced people (IDP) in the region. The actual data about migrant workers were not yet known. Nevertheless; the migrant workers were estimated about 15% of the total population (7,646). This number was increased in agricultural season. According to the CSA 2007 report; the average household size of Menge Woreda was 4.8 which differ with 0.9 from the national household size [6].

Ethnic group

The 2007 CSA report verified those Berta; Gumuz, Amhara and Oromo ethnic groups constitute the majority population size of the region [8]. This report also verified that; Berta ethnic groups represent the larger size of the population in Menge Woreda. The available data confirmed that around 93% the population inhabiting in Menge Woreda are Berta ethnic group and the remaining 7% shared by Amhara, Oromo, and Tigre and others.

Religion

The largest religious compositions of Menge Woreda are Muslims (97%) and the remaining 3% was Christian (all type) [8]. All Berta communities had Muslim religion follower.

Housing Condition

Quality of housing was one of the health problems of the Woreda. During field observation; almost all of household members were living in a grass thatch roof with round housing unit. Very few housing unit were roofed with corrugated iron sheets. The field observation also reveals that all houses units floor were made with soil and it‘s not properly leveled. Hence, creates inconvenience to female household members while keeping the house clean.

Settlement Pattern

Menge Woreda is one of the most scarcely population settlement pattern. Therefore, consciously planning and implementing health program should be in line to their settlement pattern. It may enable the communities to benefit from the planning, implementing and monitoring and evaluation health programs and the construction of infrastructures with equitably and reasonable distance.

Economy

Menge Town, which is Woreda capital, is an important for administration, economic and communication center of all Kebeles and nearby Woredas. According to the Woredas Finance and Economic Development Officials, the major economic activity of the Menge Woreda is agriculture. It revealed that agriculture shared 95% the Woreda economic. This economic source also was supported with traditional gold mining/ panning and animals husbandry. Civil servants as well as small trading contributed the remained to the remaining slash. Also a significant numbers of the community particularly nearby Menge Town supporting their livelihood by selling fire woods and charcoals (mostly managed by woman) and bamboo for house construction.

Marketing

All Kebeles had their own marketing site. Nevertheless, main marketing site is in Menge Town. It takes place every Saturday. Markets in the study area classified into two types; namely Kebele market held in each Kebele level and town market held in Menge town every Saturday. Both markets are held at the open locations. A range of commodities are traded in the market, which includes household food, and other consumables offered by outside traders and farm produce such as grains and livestock‘s and gold offered by the farmers. According to the information gained from Woreda Finance and Economic Development office; the magnitude of this market decreased during rainy season.

Agricultural Activities

The Woreda population subsists on mixed farming; including crop cultivation and animal husbandry and traditional gold mining. However, crop production and traditional gold mining are more intensified than livestock husbandry because of animal diseases (trypanosomiasis). Although they have plenty of land covered with grasses. At the moment, different crops varieties such as maize, sorghum, Niger seed, sesame etc are cultivated in Menge Woreda. Also fruit like Mango are also cultivated in the area.

The study area population largely relay on rain feed agriculture and shifting cultivation. Plow cultivation is a technology prevailing in the area from the time immemorial. In the course of farming; human and oxen cultivation are used intensively. May - October are main rainy months which make the main farming season of the Woreda.

Despite the fact that agriculture constitutes the major share of the communities means of livelihood. This sector itself is backward and linked with multiple problems. Crop and livestock production have seriously been affected due to unpredictable rainfall change, high population growth, limited provision of new technologies, lack of product diversification and inadequate agricultural market system and limited access to credit facilities are major constraints of this sector development.

Households Income

With regard to income related issues, detailed up-to-date information of the Woreda specific income data were not available in Woreda Finance and Economic Development Office. The economic strata of the study communities could be differentiated into households who have plow oxen and cover yearly food requirement and those who do not possess on oxen and had hardly meet yearly food need.

Majority of households are relay on mono production and they didn‘t they have saving habits. Most of the households aren‘t produced enough amount of production to cover their yearly food needs. They are faced with food security for two to three months even during good harvesting time. The communities were engaged in other works like traditional gold mining and selling of fire wood and charcoal to cover their food security due to poor harvest. The average monthly or yearly income of the households is not yet known.

Gender

Gender is the socially constructed roles and responsibilities assigned to women and men but not a biological factor. Sex based division of labor prevails in Menge Woreda from time immemorial. Woreda Women, Youth and Child Affair Office Head confirmed that women had actively participated in all aspect of agriculture and traditional gold mining.

Women had the biggest share for caring the children and sick member of families. It is as well; the duty of women to prepare the food, cleaning and managing the house, fetching water from source and collecting firewood.

Men in Menge Woreda are mostly engaged in agricultural activities/ plowing, selling of gold collected by their wives and purchasing consumable items. Husband plays a decision making role in any aspect of their houses and can marry up to four wives. All wives living in the same compound but in different houses. Sometimes, husband can drop the oldest wife and marry again a young girl.

Social Services

Transportation

Out of 24 Kebeles; 17 Kebeles are hardly accessible while this situation is largely aggravated during the rainy season. There was no public transport from Menge town to Kebeles and back. As the result people of the area use back animals and carry by them to all their products and to transport purchasing agricultural inputs and other items from the market. The major proportion of the road is poor condition (constructed by human powers with different tools availed in home of framers). Only four Kebeles had all weather roads.

Telephone Communication

Wireless telephone system is available in all 24 Kebeles while it is reported that there is frequent interruption of the telephone service. Landline/ fixed line service yet not started in Menge Woreda. All health centers, health posts Woreda sectors offices were without this service.

Electrification (Hydro power)

Even though the effort to access some Kebeles of the Woreda with hydroelectric power started; 21 rural Kebeles are without electric power. Only 1 urban and 2 rural Kebeles had 24 hours hydroelectric power service. This service is also frequent interruption (at least three times a day and even for more than a week of this service is interrupted).

Availability of Credit and Financial Institutions

Banking facility is not available in Menge Woreda. However; Benishangul Gumuz Saving and Credit Association (Micro finance) is establish in the Region and has a branch office in the Woreda. Benishangul Gumuz Saving and Credit Association (Micro finance) is providing small loan to for the communities especially to purchase of oxen.

Community Based Organizations (CBO's)

Like many parts of Ethiopia, in the study Woreda communities had their own mutual help organizations established to meet different purposes. Community Based Organizations that exist in the study area are discussed in detail as indicated hereunder.

Iddir is the most frequent type of community-based organizations in the Woreda. Like in other parts of country; Iddir is primarily aimed to give funeral support for the families following incidents of death. A family who lost their family member get some contributed money from the members' contributed.

Iqub (Rotational Credit) is another form of community based organization practiced in the study Woreda, especially in governmental employees. The main aim of Iqub is to serve as a

traditional credit and saving scheme. Members need to save similar amount of money in monthly/ weekly (based on their income). Each member will take the collected money in monthly/ weekly based by lottery method and expected to continue till all members are served.

Debo is informal community based organization sharing their labor forces during cultivation, harvesting seasons and rehabilitation and newly constructing of grass roof homes). The organizers require preparing food (forage) and drinks (local drinking called –Batsa".

Educational Service

Menge Woreda had 36 schools, out of those; 10 schools were primary schools grade (1-4); 15 schools were primary and junior schools (grade 1-8) and 2 preparatory schools (grade 9 – 12) and 7 alternative basic educations (ABE). There were no TVT and college in the district. A total of 13,492 (both regular and ABE schools) students were enrolled at different level of schools, of whom, 8,009 (59.3%) were males and 5,483 (40.7%) were females.

A total of 245 teachers (245 Male and 47 female) were engaged in this sectors. Their qualification were 31 first degree, 192 diploma, 22 certificate, 14 alternative basic education teacher and 33 preliminary facilitators (the last two were grade 10 completed). There were a high number of male teachers compared to female teachers. This discrepancy teachers by may indicate the gender imbalance of education in the past, as parents prefer to educate their male children.

School enrolment rate was calculated with two different formulas. Gross enrollment rate (No. students registered in grade one over expected children of all age to be registered) and Net enrollment rate (No. students registered in grade one over expected children of age < 7 years of age). Based on this education indicator; Menge Woreda were reached 191% (2,546/1,332*100) gross enrollment rate and 113% (1,511/1,332*100) net enrollment rate in 2007 EFY. This may be the real population size and population projection from 2007 CSA has big difference.

According to the gathered information from Woreda education, Capacity Building and Civil Service office; out of 36 schools; only 15 schools (41.7%) had Water supply; 18(50%) schools had separated child friendly latrine for boys and girls latrine; 5 (13.9%) schools had one latrine and the remained 6 (16.7%) schools were without latrine.

Table 11 ***Number of enrolled students by sex and their ratio in 2007 EFY of Menge Woreda of Assosa Zone / BGRS; March 2008 EC***

Level of school	Number of Students			Sex proportion	
	Male	Female	Total	Male	Female
1 to 4 grade	4,329	3,714	8,043	53.8	46.2
5 to 8 grade	2,821	1,551	4,372	64.5	35.5
9 to 10 grade	854	218	1,072	79.7	20.3
11 to 12 grade	5	0	5	100.0	0.0
Total	**8,009**	**5,483**	**13,492**	**59.4**	**40.6**

Water Supply

Water is a basic necessity for life. Unfortunately not all water supply/ source helps human to survive. Water from contaminated sources is causing numerous diseases and untimely deaths. The fact that human needs water and cannot live without it, forces him/ her to use it even for drinking purposes, from any source, whether palatable or contaminated. As a result, many people suffer or die from water borne diseases.

According to the Woreda Water, Mine and Energy Resource Development office in 2007 EFY; Menge Woreda potable water supply reached 72.5% (rural 73% and urban 100%).

Table 12 ***Distribution water supply schemes and its functionalities in 2007 EFY of Menge Woreda of Assosa Zone / BGRS; March 2008 EC***

Scheme Type	Total	Functional	Nonfunctional
Spring capped on the spot	4	3	1
Hand dug well fixed with hand pump	121	77	44
Shallow well fixed with hand pump	38	33	5
Deep well with motorized and gravity 8 distribution points (Bono)	1	1	0
Total	164	114	50

Health Service

Health Institution

Based on the secondary data obtained from Woreda health office, the potential health coverage of Menge Woreda reached 85.6%. Menge Woreda had 2 health centers, 17 health posts, 5 private medium clinics and 1 private rural drug vendor provided health services to the district population. In addition to that; 1 primary hospital and 1 health post were under construction.

Out of 19 governmental health institutions, only 2 (10.5%) had incinerator; only 13 (68.4%) had latrine; only 3 (15.8%) had potable water supply; only 2 (10.5%) had 24 hours hydroelectric power; none of governmental health facility had fixed line service for communication; only 9 (47.4%) had network coverage. Among 17 governmental health posts; 5 (29.4%) health posts were constructing with mud wall and corrugated iron sheet and the remaining with cement.

Human Resource in Woreda Health Sector

In this district, 100 health professionals are deploying for the health sector to assure the well-being of the Woreda communities. Those health professional had working both in the district health office and governmental health institutions level. There is no medical doctor in Menge Woreda.

Table 13 ***Distribution of human resources in health sector in 2007 EFY of Menge Woreda of Assosa Zone/ BGRS; March 2008 EC***

Professional Category	Total No.	Health Professional to population Ratio
Health Officer	4	1:13,126
BSc. Environmental Health Officer	1	1:52,503
BSc. Nurse	6	1:8,751
Diploma Nurse	19	1:2,763
Diploma Mid Wife Nurse	11	1:4,773
Diploma Pharmacy	4	1:13,126
Diploma Medical Laboratory	5	1:10,500
Health Extension Worker	50	1:1,050
Total	100	

Woreda Health Office Organogram Structure

Menge Woreda Health Office had three main processes owners namely Health Promotion and Diseases Prevention core process owner; Curative and Rehabilitation core process owner and Health and Health Related Service core process owner and one supporting processes owner called health Planning, Monitoring and Evaluation sub process owner .Those process owner have their owns different programs with officers and directly accountable to Woreda Health Office Head. The general Woreda Health Office organogram structure is attached here.

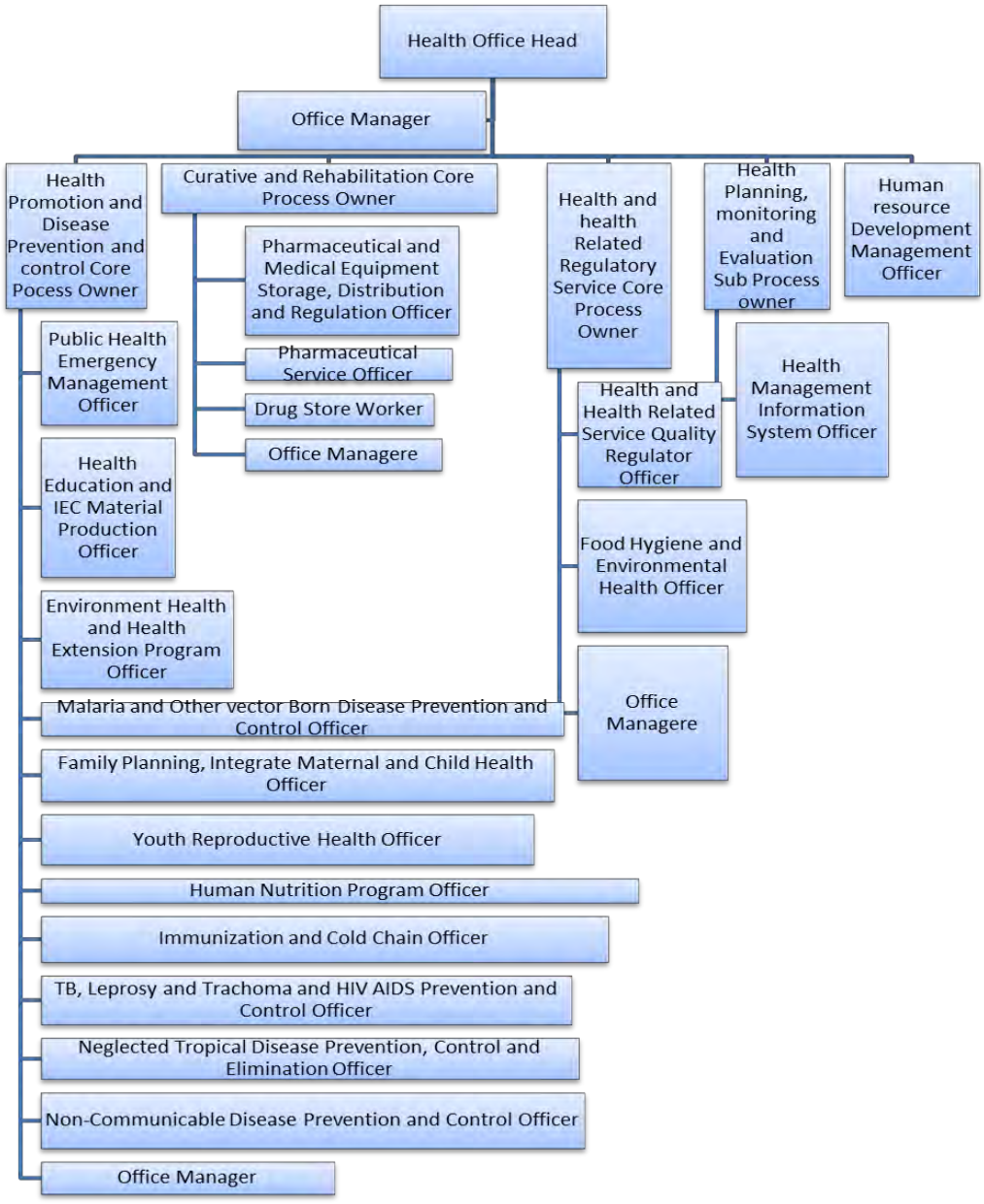

Figure 12 ***Organography structure of Mange Woreda Health Officer of Assosa Zone/BGRS in 2007EFY/ March; 2008 EC***

Budget

In 2007 EFY, the Regional Finance and Economic Development Bureau allocated 44,732,836 (forty four million seven thirty two thousand eight hundred thirty six) Birr for all Menge Woreda sector offices. In this regard, Education, Capacity Building and Civil Service Office took the highest slash of the budget; 16,435,162 birr (36.4%) and followed by Health Office. Annual budget for Woreda health sector allocated 7,952,879 birr (17.78%) in 2007EFY.

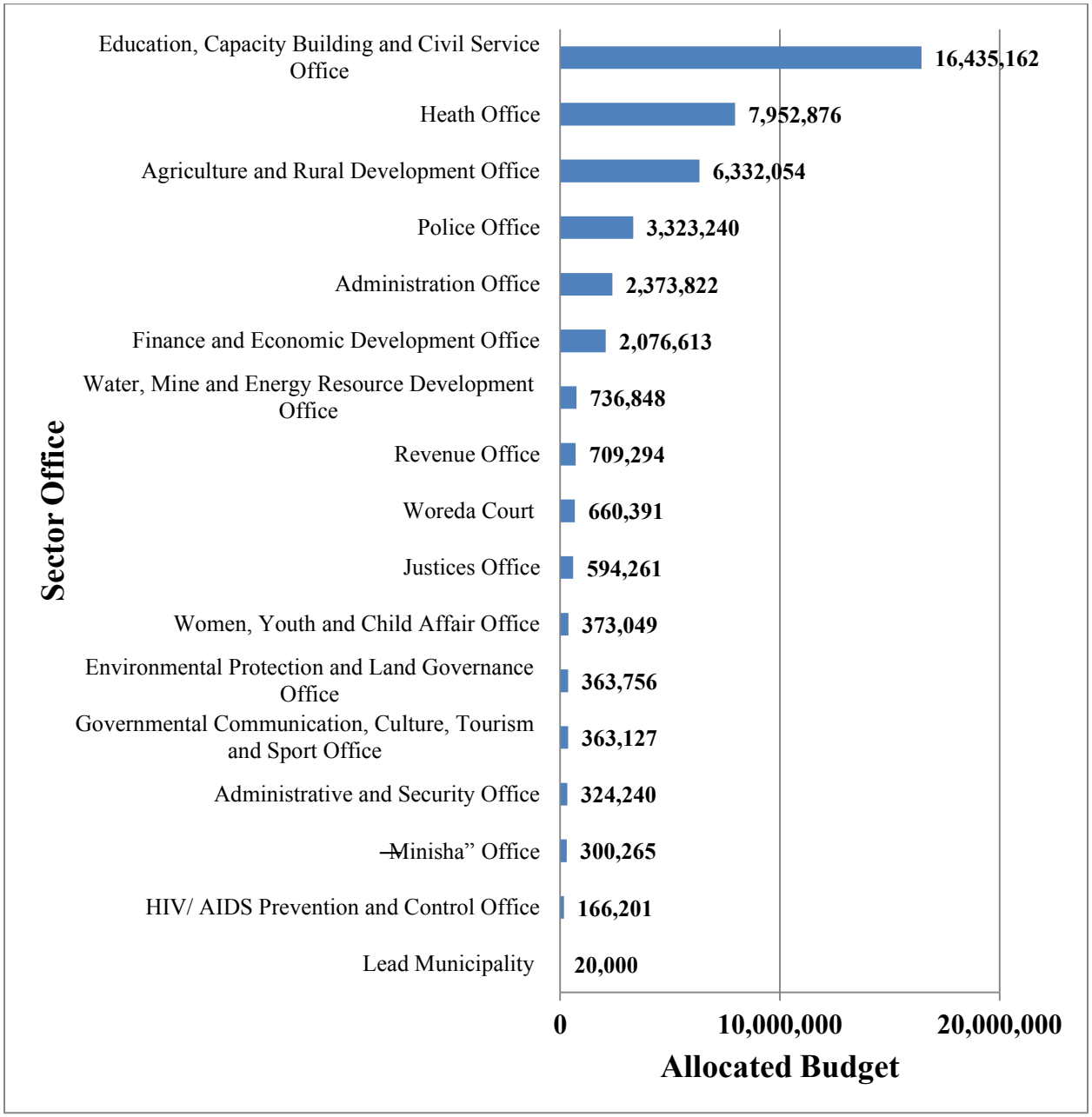

Figure 13 ***Allocated budget for each Woreda sector offices in 2007 EFY of Menge of Assosa Zone of BGRS/ March; 2008 EC***

Health Indicators and Vital Statistics

Health indicators and vital statistics are important to the estimate/evaluate performances of health and health related intervention activities and to set strategies as per needed. There is no data of some vital statistics such as Infant Mortality Rate, Maternal Mortality Rate, Under Five Mortality Rate, and Crude Death Rate.

Table 14 ***Vital Statistic of Menge Woreda from (2007 EFY – 2011 EFY) of Menge Woreda of Assosa Zone BGRS; March 2008 EC***

Vital Statistic Indicators	National	B-Gumuz	Estimates population in Menge Woreda				
			2007 EFY (50,974)	2008 EFY (52,503)	2009 EFY (54,078)	2010 EFY (55,701)	2011 EFY (57,374)
Estimated live births	3%	3.41%	1738	1790	1844	1899	1956
Total number of surviving infants at 1 year of age	3%	3.07%	1565	1612	1660	1710	1761
Under 5 year child population	15%	16.18%	8248	8495	8750	9012	9283
<3 year age group	8%	9.42%	4802	4946	5094	5247	5405
6 – 59 months age group	13%	15.68%	7993	8232	8479	8734	8996
24 – 59 months age group	11%	10.36%	5281	5439	5602	5771	5944
<15 year age group	45%	45.50%	23193	23889	24605	25344	26105
15-59 age group	50%	50.92%	25956	26735	27537	28363	29215
Women in reproductive age (15 -49 years)	3%	24.05%	12259	12627	13006	13396	13798
Total number of estimated pregnancies / Births	3%	3.41%	1738	1790	1844	1899	1956
Estimated deliveries	3%	3.41%	1738	1790	1844	1899	1956
Leprosy Prevalence	0.00006	0.00006	3	3	3	3	3
TB	0.00211	0.00258	132	135	140	144	148
Adult HIV prevalence	2%	1%	510	525	541	557	574
HIV prevalence among pregnant mothers	1%	1%	510	525	541	557	574

Note: - vital statistic conversation factors is in respect of its fiscal year population size

Source: *Ethiopia Demographic and Health Survey 2011 Central Statistical Agency Addis Ababa, Ethiopia*

Top ten Causes of Morbidity Cases

There were different diseases occurred in the district in 2007 EFY. The ten top diseases are listed below (all age groups). From the top ten diseases; a total of 24,886 patients were recorded in Menge Woreda during 2007 EFY. From those diseases, Malaria constitutes 53.34%; followed by diarrheal diseases (14.54%) and acute febrile illness (9.84%) were among the top ten causes of morbidity in Menge Woreda during 2007 EFY.

Table 15 *Top ten causes of morbidity in all age group in 2007EFY of Menge Woreda of Assosa Zone/ BGRS/ March 2008 EC*

Rank	Diagnosis	Number of cases	Percentage
Frist	Malaria	13,274	53.34
Second	Diarrhea	3,619	14.54
Third	Acute febrile illness	2,450	9.84
Fourth	Pneumonia	2,235	8.98
Fifth	Typhoid fever	1,301	5.23
Sixth	Other unspecified parasitic diseases	709	2.85
Seventh	Acute upper respiratory tract infection	473	1.9
Eighth	Malnutrition	328	1.32
Ninth	Infection of skin and subcutaneous tissue	303	1.22
Tenth	Urinary tract infection	194	0.78
	Ground Total	**24,886**	**100**

Discussions were also held with Woreda health office officials and health workers working in health institution for the confirmation of the information from secondary data. Both informants agreed on the common health problems identified in the target area are malaria and diarrhea diseases being still the top two health problems of the Woreda.

Public health emergency management (PHEM) program

PHEM is designed to ensure rapid detection of any public health threats, preparedness related to logistic and fund administration, and prompt response to and recovery from various public health emergencies. PHEM is the process of anticipating, preventing, preparing for, detecting, responding to, controlling and recovering from consequences of public health threats in order that health and economic impacts are minimized [9 and 10].

Identified immediately reportable diseases are acute flaccid Paralysis (AFP), Anthrax, Avian Human Influenza, Cholera, Dracunculiasis, Measles, NNT, Pandemic Influenza A (H1N1), Rabies, SARS, Small Pox, Viral Hemorrhagic Fever (VHF), Yellow Fever and Maternal

Death and Weekly reportable diseases are Dysentery, Malnutrition, Malaria, Relapsing Fever, Meningitis, Typhoid Fever, Typhus [9 and 10].

Malaria

Malaria is one of the weekly reportable diseases under surveillance and it is the top cause of morbidity in the Woreda among reportable diseases under surveillance. It is diagnosed as either clinical or confirmed cases. Clinical case of malaria is any person with fever or fever with headache, rigor, back pain, chills, sweats, myalgia, nausea, and vomiting without confirmatory with microscope or RDT whereas confirmed cases are those suspected cases Positive for plasmodium parasites whether by Microscopy or RDT [9 and 10].

Health description of Menge Woreda verified that a total of 34,231 malaria suspected cases were examined by RDT or microscopy and a total of 13,274 (clinical + parasitological confirmed) case were reported in 2007 EFY. Malaria detection rate from total suspected fever was 38.9% (13,318*100/34,231)

From the total malaria cases; 96.2% (12,806/13,274*100) cases were parasitological confirmed. 2007 EFY clinical malaria treatment rate were around 3.8% (522/13,274*100). Among confirmed cases; plasmodium falciparum constitutes 90.8% (11,630/12,806*100) while the rest 9.2% (1,176/12,806*100) were plasmodium vivax. Total inpatients due to malaria were cases 44 and one death due to malaria was reported in 2007EFY.

Menge Woreda PHEM malaria data verified that; the trend of malaria cases were started to up from WHO week-10. The trend of plasmodium Vivax malaria case was almost constant in every WHO weeks.

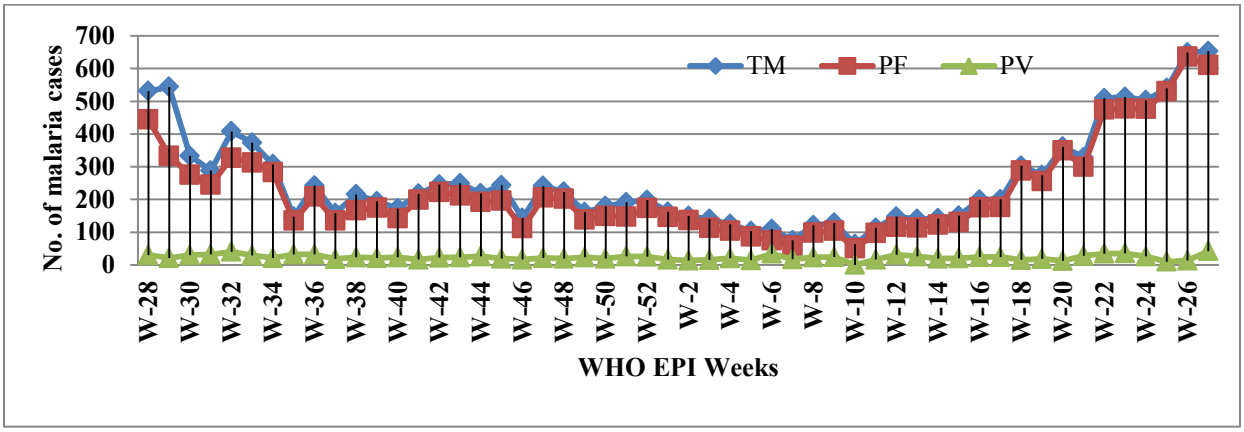

Figure 14 ***Trend of total malaria, PF and PV cases with similar WHO weeks in 2007 EFY of Menge Woreda of BGRS/ March 2008 EC***

WHO week-28 started from July (the beginning of Ethiopian fiscal year)

Health profile description data of Menge Woreda verified that; the average monthly malaria cases in 2007 EFY were around 1,106 the largest slash malaria cases were recorded on June (1,906) and July (1,891) months respectively. The smallest cases were recorded in February (606) and March (619) respectively.

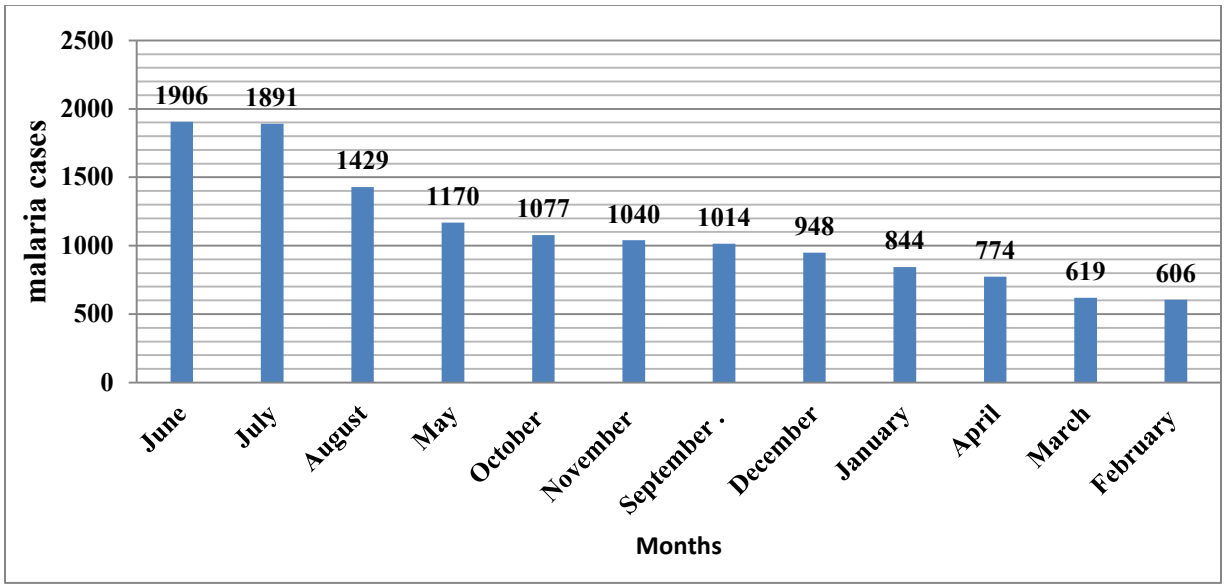

Figure 15 ***Malaria cases loads in 2007 EFY of Menge Woreda of Assosa Zone BGRS/ March 2008 EC***

During 2007 EFY health profile description data of Menge Woreda verified *that plasmodium falciparum* constitutes 90.8% while the rest 9.2% was *plasmodium vivax*.

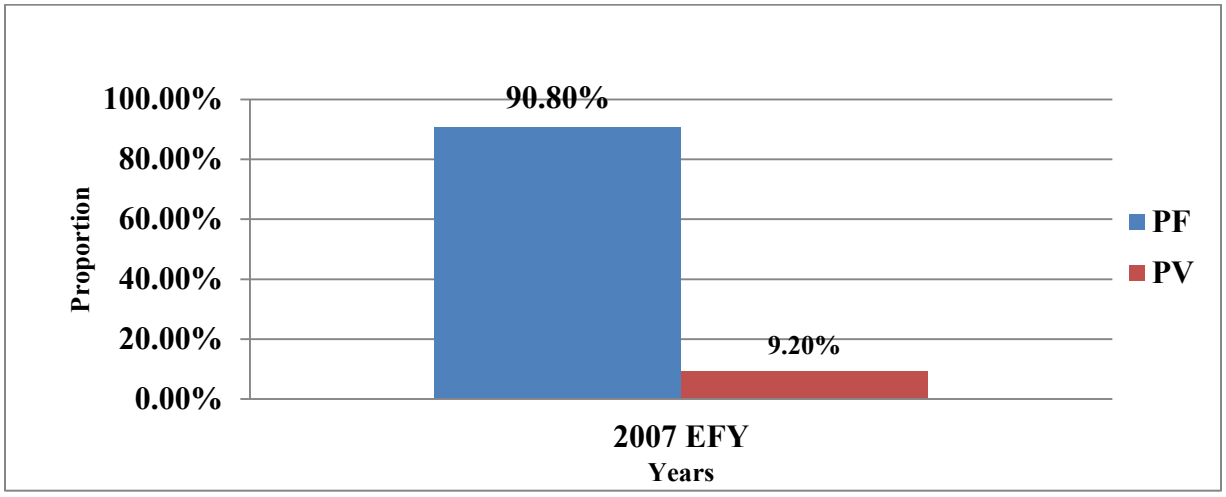

Figure 16 ***Proportion of plasmodium falciparum and plasmodium in 2007 EFY of Menge Woreda of Assosa Zone BGRS March 2008 EC***

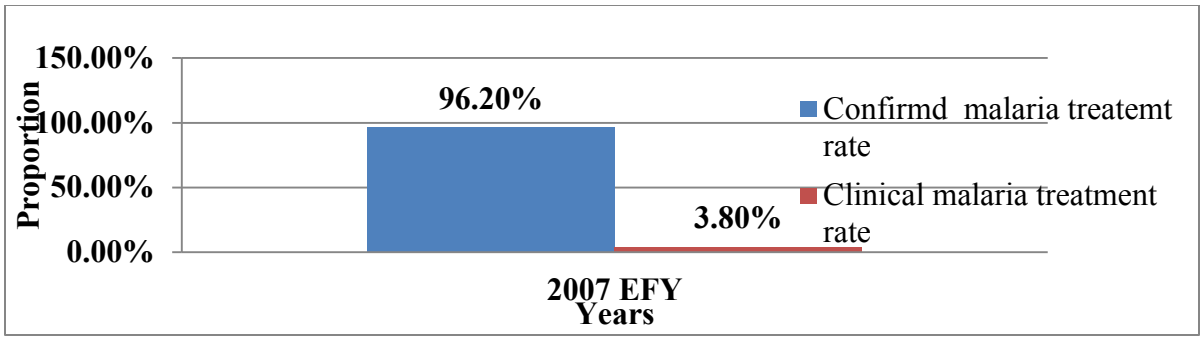

Figure 17 ***Proportion of parasitological confirmation and clinical malaria treatment rate in 2007 EFY of Menge Woreda of Assosa Zone BGRS March/ 2008 EC***

Meningitis

Any person with sudden onset of fever (>38.5 ^{0}C rectal or 38 ^{0}C axillary) and one of the following signs: neck stiffness, altered consciousness or other meningeal signs is suspected case; or a suspected case confirmed by isolation of Neisseria meningitidis from CSF or blood [9].

Meningococcal Meningitis action Threshold Level is; If in a population <30,000 five cases are found in a week or doubling of cases over 3 weeks period; or if in a population of > 30,000 attack rate (AR) of 10/100,000 population per week. In 2007 EFY there was zero suspected of meningococcal meningitis reported from Menge Woreda.

Dysentery

A person with diarrhea with visible blood in stool is a suspected case for dysentery; OR a suspected case with stool culture positive for Shigella dysentery [9].

A total of 3,619 dysentery cases were reported from Menge Woreda in 2007 EFY without inpatient and no death. It constitute 19.4% (3,619/18,658*100) from all diseases and condition under PHEM surveillance system

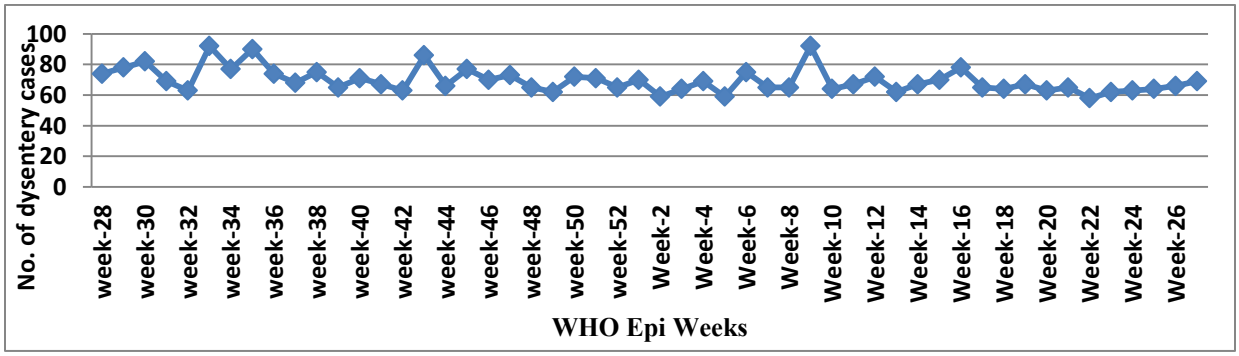

Figure 18 ***Dysentery trend of Menge of Assosa Zone; BGRS in 2007 EFY March/ 2008 EC***

Typhoid Fever

Any person with gradual onset of remittent fever (rising in step ladder fashion) in the 1st week, headache, arthralgia, anorexia, constipation and abdominal pain is a suspected case; *OR* a suspected case with widal test ~~–O~~" titer reactive *OR* case with positive blood culture at the 1st week or positive stool culture at 3rd, 4th, and 5th week of illness is a confirmed case [9].

In the respect of this case definition a total of 1,301 outpatient and 6 inpatient of typhoid fever without death was reported in 2007 EFY; which constitutes 7% (1,301/18,658*100) of total morbidities among surveillance reportable diseases in 2007 EFY.

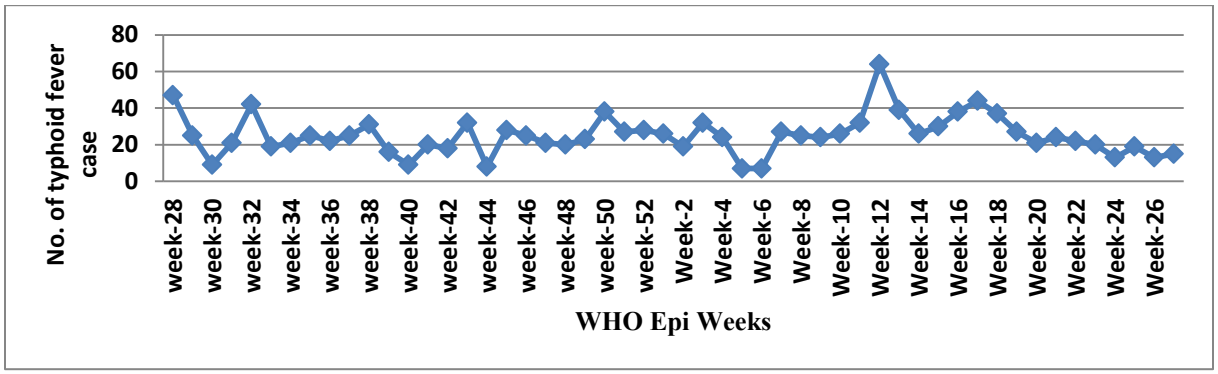

Figure 19 ***Typhoid fever trend of Menge of Assosa Zone; BGRS in 2007 EFY March/ 2008 EC***

Relapsing Fever

Any person presenting with an abrupt onset of rigors with fever, usually remittent, headache, arthralgia and myalgia, dry cough, epistaxis is suspected case OR a suspected case with demonstration of Borrelia in peripheral blood film. Based on this definition eight suspected cases were reported from Bullen Woreda [9].

For 2007 Ethiopian budget year, there was 0 (zero) case of relapsing fever reported within the Woreda.

Typhus

Typhus is one that occurred in epidemic form in high lands and poor sanitary condition. Any person with an abrupt onset of headache, chills and rapidly mounting fever, malaise, prostration and Rash are suspected cases OR a suspected case with Weil Felix test reaction is a confirmed case [9].

Based on this case definition, a total of 78 outpatient and 1 inpatient cases in WHO week of week 8/2016 and zero death of typhus fever was reported from Menge Woreda in 2007 EFY which constitutes 0.4% (78/18,658*100) of all the total morbidities among diseases reported under surveillance.

Sever Acute Malnutrition

MAM and SAM is a weekly reportable condition which occurs as a result of deficiency of nutritional problems. Children aged from 6 months to 5 years with MUAC less than 11.5 cm and/or children with bilateral edema regardless of their MUAC are suspected cases OR Children with MUAC less than 11cm and/or children with bilateral edema regardless of their MUAC are confirmed cases for SAM [9].

So based on this case definition; in 2007 EFY a total of 303 MAM and SAM cases without death were reported from Menge Woreda; which constitutes 1.6% (303/18,658*100) of total morbidities among reportable diseases under surveillance/ public health emergency management.

Immediately reportable diseases

Among 13 immediately reportable under PHEM, there were 39 measles cases (35 Suspected and 5 confirmed) without inpatient and death reported and 2 rabies dog bites without inpatient and death reported from Menge Woreda in 2007 EFY.

Completeness and Timeliness

Completeness denotes whether all the reporting facilities have reported as expected. A report is said to be complete if all the reporting facilities within its catchments area have submitted the reports completely [9].

$$\text{Completeness} = \frac{\text{No. of health facilities reported in 2007 EFY} \times 100}{\text{Total No. of health facilities expected to report}}$$

Note: - One health facilities expected to send 52 time * all health facilities expected to report from Woreda (19*52 = 988)

Completeness of Menge Woreda in 2007 EFY = (955 x 100) / 988 = 96.7%

Timeliness indicates how much the expected health institution reported the report on time up to Wednesday midday. Timeliness status of Menge Woreda in 2007 EFY **was 96.7% (955/988*100).**

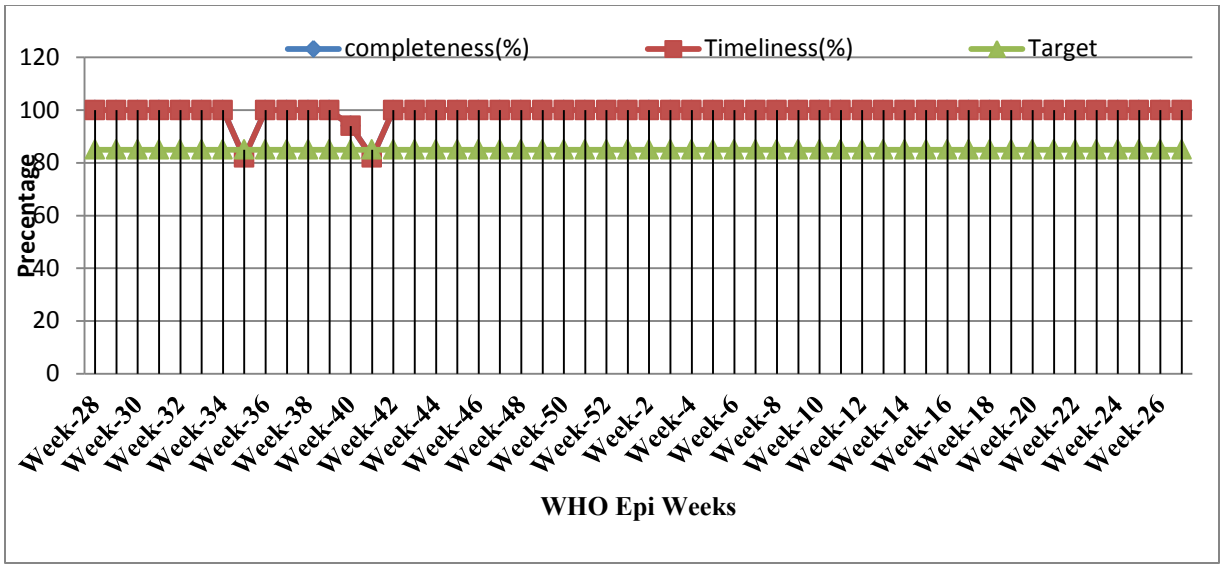

Figure 20 ***Trend of completeness and timeliness of weekly report in 2007 EFY of Menge Woreda of Assosa Zone/ BGRS/ March 2008 EC***

Malaria Prevention and Control Program

Malaria is caused by a parasite called Plasmodium, which is transmitted via the bites of infected mosquitoes. Key interventions to control malaria include: prompt and effective treatment with artemisin-based combination therapies; use of insecticidal nets by people at risk; indoor residual spraying with insecticide to control the vector mosquitoes and environmental management and larva control [10].

Menge Woreda is one of the most malaria epidemic-prone Woreda in Region. All people are living in malaria-endemic areas. According to Regional Health Bureau and Ministry of Health; Menge Woreda had implementing the following malaria prevention and control activities.

Case detection and treatment (including epidemic)

Malaria is the top cause of morbidity in the Woreda. It is diagnosed as either clinical or confirmatory with microscopy or RDT. Clinical case of malaria is any person with fever or fever with headache, rigor, back pain, chills, sweats, myalgia, nausea, and vomiting, whereas confirmed cases are suspected cases Positive for plasmodium parasites whether by Microscopy or RDT [10].

A total of 34,231 malaria suspected cases were examined by RDT or microscopy in 2007 EFY. A total of 13,274 malaria (clinical + parasitological confirmed) cases were treated with antimalarial drugs in 2007EFY (source Woreda HIMS and PHEM weekly report). Zero epidemic was recorded in 2007 EFY in Menge Woreda.

Environmental management and larva control

Water is essential for the breeding of malaria mosquitoes. To ensure the prevention and control of malaria, it is important that all temporary or permanent breeding sites with water are identified and eliminated through the active participation of communities [10].

In this regards; Menge Woreda Health office did not implement environmental management in 2007 EFY to prevent and control malaria disease.

Indoor residual spray

IRS is the application of long-acting chemical insecticides on the walls and roofs of all houses and domestic animal shelters in a given area, in order to kill adult vector mosquitoes that land and rest on these surfaces. IRS is one of the primary vector control interventions for reducing and interrupting malaria transmission [10].

According to Woreda Health Office 2007 EFY report; 20,094 unit structures (dwelling houses, latrine and animal houses) were sprayed with profoxer of indoor residual spray and it make 55.8% of the population were protected in the above mentioned fiscal year.

Long lasting insecticide net distribution

LLINs are an effective tool to significantly reduce morbidity and mortality due to malaria. It has three main functions: 1. When mosquitoes are in contact with the net, it has a knock-down effect, temporarily incapacitating or even killing mosquitoes; 2. It has a repellent effect; and, 3. It reduces contact between the person sleeping under the net and mosquitoes by acting as a physical barrier [10].

LLINs coverage of the Woreda was reached around 100% the midyear of 2007 EFY. LLINs utilization rate of Menge Woreda does not yet known. Coverage alone can‘t guaranty the protection of the population against mosquito biting/ malaria. It is mandatory to know the utilization rate of LLINs.

Larva Control

Larvicides can be used to address collected water that cannot be managed through environmental control measures. The most common water-soluble chemical used to kill mosquito larvae in Ethiopia is temephos (Abate) [10].

Menge Woreda health office is not yet practicing temepose or Abate chemical to kill the larva‘s of mosquitoes in 2007 EFY.

Expand Immunization Program and Cold chain manage

Immunization

Immunization is the cheapest public health intervention available today in the world. However, vaccine preventable diseases are contributing substantially to under-five mortality. The goal of this program is to reduce morbidity, disability and mortality caused by vaccine preventable diseases to target population. Today, our nation, including each Woreda has been fighting 10 selected infectious diseases in targeting of all less than 1 year of age in routine immunization and campaign (polio and measles commonly < 5 years of child) program. Those selected diseases are diphtheria, pertussis, tetanus, hepatitis, haemophilus influenza infection type B related disease (also called Penta), pneumococcal pneumonia, tuberculosis, Rota virus diarrhea, poliomyelitis and measles [11].

Routine immunization program has been implemented with three different approaches in the Woreda; namely static, outreach and mobile. The district had 23 outreach sites 5 mobile sites and 3 static sites for immunization program. The immunization programs are targeting children < 1 year and women in reproductive age group in the district.

The data gathered from Woreda Health Office about immunization coverage and dropout rate clash each other. Many antigens coverage reached > 100%. This means there should be no dropout rate. For instance PENTA dropout rate (PENTA 1- PENTA 3/PENTA 3*100) was 6.2% in 2007 EFY.

I discussed the issue reason why it happens? The program owner/ EPI officer verified that the actual population size of the Woreda is by far greater than CSA 2007 population projection. The Regional Health Bureau report confirmed that what the officer said. The details of immunization coverage and figure of each is indicated on the following table.

Table 16 ***Distribution of immunization coverage of children <1 year and women in reproductive age group in 2007 EFY of Menge Woreda BGRS/ March 2008 EC***

S.N	Types of antigen	Target	Achieved	coverage
1.	BCG	1,739	2,415	>100
2.	OPV1	1,565	2,566	>100
3.	OPV3	1,565	2,398	>100
4.	Measles	1,565	2,311	>100
5.	PENTA 1	1,565	2,531	>100
6.	PENTA 3	1,565	2,374	>100
7.	PCV1	1,565	2,578	>100
8.	PCV3	1,565	2,423	>100
9.	Fully immunized	1,565	1,872	>100
10.	TT2+ for pregnant	1,735	554	31
11.	TT2+ for Non-pregnant	10,547	1,314	12

Cold chain

Vaccines are temperature sensitive products. Some vaccines are sensitive to freezing temperatures. Therefore they must be kept at correct temperatures from the time they are

manufactured until they are used. The system used for keeping and distributing vaccines in good condition is called the cold chain. The cold chain consists of a series of storage (refrigerators) and transport link (cold boxes, vaccine carriers and water packs also called ice packs). All designed to keep vaccines within an acceptable range until it reaches the users [11].

Regarding the cold chain, the Woreda had 24 refrigerators. Of those, 15 (62.5%) were functional and 9 (37.5%) were non-functional. Also the Woreda had 35 cold box, 60 vaccine carriers and 350 ice packs. All functional refrigerators can work both with electrical power supply and kerosene. At the moment all functional fridges had worked with kerosene, except fridge available in Menge Health Center.

Maternal Health Program

The health of women and children is vital to create a healthy world. Despite great progress, there are still too many mothers and children dying; mostly from causes that could have been prevented [12].

Family Planning

8,438 women were targeted for family planning (both short and long term) in 2007 EFY. The contraceptive prevalence rate of Menge Woreda reached 38% (3,219/8,438*100) in 2007 EFY. When it was disaggregated in to short and long term family planning; 64% (2,718/4,219*100) was short term and 12% (501*4,219*100) long term family planning.

Ante-Natal Care

Ante-natal care coverage of Menge Woreda reached 100% (2,083/1,739*100) (at least 1 visit) and 56% (878/1,565*100) (4 round visit) in 2007 EFY from their yearly plan not from the target groups. There was a big gap between ANC-1 and ANC-4.

Safe and Clean Delivery Service

Menge Woreda Health Office planned to give 1,565 safe and clean delivery service in 2007 EFY. Performance report of that budget year revealed that 57.3% (898/1,565*100) women received safe and clean delivery service.

Post-Natal Care

51.5% (806*100/1,565) women received post-natal care service in 2007 EFY.

PMTCT Service

From their plan not from the target groups; 68.3% (1,188/1,739*100) women were received PMTCT service in 2007 EFY.

Safe Abortion

Nine point two percent (29/174*100) women received safe abortion service in 2007 EFY.

Health Education Program

Health education is a profession of educating people about health. It can be defined as "any combination of planned learning experiences based on sound theories that provide individuals, groups, and communities the opportunity to acquire information and the skills needed to make quality health decisions [13 and 14]".

All health facilities are expected to deliver health education program based on the priority public health problems on the communities. Almost all health facilities didn‘t implement health education program base on the prearranged scheduled. Nevertheless, the Woreda Health Office data verified indicated that; 38,513 people attended and received health education programs on different public health priority topics in different sites.

Neglected tropical diseases prevention (NTDs) and control Program

Neglected tropical diseases (NTDs) are a diverse group of diseases with distinct characteristics that thrive mainly among the poorest populations. The 17 NTDs prioritized by WHO are endemic in 149 countries (8). Our nation also identified and targeted eight neglected tropical diseases; namely dracunculiasis, leishmaniasis, lymphatic filariasis, onchocerciasis, podoconiosis, schistosomiasis, soil transmitted helminthiasis and trachoma [16].

Mass Drug Administration (MDA) is one of the approaches to eliminate onchocerciasis, and implemented in the Region. In this regards; in 2007 EFY there was MDA for onchocerciasis in Menge Woreda. A total of 41,193 (79%) from the total population were treated with ivermectin.

Exclusion criteria’s for MDA are: <5 years of age children, pregnant, lactating mothers with in one week and severely sick individual

Health Extension and Hygiene and Sanitation promotion program

Latrine coverage of the district reached 84% in 2007 EFY. Woreda Health Office doesn‘t data on latrine utilization rate. None of the Kebeles launched open deification free in the Woreda in 2007 EFY.

TB and leprosy prevention and control program

Tuberculosis (TB) is a disease caused by an organism called *Mycobacterium tuberculosis*, a rod-shape bacillus with ―acid-fast” due to its staining characteristics in laboratory. Occasionally; the disease can also be caused by *Mycobacterium bovis and Mycobacterium africanum* [17].

Leprosy is a chronic infectious disease caused by *Mycobacterium leprae*, an acid-fast, rod-shaped bacillus. It affects persons in all age groups and both sexes. The age group mainly affected is between 15 and 45 years [17].

A total of 24 tuberculosis cases (all form of tuberculosis) and 4 leprosy cases were reported in 2007 EFY. Detection rate and treatment success rate of tuberculosis reached 25% and 100% respectively.

Table 17 ***Distribution of tuberculosis cases in 2007 EFY of Menge Woreda of Assosa Zone/ BGRS/ March; 2008 EC***

Indicator	Menge Woreda		
	Planned	Achievement	Coverage
TB case detection rate	117	24	20.5%
TB treatment success rate	24	24	100%
TB cure rate	9	8	88.9%

Table 18 ***Distribution of leprosy cases in 2007 EFY of Menge Woreda of Assosa Zone/ BGRS/ March; 2008 EC***

Indicator	Menge Woreda		
	Planned	Achievement	Coverage
Leprosy case detection rate	3	4	>100%
Leprosy treatment success rate	3	3	100%
Leprosy cure rate	3	1	33.3%

HIV/ AIDS Prevention and Control Program

Human Immunodeficiency Virus (HIV) is a retrovirus that infects cells of the immune system and impairing their function. The most advanced stage of HIV infection is Acquired Immunodeficiency Syndrome (AIDS). It can take 10-15 years for an HIV-infected person to develop AIDS; antiretroviral drugs can slow down the process even further [18].

A total of 4,350 people were screened for HIV/AIDS in the approach (VCT, PICT and PMTCT). The test result verified that; only one person had had HIV in their blood. A total of 22,632 cartoon condoms (1 carton has 12 pieces of condoms) were distributed in the district in 2007 EFY.

Outbreak and other disaster situations

In this district, only one measles outbreak was occurred during 2007 EFY in Fudundu Kebele of Menge Woreda.

Discussion

Ratio of Health center to population reached 1:25,487 which was almost equivalent the national standard (1:25,000); and health post to population was 1:2,999 which was by far above the national standards (1: 5,000). The findings verified that; the potential health service coverage of Menge Woreda reached 85.6%. This description is similar with the HSDP III target to attain 100 % of potential health service coverage at national level.

The assessment verified health professional to population ratio in 2007 EFY were Health Officer-1:13,126; Environmental Health Officer-1:52,503; Nurse-1:2,100; Mid Wife Nurse-1:4,773; Pharmacy technician-1:13,126; Medical Laboratory technician- 1:10,500 and Health Extension Worker-1:1,050.

Appropriate budget allocation is very important for quality health service. In 2007 EFY, Menge Woreda health office received the second big slash of budget (17.78%) next to Menge Woreda Education, Capacity Building and Civil Service Office (36.74%). This was above the WHO standard that declares >15% of the budget should be allocated for health care.

From the listed of top ten diseases a total of 24,886 patients were recorded in Menge Woreda. From those diseases, Malaria covered 53.34%; followed by diarrheal diseases (14.54%) and acute febrile illness (9.84%) was the third among the top ten causes of morbidity in 2007 EFY.

The status of completeness and timeliness of weekly and immediately reportable disease and condition is the leading indicator of early warning and communication in public health emergency management program. In this regard; completeness and timeliness status of Menge Woreda in 2007 EFY reached 96.7% which make the Woreda the leading Woreda entire the Region Woredas and more than the minimal expectation of Ethiopia public health institute (85%).

From the total malaria cases, 96.2% (13,677/14,215*100) cases were parasitological confirmed. Among confirmed cases; plasmodium falciparum constitute 90.9% (12,439/13,677*100) while the rest 9.9% (1,238/13,677*100) were plasmodium vivax. This finding didn't match with the national malaria guideline as the distribution of plasmodium species, PF 60% and PV 40%. 2007 EFY clinical based malaria treatment rate was around 3.8%. This finding concedes with that the national malaria treatment guideline; clinical malaria treatment rate shouldn‘t be greater than 5% [10].

The surveillance data of Menge Woreda verified that the largest slash malaria cases recorded on June (1,906) and July (1,891) months respectively. This health profile assessment result was coinciding the major malaria transmission season in the nation. 96.2% (12,806/13,274*100) cases were parasitological confirmed.2007 EFY clinical malaria treatment rate was around 3.8% (522/13,274*100). It was in acceptable level based on

national malaria guideline third edition [10]. 2007 EFY surveillance data of Menge Woreda verified that plasmodium falciparum constitutes 90.8% while the rest 9.2% was plasmodium vivax. Malaria cases by species in Menge Woreda vary from the national *plasmodium falciparum and plasmodium vivax* [10].

Malaria is the top ten leading morbidity in outpatient department. Several activities were made to combat malaria disease burden, but the number of malaria cases increased year to year. The ITNS coverage (a minimum of one sleeping net per household) reached 100.9% in 2007 EFY. 2007 EFY report revealed that 20,094 (55.8%) was protected malaria by implementation of IRS. Nevertheless; malaria takes the more than a half slash of the weekly reportable diseases. This might be due to poor utilization of ITNs and poor IRS. This needs further investigation.

Ante-ten immunization coverage for less than 1 year old children was > 100%. This means there should be no dropout rate. But dropout rate of PENTA 1 to PENTA 3 was 6.2%. This data confirmed that many children were not vaccinated/ unreached. This might be happening due to the actual population size of the Woreda is by far greater than CSA population projection. The dropout rate PENTA 1 to PENTA 3 was 6.2% and PENTA 1 to Measles was 8.6%. These dropout rates were found in the acceptable level i.e. less than 10% [11].

Based on their year plan; ANC service for pregnant women of 1st and 4th visit reached >100 % and 56% in 2007 EFY respectively; which was better than regional (ANC1 86.5%) compared to 2007 regional report. On the other hand, PNC coverage was 51.5% and it was almost equivalent to regional (53.6%) performance of 2007EFY [20].

Family planning reduces mortality and morbidity due to pregnancy and child birth. Family planning saves lives of women and children as well as improves the quality of life for all. The contraceptive acceptance rate (short 64% and long term 12%) of the Woreda was about 38 % which was lower as compared with the region contraceptive acceptance rate (58%) [20].

Safe and clean delivery coverage is a major problem of the nation. Unlike other woredas in the region; performance report of 2007 EFY revealed that 898 (83% from the target) women was received safe and clean delivery service. Skilled, safe and clean delivery service founded good status as compare to the regional (35%) and national target (60.7%) in 2007 EFY. This figure might be not indicated what availed in the ground and CSA population projection estimated and actual population growth wasn‘t concede each other.

Even if the utilization rate of latrine data weren‘t available in the Woreda; the numbers of households with latrines in 2007 EFY was reached 9,491(84%). So the district household with latrines coverage of the district was almost equal to the national latrine coverage.

The district TB case detection rate and TB treatment success rate were 25% and 100 % respectively. The regional annual report of 2007EFY showed that TB case detection rate was

51.6% and TB treatment success rate was 67.3% in 2007 EFY. This finding revealed that; TB detection rate in Menge Woreda was less than the regional and national performance in 2007 EFY. In the revers; TB treatment success rate was by far greater than the regional and national performance in 2007 EFY.

Conclusion and Recommendation

Conclusion

- Malaria and diarrhea diseases burden were leading health problem in the Woreda.
- Information of utilization rate LLITNs and latrine were not available in the Woreda.
- The children vaccination dropout rate PENTA1 to PENTA 3 and PENTA 1 to Measles were in good status (<10 %)
- Right budget was allocated for health sector.
- Almost all health facilities didn‘t implement health education program bases on the prearranged scheduled.
- Only one measles outbreak was happened/occurred during 2007 EFY in Fudundu Kebele of Menge Woreda.
- The status of completeness and timeliness of weekly and immediately reportable disease and in 2007 EFY by far greater than the national expectation of Ethiopia public health institute

Recommendation

- The Woreda should access and avail the LLITNs and latrine utilization data for immediately follow up of the priority diseases in the area;
- The Woreda Health Office should monitor the EPI coverage based on the real count of children population in parallel to the projected population;
- Immunization activities status and budget allocation trend should be sustain like 2007 EFY;
- Further research needed to be conducted on the topic of LLINs and latrine utilization
- Daily based health education should be start in health institution levels

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3. Surveillance Data Analysis

Malaria Surveillance Data Analysis of Benishangul Gumuz Regional State/ Western Ethiopia/ August 2008 EC

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Title: Malaria Surveillance Data Analysis of Benishangul Gumuz Region State-Ethiopia from 8th July 2006 EC to 7th July 2008 EC

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Background: Malaria is caused by parasites of the Plasmodium family and transmitted by female Anopheles mosquitoes. 190 million cases (89% of global total) and 400,000 deaths (91% of global total) occurred in Africa in 2015 GC. In Benishangul Gumuz Regional State; 1,055,494 (99%) of 1,066,156 people live in malaria-endemic areas. I assessed malaria morbidity and mortality by time, person and place of Benishangul Gumuz regional State of the last three Ethiopian fiscal years.

Method: Descriptive Retrospective record review design was used. Three year malaria data were collected from Benishangul Gumuz Regional Health Bureau. A suspected case confirmed by microscopy or RDT for plasmodium parasites and any person with fever or fever with headache, rigor, back pain, chills, sweats, myalgia, nausea, and vomiting diagnosed clinically as malaria. Data were processed and analyzed using Micro Soft Excel pivot.

Result: A total of 790,047 malaria cases were reported in the past three years. Eighty five percent reported cases were parasitological confirmed. *Plasmodium falciparum* constitutes 78.4% (522,667/667,044*100).The trend of malaria cases were started to pick up from WHO Epi week of week-36 till WHO Epi week of week-52 again it started to up from WHO week-14 till WHO Epi week of week-26. All Woredas entire the Region are high risk for malaria. Nevertheless, the highest prevalence rate of malaria cases reported from Guba and Yasso Woreda respectively.

Conclusions: The predominate malaria cases were due to *plasmodium falciparum.* Malaria cases proportion by species in the Region vary from the national proportion**.** Malaria prevention and control activities should be strengthen to reduce the incidence and prevalence of malaria. Indoor residual spry of anti-mosquito chemical should implement before the major and minor transmission seasons of malaria.

Keywords: Surveillance data; Malaria secondary data and Benishangul Gumuz

Introduction

Malaria is caused by parasites of the Plasmodium family and transmitted by female Anopheles mosquitoes. There are four different human malaria species *(Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae and Plasmodium ovale)*, of which *P. falciparum and P. vivax* are the most prevalent and P. falciparum is the most dangerous. *Plasmodium knowlesi* is a zoonotic plasmodium that is also known to infect humans [1].

Malaria remains a major public health and development problem in Africa. It is estimated that over 800 million people in 47 malaria endemic countries of Africa are at risk of malaria, with 82% at high risk of the disease [2]. Approximately 190 million cases (89% of global total) and 400,000 deaths (91% of global total) are estimated to occur in Africa in 2015 [3].

Malaria is also a major socio-economic problem for Africa. In high endemic countries of Africa malaria has been estimated to account for an average annual reduction of 1.3% in economic growth. Malaria endemic countries are known to have lower economic growth [3].

Malaria affects over 60% of the 94 million total population of Ethiopia. *Plasmodium falciparum* accounts for nearly 70% of all malaria cases, while the remaining are due to *P. vivax* [4]. The contribution of the other plasmodium species in the country is very negligible (5). Malaria transmission manifests in two seasons where the high transmission season coincides with the cultivation months; hence, malaria has a deleterious socioeconomic effect on productivity and development in the country [4]

Benishangul Gumuz Regional State is one of the most malaria epidemic-prone Regions in Ethiopia. Approximately 954,999 people (99%) live malaria-endemic areas [6].

Before 1998, the nation implemented Multiple Surveillance which is surveillance for each disease. From 1998 – 2009, there was approach shift, which was integrated disease surveillance and response (IDSR) for the selected 23 diseases [7].

Since 2009 and onward, our nation has been implementing Public Health Emergency Management (PHEM) [8]. Based on this approach, there are 20 diseases and conditions identified as Priority diseases on surveillance [8]. Recently, Benishangul Gumuz Regional State (BGRS) Health Bureau is adding maternal death surveillance and response under PHEM structure. PHEM has four pillars (early warning and communication, preparedness, response and recovery) [8].

Rationale of Malaria Surveillance Data Analysis

Systematically collected and analyzed malaria surveillance data are important for monitoring disease trends and evaluating the effectiveness of malaria prevention and control activities in the Region. This information is needed to determine the most appropriate and efficient allocation of public health resources and personnel. Also the systematically collected and analyzed malaria surveillance data is very powerful for assessing incidence and prevalence of malaria cases (out-patient and in-patient cases and death due to malaria over time, place/ woredas and affected communities.

Objectives

Genera Objective

- The main objective of this surveillance data analysis was to assess malaria morbidity and mortality by time, person and place of Benishangul Gumuz Regional state of the last three years.

Specific Objectives

- To describe malaria caseload by place/ woredas from 2006 EFY – 2008 EFY;
- To describe the malaria data by time in region from 2006 EFY-2008 EFY;
- To describe the malaria data by person in region from 2006 EFY-2008 EFY;

Materials and Method

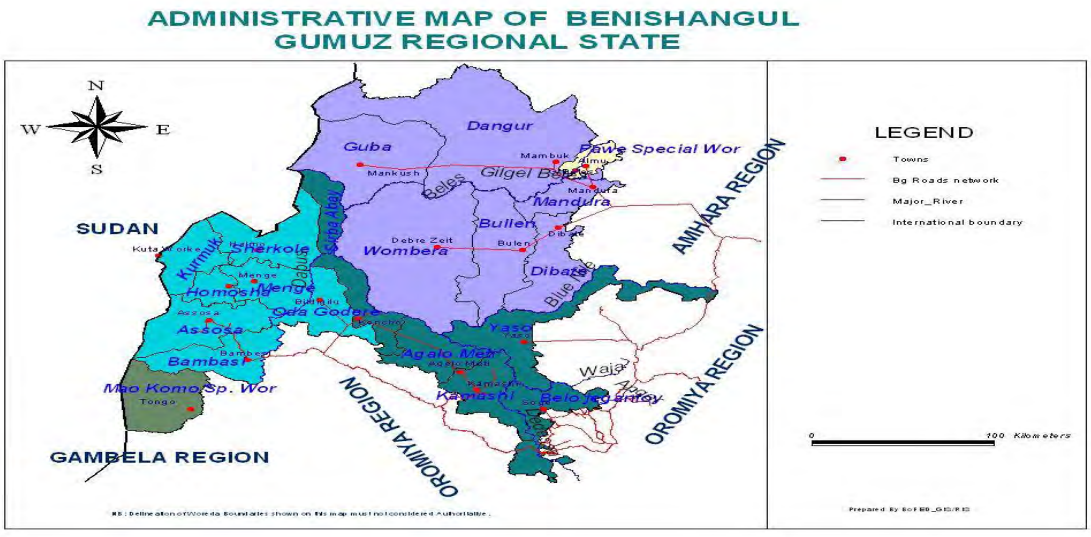
Study Area

Benishangul Gumuz Regional State /BGRS/ is one of the nine regional states that constitute the Federal Democratic Republic of Ethiopia /FDRE/. It is located in the western part of the country. It Stretches between 8°47′13″ N and 12°3‘28‘‘ N latitude and 34°16′37‘‘E and 37°2‘13‘‘E longitude [9]. The region is bordered by Amhara Regional State in the East and North, Oromia Regional State in the South and East, and Gambella Regional State in the south and Sudan in the whole of the Western part [9]. The elevation of the region ranges from 580 - 2, 731 meter above sea level. Agro- ecologically 75% of the region is wet lowland /kola/, 24% mid land /woina-degal and the remained 1 % is high land /Dega/ [10].

BGRS has three Zones, 19 woredas, 1 special Woreda and 1 Town Administration. Assosa town is capital city of the Region. It‘s 668 KM far from Addis Ababa. The Region has 475 (34 urban and 441 rural) Kebeles. BGRS had 2 general hospitals; 37 health centers and 368 health posts. In this Region; 1,089 HEWs had deployed for the health sector.

Total population of BGRS estimated to reach 1,066,001 (projection based on 2007 census). Of these population males 545,686 and females 520,315; children under 5 years of age 172,479 numbers of women of reproductive age (15-49) 220,556; numbers of pregnant women 36,351 [11 and 12]. The Region also hosted around 58,432 South Sudanese refugees. There was no pastorals and internal displaced people (IDP) in the Region. The actual data about migrant workers were not yet known. Nevertheless; the migrant workers were estimated about 20% of the total population (213,200). This number was increased in agricultural season.

Figure: 21 - *Map of Benishangul Gumuz Regional State; Ethiopia; August 2008 EC*



Study Population

Benishangul Gumuz Regional Health Bureau Public Health Emergency Management (PHEM) case team targets all the population in the Region to be under surveillance for all twenty one priority diseases.

Study Period

From 2006 EFY to 2008 EFY malaria data were collected, organized, analyzed and interpreted accordingly using Microsoft excels 2007 pivot.

Study Design

Descriptive Retrospective record review design was used.

Data Collection

We collected the data from a routine weekly surveillance data of Public Health Emergency Management Centre for three year (2006 – 2008 EFY).

Data Processing and Analysis Technique

Data were processed and analyzed using Microsoft Office Excel 2007 Pivot Table.

Data Dissemination

Written report (both hard and soft copies) were prepared and shared to the Addis Ababa University/ School of Public Health, Ethiopia Field Epidemiology Training Program Resident Advisors and Coordinator and Benishangul Gumuz Regional Health Bureau Resident supervisor.

Case Definition

Suspected Fever for Malaria

Any person with fever or fever with headache, back pain, chills, rigor, sweating, muscle pain, nausea and vomiting [8]

Malaria

Any person with fever or fever with headache, back pain, chills, rigor, sweating, muscle pain, nausea and vomiting or suspected case confirmed by rapid diagnosis test or microscopy [8].

Total Malaria Cases

A suspected case confirmed by microscopy or RDT for plasmodium parasites and any person with fever or fever with headache, rigor, back pain, chills, sweats, myalgia, nausea, and vomiting diagnosed clinically as malaria [4 and 8].

Clinical Malaria

Suspected malaria case without confirmatory test for malaria and the clinician diagnosed as malaria [4 and 8].

Plasmodium Falciparum

A suspected malaria case confirmed by microscopy or RDT as *plasmodium falciparum* [4];

Plasmodium Vivax

A suspected malaria case confirmed by microscopy or RDT as *plasmodium vivax* [4];

Confirmed Malaria or Parasitological Confirmed Rate

Number of confirmed malaria cases (both species) over total malaria cases (Confirmed +Clinical Malaria cases) times 100

Plasmodium Falciparum Rate

Number of PF malaria cases over total parasitological confirmed malaria cases times 100.

Plasmodium Vivax Rate

Number of PV malaria cases over total parasitological confirmed malaria cases times 100.

Malaria Action Threshold Level

Malaria cases crossing the norm line or doubling of cases compared to the same week of the previous year [8].

Malaria Epidemic Threshold Level

A situation when the number of malaria cases is in excess of the normal number at a specific period of time and place. Therefore, the "normal" expected number has to be estimated. One way to do this is by using past weekly data of up to five previous years to construct a third quartile (second largest number) threshold line in an epidemic monitoring chart [4 and 8].

Population at Risk

Populations at high risk for malaria are those living in areas where the number of reported cases is ≥1 per 1000 population per year, and those at low risk are living in areas with < 1 case of malaria per 1000 population per year (defined at the lowest administrative level for which data are provided) [4 and 8].

Ethical Consideration

This three year data were collected after having written consent letter from the Regional Health Bureau Head/ Health Promotion and Disease Prevention and Control main process owner.

Result

Malaria Surveillance Data Analysis of BGRS by Person

The systematically collected and analyzed data from Benishangul Gumuz Regional State Health Bureau PHEM case data team verified that a total of 1,373,722 malaria suspected cases were examined by RDT or microscopy and a total of 790,047 malaria (clinical + parasitological confirmed) cases were reported from July 2006 EFY – June 2008 EFY. Malaria detection rate from total suspected fever was 57.5% (790,047*100/1,373,722)

From the total malaria cases, 84.4% (667,044/790,047*100) cases were parasitological confirmed. The three years clinical based malaria treatment rate was around 15.6% (123,003/790,047*100). Total inpatients due to malaria were 9,650 and a total of 79 deaths due to malaria were reported from July 2006 EFY – June 2008 EFY.

Among the confirmed cases; *plasmodium falciparum* constitutes 78.4% (522,667/667,044*100) while the rest 21.6% (144,431/667,044*100) *were plasmodium vivax*. The following figure 22 shows that proportion of malaria cases by species of the past three years.

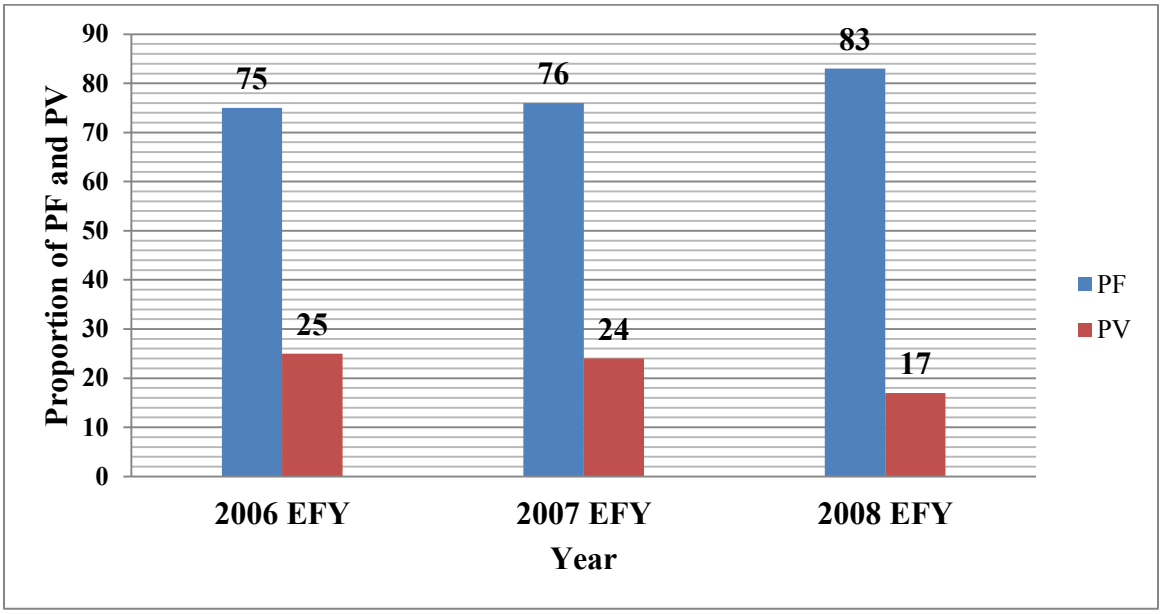


Figure 21 ***Proportion of plasmodium falciparum and plasmodium vivax malaria cases of the past three years of BGRS/ July 2006 – June 2008 EFY***

Proportion of parasitological confirmation treatment rate (show in figure 22) were 75%, 84% and 93% in 2006 EFY, 2007 EFY and 2008 EFY respectively. The systematically collected and analyzed malaria data revealed that the clinical malaria treatment rate was decreases from year to year.

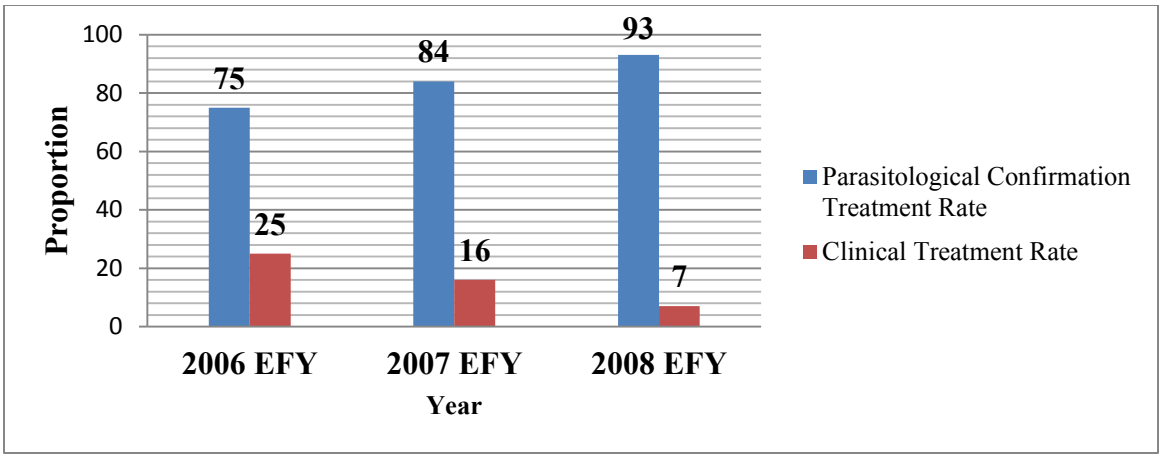


Figure 22 ***Proportion of parasitological confirmation and Clinical treatment rate malaria cases of the past three years of BGRS/ July 2006 – June 2008 EFY***

The total malaria annual prevalence rates were 289 per 1000; 255 per 1000 and 249 per 1000 population in 2006 EFY, 2007 EFY and 2008 EFY respectively. Still, malaria annual prevalence rate in Benishangul Gumuz Regional State was constant through year to year.

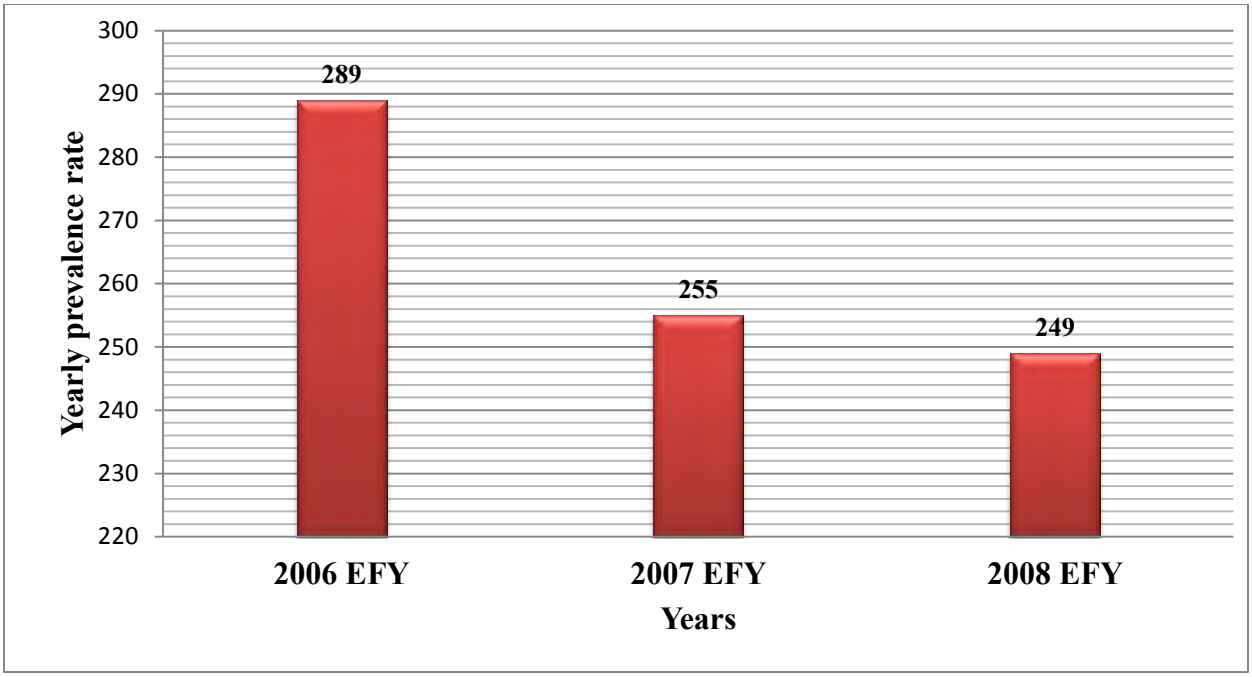


Figure 23 ***Annual prevalence rates of total malaria cases per 1000 populations of the past three years of BGRS/ July 2006 – June 2008 EFY***

The yearly prevalence in-patient due to malaria per 100,000 populations were (416 in 2006 EFY; 206 in 2007 EFY and 278 in 2008 EFY). The prevalence of in-patient due to malaria case show again constant year to year.

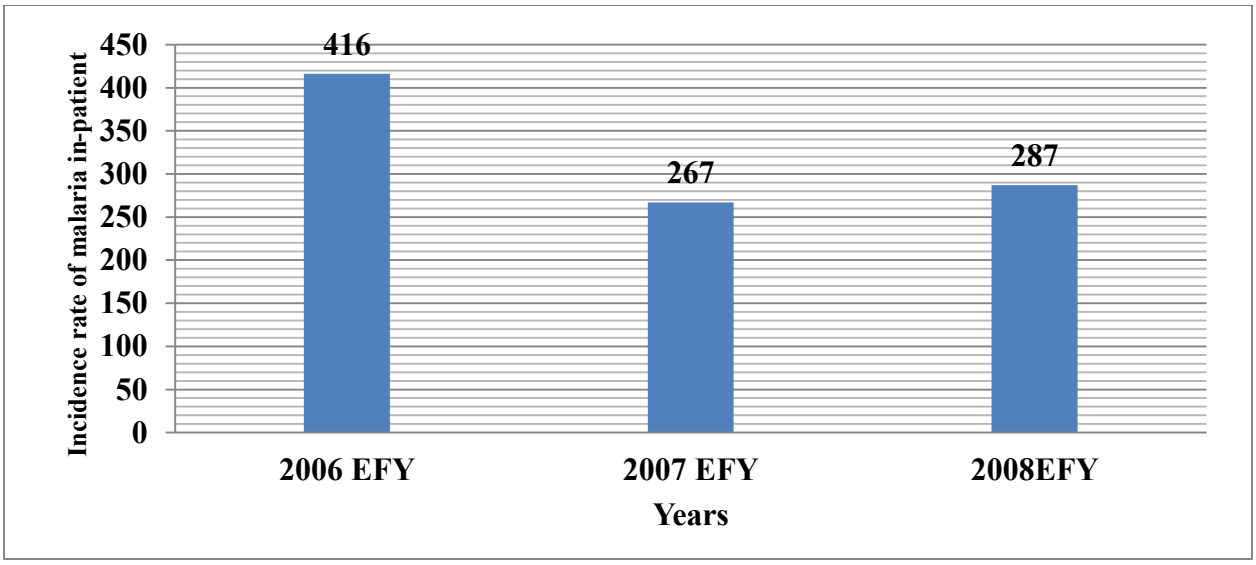


Figure 24 ***Annual prevalence rate in-patient cases due to malaria per 100,000 populations of the past three years of BGRS/ July 2006 – June 2008 EFY***

Three year aggregated data verified malaria specific mortality rate in the Region was 9.9 per 100,000 malaria cases. Yearly malaria specific mortality rate of Benishangul Gumuz Regional State (show in figure 26) were 9.6; 10.2 and 10 per 100,000 malaria cases in 2006 EFY, 2007 EFY and 2008 EFY respectively.

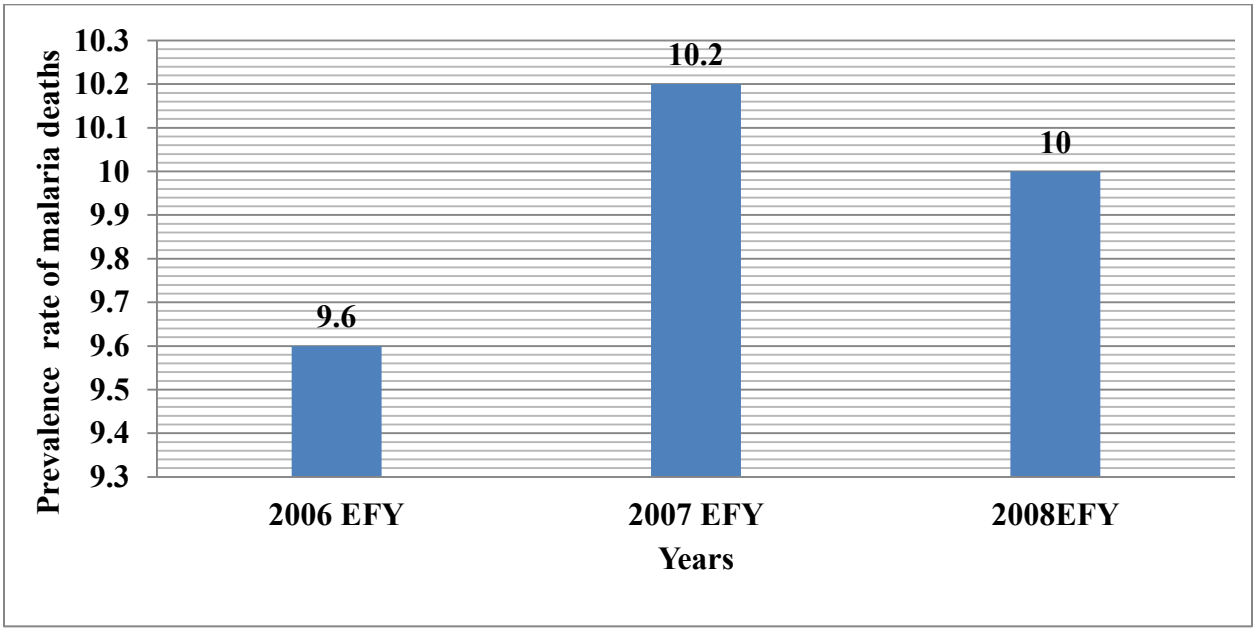


Figure 25 ***Malaria specific mortality rate per 100,000 populations of the past three years of BGRS/ July 2006 – June 2008 EFY***

Malaria Surveillance Data Analysis of BGRS by Time

The systematically collected and analyzed malaria surveillance data verified that; the trend of malaria cases were started to pick up from WHO Epi week of week-36 till WHO Epi week of week-52 (September till December) and ; again it started to up from WHO week-14 till WHO Epi week of week-26 (mid of March till mid of May). The trends of plasmodium Vivax malaria cases were almost constant in every WHO weeks.

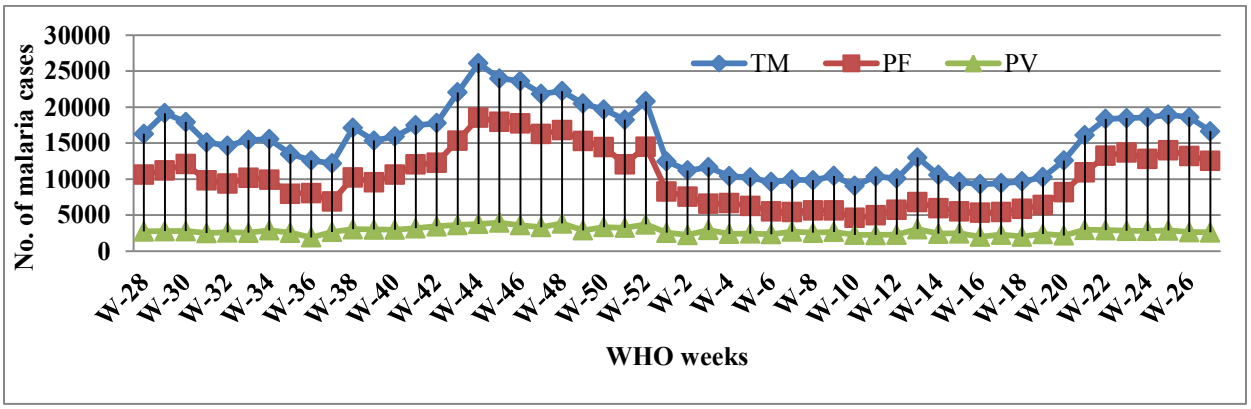


Figure 26 ***Trend of three year aggregated total malaria cases with similar WHO weeks of the past three years of BGRS/ July 2006 – June 2008 EFY***

WHO week-28 started from July (the beginning of Ethiopian fiscal year)

The systematically collected and analyzed malaria surveillance data revealed that; the trend of in-patient cases due malaria was increased and decreased looks like the trend of total malaria cases. It also verified in-patient cases of malaria were due to *plasmodium falciparum* species.

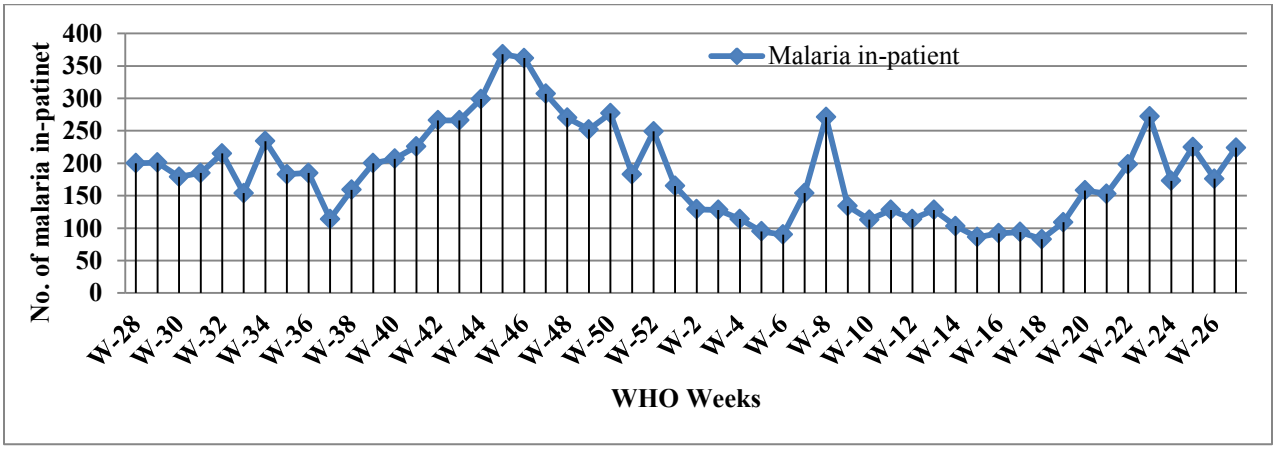


Figure 27 ***Trend of three year aggregated malaria in-patients with similar WHO weeks of the past three years of BGRS/ July 2006 – June 2008 EFY***

The systematically collected and analyzed data from BGRS health bureau PHEM cases team verified that; the average monthly malaria cases of the past 3 consecutive years were reached around 21,946 (790,047 case/ 36 months). When it aggregated with similar months; the largest slash malaria cases were recorded on October (89,869) and November (88,171) months respectively. The smallest cases were recorded in February (39,391) and April (45,031) respectively.

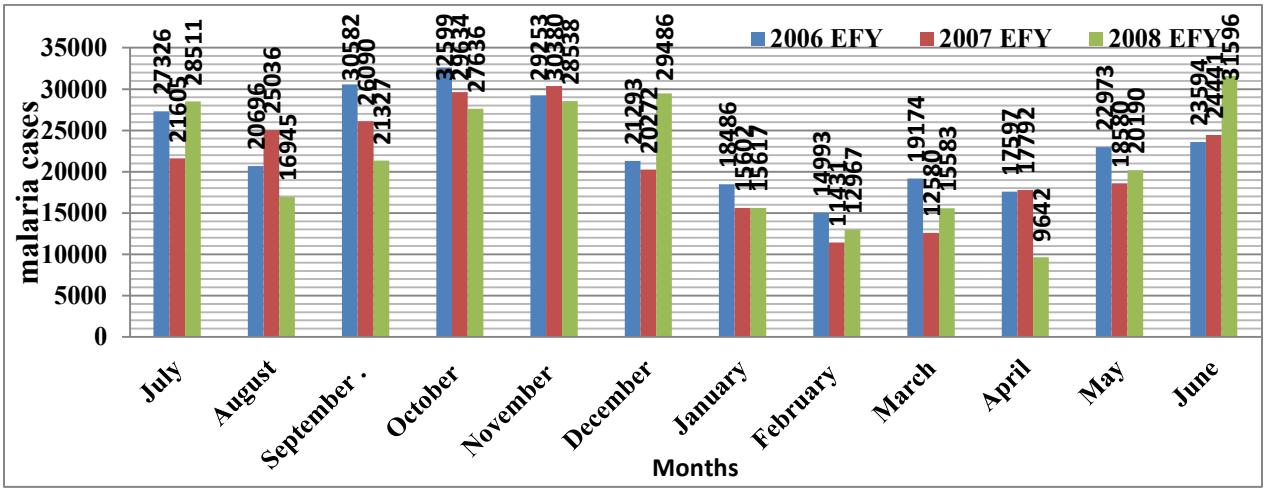


Figure 28 ***Malaria cases loads Benishangul Gumuz Regional State versus months in BGRS/ July 2006 – June 2008 EFY***

The systematical data collected and analyzed data from BGRS health bureau PHEM case team verified that; a total of 79 malaria deaths were recorded in the past three years. The highest malaria deaths were recorded on July (17), September (11) and October (11). Zero malaria death was recorded on February.

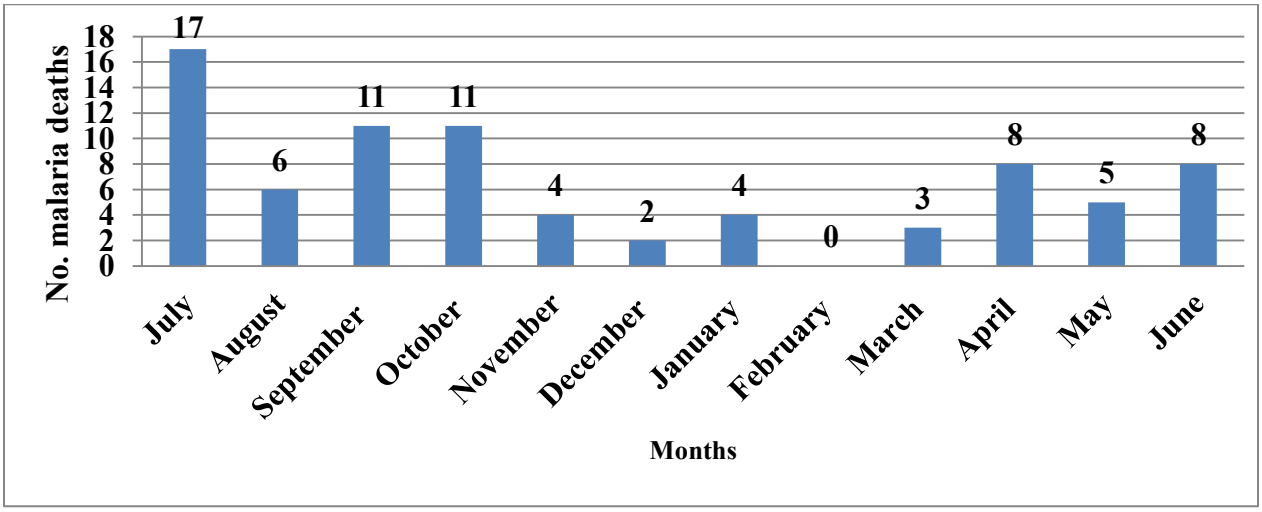


Figure 29 ***Aggregated malaria death with similar months of the past three years of BGRS health bureau of PHEM cases team July 2006 – June 2008 EFY***

The three years surveillance data verified that *plasmodium falciparum* constitutes 77.9% while the rest 22.1% was *plasmodium vivax*. It also verified that the numbers of plasmodium falciparum cases were increased year to year.

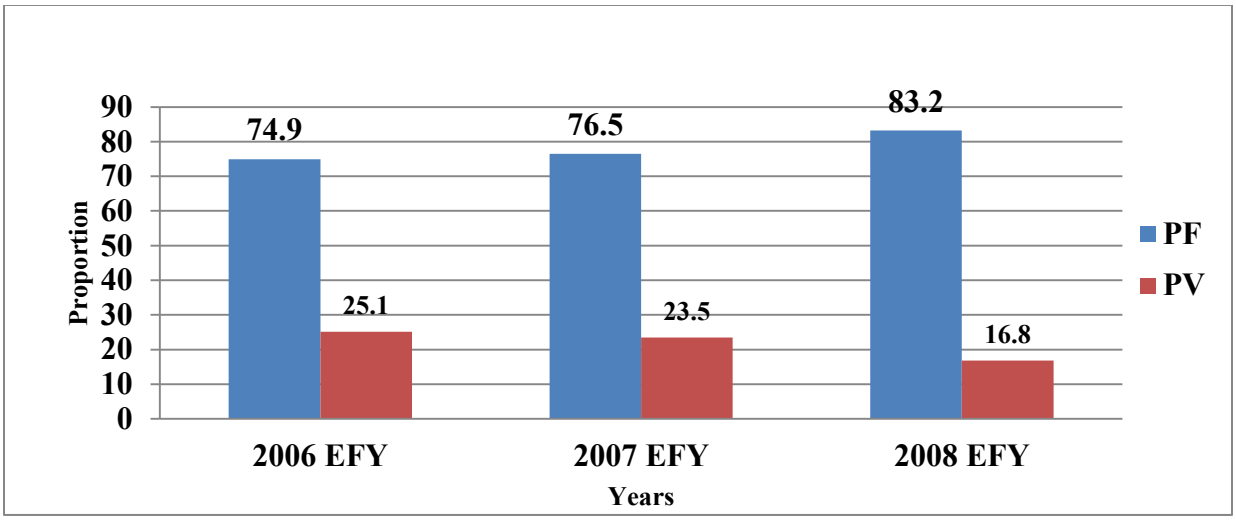


Figure 30 ***Proportion of plasmodium falciparum and plasmodium vivax malaria cases rate versus years in BGRS August/ July 2006 – June 2008 EFY***

Malaria Surveillance Data Analysis of BGRS by Place

The systematically collected and analyzed data verified that; the highest three year prevalence rate of malaria cases reported from Guba (256 per 100 populations) and Yasso (184 per 100 populations) Woreda respectively. In other side the lowest reported from Wombera (13 per 100 populations) and Assosa (17 per 100 populations) Woredas. Malaria prevalence rate of each Woredas of BGRS is show in figure 34.

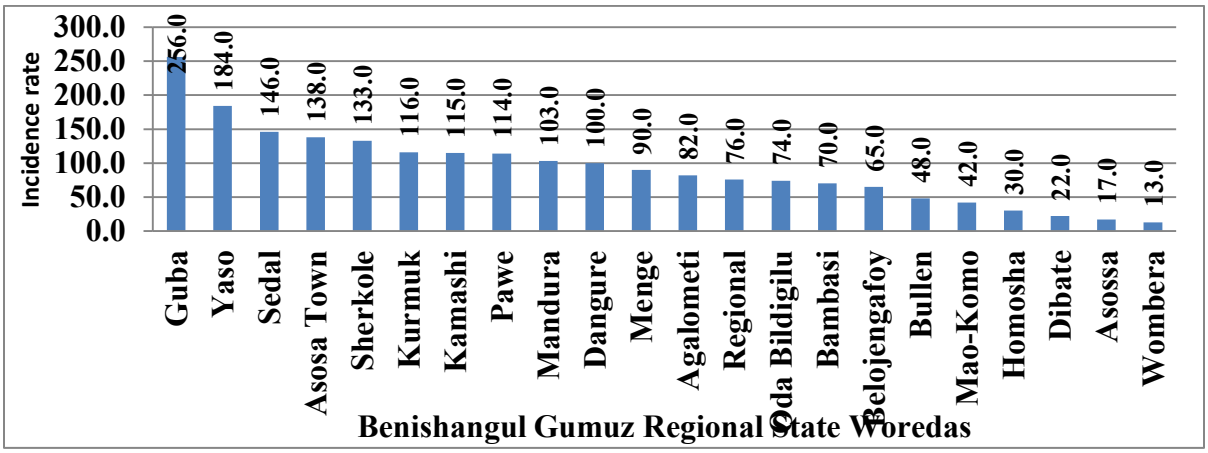


Figure 31 ***Three year prevalence rate of Malaria per 100 populations by woredas and region of BGRS July 2006 – June 2008 EFY***

The systematically collected and analyzed data of malaria cases from Regional PHEM case team verified all woredas of the Region is high risk for malaria. Nevertheless this; the highest cases loads was recorded in Pawi (68,356) and Dangur (64,291) woredas respectively. The smallest slash of malaria cases were reported from Homosha (8,486) and Wombera (10,604) Woreda respectively.

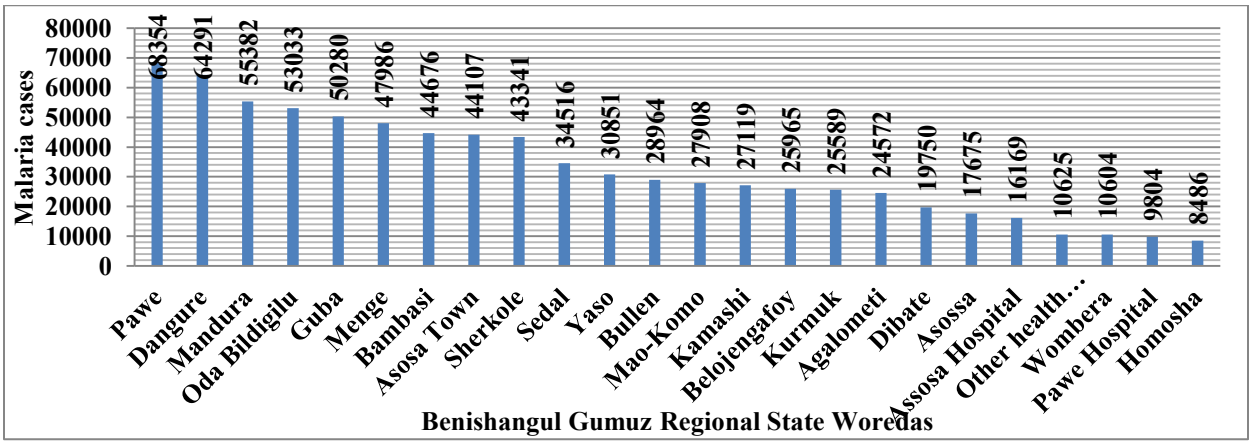


Figure 32 ***Three years aggregated malaria loads versus woredas of BGRS July 2006 – June 2008 EFY***

The systematical data collected and analyzed data from Regional PHEM cases team verified that; the biggest numbers of malaria deaths were reported from Pawi hospital (26) and Dangur Woreda (14). Two malaria deaths were reported from other health facilities.

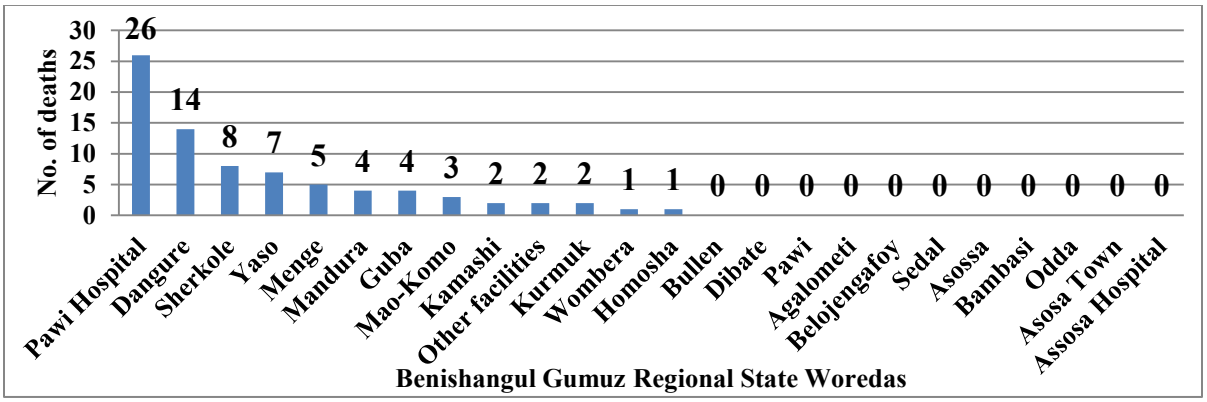


Figure 33 ***Number of malaria cases deaths versus Woredas of BGRS/ July 2006 – June 2008 EFY***

Hospitals data are equivalent to Woreda data in PHEM structure;
Other reported facilities included; - refugee camps, Ethiopian Great Renaissance Dam Clinic, police clinic and private clinic).

It verified that the highest parasitological confirmation treatment rate reported from Sherkole, Wombera and Belloji Ganfoy woredas and the lowest in Pawe hospital, Assosa hospital and Kurmuk Woreda.

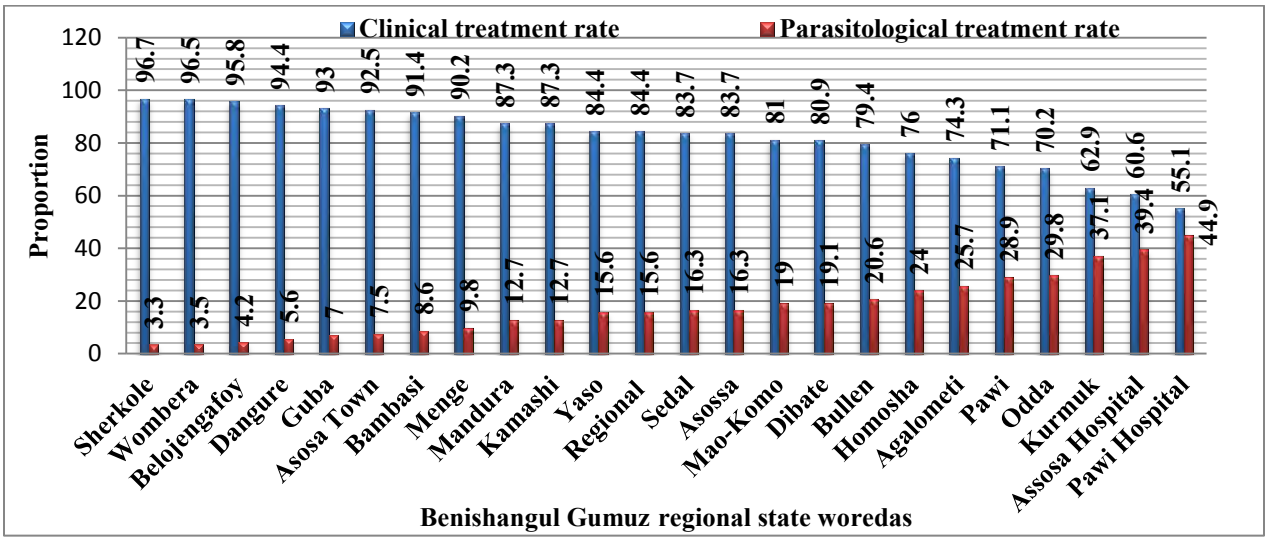


Figure 34 ***Proportion of clinical and parasitological confirmation treatment rate of malaria cases of the past three years versus BGRS woredas and two hospitals/ July 2006 – June 2008 EFY***

The biggest *plasmodium falciparum* malaria rates were reported from Agallo Miti, Kamash, Mandura, Sherkole and Menge woredas respectively and the highest *plasmodium vivax* rates malaria reported from Assosa town administration, Assosa Hospitals, Bambasi, Assosa and Yasso woredas respectively.

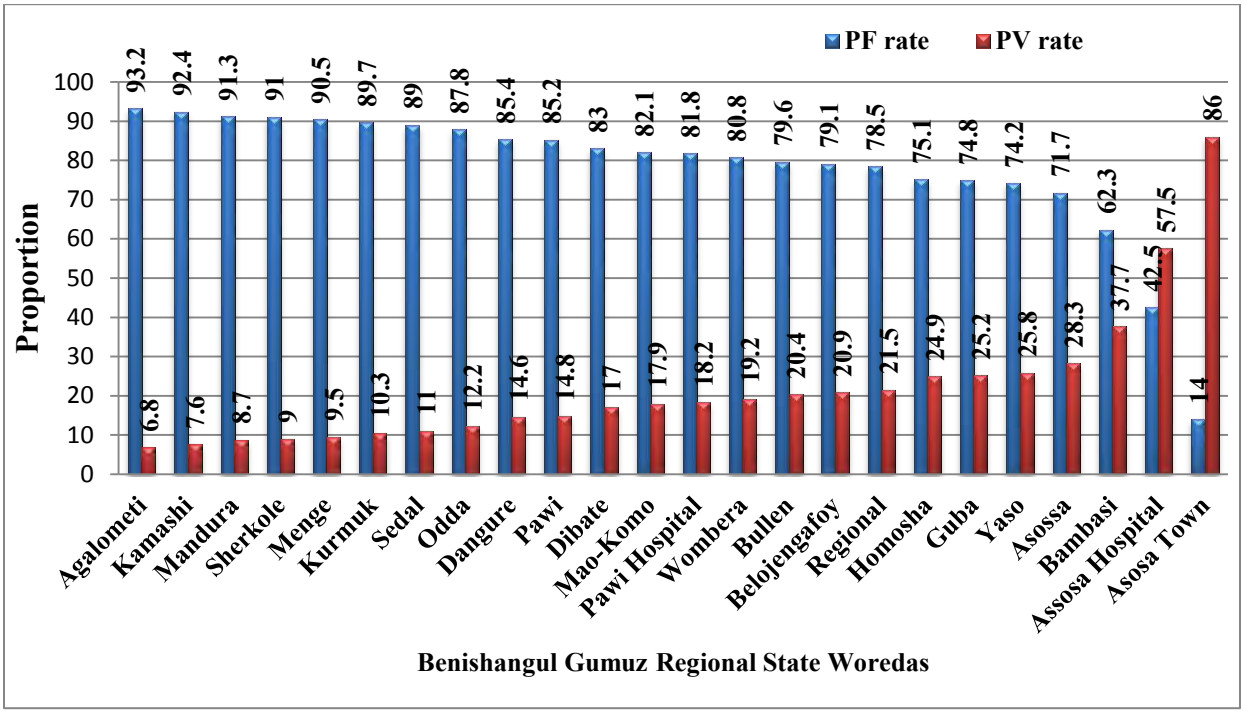


Figure 35 ***Proportion of plasmodium falciparum and plasmodium vivax rate malaria of malaria cases of the past three years versus BGRS woredas and two hospitals/ July 2006 – June 2008 EFY***

Discussion

Plasmodium falciparum and plasmodium vivax are the two dominant parasite species causing malaria in Ethiopia, with relative frequencies of about 60% and 40%, respectively (5). The three years surveillance data verified that *plasmodium falciparum* constitutes 78.5% while the rest 21.5% was plasmodium vivax. Malaria cases by species in Benishangul Gumuz Regional State vary from the national proportion [4].

Malaria cases prevalence rate per year per 1000 populations were 289 in 2006 EFY, 255 in 2007 EFY and 249 in 2008 EFY. Malaria in-patient prevalence rate per 100, 000 populations were 416 in 2006 EFY, 267 in 2007 EFY and 287 in 2008 EFY. Malaria specific mortality rate per 100, 000 malaria cases were 9.6 in 2006 EFY, 10.2 in 2007 EFY and 10 .in 2008 EFY. Malaria cases, in-patients and deaths due to malaria in past three years decrease very slightly; even if many malaria prevention and control activities performed in the Region. It might show the impact of malaria prevention and control activities in the region was weak. But previous study shows that malaria prevention and control interventions have recently undergone major scale-up in Africa, and malaria disease burden is reported to be declining in several countries, including Ethiopia and other East African countries [13 and 15].

The three years trend of malaria revealed that malaria caseloads were started to pick up on September till December and again started from mid of March to till mid of May. It also verified inpatient malaria increased when the trend of total malaria started to pick up. This systematically collected and analyzed data coincide the major and minor malaria transmission season in the nation [4 and 14].

Microscopic diagnosis and RDTs are the methods employed for confirmation of malaria etiology. National malaria guideline third edition recommended that; Patients who test negative by malaria RDT or microscopy do not need anti-malarial medications and Clinical treatment rate should not exceed 5% [4]. As we have been seen from the finding; clinical malaria treatment rate were decreases from year to year (24.3%, 15.1% and 6.5% in 2006, 2007 and 2008 respectively). The probable cause for this might show the approach of treatment of malaria case changed and availability of RDT in lower health facilities.

All woredas in the region were affected by malaria. No Woreda was free from malaria [16]. The highest malaria prevalence was reported from Pawi, Dangur, Mandura, Oda Bilidigilu and Guba woredas. It coincided with the many agricultural investors were availed within those woredas and low malaria resistance influx were happen in those are for the daily workers. It coincide with low malaria resistance communities are highly venerable to malaria [4]

The big slash of malaria deaths recorded in Pawi Hospital, Dangur and Sherkole Woreda. It might not show the quality of hospital and malaria prevention and control actives Woredas Health Office. It needs additional findings.

The highest *plasmodium falciparum* rate recorded in Agallo Miti, Kamash and Menge woredas respectively; inversely highest *plasmodium vivax* proportion were recorded in Assosa town administrator, Assosa hospitals and Bambasi woredas respectively. It needs additional finding the reason of high and low *plasmodium vivax* recorded in those woredas in against with regional and national average *plasmodium falciparum* and *plasmodium vivax* cases [4 and 14]

The systematically collected and analyzed data revealed that the highest slash of parasitological confirmed malaria treatment rates were reported from Sherkole, Wombera and Belloji Ganfoy oppositely the highest clinical treatment rates were reported from Pawi and Assosa hospitals and Kurmuk woredas. It might show the complicated malaria suspected cases were visited the hospitals. Nevertheless this; it need additional confirmatory findings.

Strength and Limitation

- Three years PHEM data were availed in well-organized ways in the Regional Health Bureau
- Completeness and timelines of weekly report in the past three years were above minimum expectation of EPHI

- All population entire the Region are under surveillance for all priority diseases and conditions

Limitation

- It was not possible to analyze the data by age and sex because the PHEM reporting format lacks that personal information's.
- Most of private clinics were not included in this surveillance data analysis. Therefore, the number of cases could be greater.

Conclusion and Recommendation

Conclusions

The systematically collected and analyzed malaria surveillance data conclude:-

- The predominate malaria cases were due to *plasmodium falciparum.* Malaria cases proportion by species in the Region vary from the national proportion
- Malaria caseloads started to pick up on September till December and again started from mid-March till mid-May.
- *Plasmodium vivax* malaria case occurred constantly in every WHO Epi weeks
- Clinical malaria treatment rate decreased from year to year
- All Woredas entire the Region were affected by malaria.
- The biggest malaria deaths were recorded in Pawi Hospital, Dangur and Sherkole Woredas.
- *Plasmodium falciparum* and *plasmodium vivax* malaria proportion greatly vary from woredas to woredas
- The scale up of interventions did not demonstrate considerable impact on malaria cases loads;

Recommendations

- Malaria prevention and control activities should be strengthen to reduce the incidence and prevalence of malaria;
- The recent reporting format lacks some important variables; like age, sex, occupation. Need to incorporate;
- Regional Health Bureau PHEM Case Team and disease Prevention and Control Case Team should perform rapid assessment on bed net utilization in high malaria prevalence rate recorded Woredas.
- Malaria interventions activities should be strengthened before the major and minor transmission seasons of malaria.
- Indoor residual spry of anti-mosquito chemical should implement before the major and minor transmission seasons of malaria.

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4. Evaluation of Surveillance System

Evaluation of Malaria and Measles Surveillance System Assosa Zone; Benishangul Gumuz Regional State; Ethiopia/ February 2009 EC

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Introduction: - Surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health. Assosa Zone is one of the high risk areas for several public emergencies including malaria and measles. The objective was to evaluate malaria and measles surveillance system of Assosa Zone of Benishangul Gumuz Regional State;

Method: - Observational and face to face interview was used to collect the data. Surveillance System was evaluated from 1st – 20th February 2009 EC. All population living in Assosa Zone was taken as the study population. Purposive sampling method was used to select one Zone, Three woredas and twelve heath facilities. We entered data and analyzed using the Epi Info and Microsoft Excel 2007.

Result: - All visited health institutions Focal persons; Woreda Health Officer PHEM officers and Zonal PHEM officer answered that the case definition malaria and measles. All respondents suggested that data collection formats for weekly and immediately reportable diseases and condition had cleared and easy to filled. Case definition was acceptable to all stakeholders and the flow of data was clearly indicated. Completeness and Timeliness of Assosa Zone was 95.5 % in the past one year (2008 EFY).

Conclusion: - Surveillance system evaluation detects malaria and measles cases easily. Malaria and measles were major public health problems of Assosa Zone. The report timeliness and completeness above expectation. Malaria and Measles surveillance data should be analyzed and interpreted for decision making.

Key Words: Evaluation of Surveillance System, Benishangul Gumuz

Introduction

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health [1] [6] . Data disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation, and formulating research hypotheses [2] [4].

Before 1998 the nation implemented multiple surveillance system which is surveillance for each disease. From 1998 – 2009, there was approach shift, which was integrated disease surveillance and response (IDSR) for the selected 23 diseases [2]. Since 2009 and onward, our nation has been implementing Public Health Emergency Management (PHEM) [3]. Currently in Ethiopia, 19 high priority diseases and 2 conditions are selected to be included in the routine surveillance system (see table 20). Diseases were selected in regard to public importance, epidemic potential, international concern and diseases under eradication and elimination under surveillance [3].

The purpose of disease surveillance is to detect sudden changes in disease occurrence and distribution; learn more about the natural history of the disease, clinical spectrum and epidemiology of a disease; and to identify changes in agent, host and environmental factors. Currently public health surveillance is beyond disease surveillance that defined as ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding health and health-related event for use in public health action to reduce morbidity and mortality and to improve health [1] [2] [3].

In addition to communicable diseases, non-communicable diseases such as hypertension and diabetes are emerging threats in our country. As well as; conditions and events such as malnutrition and maternal deaths are critical targets for national public health programs. Data disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation, and formulating research hypothesis [4] [5]

Public health surveillance system should be evaluated periodically, and the evaluation should include recommendation for improving quality, efficiency, and usefulness. The public health surveillance system is evaluated to ensure that problem of public health importance are being monitored efficiently and effectively. The evaluation of public health surveillance systems should also involve an assessment of system attributes, including simplicity, flexibility, data quality, acceptability, sensitivity, predictive value positive, representativeness, timeliness, and stability and core activities including case detection, analysis reporting and response of the surveillance system in the study area. Surveillance could not be carried out for all diseases and conditions therefore; priority should be public importance, epidemic potential, international concern and diseases under elimination and eradication [6].

Malaria and measles are the two of 21 priority diseases reported as weekly and immediately respectively [3]. Malaria is one of the ten top diseases throughout the Region for more than a decade. From July 2006 EFY – June 2008 EFY a total of 1,373,722 malaria suspected cases were examined by RDT or microscopy and a total of 790,047 malaria (clinical + parasitological confirmed) cases were in the region. Malaria detection rate from total suspected fever was 57.5% (790,047*100/1,373,722)

Measles epidemic is becoming more frequent reported and occurs as epidemic in Assosa Zone of Oda-Bilidigilu Woreda. In 2007 EFY; there was measles outbreak in Assosa Zone of Oda-Bilidigilu Woreda. A total of 338 cases & 11 community deaths were reported with CFR of 3.3%.

The overall purpose of surveillance of these diseases is to monitor the trend against the expected tolerance limits and to evaluate effectiveness and efficiency of surveillance system attributes and core activities.

Therefore this study was conducted to evaluated public health surveillance systems in Benishangul Gumuz regional State of Assosa zone to determine how well they operate to meet their stated purpose and goal; finally to provide specific recommendation for improving surveillance quality, efficiency and usefulness of the system.

Table: 20 - *Priority diseases and Conditions reported through public health surveillance activities; Ministry of Health; Ethiopia; February 2017*

Immediately Reportable Diseases	Weekly Reportable Diseases
1. Acute Flaccid Paralysis(AFP)/ Polio 2. Anthrax 3. Avian human influenza 4. Cholera 5. Dracunculiasis /Guinea worm 6. Maternal Death* 7. Measles 8. NNT 9. Pandemic influenza A 10. Rabies 11. SARS 12. Smallpox 13. VHF 14. Yellow fever	15. Dysentery 16. Malaria 17. Meningococcal meningitis 18. Relapsing fever 19. Typhoid fever 20. Typhus 21. Severe Malnutrition

***** Recently added (since 2008 EFY PHEM system or surveillance and response)

The data and information flows routinely from the peripheral (community) up to the higher and central level EPHI. This starts from health post (community) to health facilities then to Woreda Health Office and followed by Zonal Health Department; to Regional Health Bureau PHEM case team. Then, it sends the compiled data and information to the EPHI.

Figure: 39 - *Frequency of weekly reportable diseases and condition for public health surveillance activities; Ministry of Health; Ethiopia; February 2009 EC*

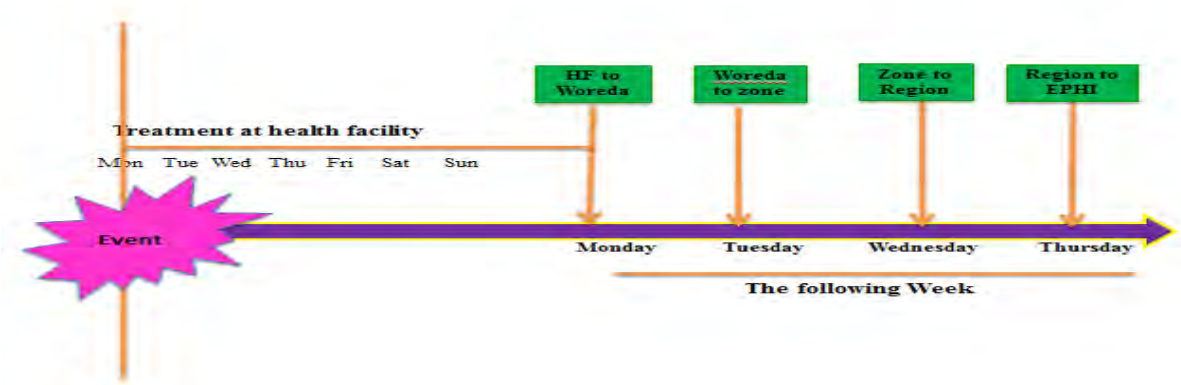
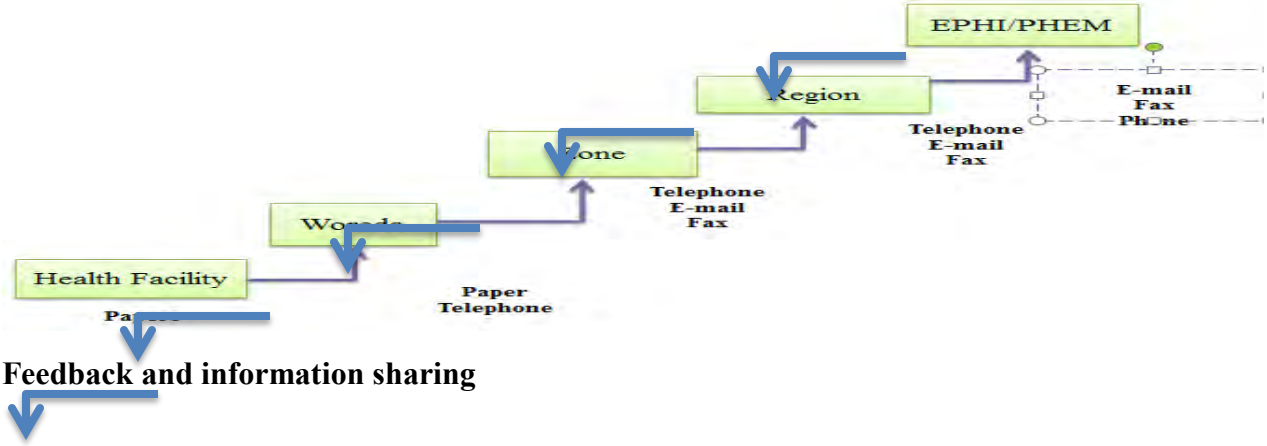


Figure: 40 - *Frequency of immediately reportable diseases and condition for public health surveillance activities; Ministry of Health; Ethiopia; February 2009 EC*

Figure: 41 *- Surveillance System (Reporting and Feedback) public health surveillance activities; Ministry of Health; Ethiopia; February 2009 EC*



Rationale of the Study

Assosa Zone is one of the high risk areas for several public emergencies including malaria and measles. Malaria and measles are the major and highly burden of public health importance in Assosa Zone. We make due consideration to these two diseases could be used as proxy indicators of the surveillance system evaluation of the Zone.

Surveillance system evaluation has not yet been done in the area; and it is difficult to know the effectiveness and efficiency of the system without evaluation. Use of the collected data at the local level as evidence for public health decision making has not been well established and functional till now. An evaluation of the Zone based on surveillance system for malaria and measles improve the information provided evidence based information that help decision maker to ensure that the diseases are being monitored effectively and efficiently.

Therefore an evaluation of malaria and measles surveillance system was conducted to make recommendation that may use to improve the current surveillance system of the diseases and preparedness and response against the possible outbreaks in the future.

Objectives

General objective

- To evaluate malaria and measles surveillance system of Assosa Zone Health Department of Benishangul Gumuz Regional State; Western Ethiopia

Specific Objectives

- To assess the core activities such as case detection, analysis reporting and response of the surveillance system in the study area;
- To assess the usefulness of surveillance system in early detection of diseases and outbreaks and response;
- To evaluate Simplicity, Flexibility, Data Quality, Acceptability, Predictive Value Positive, Representativeness, Stability, Timelines and Completeness of the surveillance system of the selected diseases in the study area;

Methods and Materials

Study Area

Benishangul Gumuz regional state /BGRS/ is one of the nine regional state that constituted the Federal Democratic Republic of Ethiopia /FDRE/. It located in western of the country. The region is divided into 19 administrative Woredas; three Zones, one special Woreda and one town administration [7].

Assosa Zone is one of the 3 administrative Zones of Benishangul Gumuz Regional State. It located in the Western part Ethiopia. It covers an area of 12,206 squares KM [7]. Geographically the altitude varies from 560 (Great Ethiopian renaissance hydroelectric dam construction site) up to 2,510 meter above sea level [8]. The annual average temperature ranges 20 - 35 degree centigrade. The capital town of the zone is Assosa which is about 679 KMs far from Addis Ababa to the West direction. According to 2007 census population projection; the total population of the Zone reached 389,546 in 2009 EFY [9] [10]. Administratively the Zone is divided in to 7 Woredas; 203 Kebeles and 952 villages. From those Woredas; three Woredas were selected for surveillance system evaluation. Assosa Zone had 166 health posts; 13 health centers and one general hospital. Those health institutions were under surveillance system.

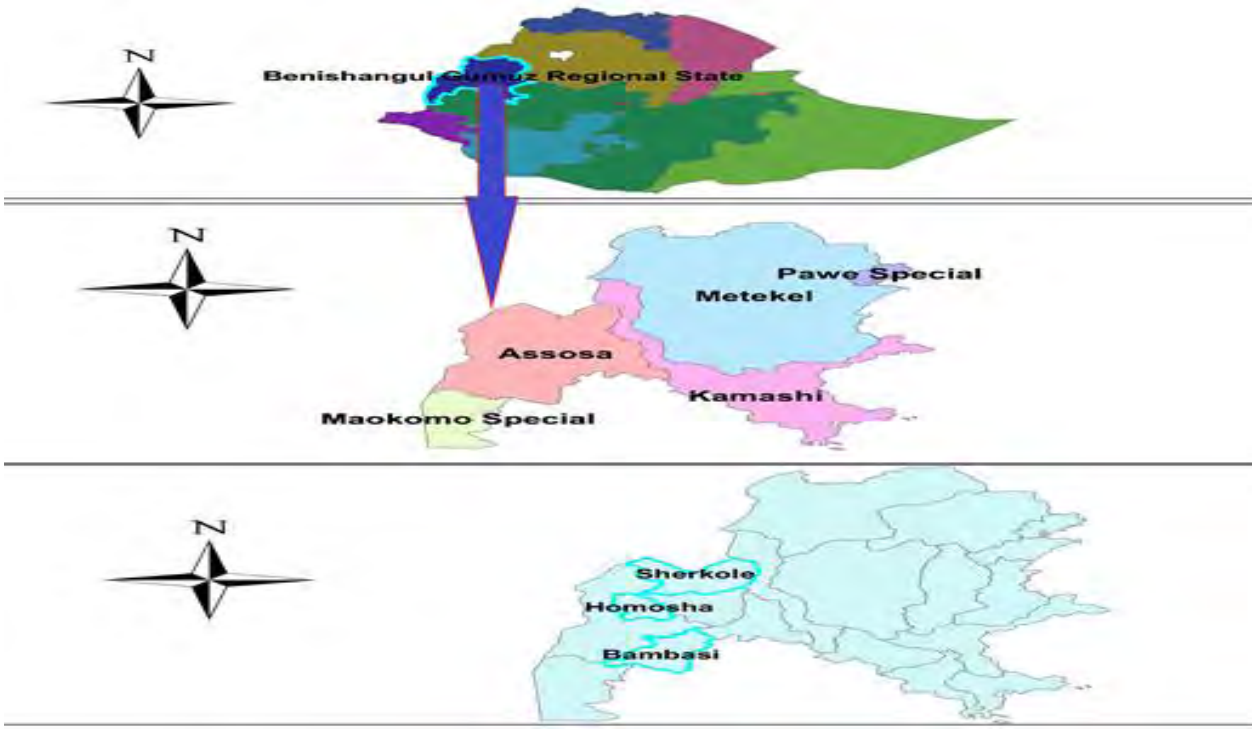


Figure 36 ***Map of Assosa Zone and visited Woredas in the Zone; BGRS; Ethiopia; February 2017***

Study Subjects

The study subjects were health facilities (Hospital, Health Centers, and Health Posts); Woreda Health Offices and Zonal Health Department.

Study Design

A Cross Sectional descriptive study conducted. The system was evaluated using Center for disease control and prevention (CDC) updated guidelines for evaluating surveillance system. We assessed the structure and the core activities of the surveillance system in the Zonal Health Department; Woreda Health Office and Health Institutions about usefulness of the system and attributes of the surveillance system.

Study Period

Public health emergency management/ surveillance system was evaluated from 1st – 20th February 2009 EC.

Source Population

All Population in Benishangul Gumuz Region State was taken as a source population for our study.

Study Population

All population living in Assosa Zone was taken as the study population

Sample Size

Purposive sampling was used to select one Administrative Zone from the Regional Health Bureau. Three Woreda Health Offices, three health centers and fifteen health posts were selected conveniently.

Sampling Technique

Selection criteria of the study subjects were done as in the steps below:

- From the Region one Zonal Health Department were selected purposively.
- From the Assosa Zone three Woredas were selected.
- From each selected Woreda one health center and four health posts were selected

Data collection Procedure

Observational and face to face interview was used to collect the data. A CDC surveillance Evaluation Guideline [4] data collection tool was adopted.

System of Data Analysis

We entered data and analyzed using the Epi Info and Microsoft Excel 2007and summarized qualitative data to complement for quantitative findings.

Data Dissemination

Written report (both hard and soft copies) was prepared and shared to Addis Ababa University/School of Public Health, Ethiopia Field Epidemiology Training Program Resident advisors and coordinators and BGRS Bureau, Then to Assosa Zonal Health department and all visited Woreda health offices.

Ethical Consideration

This data were collected after having written consent letter from BGRS Bureau to Zonal Health Department. After all, discussed the purpose and method of the study with zonal health office head PHEM department they were convinced to write a letter for selected health Woredas

Operational Definitions

Suspected Malaria Cases: Any person with fever or fever with headache, back pain, chills, rigor, sweating, muscle pain, nausea and vomiting without confirmatory test for malaria and any the clinician diagnosed as malaria [3] [11].

Confirmed Malaria Cases: Any person with fever or fever with headache, back pain, chills, rigor, sweating, muscle pain, nausea and vomiting or suspected case confirmed by rapid diagnosis test or microscopy [3] [11].

Malaria Outbreak: Is the occurrence of numbers of cases above what is expected in a place in a particular time period [11].

Suspected Measles: Any person with fever and maculopapular (nonvascular) generalized rash and cough, Coryza or Conjunctivitis (red eyes) or any person in whom clinician suspects measles [3] [12].

Confirmed Measles: A suspected case with laboratory confirmation (positive IgM antibody) or epidemiological link to confirmed Cases in an epidemic [3] [12]

Suspected Measles Outbreak: Occurrence of five or more reported suspected measles cases in one month in a defined geographic area such as a Kebele, Woreda or health facility catchment area [12].

Confirmed Measles Outbreak: Occurrence of three or more laboratory confirmed measles cases in one month in a defined geographic area such as a Kebele, Woreda or health facility catchment area [12]

Usefulness: How helpful the system is to public health staff in taking actions as a result of interpreting and analyzing its data [4] [13].

Simplicity: refers to both its structure and ease of operation. Surveillance systems should be as simple as possible while still meeting their objectives [4] [13].

Flexibility: refer the ability of system to adapt to changing needs such as: The addition of a new disease and the collection of additional data [4] [13].

Data Quality: Completeness or validity of the data is the system collecting and managing accurate, high-quality information regarding the issue(s) of interest [4] [13].

Acceptability: is a reflection of the willingness of the public health emergency staff to implement the system from the national to the grass root level [4] [13].

Predictive value: The probability of the disease given the results of the test. Predictive values of a test are determined by the sensitivity and specificity of the test and by the prevalence of the condition for which the test is used [4] [13].

Predictive value, negative (Sync: predictive value of a negative test) the probability that a person with a negative test result is a true negative (e.g., does not have the disease) [4] [13].

Predictive value, positive (sync: predictive value of a positive test) the probability that a person with a positive test result is a true positive under surveillance [4] [13].

Representativeness: Ability to describe health events accurately in terms of time, place and person [4] [13].

Stability: Reliability and availability of the surveillance system; reliability i.e., the ability to collect, manage, and provide data properly without failure and availability is the ability to be operational when it is needed of the public health surveillance system [4] [13].

Timeliness: Interval between the occurrence of an adverse health event and (I) the report of the event to the appropriate health agency, (ii) the identification by that agency of trends or outbreaks, or (iii) the implementation of control measures [4] [13].

Completeness: proportion of all expected data reports that were actually submitted to the public health surveillance system [4] [13].

Validity: Degree to which statistical information correctly describes the phenomena it was designed to measure [4] [13].

Result

Engage the Stakeholder in the Evaluation System

Prior to the evaluation of the surveillance system started with discussion and consultation was made with Regional Public Health Emergency case team on how to select sites. It is known that stakeholders can provide input to ensure that the evaluation of a public health surveillance system addresses appropriate questions and assesses relevant attributes and the findings will be acceptable and useful. In this context, Assosa Zone Health Department PHEM officer and selected Woreda Health Office PHEM officers and health institution focal persons were participated in the evaluation of the surveillance system of Assosa zone.

Description of the surveillance system to be evaluated

Public Health Emergency Management (PHEM) is defined as the process of anticipating, preventing, preparing for, responding to and recovering from the impact of epidemics and health consequences of natural and manmade disasters. The sub processes identified for the process include preparedness and early warning, response and recovery. The early warning sub-process contains the integrated public health surveillance [3].

The description of the system can be improved by describing the public health importance of the health-related event under surveillance, describing the purpose and operation of the system; and describe the resources used to operate the system.

Description Public the importance of diseases/ conditions under Surveillance in Ethiopia and the related with the Surveillance system

Acute Flaccid Paralysis; Anthrax; Avian Human Influenza; Cholera; Dracunculiasis/ Guinea worm; Measles; Neonatal tetanus; Pandemic Influenza A(H1N1); Rabies; Small pox; SARS; Viral Hemorrhagic Fever(VHF); Yellow Fever and Maternal death were immediately reportable diseases. Dysentery; Malaria; Meningitis; Relapsing; Typhoid Fever; Typhus and Severe Acute Malnutrition also were weekly reportable diseases. Those are were selected based on high epidemic potential; required internationally-IHR; diseases having significant public health importance and disease that have effective prevention and control measure [3]

These diseases had monitored by a designated bodies through available means of communications such as telephone, paper based reporting etc. These diseases are set to be reported as mandatory notification (immediately reportable) diseases and routine surveillance (reported weekly).

This surveillance evaluation tried to assess diseases targeted for epidemic potential in our region; those are immediately (measles) and weekly (malaria) reportable diseases. A disease like malaria is one of the ten top diseases throughout the zone for more than a

decade. Measles epidemic is being known become more frequent in different parts of the region and also in the Zone.

Descriptive the Purpose and Operation of Surveillance System

Overview of the Surveillance System

PHEM system is fully integrated, adaptable for all-hazards and all health approach for national preparedness and response system. This system is comprised of four sub processes which are: Public Health Emergency Preparedness, Early Warning, Response, and Recovery. Every public health emergency management processes have a starting and ending point. As indicated in Figure: 5 - the process starts with early warning and ends with recovery [3].

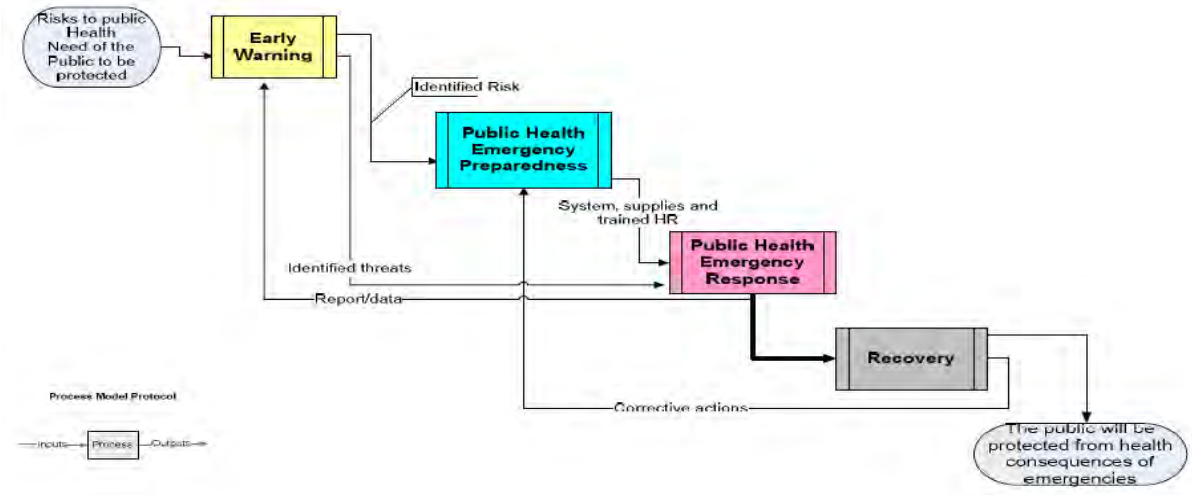


Figure 37 ***PHEM system pillars and its flow chart Ministry of Health; Ethiopia* 2017**

Source: FDRE-MOH PHEM Guideline for Ethiopia; Addis Ababa; 2012

Population under Surveillance

Total population of Assosa Zone estimated to be 389,546 (projection based on 2007 census). Of these population male 199,409 and female 190,029; children under 5 years of age 63,029 numbers of women of reproductive age (15-49) 80,597 numbers of pregnant women 15,971. Assosa Zone also hosted 58,432 South Sudanese refugees. There was no pastorals and internal displaced people (IDP) in the Woreda [9]. The actual data about migrant workers were not yet known. Nevertheless; the migrant workers were estimated about 20% of the total population (77.909). This number was increased in agricultural season.

Benishangul Gumuz Regional Health Bureau Public Health Emergency Management (PHEM) case team targets all the population in the region to be under surveillance for all the twenty one priority diseases.

Description of usefulness, Core and Support Function and Attributes of Surveillance System

Usefulness

All PHEM focal persons (12) (100%) and PHEM officers (4) (100%) agreed that the Surveillance System helps to detect outbreaks; estimate the magnitude of morbidity and mortality related to those diseases, including identification of factors associated with these diseases and permit assessment of the effect of prevention and control programs. They also agreed that surveillance system is useful to guide the planning, implementation, and evaluation of prevent and control innervations.

Core Function of Surveillance System

Case Detection

The Zonal Health Department surveillance system evaluation verified that a total of 184,682 malaria suspected cases was examined by RDT or microscopy and a total of 83,722 malaria (clinical + parasitological confirmed) case were reported from 2008 EFY. Malaria detection rate from total suspected fever was 45.3% (83,722*100/ 184,682)

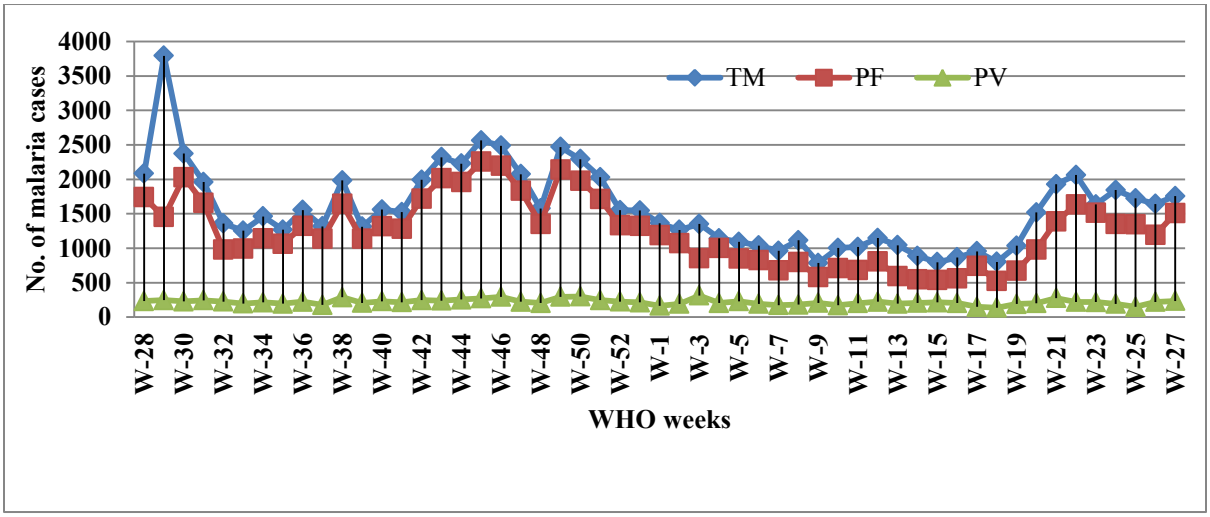


Figure 38 ***Trend of total malaria cases in WHO Epidemiology weeks in 2008 EFY of Assosa Zone; BGRS; February 2009 EC***

WHO week-28 started from July (the beginning of Ethiopian fiscal year

From 2006 EFY – 2008 EFY; a total of 543 suspected cases and 8 deaths were reported from Assosa Zone. Oda Bilidigilu Woreda account the highest number of cases; 342 (63%) followed by Bambasi 76 (14%) and Menge 49 (9%). The lowest suspected measles case proportion reported in Homosha Woreda 7 (1.3%)

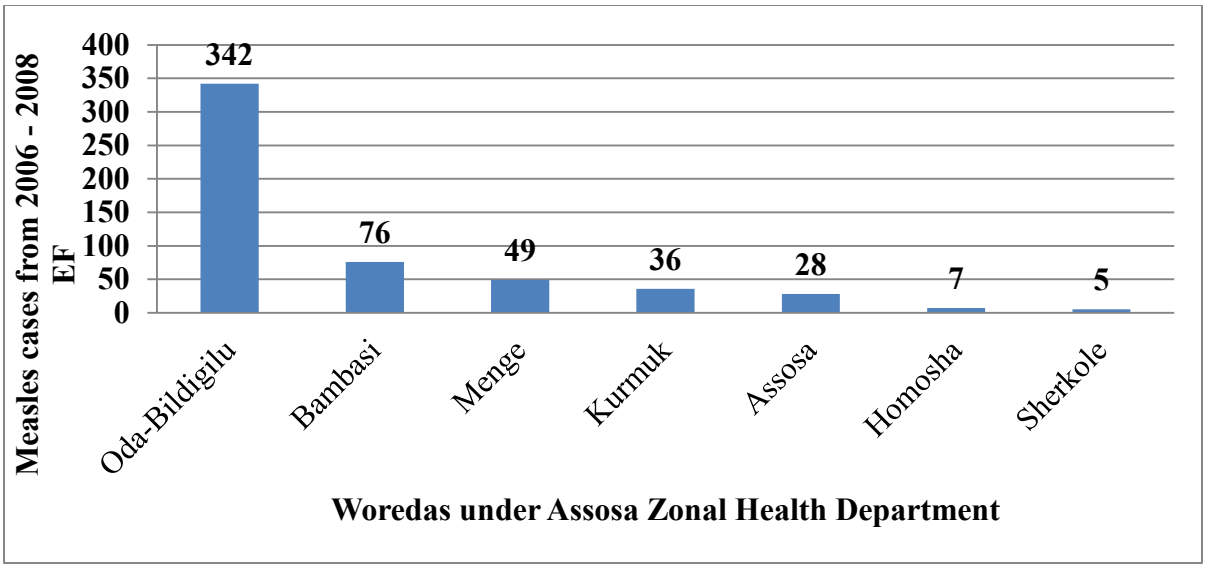


Figure 39 ***Measles cases reported from 2006 EFY – 2008 EFY of Woredas under Assosa Zone; BGRS; February 2017***

Except Homosha Woreda; all Woredas under Assosa Zonal Health department reported above their expectation. Only Homosha Woreda was silent for suspected measles cases reported in 2008 EFY. The highest detection rate reported from Kurmuk Woreda (14).

Table 19 ***Expected suspected measles cases report and its detection rate in 2008 EFY Woredas under Assosa Zone; BGRS; February 2017***

Woreda	Total Population in 2008 EFY	Expected Suspected Measles Cases in 2008 EFY (2/100,000)	Reported Cases	Detection Rate of Suspected Measles per 100,000	Suspected Measles Detection Rate
Assosa	105,430	2	9	**8.5**	**9**
Bambasi	64,185	1	5	**7.8**	**10**
Homosha	28,661	1	0	**0**	**0**
Kurmuk	22,057	1	7	**31.7**	**14**
Menge	53,042	1	5	**9.4**	**10**
Oda Bilidigilu	71,948	1	4	**5.6**	**8**
Sherkole	32,529	1	3	**9.2**	**6**
Assosa Zone	**377,852**	**8**	**33**	**8.7**	**8**

Suspected Measles Detection Rate formula: - (Reported case divided by total population times 100,000)

Case Registration

I observed that in all 9 (100%) Health Posts and Health Centers 3 (100%) had standard printed registration books and patient cards which were supplied by their Woreda Health

Office. The availability of standard case definition per health facilities (n=12) was 4 for malaria and measles standard case definitions. Those four health facilities were posted standard case definitions on wall. All health facility diagnoses cases based on HMIS disease classification.

All health institution registers properly based on case definition. These helps to identify and to report those selected diseases. I got 157 malaria cases which was reported on 2008 EFY epidemiological week of weekly reporting formats but not registered on registration book. Among 16 respondents worked in zonal, woredas and governmental health institution level only 14 (87.5%) respondents define the standard case definition of suspected and confirmed measles and malaria cases properly.

Case Confirmation

I verified that 100% (n-4) PHEM focal persons and 75% (n=12) PHEM officers had knowledge and skilled how to collect and shipment procedures of measles suspected cases samples and where to send (EPHI). Laboratory result for malaria took 15-30 minutes. Confirmatory test for measles specific antibody (IgM) done at EPHI central level which takes up to two to three months to get feedback. Currently Regional PHEM case got laboratory result of measles from EPHI through e-mail.

Reporting

Every notification disease has a time limit to report to the next level (with 30 minutes) for immediately reportable diseases weekly from weekly reportable diseases [3]. To make it applicable report format/ tools plays its great roll. Those reporting tools are Weekly Reporting Format (WRF); Case based reporting format (CRF); Case Based Laboratory reporting form (CLRF) Daily Epidemic Reporting Formats; Line list (For all diseases) and Rumor log book for suspected epidemic tools are developed to facilitate the reporting of the identified diseases and conditions to be utilized at different levels of the surveillance systems [3].

From those reporting formats; 100% (n=12) of health facilities had only Weekly Reporting Format (WRF). The remained reporting formats were availed only on Regional; Zonal and Woreda level.

Data Analyses and Interpretation

Ongoing analysis of surveillance data is important for detecting outbreaks and unexpected increases or decreases in disease occurrence. Analyses should be performed at regular intervals to identify changes in disease reporting [2] [6]. At zonal level the data was analyzed weekly and monthly by person, time and place regularly for action. Trend monitoring (line graph) was also seen at zone level on priority disease such as malaria.

During visiting I observed 83.3% (n=12) health institutions and 66.7% (n=3) Woreda health analyze and interpret the only malaria data were analyzed and displayed on the wall. PHEM coordinators/officers were responsible for surveillance data analysis in all woredas. All Woredas were analyzing the surveillance data on quarterly bases. No woredas analyzed the collected data on weekly and monthly bases.

Outbreak Investigation

During 2007 EFY; Measles outbreak was recorded from Oda Bilidigilu. A total of 338 cases & 8 community deaths were reported with CFR of 2.4% and attack rate of 0.5% in the above mentioned fiscal year of Ethiopia. This outbreak investigation and control activities were done by regional RRT.

Epidemic Preparedness

Preparedness is the range of deliberate, critical tasks and activities necessary to build, sustain, and improve the operational capacity to prevent, protect against, respond to, and recover from incidents. Preparedness activities and tasks are those things that should be done prior to the occurrence of emergency [3].

The visited Zonal health departments and all Woreda Health Offices had PHE preparedness and response plan. Those EPRP was not supported by budget either governmental or non-governmental organization. PHEM officers replied that there had epidemic management committee and also RRT at zonal level (a team of clinician and laboratory technologies from hospital) and Woreda (a team of clinician and laboratory technologies from health center) level. But we could not find indicator (meeting munities) that show the functionality of both RRT and epidemic management committee at all level.

Epidemic responses and control

Assosa Zone Health Department didn't respond within 48 hours of notification of most recently reported outbreak i.e. measles in 2007 EFY. None of the epidemic management committees had evaluated their preparedness and response activities during the past year (2008 EFY) at Woreda level. The health centers and health posts implemented prevention and control measures based on local data for epidemic prone disease like malaria and measles.

Describing Surveillance System Attributes

Simplicity

Simplicity of a public health surveillance system refers to both its structure and ease of operation of surveillance system shown is as simple as possible while still meeting their objectives. All visited health institutions Focal persons; Woreda health officer PHEM

officers and zonal PHEM officer answered that the case definition malaria and measles was easy for case detection; ease of collection, compilation, analysis, reporting, and ease to fill it in reporting format. It takes 10-15 minute to fill the format.

Flexibility

A flexible health surveillance system can adapt to changing information needs or operating conditions with little additional time; personnel and allocated fund. All visited focal persons answered that the current surveillance reporting formats used to report other new health events without any difficulty by filling ―other" cell in the weekly reporting format and also all respondents answered that the system has very flexible and possible for any modification if new or reemerged health event occurred without difficulty.

However; the current report format was difficult to add additional in formations required by a surveillance system especially variables like age, sex, address and clinical symptoms.

Data Quality

Data quality reflects the completeness and validity of data recorded in the public health surveillance system which is amount of unknown or blank response on weekly reporting formats filled or not reflects data quality. All respondents suggested that data collection formats for weekly and immediately reportable diseases and condition had cleared and easy to filled. I verified that from two months reported formats; 66.7% (n=9); 66.6% (n=3) and 33.3% (n=3) health post; health center and Woreda health office report shows blank (unfilled cell in the report format) spaces were availed respectively.

Acceptability

Acceptability of a system is a reflection of the willingness of the public health emergency staff to implement the system from the national to the grass root level. All PHEM focal persons and officers told me their reported immediately and weekly reportable diseases and condition for the next level accordingly on prearranged schedule. Case definition was acceptable to all stakeholders and the flow of data was clearly indicated.

Predictive Value Positive

PVP is the proportion of reported cases that actually have the health related event under surveillance system. Assuming that reporting cases through public health surveillance system were correctly classified accordingly (true positive, true negative, false positive, false negative). It is possible to estimate the proportion of total number of cases in the population under surveillance being detected by our system.

However, the measurement of sensitivity requires a collection or access of data usually external to the system to determine the true frequency of the condition and validation of

data collected by the system. For this reason, it is difficult to calculate the exact value true positive, true negative, false positive, false negative from the existing data.

Representativeness

Representativeness is occurrence of a health related events over time and its distribution in the population by place and person. Geographical representativeness and health service physical accessibility in the Kebeles (the lowest governmental structure) are particularly greater important in an early warning system to ensure detection of outbreaks nationally notifiable and potential outbreak prone diseases. In addition; it is related to the potential health service coverage of visited woredas in the zone was reached between 85% and 95%. Not only potential health coverage; health seeking behaviors are mandatory to have representative data.

The surveillance system is structurally representative in each Kebele but have limitation to access the whole communities in the required time and place due to settlement patter.

Stability

I tried to assess the stability of the system related to the budget needed to undertake, the human resource employed, sufficient amount of the time required for the system to collect or receive data, run the data including collate, analyze and interpreted storage and release of the data.

All 16 (100%) of them were answered that, the new BSC did not affect the surveillance, also all of respondents answered that currently lack of resource were not interrupting the surveillance systems. They suggest that resources like communication and means of transportation if supplied for health institutions improves the surveillance system. Currently, even though high staff turnover of Focal Persons and logistic problems at different levels.

Timelines

Timeliness of the public health surveillance is usually considered that time interval between the onset of health-related event and the reporting of the event to the public health agency responsible for immediate control. It also had shown how much the reported data report on time. A report is said to be on time, if all the reporting units within its catchments area has submitted the reports on its pre agreed time schedule. Based on this, Assosa Zone weekly report timeliness was **95.5 %** in the past one year (2008 EFY).

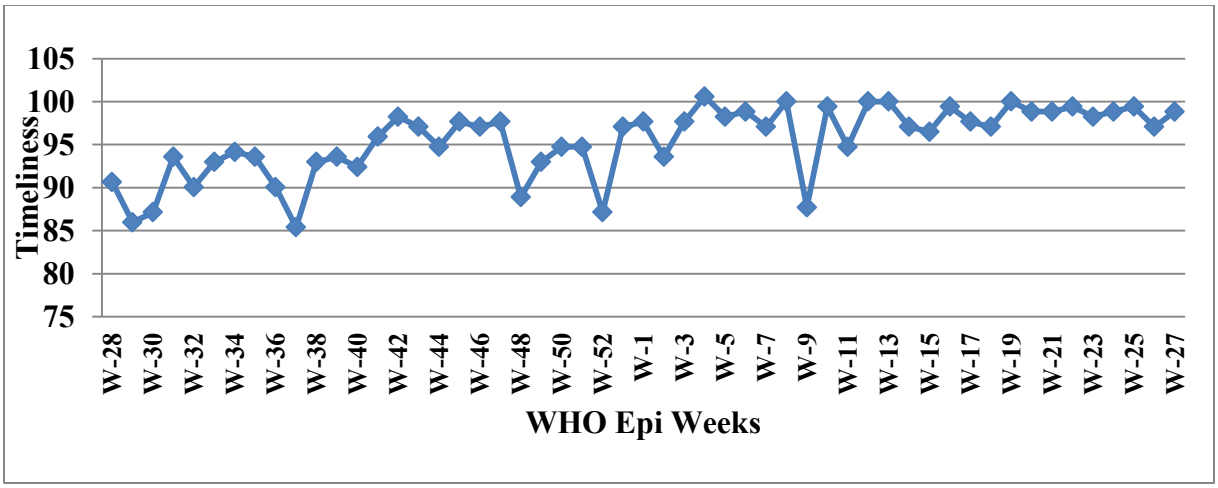


Figure 40 ***Trend of timeliness of Assosa Zonal Health Department in 2008 EFY; BGRS; February 2017***

Completeness

Completeness denotes whether all the reporting units have reported as expected. A report is said to be complete if all the reporting units within its catchments area has submitted the reports.

$$\text{Completeness} = \frac{\text{Number of health facilities reported in that week} \times 100}{\text{Total number of health facilities expected to report}}$$

The weekly reporting rate (completeness) of the Woreda in the Zone in 2008 EFY were 95.7% which were greater than the national target. However, the Achievement of report completeness of six Woreda's in the Assosa Zone was more than the expected. Among them Assosa; Menge and Bambasi Woredas' scored the highest reporting completeness with coverage of 99%, 99% and 98% respectively.

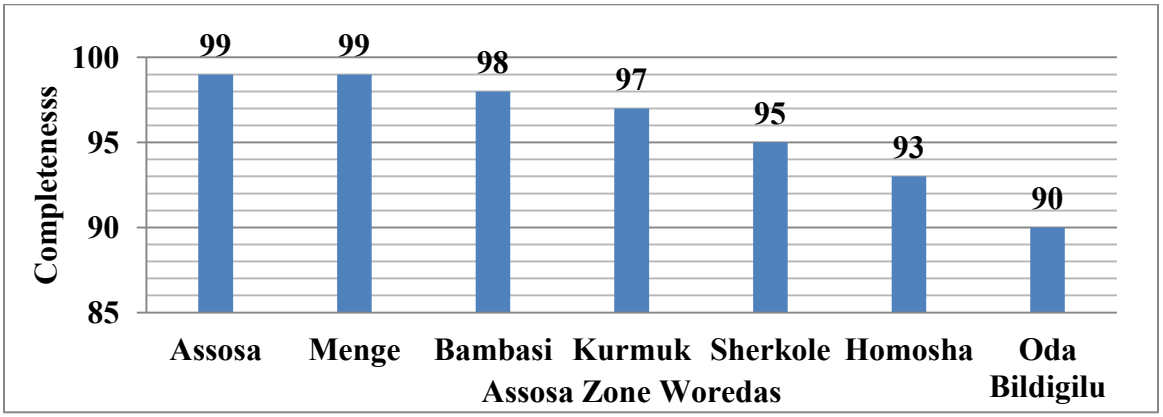


Figure 41 Completeness of Assosa Zonal Health Department in 2008 EFY; BGRS; February 2017

Support Function of Surveillance System Evaluation

Training

PHEM basic level training incorporate the following topics PHS collecting data; case definition and line lists; PHS data quality; PHS summary statistic; PHS displaying data; PHS interpreting data; PHS communicating information and taking action; Case investigation and PHS monitoring and evaluation. This training will equip and extend opportunity to obtain knowledge and skill and able to use the data collected from the system, detect and respond to priority diseases risks, conditions and events and thereby contributing to reduction of the burden of illness, death and disability.

During my visit among 100% (n=4) PHEM officers were trained PHEM basic level training and the remained 100% (n=12) PHEM focal persons were not trained yet.

Resources

To operate the public health surveillance system and enhance the system‘s ability to meet its objectives; materials and resource for operation of surveillance is crucial [4]. Resources for data management, communication, and other logistics were comparatively available at the zonal health department. Nevertheless this; crucial /minimum required resource for optimal functionality of PHEM system) resource for all became limited down in the hierarchy. 100% [n=3] and 100% (n=3] of the Woreda health offices and health centers had desk top computers for overall office activities. None of the Woreda PHEM officers had their personal laptop for effective data management and analysis. 100% (n=9) of health post were without any computer.

Transport vehicles also very important for supportive supervision; active case search and outbreak investigation. There is no independently assigned vehicle for surveillance system in all visited Zone, Woredas and Health Center level. Motor bikes were available in all assessed units.

For data management process stationary, calculator, computer, software, printer and Statistical packages are important. Only zonal PHEM unit have tools for data management like computer accessories with statistical packages. At Woreda levels there are no statistical packages.

Communication tools are important for public health surveillance system to receive information and respond on it timely. Zonal and 33.3 (n=3) Woreda level surveillance system use Telephone (fixed line and cell phone) for communication. At all health institutions level the only available communication tool was personal mobile phones. Health extension workers use their mobile phone to communicate emergency and other health activities without refunding of its cost.

Electronic Surveillance System

During my visit I observed that almost all PHEM officers and PHEM focal person not utilized e-PHEM (electronic PHEM software package). In addition this 50% (n=4) of PHEM officers and 83.3% (n=12) PHEM focal persons weren‘t have personal e-mail. 100% (n=16) yet not trained in electronic surveillance system.

Human Resource

All PHEM focal persons worked in health centers and health posts weren‘t fulltime workers. They were delegated for data collection and to report data to the next level. All Woreda Health Offices and Zonal Health Department level was a fulltime worker in surveillance system and their position called PHEM officer under health promotion and disease prevention core process owner.

National Surveillance Manual

PHEM, Malaria and Measles guidelines were available in all Woreda Health Office and Zonal PHEM level. In all evaluated health posts and health centers hadn‘t surveillance or PHEM, Malaria and Measles guidelines.

Supportive Supervision and Feedback

From visited health institutions; 100% (n=12) health centers and health posts got supportive supervision in the last 6 months in their respected Woreda health office integration with other programs. Assosa Health Department was not supervised by RHB. Also Assosa Zone Health Department did not conduct supportive supervision to the lower level. Reasons not to conduct supportive supervision were due to budget shortage and occupied with other unplanned activities.

Budget Line

At all level the surveillance unit there was budget line for the surveillance system. The allocated budget was only for salary and operational costs. Nevertheless this, the visited Zonal health department and the Woreda Health Office had PHE preparedness and response plan. Those EPRP was not supported by budget either governmental or non-governmental organization.

Strength and Limitation

Strengths

- Surveillance/ PHEM system was fully function in all Woredas of Assosa Zone Administration;
- All interviewed PHEM officers and focal persons were very cooperative for this system evaluation;

Limitation

- We use the secondary data/source;
- We could not evaluate the sensitivity and specificity of the surveillance system because variables required for calculating specificity and sensitivity was not complete;

Discussion

Evaluation is the important component for all programs because all activity needs to see its efficiency and effectiveness. Surveillance is also essential for planning, implementation, and evaluation of public health practice [1] [4] [6] [14] [18] [19]. All PHEM focal persons and PHEM officers agreed that the surveillance system helps to detect outbreaks and to implement control and prevent public health importance diseases/ events.

The standard and community cases definition should be available and posted in health institutions for detection of suspected cases [3] [16] [17]. The cases definition was not available in the visited health institutions. This may lead to low detection of malaria measles from the community. Nevertheless this; malaria still remains one of the most important parasitic diseases of the BGRS. The surveillance system evaluation confirmed that malaria cases (from weekly diseases and condition) of Assosa Zone was 76.5% (99,460*130,028/100) in 2008 EFY. Even though different malaria control strategies were designed to roll back to its lowest level, the malaria cases were not decreased as expected. Therefore, the RHB in collaboration with the respective Zone Health Department should evaluate the impact of malaria prevention and control intervention.

Yearly suspected measles detection rate should be greater than or equal to 2/100,000 population [12]. The finding reveals that a yearly suspected measles detection rate of Assosa Zone was 8 in 2008 EFY. However; it was less than the annual performance rate of BGRS 21. All Woreda of Assosa Zone reported suspected measles cases except Homosha Woreda. This surveillance system evaluation confirmed suspected measles detection rate of Assosa Zone greater than its expectation [12].

Public health surveillance is the systematic, ongoing collection, management, analysis, and interpretation of data followed by the dissemination of these data to public health programs to stimulate public health action [14] [15] [18] [18]. At the health facilities level data were collected and recorded in registry books and were not entered to electronic data base. As a result surveillance data was not analyzed and interpreted.

According to the Assosa Zone Health Department and all visited Woreda Health Office had prepared written epidemics preparedness and response plan (EPRP) without budgeted. None of visited Zone and Woreda had emergency stocks of drugs and supplies for outbreak control.

Establishing multi-sectorial PHEM committee and rapid response team is the primary steps of preparedness at each level [3] [18]. In addition, this established committee should be oriented or trained on epidemic preparedness and response (especially for RRT). The committee should have a regular meet. In the visited sites even though there is established

multi-sectorial task force committee in all visited Woredas and Zone, it lacks functionality or regular meeting at all levels.

Within 48 hours of notification of any outbreak should be investigated [3]. None of visited Zone HD weren‘t investigated most recently reported measles outbreak happened in Oda Bilidigilu Woreda.

The reporting formats were easy to fill out; this finding was matched with the CDC, updated guideline [4] [15] [18] that is the simplicity of a public health surveillance system refers to both its structure and ease of operation. Any change in the existing procedures of case detection, reporting and formats will not be difficult to implement or it can accommodate changes; this finding was the same as that of flexible systems can accommodate, for example, new health-related events [15] [18]. All reporting agents accept and well engaged to the surveillance activities this finding fulfills the CDC updated guideline of acceptability, reflect the willingness of persons and organizations to participate in the surveillance system.

Timeliness and completeness of the Zonal Health Department were 95.5% and 95.7% in 2008 EFY respectively. It was more than the national upgraded expectation (85%) [3]. Nevertheless this; Assosa Zone Health Department didn't respond within 48 hours of notification of most recently reported outbreak i.e. measles outbreak of Oda Bilidigilu Woreda that occurred in 2007 EFY. Three (75%) of the HCs focal persons have been trained about PHEM basic level training or IDSR; but WHO Technical Guidelines for Integrated Disease Surveillance and Response recommend that all PHEM/ surveillance focal persons must be trained [6] [14] [19].

For the success of surveillance program capacity building plays a major roll. To increase the quality of early detection of diseases and reporting system formal or on job training for PHEM officers and surveillance focal persons are necessary [4] [6] [12]. In this regards; Zonal Health Department and Woreda PHEM officers were trained on public health surveillance of national priority diseases and conditions. In other views the visited health facilities PHEM focal persons weren‘t trained on public health surveillance. This may affect the efficiency and effectiveness of the surveillance system to detect early and respond public health importance diseases/ events. Therefore, conducting refreshment training is important to update and upgrade the health workers knowledge.

Flow of data has so many obstacles with reporting means and infrastructure like vehicle for transport, telephone, fax machines and computers for data management and analysis. There is also a problem of describing data by person, place and time at all level. This might be due to irregular supervision and feedback system, and lack of logistics.

National PHEM guideline recommended that PHEM guideline should be availed in all time at heath facilities level (3). Nevertheless this; Three HCs (75%) and out of seven health posts none of them had national manual of PHEM guideline. Assosa Zone and the assessed woredas had a EPRP; but all of them didn't had emergency stocks of drugs and supplies at all times in past one year and in addition it‘s not supported by governmental or and non-governmental budget. There was no a budget line or access to funds for epidemic response.

There were no feedback and supportive supervision given to the lower levels. In general the core functions of the surveillance system recording, reporting analysis and feedback have gap which have negative implication on the quality of surveillance data. Surveillance data should have good quality because without quality public health data, interventions may mislead and wasteful [4] [6] [15] [18]. Except Zonal Health Department; all evaluated Woreda and health facilities have no independent computer for the surveillance system. There was no electronic data base at Woreda and health facility level. There was no periodic and uniform supportive supervision from higher level.

Operational budget is one of the supportive functions of the surveillance system [6] [19]. There was no budget line for surveillance at all levels. Study suggest that failure of surveillance systems in developing countries is often due to limited available resources, lack of knowledgeable staff, disorganization, and poor infrastructure for finding and reporting cases.

Conclusion and Recommendation

Conclusion

- Surveillance system evaluation detects malaria and measles cases easily. Nevertheless; the data were not analyzed and interpreted accordingly. Malaria and measles were a major public health problems of Assosa Zone in which both were main threats of the community. Both measles and malaria outbreak will anticipate occurring.
- Epidemic management committee was formally established in Assosa Zone and the assessed Woredas based on the guideline. None of visited site have minute for meeting epidemic management committee and did not evaluate.
- Rapid Response Teams (RRTs) had available at all level.
- National guidelines did not distribute uniformly to all surveillance units.
- Surveillance data was not properly analyzed and used for action.
- All of the districts had written EPRP;
- The report timeliness and completeness above expectation (>85%);
- Only Homosha Woreda was silent for suspected measles case detection,
- The system could responded the new health demand;
- There was irregularity of supervision
- There was a gap on training of basic computer skills in all PHEM officers and focal persons how to analyze and interpret data on timely basis for immediate actions;

Recommendation

- Malaria and Measles surveillance data should be analyzed, interpreted and used for decision making. All the peripheral staff should be able to manually organize, summarize and display data in table and graphs as appropriate;
- The emergency committee should review their plans, actions, and learned experiences. The emergency committee should review their plans, actions, and learned experiences;
- Zonal Health Department and Woreda Health Office should be given special concern on weekly and immediately reportable diseases to keep as it the completeness and timeliness;
- The Zonal Health Department and Woreda Health Office should integrate their supervision, giving feedback.
- National surveillance guidelines should avail to all level of the surveillance unit.
- The surveillance system should have budget and equipped with the minimum communication and electronic tools (telephone, computer and fax).
- Monitoring and evaluation, supervision and delivering feedback should be strengthening at all levels at all-time which desire special consideration;
- Strengthening data processing capacity at all levels by providing necessary computing skill using the appropriate software

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5. Scientific Manuscripts for Peer Reviewed Journals

Scientific Manuscripts for Peer Reviewed Journals

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Title: Rubella Outbreak Investigation in Sherkole Woreda of Assosa Zone; Benishangul Gumuz Region State-Ethiopia March 2017

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Introduction: Rubella is a contagious disease, caused by rubella virus and transmitted via the respiratory route. Ethiopia does neither currently have a rubella immunization program nor a congenital rubella syndrome (CRS) surveillance system. To investigate rubella outbreak and identify risk factors associated with rubella outbreak in Sherkole Woreda of Assosa Zone; BGRS; Ethiopia

Method: An analytical case-control study supported by descriptive study was employed to investigate the outbreak. Matched (by sex, age and Kebele) case control study in the ratio of 1:2 (50 cases - 100 controls) was conducted. Case defined as any person with fever and maculopapular (nonvascular) generalized Rash and Cough, Coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects rubella. The measles case-based surveillance reporting form was used to identify rubella cases from 14th December 2016 to 7th January 2017. Epi Info ™ version 7 used to enter and analyze data.

Results: A total of 155 cases and zero death (CFR=0) cases were line listed. The overall AR was 46 per 10, 000 population. The attack rate less than 5 year of age was 133 per 10,000. The median age was 6 years. 79 (51%) of cases were males. Sex specific AR was equal (46 per 10,000 populations). The cases were reported from four (22.2%) Kebeles. Sixty four percent of the cases reported from one Kebele. Nine samples were positive for Rubella IgM antibodies. Having contact history with rubella infected (AOR: 8.38; 95% CI 3.8 – 14.47; P <0.05) and having travel history to rubella affected Kebele/ area (AOR: 3.71; 95% CI 2.11 – 6.53; P <0.05) were statically associated with the rubella infections.

Conclusion: We investigated an outbreak of rubella in which 97.4% of the cases were in children aged less than 15 years, with a median age of six years. A rubella specific case definition should be needed for early case detection because currently the case definition used to detect rubella is the measles suspected case definition.

Key Words: Rubella outbreak; Congenital Rubella Syndrome; Rubella Cognitive Vaccine

Introduction

Rubella also known as German measles or three-day measles [1] is an infection caused by the rubella virus [2]. This disease is often mild with half of people not realizing that they are sick [3] [4]. Rubella is a viral disease which is caused by the rubella virus, an envelope, positive-stranded RNA virus (family Togaviridae, genus Rubivirus) [1] [2]. It is a contagious disease, which is transmitted via the respiratory route. The average incubation period is 14 days, with a range of 7 to 21 days. Infection is up to five days after the onset of rash [2].

Rubella is usually spread through the air via coughs of people who are infected [2] [5]. People are infectious during the week before and after the appearance of the rash. Babies with Congenital Rubella Syndrome (CRS) may spread the virus for more than a year [4]. Only humans are infected [2]. Insects do not spread the disease [4].

Rubella is preventable with the rubella vaccine with a single dose being more than 95% effective [2]. Often it is given in combination with the measles and mumps vaccine, known as the MMR vaccine [4]. Rubella is a common infection in many areas of the world [6]. Each year about 100,000 cases of congenital rubella syndrome occur [2]. Rates of disease have decreased in many areas as a result of vaccination [3] [5].

Rubella can cause serious problems can occur including the following: Brain infections; bleeding problems; Birth defects (congenital); Cataracts; Glaucoma; Heart defects and Hearing loss [7]. Rubella also can cause congenital rubella syndrome in the newborn. The syndrome (CRS) follows intrauterine infection by the rubella virus and comprises cardiac, cerebral, ophthalmic and auditory defects [8].

Rubella virus specific IgM antibodies are present in people recently infected by rubella virus, but these antibodies can persist for over a year, and a positive test result needs to be interpreted with caution [9]. Rubella infections are prevented by active immunization programs using live, disabled virus vaccines. Two live attenuated virus vaccines. The WHO recommends the first dose be given at 12 to 18 months of age with a second dose at 36 months [10] [11].

There is no specific treatment for rubella; however, management is a matter of responding to symptoms to diminish discomfort. Treatment of newborn babies is focused on management of the complications. Congenital heart defect and cataracts can be corrected by direct surgery [12].

Surveillance for rubella or CRS does not exist in Ethiopia; however, the measles case-based surveillance system, established in 2004, includes laboratory testing for the detection of measles specific and rubella-specific antibodies. In African countries, including Ethiopia, CRS is widely under-recognized as a public health problem, and information on rubella and CRS epidemiology is very limited [13].

We investigated the outbreak and determine its magnitude and describe the outbreak in time, place and person and risk factors associated with rubella.

Methods and materials

Sherkole Woreda is one of the seven woredas of Assosa Zone. It's far about 775 KM from Addis Ababa and 98 KM from regional capital; Assosa town. Administratively the Sherkole Woreda is divided 19 (1 urban and 18rural) Kebeles (the lowest governmental structure). The Woreda is found at the border of Sudan. Total population of Sherkole Woreda estimated to be 33,536 (projection based on 2007 census). Regarding the Health service coverage, the Woreda has 1 Health Center 13 Health Post which gives the potential health coverage reached above > 100%.

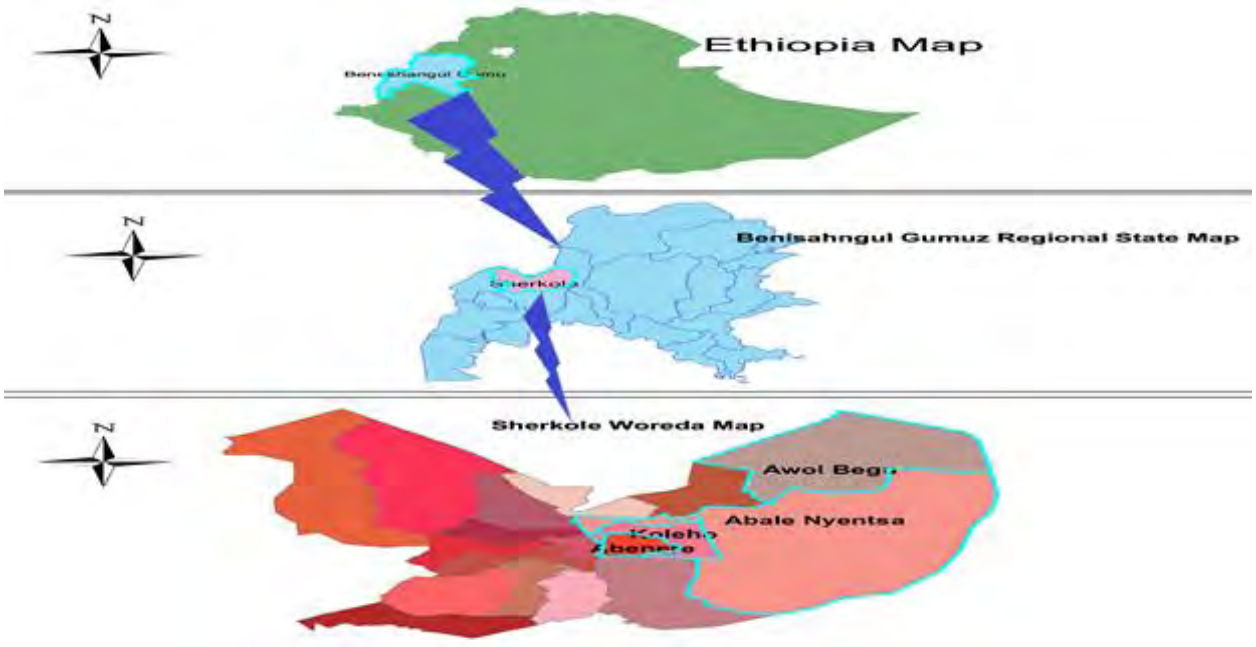

Figure 42 ***Map of Ethiopia, BGRS and Sherkole Woreda of Assosa Zone of Benishangul Gumuz regional state/ March 2017***

Note:- Awol Begu; Abale Nyentsa, Koleho and Abenare Kebeles of Sherkole Woreda were Rubella outbreak affected Kebeles

Descriptive data was analyzed from line listed reported cases from 14th November 2016 to 7th January 2017. The case control study was done from 1st to 15th February 2017. Both descriptive and Analytical matched Case- control study design was used. Unmatched case-control study in the ratio of 1:2 (50 cases and 100 controls) was conducted to describe potential household's risk factors for infection. A suspected case was a person with maculopapular rash and fever and resided in Rural Kebele of Sherkole Woreda; tested positive for rubella specific IgM or was linked epidemiologically to a laboratory confirmed case. The measles case-based surveillance reporting form was used to identify rubella cases from 14th December 2016 to 7th January 2017. Epi Info TM version 14 was used to analyze data.

Result

Descriptive epidemiology

On 14th November; 2009 EC the first case (index) was registered and reported from Abale Nyentsa Kebele of Sherkole Woreda. It's far 12 KM from the Woreda center. The index case was male and 4 years old. A total of 155 rubella cases (9 confirmed and 146 Epi-linked) without death were reported from four kebeles of Sherkole Woreda. Out of 19 Kebeles; four Kebeles were affected. From the total cases (155); 63.9% were reported from Abale Nyentsa Kebele. The remained 36.1% cases were reported from other three Kebeles. Of the total affected cases; 79(51%) were males.

The overall attack rate was 46 case per 10, 000. Case fatality rate was zero. The median age of the case was 6 years old with range of three month – 19 years. The attack rate among less than and equal to five years age group was 133 cases per 10,000 populations while 29 cases per 10,000 populations in the age of greater than five years. In addition, the attack rate between five and 15 years age was 83 cases per 10,000 populations. There was zero case fatality rate registered throughout the outbreak.

Ten samples taken for laboratory confirmation on Week-48 of 2016 (25th November 2016); Nine of the sample was positive for rubella IgM. Subsequently, a total of 155 rubella cases were line listed. The index case for this outbreak was believed to be a 4 year old child male. Although the index case was not laboratory-confirmed, ten cases developed rashes after contact with him, and were subsequently laboratory-confirmed. The peak of the outbreak occurred on in 25th November 2016 (WHO Epi week – 48 of 2016) and 27th December 28 (WHO Epi week – 1 of 2017). The shape of epidemic cover was propagated source and probable sporadic type of outbreak. The last case occurred on 7th January 2017 (WHO Epi week – 3 of 2017).

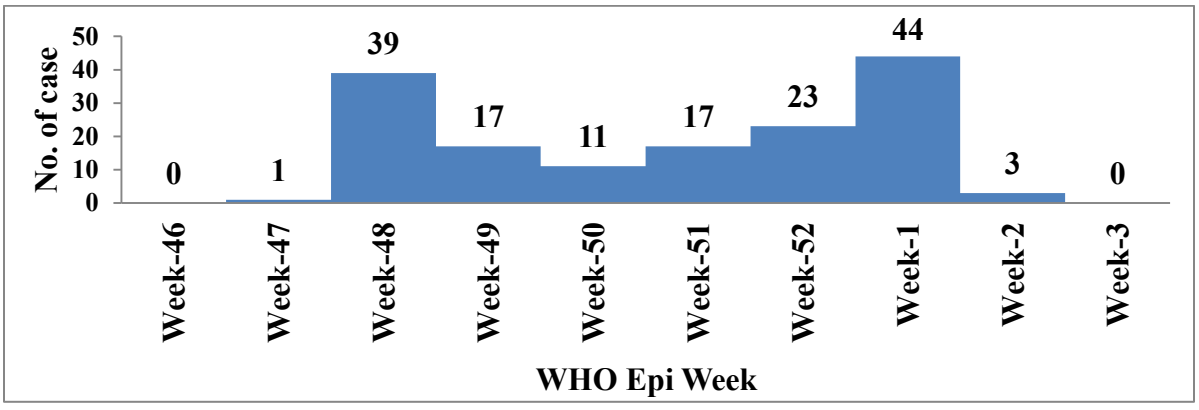

Figure 43 WHO Epi week of onset of Rubella sign and symptom from 23th November 2016 to 13th January 2017 of Sherkole Woreda; Assosa Zone of BGRS; March 2017

The outbreak started in one Kebele (Abale Nyentsa) but quickly spread to neighboring Kebeles. In total, 4 Kebeles reported cases; the number of reported cases ranged from 5 to 99 cases per Kebele. Sixty seven percent of children less than 5 years reported having been vaccinated against measles while none had been vaccinated against rubella. All cases were treated as outpatients and there were no deaths. Fifty one percent of all cases were males. Forty six percent of the cases were aged less than 5 years while 83 % were aged less than 10 years. A total of 4 cases (2.5% of all cases) occurred in women of reproductive age (>15 and <20). None of cases was reported above 20 years of age.

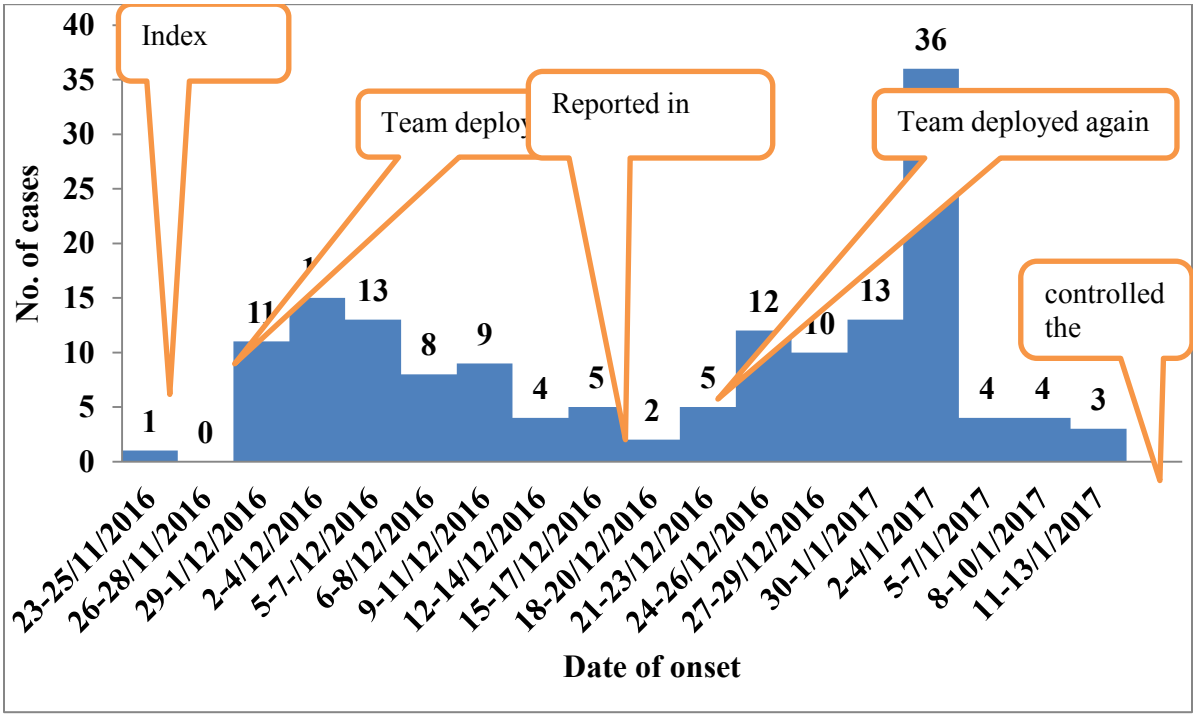

Figure 44 Rubella cases reported by date of onset of sign and symptom from 23th November 2016 to 13th January 2017 in Sherkole Woreda; Assosa Zone of BGRS; March 2017

Rubella has similar symptoms with measles. The common sign and symptoms manifested in rubella cases were listed below; rash (100%); fever (98.1%), cough (52.9%), and Conjunctivitis (34.8%); Coryza (29) and headache (8.4%).

The outbreak started in one Kebele (Abale Nyentsa) but quickly spread to neighboring to four Kebeles. The number of reported cases ranged from 5 to 99 cases per Kebele. Sixty seven percent of children less than 5 years reported having been vaccinated against measles while none had been vaccinated against rubella. All cases were treated as outpatients and there was no death.

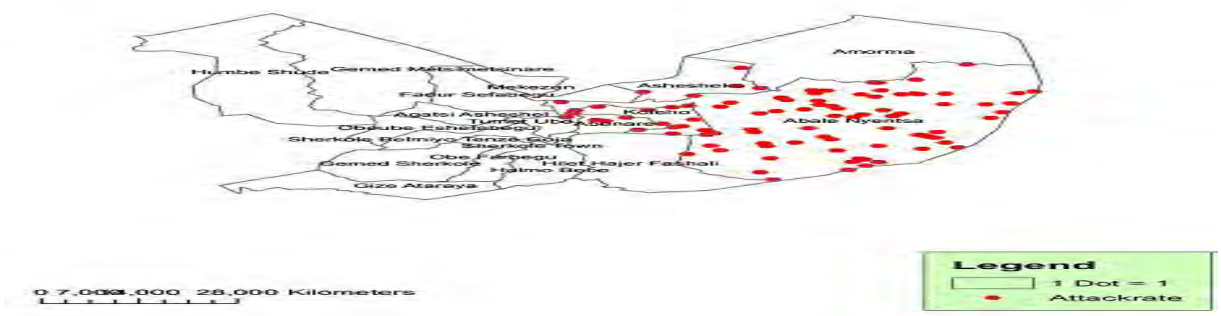

Figure 45 Attack rate of Rubella outbreak by 23th November 2016 to 13th January 2017by Kebeles in Sherkole Woreda; Assosa Zone of BGRS; March 2017

Laboratory investigation

To identify the etiologic agent of the outbreak ten specimens were collected and sent to EPHI. Nine out of ten the specimens were IgM positive for Rubella. Therefore the Positivity rate was 90% for Rubella IgM.

Public Health Intervention

The investigation team identified and characterized the Rubella outbreak. Technical assistance was given for health workers on case management, recording and reporting situation. Cases were treated to prevent further spread and complication. Routine surveillance was enhanced and the situation was closely followed at each level on a daily bases. Health education was given for the community members to prevent the transmission of the disease. Alarming the community, health extension workers and community leaders was implemented to strength the local surveillance system

Analytical Epidemiology

We compared 50 Rubella cases with 100 community controls matched by sex, age and place of residence. Descriptive statistics and odds ratios (OR) with 95% confidence intervals (CI) were calculated to compare risk factors among cases and controls. Analysis was performed using Epi Info version 14.Bivariate analysis was performed to determine the strength of association of potential risk factors for measles cases as compared to controls. The statistically significant variables were found to be associated with rubella as listed below: had contact history with rubella infected person (AOR: 8.38; 95% CI: 3.8 – 14.47; P: <0.05), had a travel history to rubella affected Kebele/ area (AOR: 3.71; 95% CI: 2.11 – 6.53; P: <0.05); estimated area of the house <8m^2 (AOR: 2.93; 95% CI: 1.78 – 4.83; P: <0.05), family size above 4 (AOR: 3.55; 95% CI: 2.09 – 6; P: <0.05) were statically associated with the rubella infections. Further; Knowledge of rubella vaccine preventable (AOR: 0.58; 95% CI: 0.16 – 2.05; P: > 0.05) and distance of health facilities (AOR: 0.89; 95% CI: 0.33 – 2.36; P: <0.05) were protective associated with the rubella infections.

Discussion

Rubella cases captured by measles case-based surveillance system have been sporadic throughout the region. We attributed this outbreak to the fact that our does not currently provide RCV in the National Immunization Program; therefore; most of the children were susceptible to this disease. The results of the investigation revealed that of the total number of rubella (155), 100% had never been vaccinated against rubella infection. Studies in other countries not providing RCVs have also demonstrated widespread transmission and rubella outbreak [14, 15, 16].

Contact with rubella case during illness, thereby spreading the rubella infection to others in contact through sneezing and coughing. This finding is therefore biologically plausible considering that rubella is spread through respiratory secretions.

Household contact was a significant risk factor for rubella outbreak in Sherkole Woreda of Assosa Zone; Western Ethiopia. Children who contracted rubella from their village was spreading the disease to their siblings at home. This was consistent with the study done by Mpeta T et al in 2005 in Insiza District, Matebeleland Province and Muchedzi A et al in 2004 in Gweru district, Midlands Province where household contact was a significant risk factor for contracting rubella [17].

Having >4 family size in a household was an independent significant risk factor for contracting rubella, thus overcrowding was highlighted to be the driver of the current outbreak. This implies that having more children in the household increased the risk of being in contact with the infected child. This was consistent with a study done in 1999 on rubella outbreak investigation by Danovaro-Holliday et al in the United States whereby overcrowding in the work place and at home was a risk factor for contracting rubella [18].

Limitation of the Study: There was a possibility that controls could have been infected with rubella virus but not yet developed signs and symptoms of rubella during the investigation period. This could have introduced ascertainment bias which might have reduced the strength of associations.

Conclusion and Recommendation: We investigated an outbreak of rubella in which 97.4% of the cases were in children aged less than 15 years, with a median age of six years. A rubella specific case definition should be needed for early case detection because currently the case definition used to detect rubella is the measles suspected case definition.

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6.Abstracts

Surveillance Data Analysis of Malaria-Benishangul Gumuz Region State-Ethiopia from July 8, 2014 G.C. to July 7, 2016 GC

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Title: Surveillance Data Analysis of Malaria-Benishangul Gumuz Region State-Ethiopia from July 8, 2014 G.C. to July 7, 2016 G.C.

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Background: Malaria is caused by parasites of the Plasmodium family and transmitted by female Anopheles mosquitoes. 190 million cases (89% of global total) and 400,000 deaths (91% of global total) were occurred in Africa in 2015 GC. In Benishangul Gumuz Regional State; 1,055,494 (99%) of 1,066,156 people live in malaria-endemic areas. I assessed malaria morbidity and mortality by time, person and place of Benishangul Gumuz regional State of the last three Ethiopian fiscal years.

Method: Descriptive Retrospective record review design was used. Three year malaria data were collected from Benishangul Gumuz Regional Health Bureau. A suspected case confirmed by microscopy or RDT for plasmodium parasites and any person with fever or fever with headache, rigor, back pain, chills, sweats, myalgia, nausea, and vomiting diagnosed clinically as malaria. Data were processed and analyzed using Micro Soft Excel pivot.

Result: A total of 790,047 malaria cases were reported in the past three years. Eighty five percent reported cases were parasitological confirmed. *Plasmodium falciparum* constitutes 78.4% (522,667/667,044*100).The trend of malaria cases were started to pick up from WHO Epi week of week-36 till WHO Epi week of week-52 again it started to up from WHO week-14 till WHO Epi week of week-26. All Woredas entire the Region are high risk for malaria. Nevertheless, the highest prevalence rate of malaria cases reported from Guba and Yasso Woreda respectively.

Conclusions: The predominate malaria cases were due to *plasmodium falciparum.* Malaria cases proportion by species in the Region vary from the national proportion**.** Malaria prevention and control activities should be strengthen to reduce the incidence and prevalence of malaria. Indoor residual spry of anti-mosquito chemical should implement before the major and minor transmission seasons of malaria.

Keywords: Surveillance data; Malaria secondary data and Benishangul Gumuz

Rubella Outbreak Investigation in Sherkole Woreda of Assosa Zone; Benishangul Gumuz Region State-Ethiopia March 2017

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Introduction: Rubella is a contagious disease, caused by rubella virus and transmitted via the respiratory route. Ethiopia does neither currently have a rubella immunization program nor a congenital rubella syndrome (CRS) surveillance system. To investigate rubella outbreak and identify risk factors associated with rubella outbreak in Sherkole Woreda of Assosa Zone; BGRS; Ethiopia

Method: An analytical case-control study supported by descriptive study was employed to investigate the outbreak. Matched (by sex, age and Kebele) case control study in the ratio of 1:2 (50 cases - 100 controls) was conducted. Case defined as any person with fever and maculopapular (nonvascular) generalized Rash and Cough, Coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects rubella. The measles case-based surveillance reporting form was used to identify rubella cases from 14th December 2016 to 7th January 2017. Epi Info ™ version 7 used to enter and analyze data.

Results: A total of 155 cases and zero death (CFR=0) cases were line listed. The overall AR was 46 per 10, 000 population. The attack rate less than 5 year of age was 133 per 10,000. The median age was 6 years. 79 (51%) of cases were males. Sex specific AR was equal (46 per 10,000 populations). The cases were reported from four (22.2%) Kebeles. Sixty four percent of the cases reported from one Kebele. Nine samples were positive for Rubella IgM antibodies. Having contact history with rubella infected (AOR: 8.38; 95% CI 3.8 – 14.47; P <0.05) and having travel history to rubella affected Kebele/ area (AOR: 3.71; 95% CI 2.11 – 6.53; P <0.05) were statically associated with the rubella infections.

Conclusion: We investigated an outbreak of rubella in which 97.4% of the cases were in children aged less than 15 years, with a median age of six years. A rubella specific case definition should be needed for early case detection because currently the case definition used to detect rubella is the measles suspected case definition.

Key Words: Rubella outbreak; Congenital Rubella Syndrome; Rubella Cognitive Vaccine

Acute Watery Diarrhea Outbreak Investigation in Sedal Woreda of Kamash Zone; Benishangul Gumuz Region State-Ethiopia November 2016

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Title: Acute Watery Diarrhea Outbreak Investigation in Sedal Woreda of Kamash Zone; Benishangul Gumuz Region State-Ethiopia November 2016

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Acute watery diarrhea (AWD) is becoming a big problem in Ethiopia as well in Benishangul Gumuz Regional State. The aim to investigate acute watery diarrhea outbreak and identify risk factors associated with acute watery diarrhea in Sedal Woreda of Kamash Zone; Benishangul Gumuz Regional State; Western Ethiopia

Method: Descriptive cross-sectional and Analytical study designs were used. The case control study conducted from 1st – 15th October /2009 EC.). The total numbers of people included in the study were 132 individuals. Data entered and analyzed using Epi -info version 7. Any person 5 years of age or more with profuse acute watery diarrhea and vomiting was suspected to AWD. Suspected case in which Vibrio cholerae O1 or O139 has been isolated from was confirmed case.

Result: A total of 154 AWD cases and 5 deaths were reported. Over all Attack Rate were 6.2 cases/ 1000 population. Overall case fatality rate (CFR) in the Woreda was 3.2%. The median age of the case was 25 years. 50.6% of the cases were females. Sex specific AR was 18 per 1,000 and 17 per 1,000 Female and Male respectively. Eight out of 10 stool samples were positive for Vibrio cholera. The cases were reported from six (46.2%) Kebele. Fifty percent of the case reported from one Kebele. Seventeen (65.4%) of water points were contaminated with fecal coli forms. Risk factors were; drinking water source from river {AOR; 3.52, 95% CI (2.17 – 5.7), P-value <0.05; hand washing wish soap/ ash before meal, preparing food and latrine visit (at critical time) {AOR; 3.89, 95% CI (1.87 – 8.08), P-value <0.05} and Close contact with similar illness {AOR; 6.8, 95% CI (3.58 – 12.91), P-value <0.05} were significantly associated with acute watery diarrhea outbreak.

Conclusion: This outbreak the overall case fatality rate (3.2%).*Both Vibrio cholera* 01 and 0139 serotypes were responsible for this acute watery diarrhea outbreak in Sedal Woreda. Emergency preparedness and response plan with drugs and supplies should be available in the Woreda.
Key words: Acute watery diarrhea, Vibrio cholera, Benishangul Gumuz

7.Narrative Summary of Disaster Situation

Report on Meher Emergency Needs of Benishangul Gumuz Regional State/ Ethiopia 1st January – 30th June of 2009 EC

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Title: Report on Meher Emergency Needs of Benishangul Gumuz Regional State/ Ethiopia 1st January – 30th June of 2009 EC

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Introduction: - The government of Ethiopia has been conducting emergency health and nutrition assessment in the past years to address the emergency health and nutrition need. The assessment conducted in collaboration with FDRMFSC, RHB, REB, RWMERDB, NFSDPPC; RFSDPPO; UNICEF, WFP and WHO. One of the objective was to develop emergency preparedness and response plan for epidemic prone diseases of BGRS during the second half of 2009 EFY.

Methods: - The study period was from 10 – 30 December/ 2016 G.C. Cross sectional survey study design was implemented in Regional Health Bureau; Zonal Health Departments and Woreda health Offices. Document reviews; in-depth interview; focus group discussion with the respective officials were applied to collect data using semi structured questionnaire tools. Data analysis was carried out using Microsoft excel. Tables and graphs were used for demonstration of data.

Results: - There was functional multi-sectorial coordination forum at regional levels. In this forum all relevant governmental bureaus, NGOs and UN agencies were represented. However, they did not meet regularly. Almost all woredas of the region except 7 high land Kebeles of Wombera Woreda. Meningitis outbreak prevention Men A vaccination campaign was conducted before three years. The region yet not declared free from AWD during the assessment. Measles coverage of the Regional reached 89%hich is below the expected target of 95%.

Conclusion: - Acute watery diarrhea, malaria, measles, & meningococcal meningitis, as well as unusual increase of malnutrition cases were considered as possible risks in the Region for the coming six months. Emergency drugs and supplies with budget should be availed in Woreda level.

Key Words: Meher Assessment, Disaster and Benishangul Gumuz

Introduction

The government of Ethiopia has been conducting emergency health and nutrition assessment in the past years to address the emergency health and nutrition need of the country, the assessment is conducted twice in a year following post harvesting of Belg and Meher season.

Benishangul Gumuz Regional State (BGRS) is located in the western part of the country bordering with Amhara Region in the north and northeast, Oromiya and Gambella regions in the south and southeast, and the Sudan in the west [1]. The regional capital Assosa is far about 679 KM west of Addis Ababa. Agro-climatically most of the region lies 580 – 2730 meter above sea level, of which the majority of the land mass is classified as kola [2].

The total population of the region in 2016/17 is about 1,066,001 (projection based on 2007 census) [3] with annual growth rate of 3.41% [4]. The total area of the region is 50,380 KM^2 and the population density is 14.13 people/ KM^2 which is sparsely populated compared to the national average of 65 persons /KM^2 [2].

Benishangul Gumuz Regional State (BGRS) has 3 zones, 1 town administration, 1 special Woreda, 19 Woredas, and 475 Kebeles. BGRS is one of the most geographical remote regions in Ethiopia and it runs along the Sudan border about 400 KM [1]. Road connections are poor and thus travel in the region during the rainy season is often difficult. The main category of livelihood is mixed agriculture which consists of cereal and cash crop production complimented by livestock production. The main economic activities are crop and livestock production.

Benishangul Gumuz Regional State is prone to both natural and manmade hazards that have led to mortalities, displacements and losses of livelihoods and properties. Erratic rainfall, refugee influx, crop pest and diseases, acute watery diarrhea (AWD) and measles epidemics continue to be a challenge that deteriorates the humanitarian situation in the region.

Systematic monitoring and assessment of food and non-food vulnerabilities are crucial in order to identify problems and provide an early response. Considering this situation, the regional food security; disaster prevention and preparedness office office-led a multi-sect Meher assessment was conducted its duty from 21 November 2016 to 12 December 2016.

Emergency Preparedness and Response Planning (EPRP) has been taking place in BGRS since 2011 G.C. under the leadership of the regional food security; disaster prevention and preparedness office. A team comprising of experts from RHB, REB, RWMERDB, National Disaster Prevention and Preparedness Commission (DPPC) and UNICEF, WFP and WHO had participated in the assessment of cross-sectional survey type with objective of identifying humanitarian need for the coming 6 months.

The assessment was conducted in three Zones (Assosa, Metekel and Kamash) of Benishangul Gumuz Regional State; Assosa and Bambasi Woredas from Assosa zone; Wombera, Dangur and Bullen Woredas from Metekel zone and Sedal Woreda from Kamash zone. In addition to visiting selected hot spot woreda's, all needed information based on our check-list was collected from Zonal health departments and Woreda health offices.

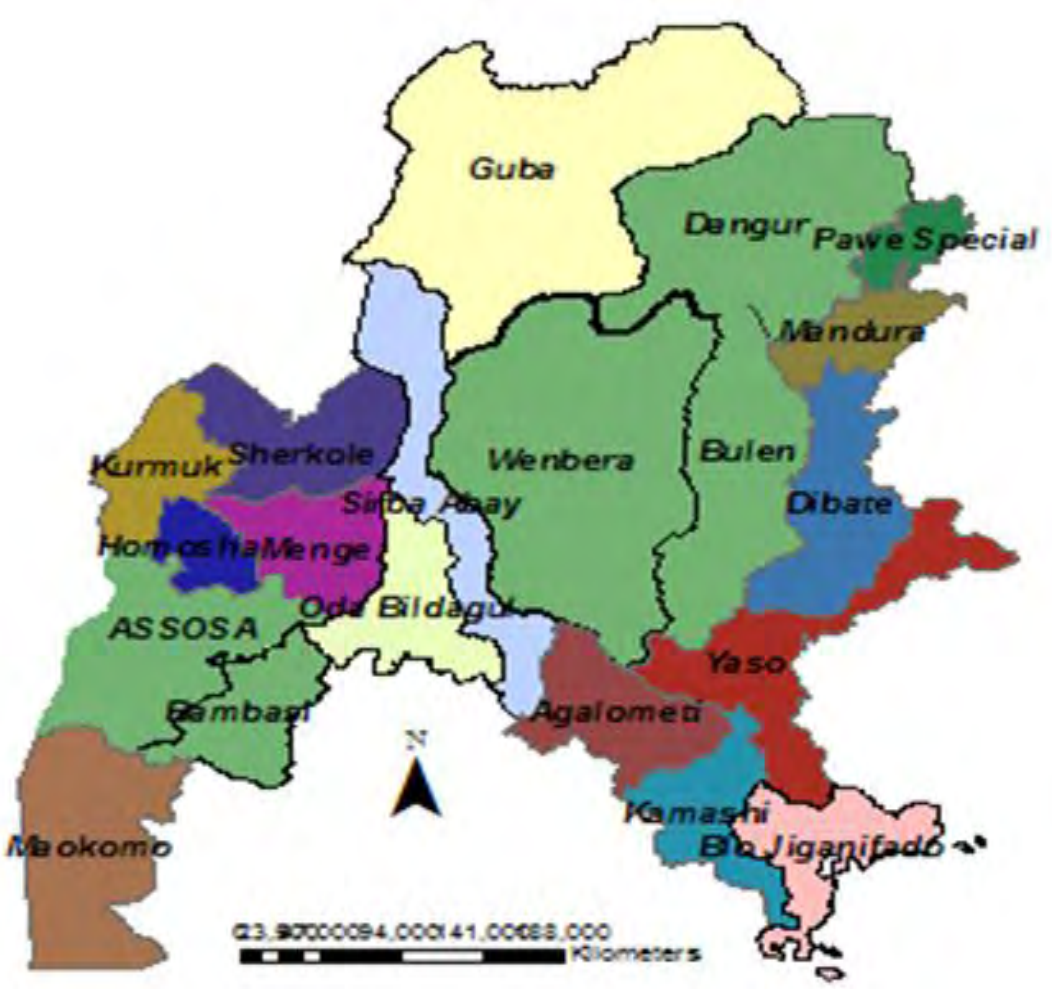

Figure 46 ***Map of Benishangul Gumuz Regional State/ December 2016***

Note: *Bambasi Woreda, Assosa Woreda, Wombera Woreda, Bullen Woreda; Dangur Woreda (Green shade), Assosa Zone, Metekel Zone and Kamash Zone Selected for Meher Assessment*

Objectives

General Objective

- The main objective of the assessment was to develop emergency preparedness and response plan for epidemic prone diseases of BGRS during the second half of 2009 EFY.

Specific Objectives

- To assess the extent, types, magnitude, severity and likelihood of different risks likely to occur from 1st January – 30th June of 2009 EC in BGRS;
- To assess the existing capacity of the health system to address epidemic prone diseases and nutrition emergencies likely to occur between 1 January – 30 June of 2009 E.C;
- To determine gaps in health system to address/ tackle the anticipated epidemic prone diseases;

Methods and Materials

Study Area

The assessment was conducted in Regional Health Bureau; whole (three) zones of health departments; namely Assosa Zone (679 KM far from Addis Ababa), Kamash Zone (154 KM far from regional capital; Assosa Town); Metekel Zone (396 KM far from regional capital; Assosa Town) and five selected woreda's health offices.

Study Period

The study period was from 10 – 30 December/ 2016 G.C.

Study Design

Cross sectional survey study design was implemented in Regional Health Bureau; Zonal Health Departments and Woreda health Offices.

Data Collection

Document reviews; in-depth interview; focus group discussion with the respective officials were applied to collect data using semi structured questionnaire tools.

Data Analysis and Summarization

Data analysis was carried out using Microsoft excel. Tables and graphs were used for demonstration of data.

Team Composition and Woreda Selection Criteria

A team comprised experts from RHB, REB, RWMERDB, NFSDPPC; RFSDPPO; UNICEF, WFP and WHO were participated in the assessment of cross-sectional survey. Purposively; all three zones and RHB were selected. Five Woredas were selected using public health emergencies early warning indicators. The assessment was conducted in:-

- Benishangul Gumuz Regional Health Bureau;
- Assosa Zone health department;
- Kamash Zone health department;
- Metekel Zone health department;
- Assosa and Bambasi Woreda health offices of Assosa Zone
- Dangur, Wombera and Bullen Woredas from Metekel Zone

Assessment Procedure

Before conducting the actual assessment, the team members received orientation on the purpose of the assessment, and pretest the assessment tools. Direct face to face structured interview using semi-structured questionnaires and document review were used to collect data from RHB; zone health departments and selected Woredas health offices. Focus group discussions were also conducted at all level.

In total, Five Woreda health office and three zonal health departments and RHB were included in the assessment. The overall procedure was indicated below.

- Brief discussion was conducted for zonal and Woreda administrates by multi-disciplinary team members composed from multi-sectorial organizations;
- Secondary data was collected using semi-structured questionnaires from the respected Woreda health offices; Zonal health departments and RHB;
- Focus group discussions and interview were made with respective officers/ program owners at all levels;
- Field observations was conducted
- Debriefing on the preliminary findings was done in visited Woreda health offices; zonal health departments and Regional Health Bureau;

Result

Region and Zones

Socio-Demographic Profile

BGRS has three Assosa Zones, 19 woredas, 1 special Woreda and 1 town administration. Assosa town is capital city of the region. It's 668 KM far from Addis Ababa. The region has 475 (34 urban and 441 rural) Kebeles. BGRS had 2 general hospitals; 37 health centers and 368 health posts. In this region; 1,089 HEWs had deployed for the health sector.

Table 20 *Number of Woredas; Kebeles, health facilities and HEW of BGRS Zones/ December 2016*

Zone Name	No. of woredas/ Town	Health Facilities		
		H	HC	HP
Assosa	7	1	13	160
Metekel	7	1	14	139
Kamash	5	0	7	50
Mao Komo Sp. Woreda	1	0	2	19
Assosa Town	1	0	1	0
Total	21	2	37	368

Total population of BGRS estimated to reach 1,066,001 (projection based on 2007 census). Of these population males 545,686 and females 520,315; children under 5 years of age 172,479 numbers of women of reproductive age (15-49) 220,556; numbers of pregnant women 36,351 [3 and 4]. The region also hosted around 58,432 South Sudanese refugees. There was no pastorals and internal displaced people (IDP) in the region. The actual data about migrant workers were not yet known. Nevertheless; the migrant workers were estimated about 20% of the total population (213,200). This number was increased in agricultural season.

Table 21 *Vital statistic of BGRS / December 2016*

Name of Zone	Population	Population by sex		Under 5 years	Reproductive age	Pregnant Women	Refugees	Pastoral	IDP	Migrant worker
		Male	Female							
Assosa	389,546	199,409	190,137	63,029	80,597	15,971	58,432	0	0	77,909
Metekel	437,463	223,937	213,526	70,782	90,511	17,936	0	0	0	87,493
Kamash	137,991	70,638	67,353	22,327	28,550	5,658	0	0	0	27,598
Assosa Town	32,972	16,878	16,094	5,335	6,822	1,352	**0**	**0**	**0**	6,594
Mao Komo sp.	68,029	34,824	33,205	11,007	14,075	2,789	**0**	**0**	**0**	13,606
	1,066,001	545,686	520,315	172,479	220,556	43,706	**58,432**	**0**	**0**	213,200

*Note: - Vital statistic indicators were adopted from regional population conversation factors and sex ratio. Children under 5 years of age **16.18%;** number of women of reproductive age (15-49) **20.69%;** number of pregnant women **3.41%** and male to female ratio **51.19%** (for male) and **48.81%** (for female from the total population); migrant worker estimated **20%** of the total population [3 and 4]; refugees estimated 15% of the Assosa Zone population.*

Coordination and Management System

There was functional multi-sectorial coordination forum at regional levels. In this forum all relevant governmental bureaus, NGOs and UN agencies were represented. However, they did not meet regularly. The visited three Zonal health departments and the Regional Health Bureau had PHE preparedness and response plan without included of reproductive health. Those EPRP was not supported by budget either governmental or non-governmental organization. Regional Health Bureau had five PHEM officers. All zones and the assessed Woredas had PHEM officers trained with PHEM basic level training. All officers were sent their weekly and immediately report on regular base on prearranged scheduled.

Disease Outbreak

During the last three months, AWD outbreak was reported initially from Sedal Woreda, followed by Wombera, then Belloji Ganfoyi & lastly Dangur woredas. A total of 415 cases & 27 community deaths were reported with CFR of 6.5% and attack rate of 0.9%. RHB deployed a multi-disciplinary technical staffs to the affected woredas; including mobilization of budget, drugs, and medical supplies to control outbreak. During the assessment; all AWD outbreaks were controlled and closed CTC except Dangur Woreda that started on 8/02/2009 EC. Nevertheless; zero case was reported in Dangur Woreda during the last two weeks as of mid-December 2009 EC.

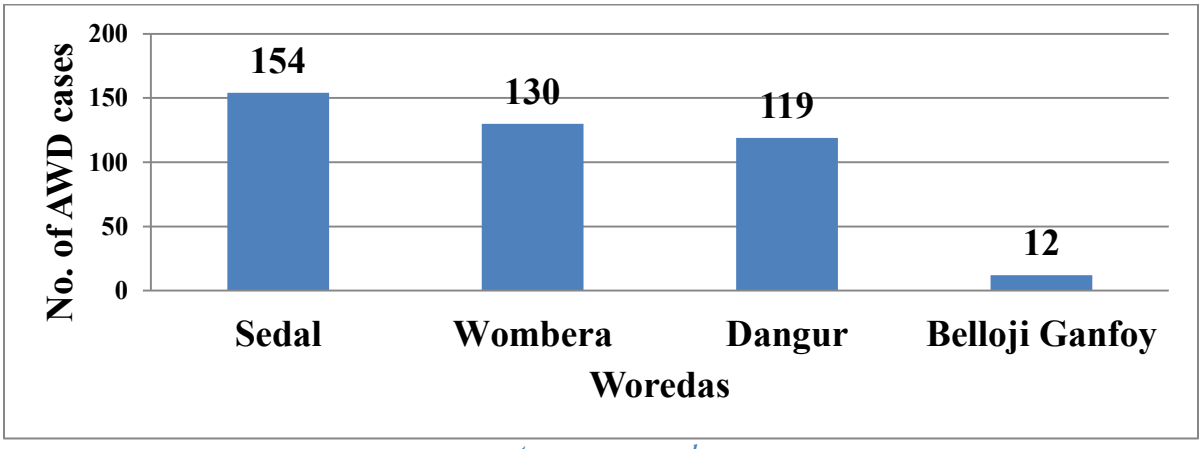

Figure 47 ***AWD cases reported from 1st August – 3rd December 2016 in Sedal, Wombera, Belloji Ganfoy and Dangur Woredas of Benishangul Gumuz regional state/ December 2016***

Table 22 ***Distribution of AWD cases by affected Kebele; CFR and AR of Benishangul Gumuz regional state/ December 2016***

Zone	Woreda	Total Population	Total Kebele	Affected Kebele	Date of Start	Total cases	Community Death	CFR	AR
Kamash	Sedal	24,455	15	6	01/08/2016	154	5	3	0.63
	Belloji Ganfoy	40,962	15	1	02/11/2016	12	1	8	0.03
Metekel	Wombera	81,535	33	6	20/09/2016	130	19	15	0.16
	Dangur	65,958	30	9	15/10/20016	119	2	2	0.18
Total		**212,910**	**93**	**22**		**415**	**27**	**7**	**0.19**

Anticipated Epidemics

The following epidemic prone diseases like acute watery diarrhea, malaria, measles, & meningococcal meningitis, as well as unusual increase of malnutrition cases were considered as possible risks in Benishangul Gumuz Regional State for the coming six months. Each disease and estimated affected population were clearly stated in the below table.

Table 23 ***Types of emergency and estimation of affect populations in BGRS/ December 2016***

Type of Emergency	Risk Territories	Estimated Affected Population
AWD	Three Zones; 19 Woredas, 1 town administration and 1 special Woreda	**21,323**
Measles	Three Zones; 19 Woredas, 1 town administration and 1 special Woreda	**21,323**
Malaria	Three Zones; 19 Woredas, 1 town administration and 1 special Woreda	**21,323**
Meningitis	Three Zones; 19 Woredas, 1 town administration and 1 special Woreda	**3,101**
Malnutrition	Three Zones; 19 Woredas, 1 town administration and 1 special Woreda	**6,038**
Total		**73,108**

Assumptions: - attack rate of AWD, Measles, Malaria and Meningitis estimated affected population were 2% [5]; 2% [6], 2% [7], 0.3% [8] of the total population of the region respectively. Malnutrition [8] estimated affected population was 3.5% of under-five population.

Table 24 ***Anticipated emergencies estimated beneficiaries & required finance for BGRS/ December 2016***

Region	Type of health emergency	Total estimated beneficiaries	Required finance
BGRS	AWD	21,323	8,374,344
	Measles	21,323	2,027,333
	Malaria	21,323	1,714,292
	Meningitis	3,101	1,437,039
	Malnutrition	6,038	Donation
	Total	**73,108**	**13,553,008**

Drugs & Medical Supplies

Shortage of emergency drugs and supplies were reported from all three zones. The assessment report on availability of therapeutic supplies in the three zones shown that only Kamash zone had availability of therapeutic supplies at zonal level but may not be sufficient for three months. Whereas Assosa & Metekel Zone including some Woredas was sock out of therapeutic supplies like RUTF, F100, F75 & 2nd line drugs during the assessment which may lead to interruption of malnutrition cases management.

Bullen & Wombera Woredas cabinets allocated budget to avail some drugs & supplies as part of preparedness, while the remained Woredas hadn‘t allocated budget to manage main public health emergencies for one month.

Public Health Emergency Preparedness

Availability of emergency drugs and supplies that will be used for the coming six months was asked for the PHEM officer. The officer verified that; emergency drugs and supplies use for emergencies/ public health importance diseases control weren‘t enough for the coming six month. The required quantities of drugs, supplies and required budget to control the selected four diseases (AWD, Measles, Malaria and Meningitis) and one condition (Malnutrition) for the regional population were presented hereafter.

Table 25 ***Depicting drugs, medical supplies and budget required for AWD outbreak control of BGRS/ December 2016***

Item description	Unit	Required Quantity	Unit price (birr)	Required budget (birr)
RL/NS bag of 1000ml	Bag	67,164	27	1,813,428
ORS	Sacket	207,896	1	207,896
Doxycycline 100 mg caps, 1000 per tin	Tin	95,952	10	479,760
Amoxicillin 250mg/5ml susp,100 ml/bottle	bottle	4,478	6	26,868
IV cannula (Adult)	pcs	8,956	2	17,912
Scalp vein	pcs	896	2	1,792
Adult NG tube	pcs	336	2	672
Pediatric NG tube	pcs	1,008	2	2,016
CTC kit	kit	112	50,000	5,600,000
RDT kits of 20 test	Kit	112	2,000	224,000
			Sub-total	**8,374,344**

Note: - The estimate amount of supplies needed was done using Guideline on Cholera Outbreak Management Ethiopia/ May 2011/ Addis Ababa/ Ethiopia.

Table 26 ***Depicting drugs, medical supplies and budget required for measles outbreak control of BGRS/ December 2016***

Item description	Unit	Required Quantity	Unit price (birr)	Required budget (birr)
RL/NS bag of 100ml	Bag	61,304	27	1,655,208
Crystalline Penicillin 1mil.IU/ vial box of 100 vials	Box	5,885	43	253,055
TTC eye ointment 1%0f 100 tube	Pack	245	3	735
Vitamin A of 200,000IU tin of 1000capsule	Tin	11	577	6,347
Dextrose 40% of 20ml of 20amp	Pack	74	168	12,432
Paracetamol 125mg/5ml bottle	Bottle	6,130	4	24,520
IV Cannula	Pcs	24,521	2	49,042
Scalp Vein	Pcs	1,962	1	1,962
Amoxicillin 250mg/5ml susp,100 ml/bottle	Bottle	1,962	6	11,772
Ciprofloxacin 500mg tab of 10 (strip)	Strip	2,452	5	12,260
			Sub-total	**2,027,333**

Note: - The estimate was done using Guideline on Measles Surveillance and Outbreak Management 3rd Edition January 2012; Addis Ababa/ Ethiopia

Table 27 *Depicting drugs, medical supplies and budget required for malaria outbreak control of BGRS/ December 2016*

Item description	Unit	Required Quantity	Unit price (birr)	Required budget (birr)
RL/DW bag of 1000ml	Bag	1,931	27	52,137
Coartem 24 tab blister/pack	Pack	2,574	14	36,036
Chloroquine 150mg tin of 1000 tab	Tin	19	101	1,919
Quinine injection (of 10 ampule) Pack	Pack	36,777	33	1,213,641
Quinine 300mg tab pack of 100	Pack	883	68	60,044
Chloroquine syrup of 60ml bottle	Bottle	154	7	1,078
Dextrose 40% of 20ml (ampule 20), pack	Pack	1,471	168	247,128
Paracetamol 500mg tab (tin of 1000)	Tin	31	21	651
Paracetamol suspension 100ml bottle	Bottle	588	4	2,352
RDT kit	Kit	3678	27	99,306
			Sub-total	**1,714,292**

Note: - The estimate of the amount of supplies needed was done using National Malaria Guideline; Third Edition/ Addis Ababa/ January 2012

Table 28 *Depicting drugs, medical supplies and budget required for meningitis outbreak control of BGRS/ December 2016*

Item description	Unit	Required Quantity	Unit price (birr)	Required budget (birr)
RL/DNS bag of 1000ml	bag	3,678	27	99,306
Crystalline Penicillin 500 mg Vial of 100	box	662	43	28,466
Ceftriaxone injection of 1gm of 50vials	vial	7,355	5	36,775
Paracetamol 500mg tab; tin of 1000 tabs	tin	272	21	5,712
Paracetamol suspension of 100ml bottle of 125mg/5ml	bottle	99,937	4	399,748
PNGT each	pcs	66	2	132
ANGT each	pcs	883	2	1,766
IV Cannula	pcs	1,839	2	3,678
Scalp Vein	pcs	132	1	132
Dextrose 40% of 20ml of 20amp	pack	368	168	61,824
Oily Chloramphenicol of 3gm of 50 vial;	box	3,198	250	799,500
			Sub-total	**1,437,039**

Table 29 ***Depicting drugs, medical supplies and budget required to manage MAM and SAM case of BGRS/ December 2016 (Donation from UNICEF)***

Item description	Unit	Quantity for 200 children/ month	Required Quantity
F75	Tone	0.42	76.0788
F100	Tone	0.8	144.912
RUTF	Tone	2	362.28
MUAC tape 50	PK	1	181.14
Salter scale 25kg x 100g	Each	2	362.28
Baby scale 16kg x 10g	Each	1	181.14
TFP opening kit	Each	1	181.14
TFP registration book	Each	2	362.28
EDK	Kit	1	181.14
Amoxicillin 250 mg/1000	Tin	3	543.42
Benzyl benzoate 25%	Litter	25	4528.5
Chlorhexidine 5%	Litter	20	3622.8
Ferrous sulphate 200 mg/1000	PK	6	1086.84
Folic Acid 5 mg/ 1000	PK	1	181.14
Gentian violet powder	25g	4	724.56
Mebendazole 100mg	PK	200	36228
Zinc oxide ointment 10%	50g	2	362.28

Risk Factors to Occur Epidemics

Malaria

Almost all woredas of the region except 7 high land Kebeles of Wombera Woreda are malarious. 1,055,341 (99%) of 1,066,001 population of the region are at risk for malaria. The presence of mosquito breeding site, interrupted rivers & unprotected irrigation sites in all woredas could be risk factors for the occurrence of malaria outbreak. However, LLINs coverage ranges from 84% in Metekel zone to 90% in Kamash while that of Assosa zone was 89%, In addition, IRS coverage of 2008 EFY also ranges from 82.6% in Metekel to 90% in Kamash & that of Assosa zone was 82%.

Both LLITNs & IRS coverage was above 80% and other prevention and control activities performed by the Woreda health offices will minimize the risk of huge outbreak occurrence but preparedness is mandatory to commence prevention & control strategies timely so as to avert its impact when malaria epidemic occur.

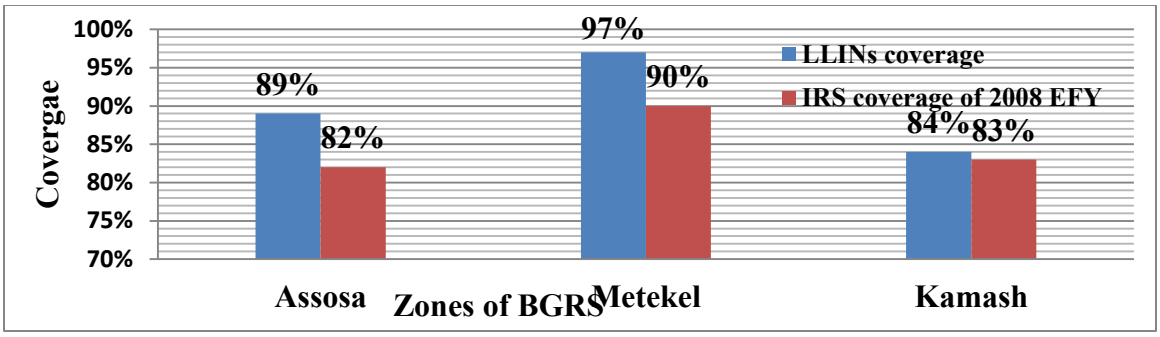

Figure 48 ***LLINs and IRS coverage in 2008 EFY of three zones of Benishangul Gumuz regional state December 2016***

Meningitis

There was no reported meningitis epidemic in the last three years in the Region. Zonal Health Department report also shows no meningitides epidemic from other woredas not visited by the assessment team. Meningitis outbreak prevention Men A vaccination campaign was conducted in October 2013 targeting all age group 2-30 years old which constitute 70% of the entire population with a good coverage of above 95% at regional level.

As no meningitis campaign conducted in the last three years and upcoming dry season from January to June as risk factor of meningitis outbreak will anticipate. Declining herd immunity & accumulation of susceptible population may also increase the risk of outbreak. In addition the current meningococcal meningitis outbreak reported from neighboring Amhara Regional State. Hence, preparedness is important for timely response of meningitis outbreak.

Acute Watery Diarrhea

There was confirmed AWD outbreak in the region in last three months; Even if the latrine coverage of **BGRS** reached **81%** (the latrine utilization rate was yet not known). The region yet not declared free from AWD during the assessment; the outbreak of AWD will occur as public health problem in the coming months in the region.

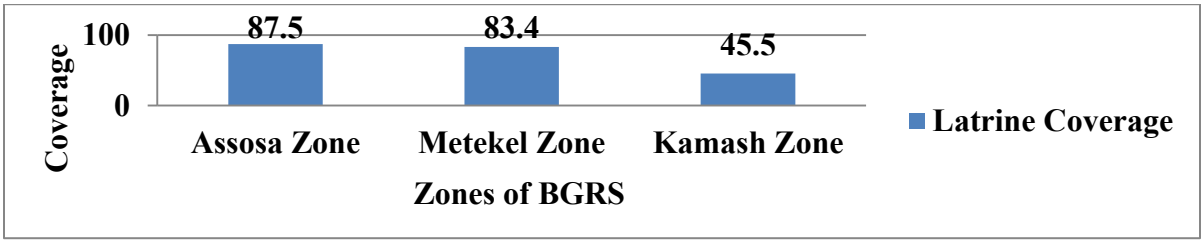

Figure 49 ***Latrine and safe water coverage in 2008 EFY of three zones of Benishangul Gumuz regional state of three zone/ December 2016***

Measles

Measles vaccination coverage reached the ranging from 152% in Yasso to Wombera 67%. The regional coverage was 89% below the expected target of 95%. As routine immunization alone is not enough to prevent measles outbreak, unless supplementary immunization activity (SIA) wider age group (9 months to 14 years) vaccination campaign is conducted as a second dose opportunity to improve population immunity. With no supplementary immunization activity (SIA) measles campaign and with low routine measles vaccination coverage; the risk of measles outbreak could be higher in the region & preparedness plan need to be in place to detect & respond to possible measles outbreak timely so as to minimize its impact

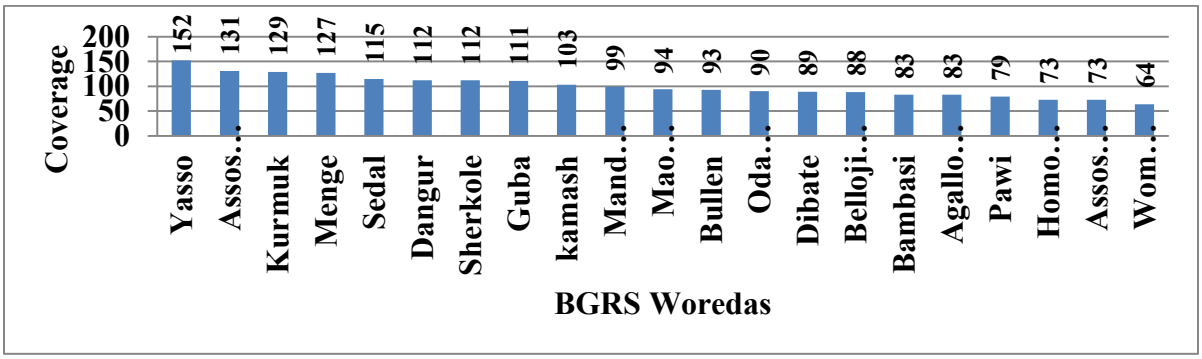

Figure 50 ***Routine Measles vaccination coverage in 2008 EFY of all woredas of Benishangul Gumuz regional state of three zone/ December 2016***

Nutrition

There were 15 stabilization centers (7 in Assosa, 4 in Metekel, 3 in Kamash, & one in Mao komo) & 305 OTP sites managing malnutrition cases in the region. Health workers from zones, woredas & health posts; health centers & hospitals including health extension workers were trained on proper management of malnutrition cases. All health facilities send SAM and MAM cases through PHEM in weekly & HMIS in monthly basis.

Sever acute malnutrition is a weekly reportable disease which occurred as a result of deficiency of nutritional problems. Children age from 6 months to 5 years with MUAC less than 11cm and/or children with bilateral edema regardless of their MUAC are suspected cases OR Children with MUAC less than 11.5 cm and/or children with bilateral edema regardless of their MUAC are confirmed cases for SAM [8].

The reported of crop failure in some Kebeles of the visited woredas of the region which will increase household food insecurity & will further exacerbate the already existing poor nutritional status of the most vulnerable groups mainly children, pregnant and lactating women.

Lack of adequate nutrition either due to household food insecurity or parent's and lack of awareness on proper feeding of children will underlying cause for major communicable diseases. Hence the availability of therapeutic feeding service is important for prevention and control of the consequences of malnutrition. Hence, strong preparedness and response, and successful management of emergency health and nutrition program management are required at all levels.

From May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 EC; there were 923 and 533 malnutrition condition reported from the region under PHEM weekly report respectively.

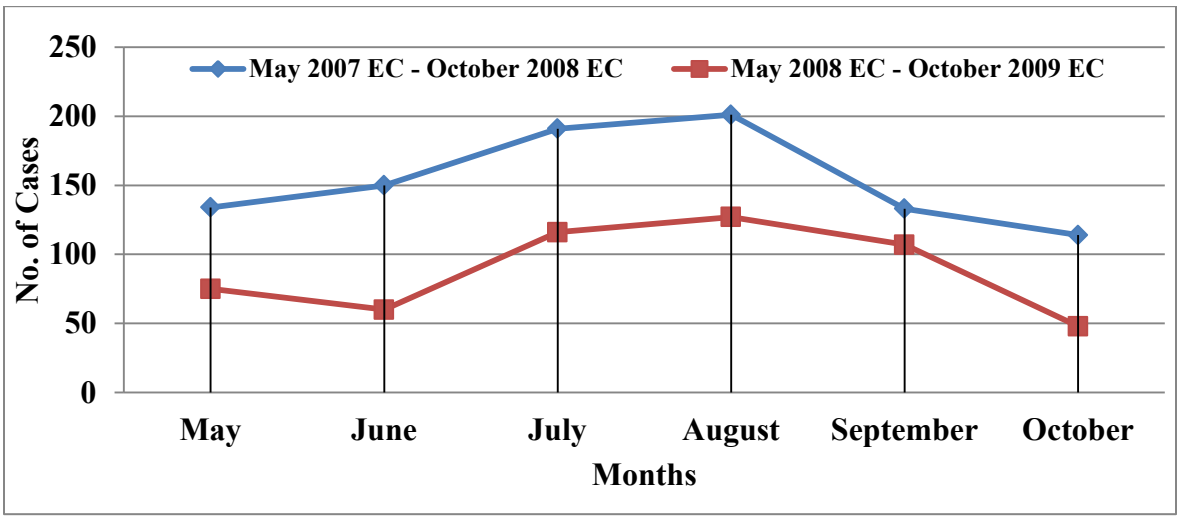

Figure 51 ***Trend of malnutrition condition reported from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C in BGRS December2016***

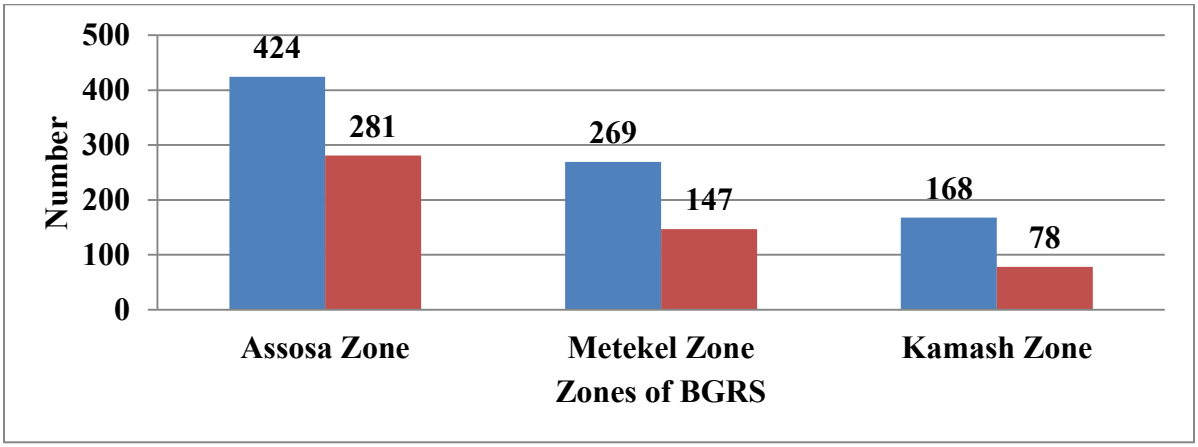

Figure 52 ***Number of acute malnutrition cases from May/ 2007 – October/ 2008 EC and May/ 2008 – October/ 2009 EC of Benishangul Gumuz regional state of three zone/ December 2016***

Note: 62 and 27 malnutrition conditions were reported from Mao Komo special Woreda and Assosa Town Administration from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C respectively.

Screening

The last screening was conducted in July 2008 E.C. The screening modality that was adapted in the region was EOS and CHD. Number of children in the Region received Vitamin A was 109,111; screened 107,364 and de-worming 73,685.

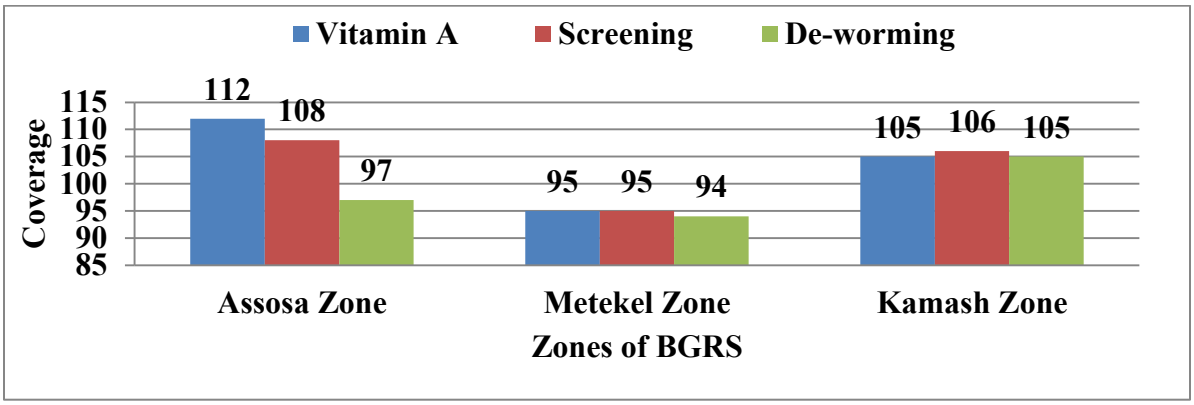

Figure 53 ***Vitamin A; screened and de-worming of children in 2008 EFY of three Zones of BGRS December2016***

Note: - target or eligible for Vitamin and screened of children (age from 6 – 59 months or 15.68% of the total population); and de-worming reached (age from 24 – 59 months or 10.36% the total population) of 2008 EFY population size of the respected woredas

Flooding

During the last six months, there was no flood disaster in the region. Due to year to year rainfall rate fluctuated and untimely rain in some part of the woredas; it will anticipate flood disaster in some woredas

Woredas
Bambasi Woreda of Assosa Zone

Socio-Demographic Profile

Bambasi Woreda is one of the seven woredas of Assosa Zone. It's far about 42 KM from the regional capital; Assosa town. The Woreda has 43 (2 urban and 41 rural) Kebeles. Bambasi Woreda had 2 health centers and 41 health posts. Both health centers had potable water supply. In this district, 86 HEWs had deployed for the health sector.

Total population of the Woreda estimated to be 66,171 (projection based on 2007 census). Of these population male 33,879 and female 32,292; children under 5 years of age 10,706 numbers of women of reproductive age (15-49) 13,961 numbers of pregnant women 2,256. The Woreda also hosted 16,038 South Sudanese refugees. There was no pastorals and internal displaced people (IDP) in the Woreda. The actual data about migrant workers were not yet known. Nevertheless; the migrant workers were estimated about 7.5% of the total population (4,962). This number was increased in agricultural season.

Coordination and Management System

Woreda had PHEM officer trained with PHEM basic level training. PHEM focal persons who had worked in health centers were not trained about PHEM. The health facilities and Woreda health office were sent its report on regular base as scheduled date. There was no functional multi-sectorial PHEM coordination forum. The woreda had PHE preparedness and response plan without included of reproductive health. Those EPRP was not supported by budget either governmental or non-governmental organization.

Top Five Morbidity

There were different diseases occurred in the district in 2008 EFY. In the list of top five diseases totally 36,489 patients were recorded both below and above 5 years of age in the Woreda. From those diseases; Malaria covered 50.9% (18,571*100/36,486); followed by Acute Febrile Illness (AFI) 20.2% (7,374*100/36,486) and Helminthiasis 10% (3,661*100/36,486) was the third among the top five causes of morbidity in 2008 EFY.

Table 30 ***Top 5 causes of morbidity of below and above s years of age in 2008 EFY of Bambasi Woreda of Assosa zone/ BGRS/ December2016***

Morbidity below 5 years			Morbidity above 5 years		
Disease	No.	Percentage	Disease	No.	Percentage
Malaria	2,269	30.6%	Malaria	16,302	56.1%
Pneumonia	1,717	23.2%	Acute febrile illness	6,106	21%
Diarrhea	1,360	18.3%	Helminthiasis	2,861	9.8%
Acute febrile illness	1,268	17.1%	Typhoid Fever	2,321	8%
Helminthiasis	800	10.8%	Pneumonia	1,485	5.1%
Sub Total	7,414	100%	Sub Total	29,075	100%

Epidemic Prone Diseases Status

Outbreak

There wasn‘t ongoing outbreak in Bambasi Woreda in the last three months.

Malaria

Malaria is one of the weekly reportable diseases under surveillance and it is the top cause of morbidity in the Woreda. A total of 10,659 and 5,510 (clinical + parasitological confirmed) malaria cases without death were reported in the Woreda from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C. respectively.

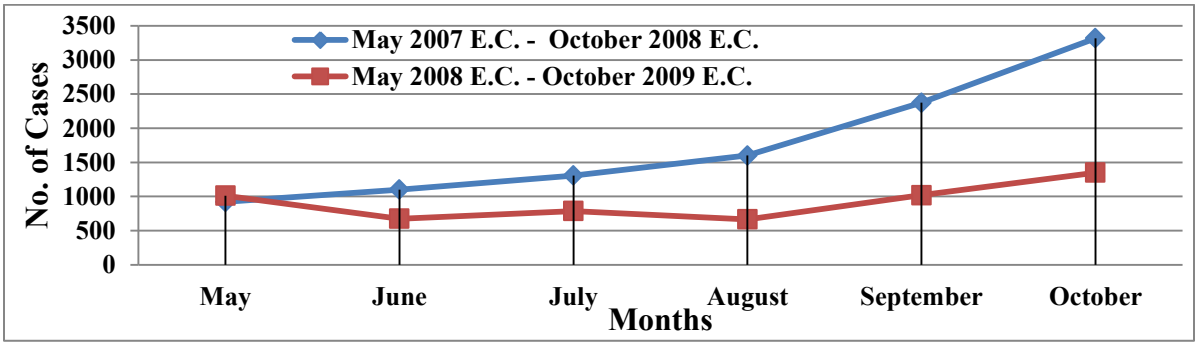

Figure 54 ***Trend of malaria from May/ 2007E.C. – October/ 2008 E.C. and May/ 2008 EC – October/ 2009 E.C of Bambasi Woreda of Assosa zone/ BGRS/ December2016***

Measles

Measles is one of the immediately reportable diseases in PHEM system. There was 1 and 1 measles suspected case without death was reported in the Woreda from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C. respectively.

AWD

There wasn‘t AWD outbreak in the woreda in the past three years.

Meningitis

From May/ 2007/ 2008 – October/ 2008/9 EC; there was zero suspected of meningococcal meningitis reported from Bambasi Woreda.

Nutrition

The Woreda had 34 OTP and 1 SC site. Concerning the therapeutic supplies; there were enough therapeutic supplies for the next one month. All OTP and SC sites were reporting regularly on monthly bases. All HEWs and health professional working in different post and health facilities were trained in MAM and SAM cases managements.

The rates of malnutrition conditions was shown slightly increased in Bambasi Woreda. From May/ 2007 EC – October/ 2008 EC and May/ 2008 – October/ 2009 EC; the number of malnutrition condition of children were raised from 68 to 76 cases.

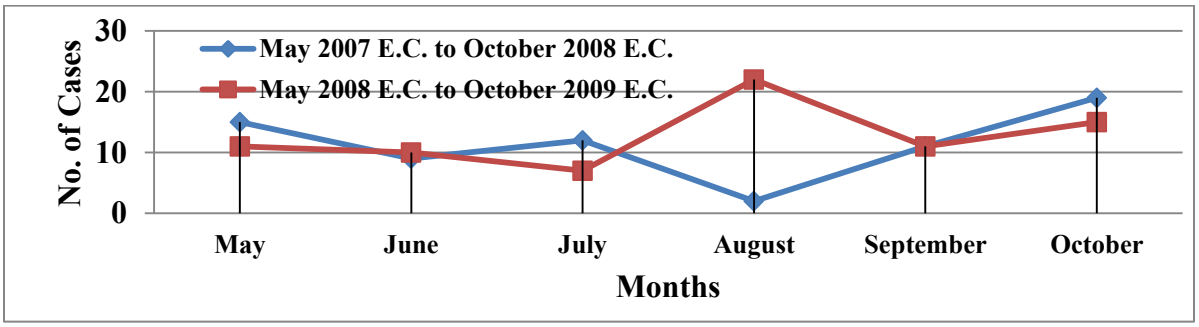

Figure 55 ***Trend of malnutrition conditions from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C of Bambasi Woreda of Assosa zone/ BGRS/ December2016***

Screening

The last screening was conducted in July 2008 E.C. The screening modality that was adapted in the Woreda was EOS. The coverage of Vitamin A; screened and de-worming of children in 2008 EFY were reached 63.9% (6,435*100/10,064); 53.1% (5,133*100/9,670); and 66.4% (4,249*100/6,396) respectively.

Preparedness

Emergency drugs and supplies for the coming one month that will be used for epidemic prone diseases were asked the PHEM officer. The officer verified that; some of the drugs like ringer lactate; ORS and doxycycline to treat AWD cases and coartem and RDT to treat malaria and tetracycline ointment and amoxicillin to treat measles cases were available and enough for the coming one month.

But some drugs/ supplies like vitamin A to treat measles and CTC for AWD; lumbar puncture (LP) set; RDT (pastorex) for meningitis; emergency reproductive health kit to provide basic emergency obstetric and new born care and emergency medicine and supplies to support care of rape survival care weren‘t available in the Woreda.

Risk Factors to Occur Epidemics

Malaria

Malaria is still a health risk in Bambasi Woreda. The availabilities of breeding sites of mosquito, unprotected irrigation and interrupted rivers and the refugee hosted; all Kebeles were malaria. Even though; LLITNs coverage reached near to **100%** in 2008; its utilization rate wasn‘t known. IRS coverage was reached **85 %** in 2008 EFY.

The presence of mosquito breeding site, interrupted rivers & unprotected irrigation sites in the Woredas could be risk factors for the occurrence of malaria outbreak in the Woreda.

Meningitis

During the last three years, there was no Meningitis epidemic and there were no vaccination conducted in the last 3 years in Bambasi Woreda. Because of high refugee hosted Woreda and population movement from different parts of the country for daily laborer; meningitis outbreak was anticipated to occur in Bambasi Woreda.

AWD

There was no AWD epidemic in the last 3 years. The latrine coverage was **98 %;** but the latrine utilization rate was not known yet. Safe water supply coverage of the woreda was reached **72.5%.** Nevertheless this; there is AWD in the region; AWD outbreak will expected to be occur as public health problem in the coming months in Bambasi Woreda.

Measles

There is no ongoing measles outbreak in Bambasi Woreda. The measles vaccination coverage of 2008 EFY was **64.8%.** Due to low measles vaccination coverage; poor cold chain system management and SIA wasn‘t conducted in 2008 EFY, the districts will anticipation of measles outbreak.

Nutrition

Lack of adequate nutrition either due to household food insecurity or parent‘s and lack of awareness on proper feeding of children will underlying cause for major communicable diseases. Hence, malnutrition condition will anticipate in some Kebeles of Bambasi Woreda

Assosa Woreda of Assosa Zone

Socio-Demographic Profile

Assosa Woreda is one of the seven Woredas of Assosa Zone. It's far about 675 KM from the national capital; Addis Ababa city. The Woreda has 74 rural Kebeles. Assosa Woreda had 3 health centers and 60 health posts. 1 health centers had potable water supply. In this district; 86 HEWs had deployed for the health sector.

Total population of the Woreda estimated to be 108,693 (projection based on 2007 census). Of these population male 55,640 and female 53,053; children under 5 years of age 17,587; number of women of reproductive age (15-49) 22,489; number of pregnant women 4,456. Even if the actual data not available in the Woreda health office; it estimated that around 21,739 migrant workers were hosted the Woreda (15% of the total population). There were no pastorals and internal displaced persons (IDP) in the Woreda.

Coordination and management system

The Woreda had a PHEM officer trained with PHEM basic level training. PHEM focal persons who had worked in health centers also trained on PHEM. The health facilities and Woreda health office were sent its report on regular base as scheduled date. The Woreda had multi-sectorial PHEM coordination forum even if they didn't meet regularly. There was PHE preparedness and response plan without included of reproductive health. Those EPRP was supported by **50,000 Ethiopian birr**. Its source was Woreda cabinet/ governor.

Top Five Morbidity

There were different diseases occurred in the district in 2008 EFY. In the listed of top five diseases; totally 18,265 patients were recorded both below and above 5 years of age in the Woreda. From those diseases, Malaria covered 41.1% (7,505*100/18,265); followed by Diarrheal Diseases 18.3% (3,340*100/18,265); and Acute Febrile Illness 16.7% (3,051*100/18,265) was the third among the top five causes of morbidity in 2008 EFY.

Table 31 Top 5 causes of morbidity of below and above 5 years of age of Assosa Woreda in 2008 EFY of Assosa zone; December2016

Morbidity below 5 years			Morbidity above 5 years		
Disease	No.	Coverage	Disease	No.	Coverage
Diarrheal Diseases	1,972	36.9%	Malaria	6,173	47.8%
Malaria	1,332	24.9%	Acute Febrile Illness	2,628	20.3%
Pneumonia	1,237	23.1%	Helminthiasis	1,447	11.2%
Acute Febrile Illness	423	7.9%	Diarrheal Diseases	1,368	10.6%
Helminthiasis	385	7.2%	Pneumonia	1,300	10.1%
	5,349	100%		12,916	100%

Epidemic Prone Diseases Status

Outbreak

There wasn‘t ongoing outbreak in Assosa Woreda.

Malaria

Malaria is one of the weekly reportable diseases under surveillance and it is the top cause of morbidity in the Woreda. A total of 3,209 and 2,869 (clinical + parasitological confirmed) malaria cases without death were reported in the Woreda from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C. respectively.

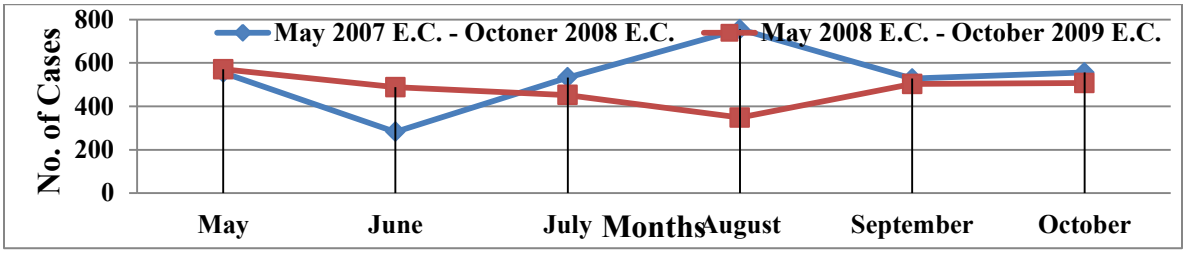

Figure 56 ***Trend of malaria from May 2007 – October/ 2008 E.C. and May 2008 – October 2009 EC of Assosa Woreda in 2008 EFY of Assosa zone; December2016***

Measles

Measles is one of the immediately reportable diseases in PHEM system. Zero measles cases and death was reported in the Woreda from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C. respectively.

AWD

There wasn‘t AWD outbreak in the Woreda in the past three years.

Meningitis

From May/ 2007/ 2008 – October/ 2008/9 EC; there was zero suspected of meningococcal meningitis reported from Assosa Woreda.

Nutrition

There were 19 OPT sites (17 HPs and 2 HCs) were available in the Woreda. There wasn‘t any SC site in the Woreda. Concerning the therapeutic supplies, the Woreda hadn‘t F100, F75 and second line drugs. All OTP sites were reporting regularly on monthly bases. 33 HEWs and 11 health professional working in different post and health facilities were trained in MAM and SAM cases managements.

The rates of admissions of children to therapeutic feeding programs were shown very insignificant in Assosa Woreda. Over the months starting *from May/ 2007 – October/ 2008 EC and May/ 2008 – October/ 2009 EC* the number of newly admitted children to OTP/SC were 41 and 18 cases respectively. All cases were cured.

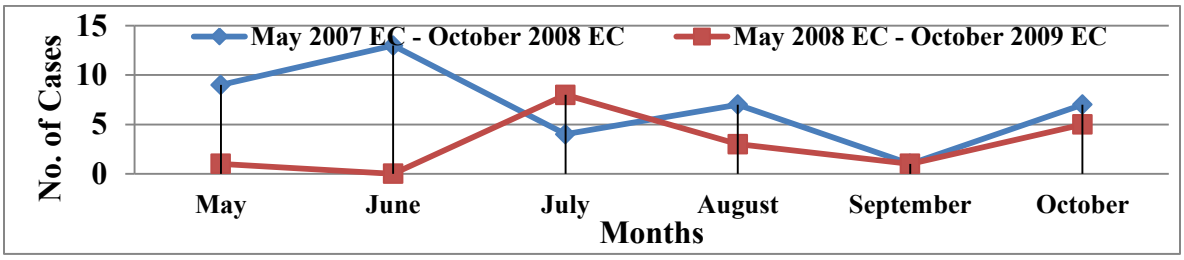

Figure 57 ***Trend of SAM cases from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C of Assosa Woreda in 2008 EFY of Zone/ BGRS/ December2016***

Screening

The last screening was conducted in July 2008 E.C. The screening modality that was adapted in the Woreda was EOS. The coverage of Vitamin A; screened and de-worming of children in 2008 EFY were reached 72 % (7,560*100/10,497); 68.7 % (11,352*100/16,531) and 68.6 % (11,342*100/16,531) respectively.

Preparedness

Emergency drugs and supplies for the coming one month that will be used for epidemic prone diseases were asked the PHEM officer. The officer verified that, some of the drugs like ringer lactate; ORS and doxycycline to treat AWD cases and coartem and RDT to treat malaria and amoxicillin and tetracycline ointment to treat measles cases were available and enough for the coming one month.

But some drugs/ supplies like vitamin A to treat measles and CTC; lumbar puncture (LP) set; RDT (Pastorex) for meningitis; emergency reproductive health kit to provide basic emergency obstetric and new born care and emergency medicine and supplies to support care of rape survival care weren‘t available in the Woreda.

Risk Factors to Occur Epidemics

Malaria

LLITNs coverage reached 89%; and IRS coverage was reached 84 % in 2008 EFY. Nevertheless this; all (74) Kebeles were malaria endemic; availabilities of breeding sites of mosquito; unprotected irrigation and interrupted rivers; LLITNs utilization rate wasn‘t known yet and all (61,862) people live in malaria endemic area. Based on this rational; malaria is still a potential of public health risk in the Woreda.

Meningitis

During the last three years, there was no Meningitis epidemic and there were no vaccination conducted in the last 3 years in Wombera Woreda. Because of high population movement from different parts of the country for daily laborer and the Woreda founded in meningitis belt; meningitis outbreak will anticipate occurring in Assosa Woreda.

AWD

Even if the latrine coverage reached **83%** (but the latrine utilization rate was yet not known); Safe water supply coverage data not available in the Woreda health office**;** there was confirmed AWD outbreak in the Wombera and on-going AWD outbreak in Dangur Woreda (those woredas are shared a boundary to Bullen Woreda); The region yet not declared free from AWD; the outbreak of AWD will occur as public health problem in the coming months in Assosa Woreda.

Measles

There is no ongoing measles outbreak in Bullen Woreda. The measles vaccination coverage of 2008 EFY was **93%.** Due to low measles vaccination coverage; poor cold chain system management and high influx of the people in the Woreda for the daily work; measles outbreak will expect to occur in the Woreda.

Nutrition

Lack of adequate nutrition either due to household food insecurity or parent‘s and lack of awareness on proper feeding of children will underlying cause for major communicable diseases. Hence, malnutrition condition will anticipate occurring in some Kebeles of Assosa Woreda.

Wombera Woreda of Metekel Zone

Socio-Demographic Profile

Wombera Woreda is one of the seven Woredas of Metekel Zone and the largest geographical size of the region. It's far about 545 KM from the regional capital; Assosa town. The Woreda has 33 (2 urban and 31 rural) Kebeles. Wombera Woreda had 3 health centers and 21 health posts. Two health centers had potable water supply. In this district, 58 HEWs had deployed for the health sector.

Total population of the Woreda estimated to be 83,535 (projection based on 2007 census). Of these population male 42,762; female 40,773; children under 5 years of age 13,516 ; number of women of reproductive age (15-49) 17,283; number of pregnant women 2,848. Even if the actual data not available in the Woreda health office; it estimated that around 8,300 migrant workers were hosted the Woreda (10%) of the total population. There were no pastorals and internal displaced persons (IDP) in the Woreda.

Coordination and management system

The Woreda had a PHEM officer trained with PHEM basic level training. PHEM focal persons were not trained about PHEM. The health facilities and Woreda health office were sent its report on regular base as scheduled date. The Woreda had multi-sectorial PHEM coordination forum even if they didn't meet regularly. There was PHE preparedness and response plan without included of reproductive health. Those EPRP was supported by 140,000 Ethiopian birr (Woreda cabinet/ governor 90,000 birr and 50,000 regional health bureau's).

Top Five Morbidity

There were different diseases occurred in the district in 2008 EFY. In the listed of top five diseases; totally 16,804 patients were recorded both below and above 5 years of age in the Woreda. From those diseases, Malaria covered 27.7% (4,656*100/16,804); followed by acute febrile illness 22.8% (3,830*100/16,804); and Helminthiasis 21.8% (3,655*100/16,804); was the third among the top five causes of morbidity in 2008 EFY.

Table 32 ***Top 5 causes of morbidity of below and above 5 years of age of Wombera Woreda in 2008 EFY of Metekel zone; December2016***

Morbidity below 5 years			Morbidity above 5 years		
Disease	No.	Coverage	Disease	No.	Coverage
Malaria	1,157	30.9%	Acute febrile illness	3,830	29.3%
Diarrheal Diseases	967	25.8%	Malaria	3,499	26.8%
Pneumonia	685	18.3%	Helminthiasis	3,153	24.2%
Helminthiasis	502	13.4%	Pneumonia	1,473	13.3%
AURI	438	11.6%	AURI	1,100	8.4%
Sub Total	3,749	100%	Sub Total	13,804	100%

Epidemic Prone Diseases Status

Outbreak

There was confirmed AWD outbreak in the Wombera Woreda from 8 September to 12 October 2009 E.C. A total of 130 AWD cases and 19 community deaths due to AWD were line listed in outbreak period.

Malaria

Malaria is one of the weekly reportable diseases under surveillance and it is the top cause of morbidity in the Woreda. A total of 1,541 and 1,727 (clinical + parasitological confirmed) malaria cases without death were reported in the Woreda from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C. respectively.

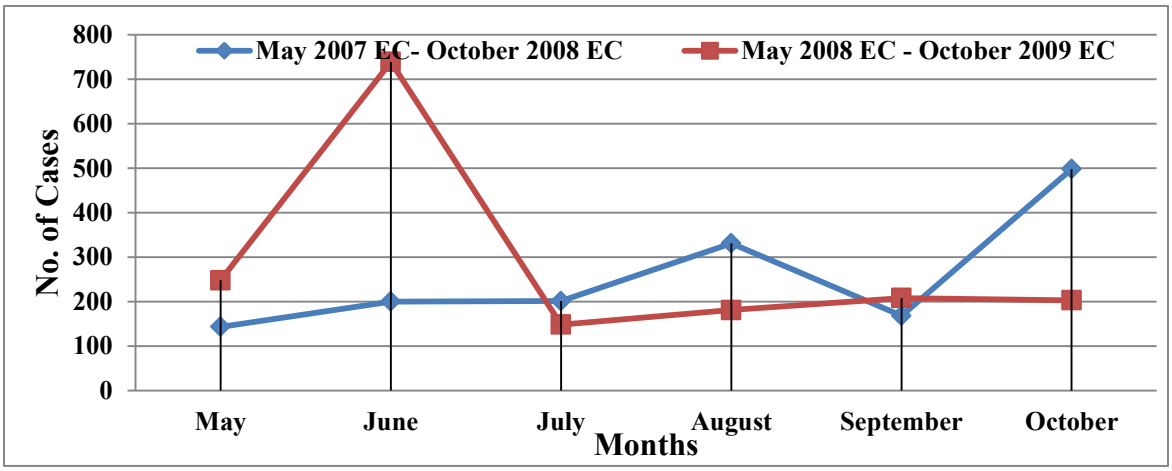

Figure 58 ***Trend of malaria from May 2007–October/ 2008 E.C. and May 2008 – October 2009 EC of Wombera Woreda in 2008 EFY of Metekel zone; December2016***

Measles

Measles is one of the immediately reportable diseases in PHEM system. There were 3 and 3 measles suspected cases without death was reported in the Woreda from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C. respectively.

AWD

There was confirmed AWD outbreak in the Wombera Woreda. A total of 130 AWD cases and 19 community deaths due to AWD were line listed in the past three months.

Meningitis

From May/ 2007/ 2008 – October/ 2008/9 EC.; there was zero suspected of meningococcal meningitis reported from Wombera Woreda.

Nutrition

The Woreda had 21 OTP sites and 1 had SC sites. Concerning the therapeutic supplies, it is enough for the next one month. All OTP and 1 SC sites were reporting regularly on monthly bases. 72 HEWs and 47 health professional working in different post and health facilities were trained in MAM and SAM cases managements.

From May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 EC; there were 84 and 68 malnutrition condition reported from the region under PHEM weekly report respectively.

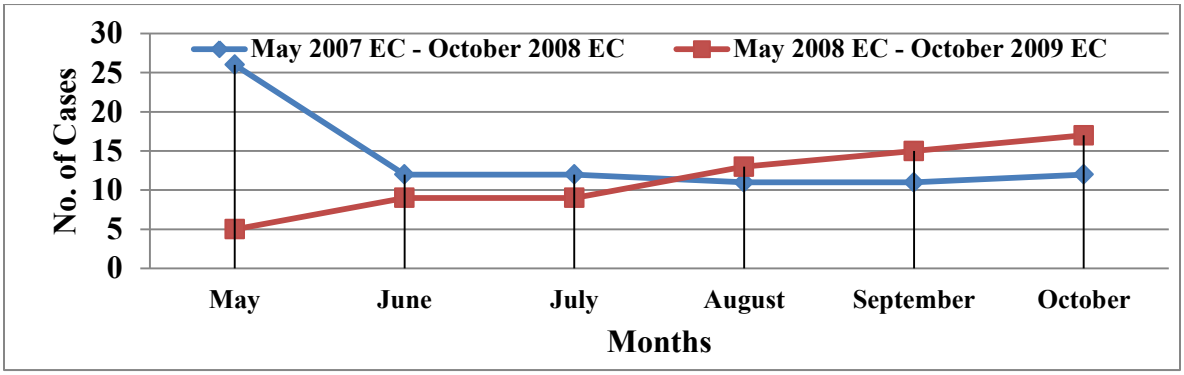

Figure 59 ***Trend of SAM cases from May/ 2007 – October/ 2008 EC and May/ 2008 – October/ 2009 EC of Wombera Woreda in 2008 EFY of Metekel zone/ BGRS/ December2016***

Screening

The last screening was conducted in July 2008 E.C. The screening modality that was adapted in the Woreda was EOS. The coverage of Vitamin A; screened and de-worming of children in 2008 EFY were reached 68.5% (8,759*100/12,786), 68.5% (8,759*100/12,786) and 69.5% (5,867*100/8,447) respectively.

Preparedness

Emergency drugs and supplies for the coming one month that will be used for epidemic prone diseases were asked the PHEM officer. The officer verified that, some of the drugs like ringer lactate; ORS and doxycycline to treat AWD cases and coartem and RDT to treat malaria and amoxicillin to treat measles cases were available and enough for the coming one month.

But some drugs/ supplies like tetracycline ointment and vitamin A to treat measles and CTC; lumbar puncture (LP) set; RDT (pastorex) for meningitis; emergency reproductive health kit to provide basic emergency obstetric and new born care and emergency medicine and supplies to support care of rape survival care weren‘t available in the Woreda.

Risk factors to Occur Epidemics

Malaria

LLITNs coverage reached 94%; and IRS coverage was reached 78 % in 2008 EFY. Nevertheless this; 16 and 10 out of 33 Kebeles identified that high and low risk of malaria Kebeles respectively. The presence of mosquito breeding site, interrupted rivers & unprotected irrigation sites in the Woredas could be risk factors for the occurrence of malaria outbreak in the Woreda.

7 out of 33 Kebeles in Wombera Woreda had free from malaria. It‘s the only Kebeles in the region free from malaria.

Meningitis

During the last three years, there was no Meningitis epidemic and there were no vaccination conducted in the last 3 years in Wombera Woreda. Because of high population movement from different parts of the country for daily laborer; meningitis outbreak will anticipate to occur in Wombera Woreda.

AWD

Even if the latrine coverage reached 86% (but the latrine utilization rate was yet not known); Safe water supply coverage reached 60.5%; there was confirmed AWD outbreak in the Wombera Woreda in last two months. The region yet not declared free from AWD and hot cases of AWD outbreak notified in adjacent to Wombera Woreda; the outbreak of AWD will reoccur as public health problem in the coming months in Wombera Woreda.

Measles

There is no ongoing measles outbreak in Wombera Woreda. The measles vaccination coverage of 2008 EFY was **67 %.** Due to low measles vaccination coverage; poor cold chain system management and SIA wasn‘t conducted in 2008 EFY, the districts will anticipation of measles outbreak.

Nutrition

Lack of adequate nutrition either due to household food insecurity or parent‘s and lack of awareness on proper feeding of children will underlying cause for major communicable diseases. Hence, malnutrition condition will anticipate in same Kebeles of Wombera Woreda.

Bullen Woreda of Metekel Zone

Socio-Demographic Profile

Bullen Woreda is one of the seven Woredas of Metekel Zone. It's far about 470 KM from the regional capital; Assosa town. The Woreda has 19 (2 urban and 17 rural) Kebeles. Bullen Woreda had 2 health centers and 17 health posts. Two health centers had potable water supply. In this district, 33 HEWs had deployed for the health sector.

Total population of the Woreda estimated to be 61,862 (projection based on 2007 census). Of these population male 31,667 and female 30,195; children under 5 years of age 10,010; number of women of reproductive age (15-49) 12,799; number of pregnant women 2,109. Even if the actual data not available in the Woreda health office; it estimated that around 3,093 migrant workers were hosted the Woreda (5% of the total population). There were no pastorals and internal displaced persons (IDP) in the Woreda.

Coordination and management system

The Woreda had a PHEM officer trained with PHEM basic level training. PHEM focal persons who had worked in health centers were not trained about PHEM. The health facilities and Woreda Health Office were sent its report on regular base as scheduled date. The Woreda had multi-sectorial PHEM coordination forum even if they didn't meet regularly. There had PHE preparedness and response plan without included of reproductive health. Those EPRP was supported by 50,000 Ethiopian birr. Its source was Woreda cabinet/ governor.

Top Five Morbidity

There were different diseases occurred in the district in 2008 EFY. In the listed of top five diseases; totally 16,745 patients were recorded both below and above 5 years of age in the Woreda. From those diseases, Malaria covered 47.9% (8,015*100/16,745); followed by diarrheal diseases 20.5% (3,425*100/16,745); and pneumonia 11.6% (1,950*100/16,745); was the third among the top five causes of morbidity in 2008 EFY.

Table 33 ***Top 5 causes of morbidity of below and above 5 years of age of Bullen Woreda in 2008 EFY of Metekel zone; December2016***

Morbidity below 5 years			Morbidity above 5 years		
Disease	No.	Coverage	Disease	No.	Coverage
Malaria	2,097	38.7%	Malaria	5,918	52.3%
Diarrheal Diseases	1,568	28.9%	Diarrheal Diseases	1,857	16.4%
Pneumonia	999	18.4%	Acute febrile illness	1,590	14%
Acute febrile illness	581	10.7%	Typhoid fever	1,008	8.9%
Helminthiasis	176	3.2%	Pneumonia	951	8.4%
Sub Total	5,421	100%	Sub Total	11,324	100%

Epidemic Prone Diseases Status

Outbreak

There wasn‘t ongoing outbreak in Bullen Woreda.

Malaria

Malaria is one of the weekly reportable diseases under surveillance and it is the top cause of morbidity in the Woreda. A total of 4,184 and 3,604 (clinical + parasitological confirmed) malaria cases without death were reported in the Woreda from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C. respectively.

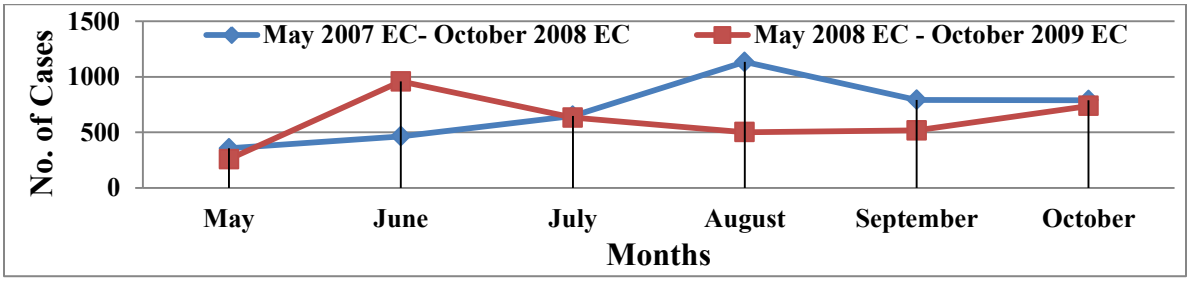

Figure 60 ***Trend of malaria from May 2007 – October/ 2008 E.C. and May 2008 – October 2009 EC of Bullen Woreda in 2008 EFY of Metekel zone; December2016***

Measles

Measles is one of the immediately reportable diseases in PHEM system. Zero measles cases and death was reported in the Woreda from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C. respectively.

AWD

There was AWD outbreak in the Woreda in the past three years.

Meningitis

From May/ 2007/ 2008 – October/ 2008/9 EC.; there was zero suspected of meningococcal meningitis reported from Bullen Woreda**.**

Nutrition

There were 19 OPT sites (17 HPs and 2 HCs) were available in the Woreda. There wasn‘t any SC site in the Woreda. Concerning the therapeutic supplies, the Woreda hadn‘t F100, F75 and second line drugs. All OTP sites were reporting regularly on monthly bases. 33 HEWs and 11 health professional working in different post and health facilities were trained in MAM and SAM cases managements.

From May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 EC; there were 8 and 8 malnutrition condition reported from the region under PHEM weekly report respectively

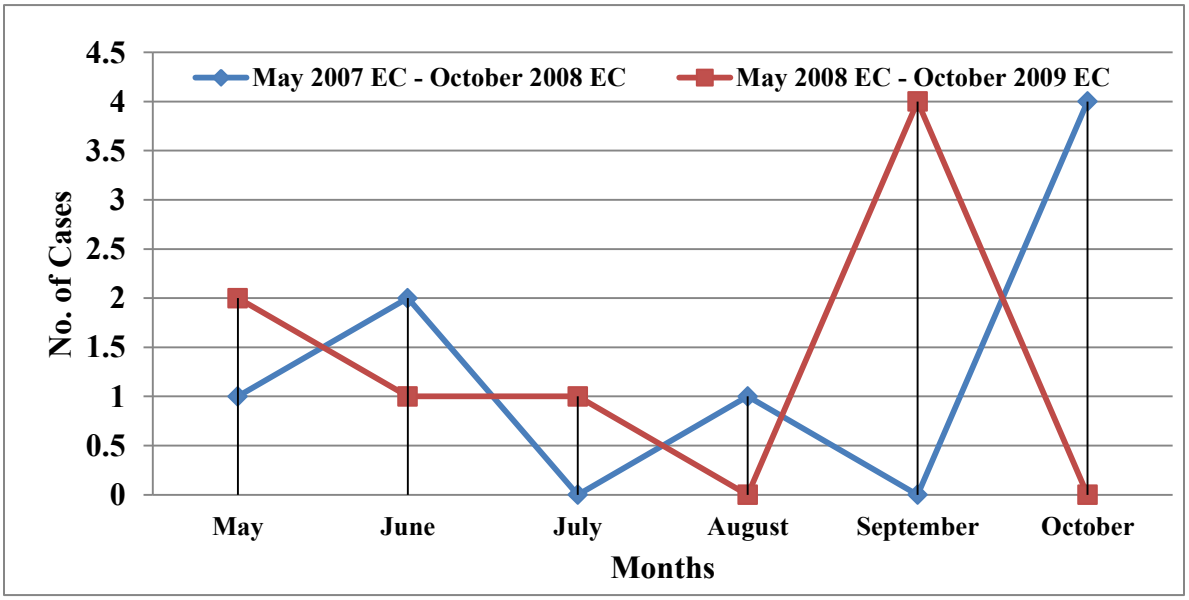

Figure 61 ***Trend of SAM cases from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C of Bullen Woreda in 2008 EFY of Metekel zone/ BGRS/ December2016***

Screening

The last screening was conducted in July 2008 E.C. The screening modality that was adapted in the Woreda was EOS. The coverage of Vitamin A; screened and de-worming of children in 2008 EFY were reached 88.8% (8,621*100/9,706), 88.8% (8,621*100/9,706 and 90% (5,792*100/6,435) respectively.

Preparedness

Emergency drugs and supplies for the coming one month that will be used for epidemic prone diseases asked the PHEM officer. The officer verified that, some of the drugs like ringer lactate; ORS and doxycycline to treat AWD cases and coartem and RDT to treat malaria and amoxicillin and tetracycline ointment to treat measles cases were available and enough for the coming one month.

But some drugs/ supplies like vitamin A to treat measles and CTC; lumbar puncture (LP) set; RDT (Pastorex) for meningitis; emergency reproductive health kit to provide basic emergency obstetric and new born care and emergency medicine and supplies to support care of rape survival care weren‘t available in the Woreda.

Risk Factors to Occur Epidemics to occur for the coming six months

Malaria

LLITNs coverage reached **89%;** and IRS coverage was reached **84 % in 2008 EFY.** Nevertheless this; **all (19)** Kebeles were malaria endemic; availabilities of breeding sites of mosquito; unprotected irrigation and interrupted rivers; LLITNs utilization rate wasn‘t known yet and **all (61,862)** people live in malaria endemic area.

The presence of mosquito breeding site, interrupted rivers & unprotected irrigation sites in the Woredas could be risk factors for the occurrence of malaria outbreak in the Woreda.

Meningitis

During the last three years, there was no Meningitis epidemic and there were no vaccination conducted in the last 3 years in Wombera Woreda. Because of high population movement from different parts of the country for daily laborer and the Woreda founded in meningitis belt; meningitis outbreak will anticipate in Bullen Woreda.

AWD

Even if the latrine coverage reached **83%** (but the latrine utilization rate was yet not known); Safe water supply coverage data not available in the Woreda health office**;** there was confirmed AWD outbreak in the Wombera and on-going AWD outbreak in Dangur Woreda (those woredas are shared a boundary to Bullen Woreda); The region yet not declared free from AWD; the outbreak of AWD will occur as public health problem in the coming months in Bullen Woreda.

Measles

There is no ongoing measles outbreak in Bullen Woreda. The measles vaccination coverage of 2008 EFY was **93%.** Even if SIA was conducted from 11 – 16/ December 2008 E.C. with a targeted age from 9 months – 59 months (8,119) with the achievement of 107.6%; the districts will anticipation to occur measles outbreak in the Woreda; due to low measles vaccination coverage; poor cold chain system management and high influx of the people in the Woreda for the daily work

Nutrition

Lack of adequate nutrition either due to household food insecurity or parent‘s and lack of awareness on proper feeding of children will underlying cause for major communicable diseases. Hence, malnutrition condition will anticipate in the Woreda.

Dangur Woreda of Metekel Zone

Socio-Demographic Profile

Dangur Woreda is one of the seven Woredas of Metekel Zone. It's far about 345 KM from the regional capital; Assosa town. The Woreda has 25 (2 urban and 23 rural) Kebeles. Dangur Woreda had 3 health centers and 22 health posts. One health center had potable water supply; the remained two health centers had not. In this district, 48 HEWs had deployed for the health sector.

Total population of the Woreda estimated to be 65,958 (projection based on 2007 census). Of these population male 33,764; female 32,194; children under 5 years of age 10,672; number of women of reproductive age (15-49) 13,647; number of pregnant women 2,249. There was no pastorals and IDP in the Woreda. The Woreda is one of agricultural investment Woreda in the region. In this regards; even if the actual data not available in the Woreda health office; it estimated that around 35,000 migrant workers were hosted the Woreda.

Coordination and management system

The Woreda had PHEM officer trained with PHEM basic level training. PHEM focal persons who had worked in health centers were not trained about PHEM. The health facilities and Woreda health office were sent its report on regular base as scheduled date. There was no functional multi-sectorial PHEM coordination forum. The Woreda had PHE preparedness and response plan without included of reproductive health. Those EPRP was supported by regional health bureau to control the ongoing AWD outbreak. 100,000 Ethiopian birr was allocated.

Top Five Morbidity

There were different diseases occurred in the district in 2008 EFY. In the list of top five diseases; totally 66,320 patients were recorded both below and above 5 years of age in the Woreda. From those diseases, Malaria covered 49.1% (32,557*100/66,320); followed by acute febrile illness 23.8% (15,802*100/66,320) and diarrheal diseases 14.3% (9,531*100/66,320) was the third among the top five causes of morbidity in 2008 EFY.

Table 34 ***Top 5 causes of morbidity of Dangur Woreda in 2008 EFY of Metekel zone/ BGRS/ December2016***

Morbidity below 5 years			Morbidity above 5 years		
Disease	**No.**	**Percentage**	**Disease**	**No.**	**Percentage**
Malaria	**5,586**	**35.6%**	**Malaria**	**26,971**	**53.3%**
Diarrhea diseases	**4,514**	**28.8%**	**Acute febrile illness**	**13,376**	**26.4%**
Acute febrile illness	**2,426**	**15.5%**	**Diarrhea diseases**	**5,017**	**9.9%**
Pneumonia	**1,906**	**12.1%**	**Typhoid Fever**	**2,691**	**5.3%**
Acute upper respiratory illness	**1,244**	**7.9%**	**Pneumonia**	**2,589**	**5.1%**
Sub Total	**15,676**	**100%**	**Sub Total**	**50,644**	**100%**

Epidemic Prone Diseases Status

Outbreak

There is ongoing outbreak of AWD in Dangur Woreda.

Malaria

Malaria is one of the weekly reportable diseases under surveillance and it is the top cause of morbidity in the Woreda. A total of 16,720 and 13,926 (clinical + parasitological confirmed) malaria cases without death were reported in the Woreda from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C. respectively.

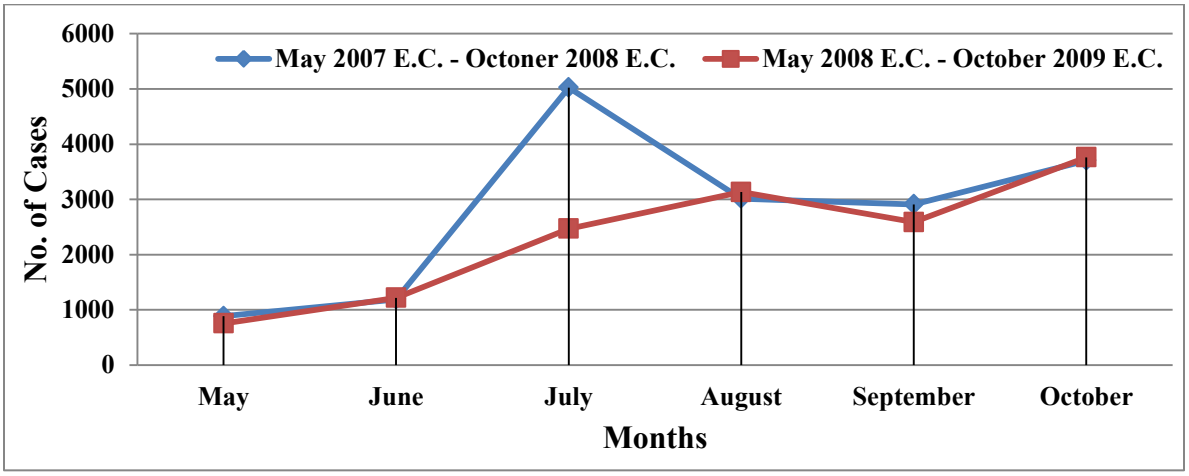

Figure 62 ***Trend of malaria from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C of Dangur Woreda in 2008 EFY of Metekel zone/ BGRS/ December2016***

Measles

Measles is one of the immediately reportable diseases in PHEM system. There were 37 and 6 measles suspected case without death were reported in the Woreda from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C. respectively.

AWD

There is on-going AWD outbreak in the Dangur Woreda since 8 October 2009 E.C. Till the assessment team reached; there were 118 AWD cases and 2 community death due to AWD line listed in Dangur Woreda.

Meningitis

From May/ 2007/ 2008 – October/ 2008/9 EC.; there was zero suspected of meningococcal meningitis reported from Dangur Woreda.

Nutrition

The Woreda had 8 OTP sits out of 26 health institutions. Concerning the therapeutic supplies, it is enough for the next one month. All OTP sites were reporting regularly on monthly bases. All HEWs (49) and health professional (16) working in different post and health facilities were trained in MAM and SAM cases managements.

From May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 EC; there were 12 and 14 malnutrition condition reported from the region under PHEM weekly report respectively.

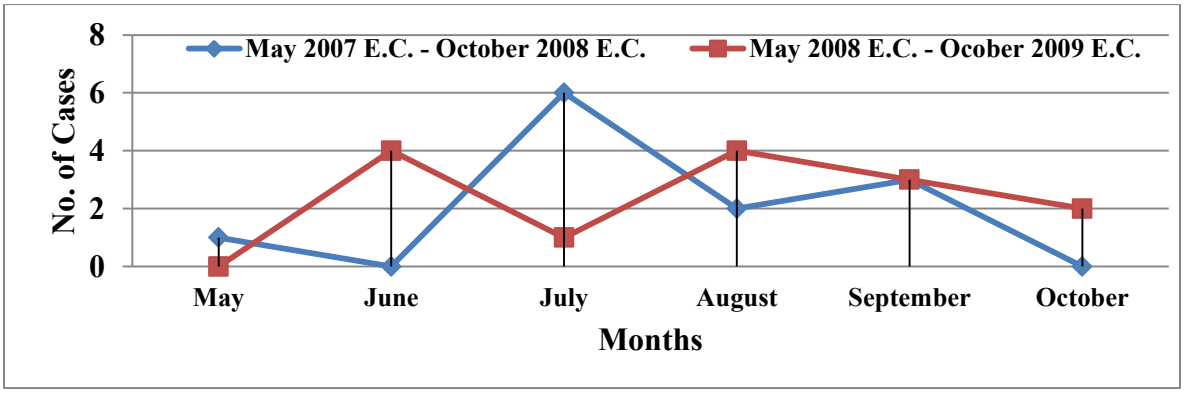

Figure 63 ***Trend of SAM cases from May/ 2007 – October/ 2008 E.C. and May/ 2008 – October/ 2009 E.C of Dangur Woreda in 2008 EFY of Assosa zone/ BGRS/ December2016***

Screening

The last screening was conducted in July 2008E.C. The screening modality that was adapted in the Woreda was CHD. The coverage of Vitamin A, screened of children and de-worming were 105.4% (10,577*100/10,032); 97.9% (9,830*100/10,032); and 102.2% (6,778*100/6,628) in respectively.

Preparedness

Emergency drugs and supplies for the coming one month that will be used for epidemic prone diseases were asked the PHEM officer. The officer verified that, some of the drugs like ringer lactate; ORS and doxycycline to treat AWD cases and coartem and RDT to treat malaria cases were available and enough for the coming one month.

But some drugs/ supplies like amoxicillin and tetracycline ointment and vitamin A to treat measles and CTC; lumbar puncture (LP) set; RDT (Pastorex) for meningitis; emergency reproductive health kit to provide basic emergency obstetric and new born care and emergency medicine and supplies to support care of rape survival care weren‘t available in the Woreda.

Risk Factors to Occur Epidemics

Malaria

Even though; **LLITNs** coverage reached **100%** in 2008 EFY; its utilization rate wasn‘t known. **IRS** coverage was reached **84 %** in 2008 EFY. Malaria is still a health risk in Dangur Woreda.

The presence of mosquito breeding site, interrupted rivers & unprotected irrigation sites in the Woredas could be risk factors for the occurrence of malaria outbreak in the Woreda.

Meningitis

During the last three years, there was no Meningitis epidemic and there were no vaccination conducted in the last 3 years in Dangur Woreda. Because of high population movement from different parts of the country for daily laborer; meningitis outbreak will anticipate to occur in the Woreda.

AWD

There is confirmed and on-going AWD outbreak in the Woreda from since 1 September/ 2009 E.C. A total of 118 AWD cases and 1 community deaths due to AWD were line listed till the assessment team reached the woreda

The latrine coverage was 86%; but the latrine utilization rate was not known. Safe water supply coverage data wasn‘t available in the Woreda health office. AWD outbreak will expect to be occurring as public health problem in the coming months in Dangur Woreda.

Measles

There is no ongoing measles outbreak in the Dangur Woreda. The measles vaccination coverage of 2008 EFY was 111%. SIA was conducted in 2008 EFY. Its coverage was 87%. Due to high people movement in the Woreda and poor cold chain system management; in the districts measles outbreak will anticipated.

Nutrition

Lack of adequate nutrition either due to household food insecurity and lack of awareness on proper feeding of children will underlie cause for major communicable diseases. Hence, malnutrition condition will anticipate in same Kebeles of Dangur Woreda.

Conclusion and Recommendation

Conclusions

- There was a functional multi-sectorial coordination forum with no regular frequency of meeting in all assessed woredas and zones.
- Malaria, Meningitis, measles, AWD outbreak and malnutrition condition will anticipated risk at regional level and at risk population groups were identified
- There wasn‘t emergency preparedness and response plan in the assessed Woredas and Zones supported by local government budget;
- No budget allocated to avail essential drugs & supplies including operational cost for emergence response despite ongoing AWD outbreak in the region;
- Stock out of drugs & supplies for meningitis & AWD cases management was observed at Zonal health department;
- Multi sector emergency coordination forum established at zonal & level but no regular coordination meeting at zonal & Woreda levels to share prevention & control responsibilities‘ among the sectors;
- Absence of complete, updated, compiled health & nutrition data for analysis, monitoring purpose, & use for evidence based decision making including data quality problems;
- Shortage of health professional (BSc in laboratory & pharmacy technologist) to improve health service quality (Kamash zone);
- Inadequate child care practices as caretakers or parents go too far for gold mining sites leaving their children at home the whole day with little or no one caring at home & at risk of malnutrition in Bambasi and Assosa woredas.
- Absence of stabilization center for managing severely malnourished children in Kamash Zone; SAM cases has been referred to Assosa hospital which is over 150 KMs far;
- Unavailability of therapeutic supplies such as RUTF, F100, F75 & second line drugs sufficient for three months in Assosa & Metekel zonal store;
- Lack of food for care takers at Stabilization centers leading to increased dropouts of SAM cases from inpatient care;
- Lack of resources (finance, logistics, and transportation) were some of the challenges mentioned during response to nutritional problems;
- Problem on data availability, accessibility, and data analysis for action in some Zonal health department and Woreda health offices was seen;
- Shortage of IRS and Abet chemical for malaria prevention and control exhibited in the assessed Woredas and Zones;

Recommendation

- Strengthening ongoing surveillance activities, periodic supportive supervision and intervention measure like- control and prevention of measles, malaria, AWD and meningitis;
- Measles Supplementary Immunization (SIA's) should be targeted in these areas because malnutrition can be predisposing factor for measles outbreak;
- Zonal and woredas EPRP should be supported by budget and Capacity building, training on PHEM to cope up with the high turnover of staffs by the RHB/PHEM;
- Revitalize the established rapid response team should be prior to any activities;
- Strengthening the multi-sectorial PHEM taskforces at all levels with regular meeting with documented minutes;
- Capacity building for health facility, Woreda & zonal PHEM officers on diseases early warning system (PHEM) on identification & management of major epidemic prone diseases so as to update their knowledge;
- Allocation of adequate budget for EPRP should be considered as well as reproductive health need to be included;
- Regular yearly capacity building of PHEM officers at different levels as part of enhancing diseases early warning system both event & indicator based diseases surveillance system;
- Capacity building for health workers & health extension workers on proper SAM & MAM cases management, proper recording of performance & reporting considering the high staff turnover in the region;
- Adequate reserve stock of therapeutic supplies need to be available so as to avoid service interruptions at operational level;
- Demand creation activities for mothers and caretakers on available nutrition interventions and also improved nutritional practices at household level;
- Expand & strengthen OTP & SC sites to ensure malnutrition cases management services accessibility to unreached areas;
- SC &stabilization centers expansion to Metekel zone should be considered as most of SAM cases are being reported from Metekel zone;
- Problem related to lack of food for care takers at Stabilization centers need to be addressed to reduce drop outs from inpatient care;
- Consider regular supportive supervision from RHB to lower level to strengthen OTP & SC as per the national guide line;
- Data management has to be improved at all levels (regular recording and reporting as well as data quality and self-assessment) for better public health action;

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8. Proposal for Epidemiologic Research Project

Assessment of Ownership and Factors Associated with Utilization of Insecticide Treated Nets at Household Level in Menge Woreda of Assosa Zone, Benishangul Gumuz Regional State, Western Ethiopia

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Introduction: - Ethiopia is among the few African countries with unstable malaria transmission. It is estimated that 75% of Ethiopian land mass is malarious, below 2000 meter of attitude and 68% (a round 63 million) of the country's population residing this area are at risk. This makes malaria a major health problem in Ethiopia with an average of 5 million cases a year and causes 70,000 deaths each year and account for 17% of outpatient visits to health institutions. It also accounts for (15%) of admissions and 29% of inpatient deaths. We intend to assess bottlenecks related with LLIN use at household level in Menge Woreda of Assosa Zone of Benishangul Gumuz Region State, Ethiopia.

Objective: - The study is aimed to assess of ownership and factors associated with utilization of insecticide treated nets at household level in Menge Woreda of Assosa Zone, Benishangul Gumuz Regional State; Western Ethiopia

Method: - A community based cross sectional Study design will be conducted. Data collection will be started in August 2017 and the final study finding will be submitted in October 2017. The study subjects will be all Households who received Insecticide Treated Nets within the last three years in Menge Woreda. The study households shall be selected systematically from the source population. A total of 680 households will be proportionally selected. Both self-reported information and direct observations will be used to collect data. Data will be entered to the computer using Epi info Version 14 and will be analyzed by using SPSS version 20. Statistical significance of the variables will be evaluated by logistic regression analytical tests using Odds ratio (OR), p-value of 0.05 and confidence interval 95%.

Work plan: Community based cross- sectional survey will be started on August 1, 2017 and will completed in 30th of October 2017.

Budget: The required cost for the study is estimated **36,069** ETH Birr

Introduction

Malaria is caused by parasites of the Plasmodium family and transmitted by female *Anopheles* mosquitoes. There are four different human malaria species (*P. falciparum*, *P. vivax*, *P. malariae* and *P. ovale*), of which *P. falciparum* and *P. vivax* are the most prevalent and *P. falciparum being* the most dangerous. *P. knowlesi* is a zoonotic plasmodium that is also known to infect humans [1].

Despite being preventable and treatable, malaria continues to have a devastating impact on people‘s health and livelihoods around the world. According to the latest available data, about 3.2 billion people are at risk of the disease in 97 countries, territories and areas in 2013, and an estimated 198 million cases occurred (range: 124 million–283 million). In the same year, the disease killed about 584 000 people (range: 367 000–755 000), mostly children aged under 5 years in sub-Saharan Africa [1].

In most countries where malaria is endemic, the disease disproportionately affects poor and disadvantaged people, who have limited access to health facilities and can barely afford the recommended treatment. Between 2001 and 2013, a substantial expansion of malaria interventions contributed to a 47% decline in malaria mortality rates globally, averting an estimated 4.3 million deaths [2].

Malaria is one of the commonest infectious diseases having a global distribution, About 3.3 (40 %) Billion of the world populations who are living in tropical and subtropical climates are exposed to malaria [3]. The World Malaria Report of 2015 summarizes data received from 97 malaria-endemic countries and territories, had on-going malaria transmission and further 6 countries that have recently eliminated malaria [4]

According to the WHO estimates, there were 214 million cases of malaria in 2015, The African Region accounted for most global cases of malaria (88%), and an estimated 438 000 (90%) of all malaria deaths occur there and particularly children under five years age are susceptible to malaria illness, infection and deaths. In 2015, malaria death an estimated 306 000 under-fives globally and 292 000 death of children occurred in the African Region. Africa is the most affected continent [3 and 4].

Ethiopia is among the few African countries with unstable malaria transmission. It is estimated that 75% of Ethiopian land mass is malarious, below 2000 meter of attitude and 68% (round 63 million) of country‘s populations are at risk [3, 5].This makes malaria a major health problem in Ethiopia with an average of 5 million cases a year [5] and causes 70,000 deaths each year and account for 17% of outpatient visits to health institutions. It also accounts for (15%) of admissions and 29% of inpatient deaths. Occurrences in distribution of both malaria cases and vectors within endemic areas have significant differences. Malaria epidemic transmission increase during rainy season due to high

environmental temperature and collected water body, both of which are ideal conditions for breeding of mosquitoes [3, 6] This shows a strong seasonal pattern –with a slacken off time varying from a few weeks at the beginning of the rainy season to more than a month at the end of the rainy season" [6].

Recognizing the disease as a priority health problem, organized intervention efforts were initiated during the late 1950s. Since 1980, ITN implementation, strong malaria prevention and control activities have been carried out, and significant achievements were made through malaria control [5, 6]. In June 2005 Presidents Malaria Initiative (PMI) was launched to rapidly scale up malaria prevention and treatment interventions and reduce malaria-related mortality by 50% in 15 high-burden countries in sub-Saharan Africa. After three year implementation in scaling up key malaria interventions, Ethiopia falls short of reaching either Roll Back Malaria (RBM)_s target goal of 80% coverage for key interventions or more ambitious goal of 100% household Insecticide Treated Net (ITN) ownership [8, 10].

There was wide gap between coverage and utilization of ITNs [11]. This shows that, mosquito net ownership in itself did not mean of utilization. Since; in addition to scale up ITN distribution, periodic assessment of the utilization and contributing factors among high risk population is highly recommended [9 and 10]. This study aimed at assesses magnitude of ownership and determine potential factors associated with utilization of ITNs at household level in a malaria endemic Kebele of Menge Woreda.

Statement of the Problem

Malaria has been a major challenge to both public health and socio-economic development particularly in countries sub-Saharan African [8]. Malaria is a complex and deadly disease that puts approximately 3.3 (40%) billion people at risk globally [3] and According to world malaria report 2015, Malaria cases estimated 214 million cases, incidence rate 37% with up to approximately 88% of cases and 90% of deaths occur in Africa with children under five years of age and pregnant women being most severely affected [11].

Vector control is the main way to prevent and reduce malaria transmission. From such measures, Insecticide- treated nets are the most powerful malaria control tools and have been an important component of global and national malaria control policies [4]. In 2015, ITNs Coverage has increased rapidly in some Countries of sub-Saharan Africa, with household ITN ownership reaching more than half (56%) of the population had access to an ITN, compared to less than 2% in 2000 [4, 7].

In Ethiopia, the Federal Ministry of Health (FMOH) conducted continuously mass distribution of LLINs between 2005 and 2007, targeting to distribute two LLINs per household in malaria endemic areas and further 28.5 million were distributed in 2014 and 2015 to replace LLINs distributed previously [7, 12]. Despite the 2005 rapid scale up ITNs possession each Kebele, there was wide gap utilization and all ITNs weren‘t use after three years [10 and 14].

Expanding of ownership of ITNs with proper use by household can make a substantial reduction in malaria mortality. But to what extent are nets that are owned actually used? Which household members are most and least, likely to sleep under it? How many family members sleep under a net and what are the most common groups likely to have sleep under a net? What happens to these patterns when the family acquires more than 2 net? And which condition of ITN, housing and environment factors affecting ITN utilization? Several studies on ITNs among household have concentrated on effectiveness of ITNs in malaria control, accessibility, availability and ownership of ITNs, in despite of, their discrepancy of utilization of ITN at household.

So Malaria is the leading cause of morbidity and mortality in Menge Woreda, especially with children less than five years of age and pregnant women being most severely affected. Locally, there is a serious lack of information and knowledge about current level of ITN coverage. Specially, data about ITNs utilization rate and factors affecting utilization and demand of the households were not assessed in the study area. In line with this particular study, the study will also try to elicit the gap that influence factors associated with insecticide treated nets of household‘s level in the study area.

Literature Review

Malaria has been a major challenge to both public health and socio-economic development in the world, particularly in sub-Saharan African countries like Ethiopia. The socioeconomic burden resulting from malaria is immense: 1) the high morbidity and mortality rate in the adult population significantly reduces production activities; 2) the increased school absenteeism during malaria epidemics significantly reduces learning capacity of students; 3) malaria epidemics overwhelms the capacity of the health services in Ethiopia, and thus substantially increases public health expenditures [7, 15].

Malaria is a preventable and treatable mosquito-borne disease, whose main victims are vulnerable groups: visitors (from highland or malaria free), immune compromised & elderly people, Pregnant woman and children under five years of age especially in Africa. The main way to prevent and reduce malaria transmission is vector control. Among this preventive measures: use of Insecticide treated nets (ITNs) remain effective tools for malaria prevention and can significantly reduce severe disease and mortality due to malaria, especially among the most vulnerable groups/ under-five children and pregnant women [3, 5, 7, 8].

The Ethiopia National Malaria Strategic Plan recognizes use of LLINs as a cornerstone for malaria disease prevention in the country. The key strategy used by the country is a rolling periodic (every three years) free distribution of LLINs to all population groups living in endemic, high and moderate malaria risk areas of Ethiopia. One LLIN per household was used as an operational guideline until 2011. That policy was then changed and, currently, Ethiopia aims to achieve universal coverage by distributing one LLIN per 1.8 persons through mass, free distribution campaigns at the community level through the HEWs and/or health facilities [5].

In 2007EFY Ethiopia has distributed about 17.2 million LLINs, this was more than the amount distributed in EFY 2006 (11.7 million). This increased the cumulative number of distributed LLINs to 75,876,866 in 2007EFY [3]. Usually, ITNs are distributed by periodic mass campaigns that occur about every three years in rotation using micro planning data. The FMOH generally does support routine ITN distribution by ANC or EPI clinics [4, 11 and 16].

The recent 2015 MIS showed significant improvements in LLIN household ownership in malaria risk areas from 3.5% in 2005 (DHS 2005) to 65.6% in 2007 and 55% in 2011 (MIS 2007, 2011). The proportion of children under five year of age who used an LLIN and who living below 2,000 meters increased from 1.6% in 2005 (DHS) to 42% in 2007 G.C and 38% in 2011 [5, 11].

Nationally, progress has been observed in terms of net use among children under five in households that owned nets. The percentage of children under five who had slept under a

mosquito net the night preceding the survey was 33.2% in MIS 2007, increasing to 64.5% in 2011. Tigray Region State demonstrated the highest increase, with 47.3% in 2007 and 67.7% in 2011 [16]. Study done in Oromiya and Amhara Region State, 63% of study subjects owned more than one ITN. The mean number of ITNs owned by ITN-owning households was 1.78 (95% CI 1.72 - 1.83) and [91.85 (95% CI 1.78 - 1.91) respectively [18]

Justification of the Study

Malaria is an endemic disease in all (24) Kebeles of the Menge Woreda throughout the Year, All populations [54,683 (100%)] are at risk. Despite different interventions, malaria is continuing to be one of the major public health problems in the Woreda. Among the strategies ITNs utilization is internationally recognized standard to protect from malaria. According to Woreda report; ITNs coverage of Menge Woreda reached 94% in 20008 EFY.

Despite different interventions, malaria is continuing to be one of the major public health problems in the Woreda. ITNs utilization is internationally recognized standard to protect from malaria .However, ITNS utilization at household levels yet not known in Menge Woreda. In addition there is shortage of evidences regarding factors affecting ITNs utilization in the Woreda too. Health planners and Decision makers are willing to have evidence regarding up on this issue due to malaria increment from time to time in the Woreda despite the higher intervention of the cases. This calls for a need to identify and calculate the pattern of ITN utilization and determine associated factors in rural and urban malaria-endemic of Menge Woreda.

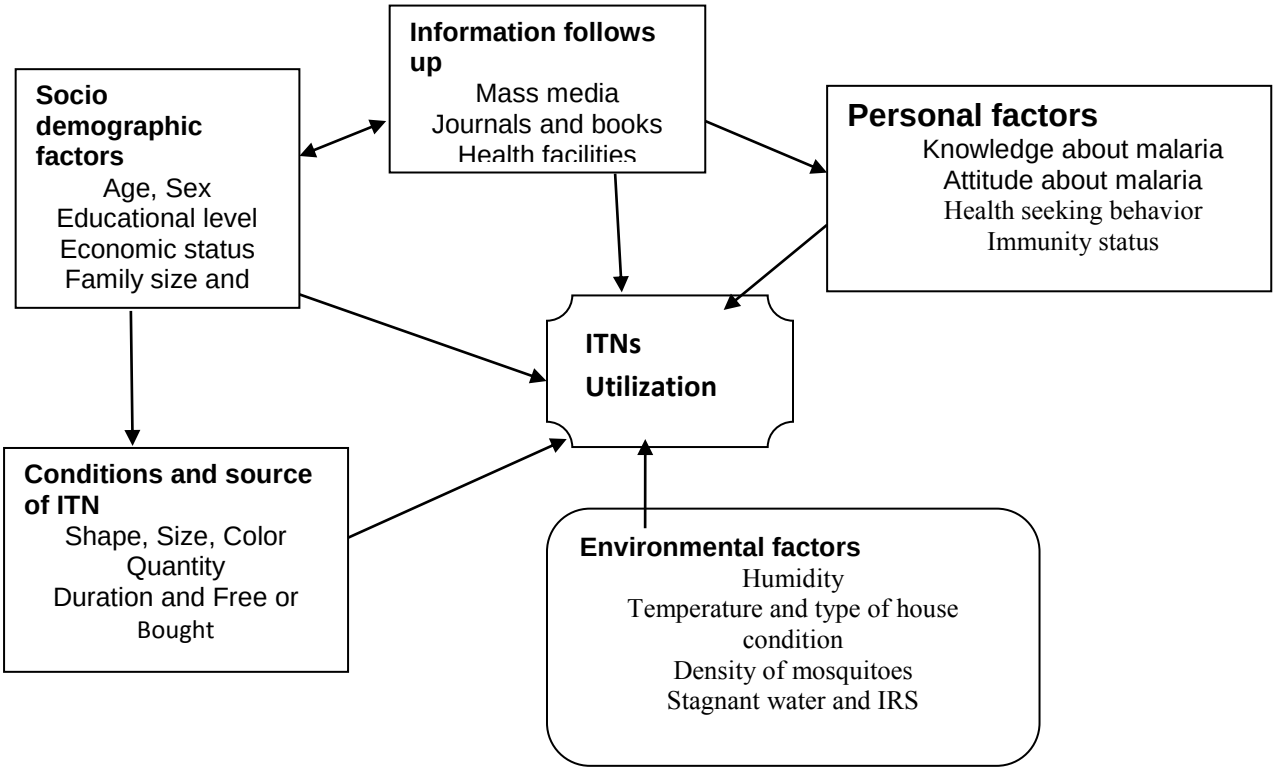
Significant of the Study

This study will be generate information that helps malaria control program to improve ITN strategies and design interventions to prevent malaria, and the study helps to assesses magnitude of ownership and to determine gaps in ITN utilization for designing appropriate information, education and communication (IEC) interventions towards improving its utilization at household level.

The result will also be useful to evaluate the progress of the Woreda towards achieving the regional and national target of SDG and to take immediate actions in planning and implementation of prevention and control strategies of malaria.

The finding shall serve as base line for the Woreda Health Office to develop appropriate plan to increase ITN utilization at household level. Information generated will helps as a baseline for further interventional research of malaria.

Conceptual Frame Work for Factors affecting LLITNs Utilization



Objectives

General objective

- To assess of ownership and factors associated with utilization of insecticide treated nets at household level in Menge Woreda of Assosa Zone, Benishangul Gumuz Regional State, Western Ethiopia

Specific objectives

- To identify the proportion of households with ITNs among householders in Menge Woreda
- To determine the utilization of ITNs in house hold level for those malaria at risk groups
- To identify factors that associated with utilization of insecticide treated nets

Methods and material

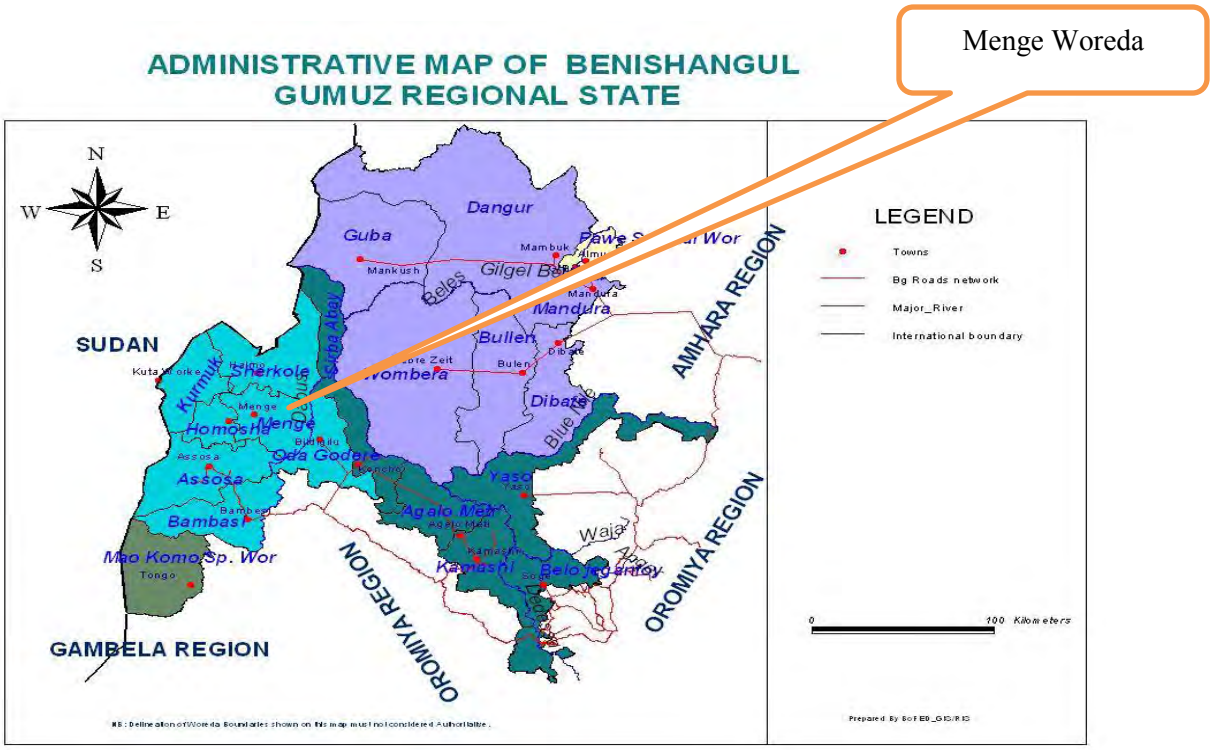
Study Area

Benishangul Gumuz Regional State /BGRS/ is one of the nine regional states that constituted the Federal Democratic Republic of Ethiopia /FDRE/. It located in Western part of the country. The Region is divided into 19 administrative Woredas; three Zones, one special Woreda and one town administration [19].

Menge Woreda is one of 7 Woreda's of Assosa Zone with high prevalence of malaria throughout the year. The Woreda has 24 Kebeles. It is located 735 KM far from Addis Ababa at Western direction and 56 KM North direction from Regional Capital City of Assosa Menge Woreda is bounding by Sherkole in North, Assosa in South, Oda-Bilidigilu in West and Homosha Woreda in East. The range of altitude and average annual rain fall is from 690 MASL to 1500 MASL above sea level and range from 1400 ml-1500ml per year, respectively. The Woreda has two climatic zone.' kola' and 'Weina dega' 'Kola' encompasses 75%, and 'Weinadega' encompasses 25%

The total population of Menge Woreda reached 54,683 according to the 2007 Central Statistics Agency population census projection [20]. All Population are living in malarious are. The total number of households is estimated to be 11,393 with the assumption of average household size of 4.8 [21].The main incomes of Menge Woreda population are agriculture, cattle breeding and traditional gold panning/ digging, as well as small trading.

Figure: 72 - *Map of Menge Woredas of Assosa Zone; BGRS; Ethiopia; April 2017*



Study design

A community based cross sectional Study design will be conducted. Quantitative data will be collected from head of household members who received LLITN in the past three years.

Study period

Data collection will be started in August 2017 and the final study shall be completed in October 2017.

Source Population

The study population will be all Households who received ITNS within the last three years in Menge Woreda

Study Population

The study population shall be selected using random sampling techniques from the source population

Study Unit

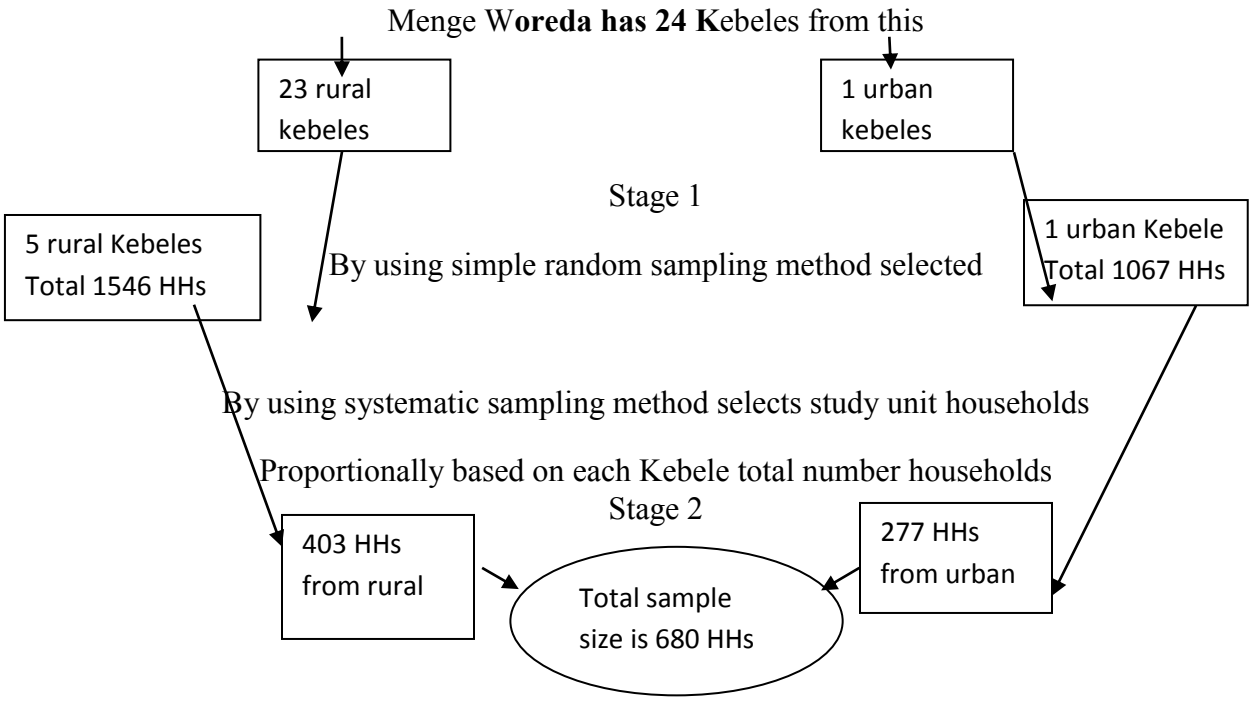
Households shall be selected using systematic sampling techniques from the study population

Sample Size Determination

The sample size of the study will be determine using Epi info stat calc. function with the following assumptions: By taking the single population Proportion sampling method and taking 71 % proportion of ITNs utilization in Arbaminch Town and the malarious villages of Arbaminch Zuria Districts Feb 2007 with marginal error of 5% and confidence interval of 95%. Assuming 10% none response rate and including in the sample unit by using design effect=618*10%=62 then 618+62=680. Total sample size required will be 680 households.

Sampling technique

By using multi stage sampling method, among the 24 (23 rural, 1 urban) malaria endemic Kebeles, six (5 from rural, 1 from urban) malaria endemic Kebeles will be selected by simple random sampling method. Then we will distribute the total sample size proportionally to each selected Kebele according to their total number of households. Finally, will be selected the study unit of households will be selected by systematic sampling method based on house hold registry found at Kebele administrative Office.



Inclusion and Exclusion Criteria

Households which received ITNS from BGRS in the past four will be **included** in the study. The House hold heads not volunteer for interview and absent during visiting will be excluded in the study.

Data Quality

Quality of data will be assured by giving a three days training for the data collectors and supervisors towards the objective of the study, the right and benefit of the study participant, clarification terminologies, how to fill data on hard copy and daily supervision activities . Data collectors will be enrolled from the study Woreda and who have diploma and working experience on health data collection and supervisors will be also recruited based on their educational back ground (BSc and above) with supervising experience. We will use semi structured questionnaires which consist of socio economic questions and determinant risk factors associated with utilization of insecticide treated nets (ITNs). The data will be collected thoroughly from systematic selected house hold by interviewing the house hold head. There will be daily supervision of th3 data collectors in their daily activities.

Data Collection Tool

We will use the National Malaria Indicator Survey semi- structured questionnaire and we will translate from the English version in to the local language (Amharic) then back to the original version to maintain its consistency. The questionnaire will have socio-demographic variables and variables related to ITNs utilization.

Data Collection Procedure

Initially the data collectors and supervisors will take three days training on their specific duties. Then the study team will be deployed to the study sites to collect data from the selected study units by following the data collection procedures.

Data Analysis

Data will be cleaned and analyzed to understand associated factors for utilization of insecticide treated nets (ITNs). The data will be entered by data clerk using Epi Info version 7 and analyzed using SPSS version 20. Statistical significance of the variables will be evaluated by logistic regression analytical tests using Odds ratio (OR), p-value of 0.05 and confidence interval 95%.

Ethical Considerations

Ethical approval will be obtained from the Research Ethical Review Committee of Addis Ababa University and permission will be get from Addis Ababa University Field Epidemiology program coordinators, from BGRS health bureau PHEM case team. Before data collection informed written consent will be gained from participants through thumb impression/signature after explaining the aims and objectives of the study. All respondents will free to withdraw from the study at any time without any consequence. Confidentiality to participants will be guaranteed by using only codes and their information will not reveal to anyone. No one will be obliged to participate unless otherwise agreed to take part.

Variables

Dependant variables: LLITNs utilization

Independent variable

- Demographic characteristic (Age, Sex)
- Socio-economic factors (Occupation, Marital status, Religion, Educational status, Family size and Composition and Family Income)
- ITN related factors (Distance from health facilities; Prior history of illness due to malaria; Source of information on ITNs; Conditions and source of ITN; Types and condition of house; Environmental factors and Health seeking behavior

Operational definitions

ITN utilization- The use of standardized properly hanged (mounted) over the bed or the Sleeping area and less than 5 years of age child and pregnant women sleeping under the Mosquito net during the early morning of observation day.

An insecticide-treated net is a mosquito net that repels disables and/or kills mosquitoes coming into contact with insecticide on the netting material. There are two categories of ITNs: conventionally treated nets and long-lasting insecticidal nets:

A long-lasting insecticidal net is a factory-treated mosquito net made with netting material that has insecticide incorporated within or bound around the fibers. The net must retain its effective biological activity without re-treatment for at least 20 WHO standard washes under laboratory conditions and three years of recommended use under field conditions.

Insecticide treated nets utilization: Is defined as having slept under a treated net during the night preceding the data collection date;

Presence of river: A river found in one kilo meter radius of the living house

Presence of stagnant water: Collected water which is motionless and having an unpleasant smell found around the living house;

Data dissemination

The study result will be disseminated to Benishangul Gumuz RHB, Assosa Zone Health Department and Menge Woreda Health Office. One day briefing will conduct in Menge Woreda Health Office staffs related to the study result.

Work plan and Budget

This study is planned and Budgeted of three month duration to conducting from pre preparation of proposal, to data collection, analyze and the major activities and implementation that will be done throughout project with estimated cost of that needed. See in table-39. And will be overseen by the collaboration of National and Regional public Health Emergency Management (PHEM) department.

Work plan

Table: -38 *Schedule for the assessment of ownership and factors associated with utilization of insecticide treated nets at household level in Menge Woreda of Assosa Zone, Benishangul Gumuz Regional State, and Western Ethiopia*

S/N	Activity	Responsibility	Time Schedule												Remark
			August 2016				September 2016				October 2016				
			Week1	Week2	Wee3	Week4	Week1	Week2	Week3	Week4	Week1	Week2	Week3	Week4	
1	Proposal writing	PI													
2	Ethical clearance	PI													
3	Travel to the Zone, then Woreda	PI													
4	Discussing with Zonal and Woreda health office and select data collector	PI													
5	Travel to Woreda	PI													
6	Training will give to data collectors	Pi													
7	Data collection	DC													
8	Entering data to the computer editing	DCL													
9	Data analysis	PI													
10	Finalizing document and sending 1st draft	PI													
11	Revision of 1st draft after comment	PI													
12	Submission of final documents	PI													

PI=Principal Investigator, S=supervisor, DC=Data Collector, DaC= Data Clerk

Budget

Table: -39 *Budget for the assessment of ownership and factors associated with utilization of insecticide treated nets at household level in Menge Woreda of Assosa Zone, Benishangul Gumuz Regional State, and Western Ethiopia*

S/No	**Budget Category**	**Item /Personnel**	**Unit cost (birr)**	**Multiplying factor**	**Total cost**	Remark
1.		Transportation fee	200	1*10*200	2,000	
Sub-Total 1					**2,000**	
		Principal investigator	450	1*10*450	4,500	
		Principal investigator	450	1*10*450	4,500	
		Principal investigator	450	1*10*450	4,500	
		Supervisor	350	1*10*350	3,500	
		Data collector	200	2*10*200	4,000	
2.	Per diem	Data Clerk	200	1*6*200	1,200	
Sub-Total 2					**22,200**	
		Pen	10	10*50*2	1,000	
		Pencil	5	5*60*2	600	
		Eraser	25	25*15	375	
		Sharpener	25	25*15	375	
		Flip chart	250	250*4	1,000	
		Paper	120	120*3	360	
		Photo copy	1	1*500	500	
		Marker	60	60*5	300	
		Printing paper	120	120*4	480	
3.	**Stationaries**	Printing, copying and binding	50	50*4	200	
Sub-Total 3					**5,190**	
	Training and	Briefing result	2400	2400	2,400	
4.	Refreshment	Hall rent	1000	1000	1,000	
Sub-Total 4					**3,400**	
Total = (Sub-Total 1 + Sub-Total 2 + Sub-Total 3 + Sub-Total 4					**32,790**	

Amount estimated contingency 10 percent of the total estimated cost **(3,279).** Ground total = Total estimated + 10% contingency from total cost **(36,069)**

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9. Additional Outputs

Water Quality Testing of Sedal Woreda, Kamash Zone of Benishangul Gumuz Regional State/ Ethiopia/ October 2009 EC

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Introduction: Water is located in all region of the earth. The problem is that the distribution, quality, quantity, and mode of occurrence. It is highly variables/ distinguishes form one locality to another.

Objective: - to determine biological parameter and sanitary survey of Sedal Woreda of Kamash zone water supply Sample collection: We conducted catch sampling methods; this means a sample collected at a particular time and place. It can represent only the composition of the source at that time and place. Water quality analysis was conducted from 5-13/2/2009 E.C. Bacteriological characteristics Parameter; are that parameter whether or not total and faecal coli form present in improved water supply. Coli form bacteria are defined as gram negative, rod shaped, and capable of growing in the presence of bile salt or other surface active agent like broth.

Result: The findings verified that; out of 26; 4 (15.4%) of water schemes were contaminated with fecal coliforms and 13 (50%) water points also other organism was isolated. The sanitary survey assessment confirmed that; out of 26 water points; 9 (34.6%) was very high risk of contamination and 15 (57.7%) was some risk of contamination. The bacteriological water assessment confirmed that; 17 (65.4%) water schemes were not bacteriological potable or against to the WHO standard of water supply and need very urgent water treatment.

Conclusion: We concluded that, the suspected cholera or acute watery diarrhea outbreak in Sedal Woreda was due to the contaminated water supply. Regular water treatment must apply in each point.

Introduction

Water is located in all region of the earth. The problem is that the distribution, quality, quantity, and mode of occurrence. It is highly variables/ distinguishes form one locality to another [1].

Water is a basic necessity for life. Unfortunately not all water helps human to survive. Water from contaminated source causes numerous diseases and untimely deaths. The fact that human needs water and cannot live without it, forces him/her to use it even for drinking purposes. As a result, many people suffer or die from water borne diseases. Hence every county have to take preventive measure to avoid pollution and contamination of the available water resources. Therefore, public water supply must be potable, palatable and wholesome. Water must not have disagreeable physical change and must be hygienically safe [2].

According to WHO survey 80% of all illness in developing country are water associated. The use of unsafe water cause high prevalence and incidences of diarrhea diseases among children resulting high infants and children mortality. Water supply and basic sanitation have emerged as primary health care components so that it will be able to alleviate the associated morbidity and mortality [2].

Communicable diseases which may be transmitted by water include bacteria, viral and protozoa infections [3].

Numerous parameters are used to determine the suitability of water and health significance of contaminants that may be found in protected or unprotected and treated or untreated water [4].

Generally quality of water is defined by physical, chemical and biological characteristics depending on the types of parameters. And also the quality of purified water is graded according to the amount of biological matter, dissolved and/or organic and inorganic materials it contents [4].

Objective

General Objective

- To determine biological parameter and sanitary survey of Sedal Woreda of Kamash zone water supply

Specific Objective

- To determine the faecal coli form isolated at 44^0c contaminant of Sedal Woreda of Kamash zone water supply.
- To determine other organism isolated at 44^0c of Sedal Woreda of Kamash zone Woreda water supply.
- To determine sanitary condition and risk of contaminates Sedal Woreda of Kamash zone water supply.

Method and Material

Investigation Area

Sedal Woreda is among one of the 5 Woredas of Kamash Zone of Benishangul Gumuz regional state; located by 152 Km from the regional Capital (Assosa) and about 625 Km from Addis Ababa. The Woreda has changed its name from Seribabay (means dancing of Abay River in Afan Oromo. The total population of the woreda reached 27,721 based on the 2007 census projection. It comprised of 13 Kebeles (12 rural and 1 urban); all Kebeles founded in the gorge of Abay (Blue Nile) river. 26 water points was tested on bacteriological and conducted sanitary survey.

Sample Collection

We conducted catch sampling methods; this means a sample collected at a particular time and place. It can represent only the composition of the source at that time and place.

Study Period

Water quality analysis was conducted from 5-13/2/2009 E.C.

Sample size

26 water points (4 hand dug well; 19 shallow well, 1 spring and 1 river) were sampled.

Sampling technique

Cleaned the tap

Remove from the tap any attachments that may cause splashing and using a clean cloth, wipe the outlet in order to remove any dirt.

Up and down stock of the pump

Turn on the tap at maximum flow rate and let the water flow for 1-2 minutes.

. Up and down stock prior to sampled

Carefully turn on the tap and allow the water to flow for 1- 2 minutes at a medium flow rate.

Filled the bottle

While holding the cap and protective cover face downwards (so as to prevent entry of dust that might carry microorganisms) immediately hold the bottle under the water jar and fill.

Left Air Space

A small air space was left to facilitate shaking at the time of inoculation prior to analysis.

Operational Definition

Grab/ Catch Sampling: is a method of sample collection at a particular time and place.

Potable/Safe water: is water potentially free from dangerous pathogenic organism; excessive/ undesirable minerals‘ and regulated essential elements/ chemical of water supply and safe to drink.

Water supply: a system for supplying water for a community or the act of water provided for a community.

Water Quality Testing: is the process of determining physical, chemical and bacteriological parameter of improved water supply incompliance with WHO water supply guideline.

Water Quality: is defined its physical, chemical and bacteriological characteristics or parameter of improved water.

Water Treatment/ disinfection; is the process of removing of all those total and faecal coli form which are potentially danger for human and domestic use from improved water supply.

Bacteriological characteristics Parameter; are those parameter whether or not total and faecal coli form present in improved water supply.

Improved water supply; those schemes of HDW, SW, DW which is pump installed and protected spring (in the spot/ gravity spring).

Coli form bacteria are defined as gram negative, rod shaped, and capable of growing in the presence of bile salt or other surface active agent like broth.

Material used

Graduated flask ; Aluminum Petri dishes; Stainless steel Forceps; Impregnated pad dispenser; Graduate Pipette; Steam sterilizer; Suction pump; Boiler (electrical and kerosene type); Sample collection bottle; Incubator; Polypropylene bottle; Consumables items used; Membrane filters; Pads; Membrane broth sulfate (powder form); Distilled water; Cotton and soft; Alcohol and kerosene

Testing procedure

Media preparation

- Weighted 38.1 gram dehydrated powdered membrane Laurly sulphate broth and added to 500ml distilled water in a conical flask.
- Heated the mixture with constant agitation until the powder was fully dissolved.
- Dispensed the medium into a clean 60ml poly propylene bottle.
- Replaced the bottle top loosely.
- Placed the bottle in a pressure cooker and maintain steam at pressure for 15 minutes.
- Removed bottle, allowed to cool, tighten top, and stored in a cool, clean and dark environment.

Bacteriological testing procedure

- Assembled the filtration unit and suction device.
- Put impregnated pad in a sterilized Petri dish by using pad dispenser.
- Added 2.5ml sulfate broth into impregnate pad using pipette.
- Using sterilized blunt ended forceps, placed a sterile membrane filter, grid side upper most on the filter base.
- Mixed thoroughly the sampled water by inverting the bottle several times
- Applied hand suction to draw the sampled to through the filter membrane.
- Using sterilized blunt ended forceps aseptically removed the membrane from filtration unit and placed it in grid side upper most on the culture medium pad in the Petri dish.
- Ensured no air bubbles trapped under the membrane. Closed the Petri dish, labeled the top of the lid with code number of the water sampled and volume of the water used.
- Leaved at an hour before incubated the sampled water at 37^0c and 44^0c for 16 hours.

Counting coli form and other organisms

- Following incubation, using oblique light examined the membrane yellow fermentation colonies greater than or equal to 1mm in diameter.
- Counted the number of the colonies and reported as colony forming unit (CFU).
- Any pink colonies were reported as other organisms isolated at 44^0c.
- Very small yellow fermentation colonies (less than 1mm in diameter) were excluded in counting.
- Recorded the result as fecal coli form per100 ml on the record sheet that was incubated at 44^0c
- Indicates of gross contamination and difficult to count were reported as too numerous to count.
- We used WHO water quality standard to interpreted water quality analysis.

Sanitary Survey

One (1) point is given for each _Yes‘ answer. Add up the total number of _Yes‘ answers to get the sanitary risk score.

Note: Sanitary risk score:

6 – 7 = very high-risk of contamination

4 – 5 = high-risk of contamination

2 – 3 = some risk of contamination

0 – 1 = low risk of contamination

Result

Bacteriological

The findings verified that; out of **26; 4 (15.4%)** of water schemes were contaminated with fecal coliforms and **13 (50%)** water points also other organism was isolated.

Fecal coli form at 44^{o}c Result

Mean count at 44^{0}c/100ml (E. coli count)	**Category**	**Comment**	**Number**
0	**A**	Excellent	**9**
1 – 10	**B**	Acceptable; But make regular sanitary checks.	**0**
11 – 50	**C**	Unacceptable: Look for and correct structural faults and disinfect equipment's and sources.	**0**
>50 & too numerous to count	**D**	Grossly polluted Carry out necessary repairs and disinfect well	**4**

Source *WHO (1997) Guidelines for Drinking water Quality, Volume 3: Surveillance and control of community supplies. World Health Organization, Geneva.*

Other Organism isolated at 44^{0}c Result

Other organism isolated at 37^{o}c 44^{0}c	**Number**
0	**0**
1 – 10	**0**
11 – 50	**0**
>50 & too numerous to count	**13**

Sanitary Survey

The sanitary survey assessment confirmed that; out of **26 water points; 9 (34.6%)** was very high risk of contamination and **15 (57.7%)** was some risk of contamination.

Score	**Category**	**Number**
6-7 yes	very high-risk of contamination	**1**
4 – 5 yes	high-risk of contamination	**9**
2 – 3 yes	some risk of contamination	**15**
0 – 1 yes	low risk of contamination	**1**

Source Water Aid Ethiopia policy guideline on water quality,

Discussion

The bacteriological analysis of water can confirm whether a water supply has been fecal contaminated or not. To search directly in a water sample for the presence of specific or individual enteric pathogen is impractical for routine controls [4].

Coli form bacteria are defined as gram negative, rod shaped, and capable of growing in the presence of bile salt or other surface active agent like broth. Coli form bacteria are hardly organisms that survive in water longer than most pathogens. They are also relatively easy to detect [4]. Total coli form test is particularly applicable to the analysis of drinking water for determination of its sanitary condition [4].

Fecal coli form test is more appropriate for monitoring of pollution. The most important member of this group is *escherica coli,* which has been used as indicator of fecal pollution. Various genera of E. coli are the origins of diarrhea diseases in children and infants. It concern about environmental problem [4].

When no normal fecal bacteria detected in the sample, it is probable that enteric pathogen (usually present in much smaller number) are also absent. The vice versa is also true [4].

The bacteriological water assessment confirmed that; **17 (65.4%)** water schemes were not bacteriological potable need very urgent water treatment [4].

Bacteriological potable	Number	Percentage
Yes	**9**	**34.6**
No	**17**	**65.4**

Sanitary Survey; One (1) point is given for each _Yes‘ answer of the result. Added up the total number of _Yes‘ answers, to get the sanitary risk score [3];

- 6 – 7 = very high-risk of contamination
- 4 – 5 = high-risk of contamination
- 2 – 3 = some risk of contamination
- 0 – 1 = low risk of contamination

The sanitary survey result verified that; **1 (3.8%); 9 (34.6%); 15 (57.7%) and 1 (3.8%);** water schemes were very high risk of contamination; high risk of contamination; some risk and no risk respectively [3].

Conclusion

We concluded that,

- The suspected cholera or acute watery diarrhea outbreak in Sedal Woreda may be due to the contaminated water supply.
- From the tested scheme **17 (65.4%)** water points were not bacteriological potable for drinking water.
- All water points was very high risk of contamination

Recommendation

- Regular water treatment should be applied in each scheme.
- Training for woreda water disk and health office staffs related to water quality mapping and water scheme treatment.
- Sanitary survey should be done at interval and any changed observed.
- Each water scheme should be fenced
- Cracked HWD/ SW slab and manhole should maintained/ plastered
- Grossly polluted on bacteriological parameter must disinfected with high dose of disinfectant and dewatered until the scheme reached acceptable dose of chlorine.

Reference

1. WHO (1997) Guidelines for Drinking water Quality, Volume 3: Surveillance and control of community supplies. World Health Organization, Geneva.
2. T. G/Emanuel lecture note for Environmental health students
3. WaterAid Ethiopia policy guideline on water quality,
4. Assessing Microbial Safely of Drinking Water, improved approach and methods, published on behalf of the WHO and organizational for economic cooperation and the organizational for economic cooperation and development.
5. Palintest guide line and calibrated chart

Weekly Bulletins of Benishangul Gumuz Regional State Health Bureau; Public Health Emergency Management Case Team

BENISHANGUL GUMUZ REGIONAL STATE HEALTH BUREAU

PUBLIC HEALTH EMERGENCY MANAGEMENT (PHEM) CASE TEAM

WEEKLY PHEM BULLETIN

Week - 30 Weekly Bulletin (18/11/2008 E.C.-24/11/2008E.C.)

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The writer and editors are ready to receive your constructive comments and suggestions for the improvement of PHEM case team

Highlights of the Week-30 Bulletin

- *Weekly reportable diseases cases load and distribution.*
- *Immediately reportable disease status*
- *The regional PHEM report completeness and timeliness*

Introduction

PHEM is designed to ensure rapid detection of any public health threats, preparedness related to logistic and fund administration, and prompt response to and recovery from various public health emergencies. PHEM is the process of anticipating, preventing, preparing for, detecting, responding to, controlling and recovering from consequences of public health threats in order that health and economic impacts are minimized.

This weekly bulletin provides information on caseload and distribution of immediate and weekly reportable diseases and condition for decision makers, partners working in the region that enables to take immediate responses to alleviate the problem.

This bulletin will play its role by delivering of information of public health surveillance status of the region. In this regards, this bulletin was prepared by summarizing of epidemiological **week – 30 (18/11/2008 – 24/11/2008 E.C.)** of both weekly and immediately reportable diseases and condition under public health emergency management (PHEM) case team of Benishangul Gumuz Regional State.

1. Malaria

The systematically collected and analyzed data from BG regional PHEM case team of **week-30 (18 – 24/11/2008 E.C.)** verified that; a total of **12,285 malaria suspected** cases was examined by RDT or microscopy and a total of **5,713 malaria** (clinical + parasitological confirmed) case were reported. **Week-30 m**alaria detection rate from total suspected fever was **46.5% (5,713/12,285*100/)**

From the total malaria cases; **88.4% (5,048/5,713*100)** cases were parasitological confirmed. Clinical based malaria treatment rate of WHO Week-30/2016 G.C was **11.6% (665/5,713*100).** Among confirmed cases; **plasmodium falciparum** constitutes **82.1% (4,144/5,048*100)** while the rest **17.9% (904/5,048*100)** were **plasmodium vivax**. Total inpatients due to malaria were cases **83** and **one malaria death was reported from Sherkole woreda.**

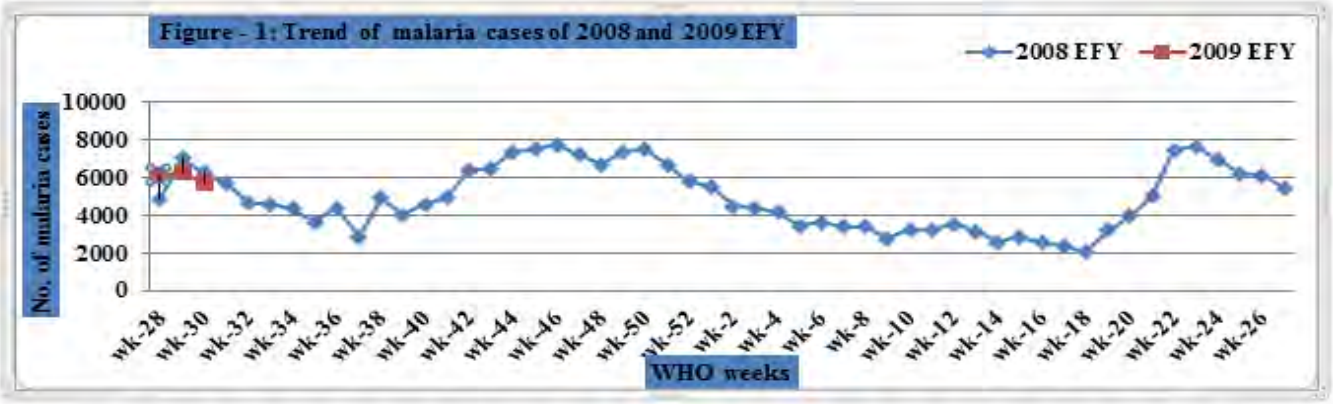
Figure - 1: Trend of malaria cases of 2008 and 2009 EFY
2008 EFY
2009 EFY
No. of malaria cases
10000
8000
6000
4000
2000
0
wk-28
wk-30
wk-32
wk-34
wk-36
wk-38
wk-40
wk-42
wk-44
wk-46
wk-48
wk-50
wk-52
wk-2
wk-4
wk-6
wk-8
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wk-18
wk-20
wk-22
wk-24
wk-26
WHO weeks

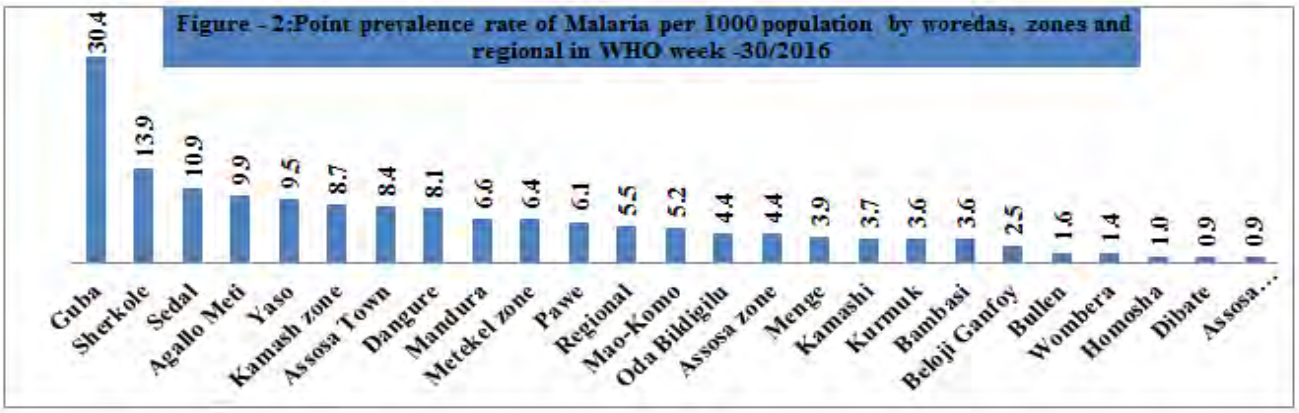


Figure - 2:Point prevalence rate of Malaria per 1000 population by woredas, zones and regional in WHO week -30/2016
30.4
13.9
10.9
9.9
9.5
8.7
8.4
8.1
6.6
6.4
6.1
5.5
5.2
4.4
4.4
3.9
3.7
3.6
3.6
2.5
1.6
1.4
1.0
0.9
0.9
Guba
Sherkole
Sedal
Agallo Meti
Yaso
Kamash zone
Assosa Town
Dangure
Mandura
Metekel zone
Pawe
Regional
Mao-Komo
Oda Bildigilu
Assosa zone
Menge
Kamashi
Kurmuk
Bambasi
Beloji Ganfoy
Bullen
Wombera
Homosha
Dibate
Assosa…

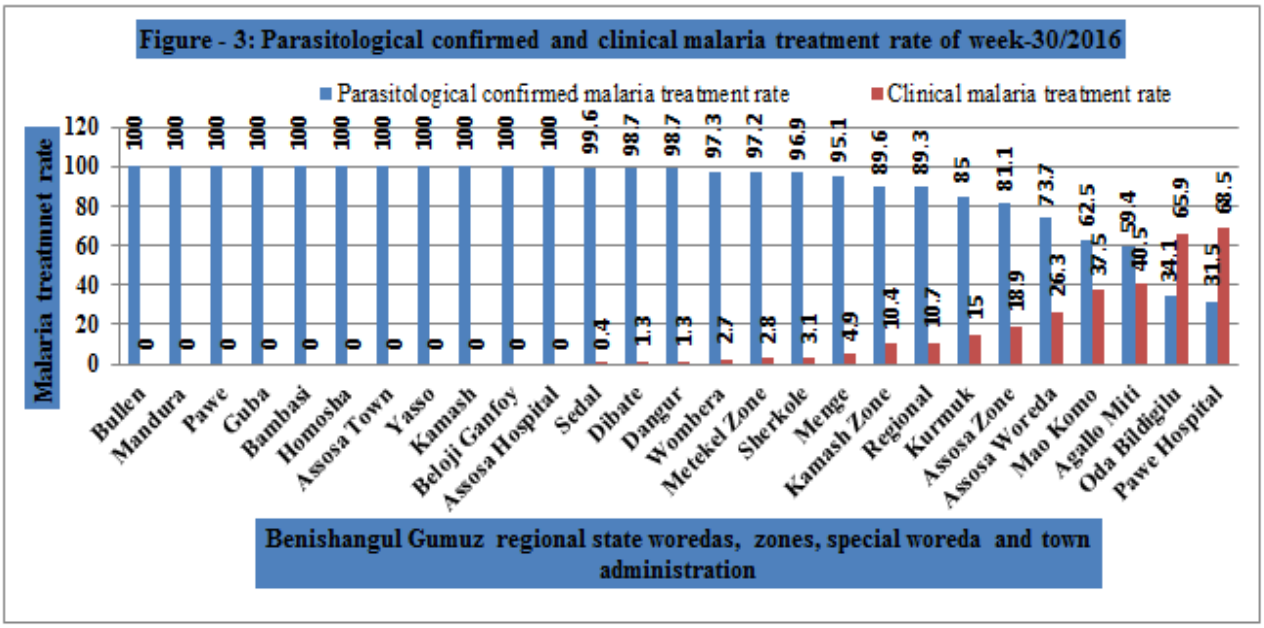


Figure - 3: Parasitological confirmed and clinical malaria treatment rate of week-30/2016
Parasitological confirmed malaria treatment rate
Clinical malaria treatment rate
Malaria treatmnet rate
120
100
80
60
40
20
0
100 100 100 100 100 100 100 100 100 100 100 99.6 98.7 98.7 97.3 97.2 96.9 95.1 89.6 89.3 85 81.1 73.7 62.5 59.4 34.1 31.5
0 0 0 0 0 0 0 0 0 0 0 0.4 1.3 1.3 2.7 2.8 3.1 4.9 10.4 10.7 15 18.9 26.3 37.5 40.5 65.9 68.5
Bullen
Mandura
Pawe
Guba
Bambasi
Homosha
Assosa Town
Yasso
Kamash
Beloji Ganfoy
Assosa Hospital
Sedal
Dibate
Dangur
Wombera
Metekel Zone
Sherkole
Menge
Kamash Zone
Regional
Kurmuk
Assosa Zone
Assosa Woreda
Mao Komo
Agallo Miti
Oda Bildigilu
Pawe Hospital
Benishangul Gumuz regional state woredas, zones, special woreda and town administration

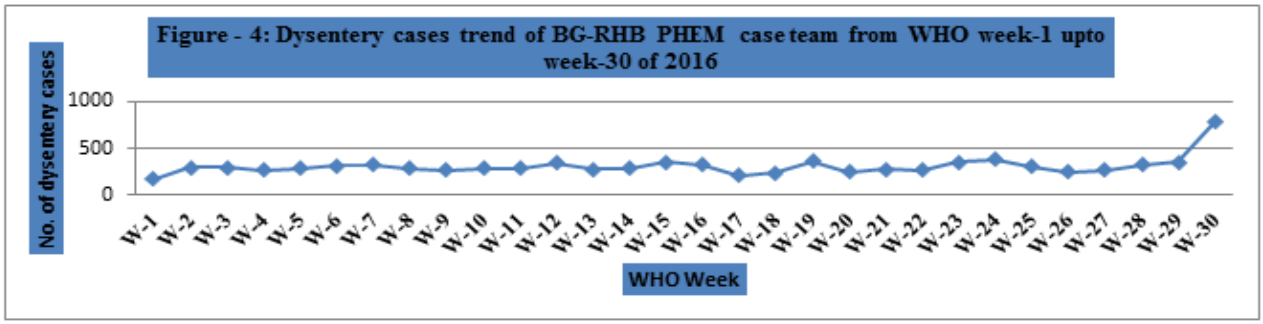
2. Meningitis

Meningococcal Meningitis action Threshold Level is; If population **<30,000** five cases in a week or doubling of cases over 3 weeks period; or if population > 30,000 attack rate (AR) of 10/100,000 population per week.

For this week there **was no suspected or confirmed case or death** of meningococcal meningitis reported.

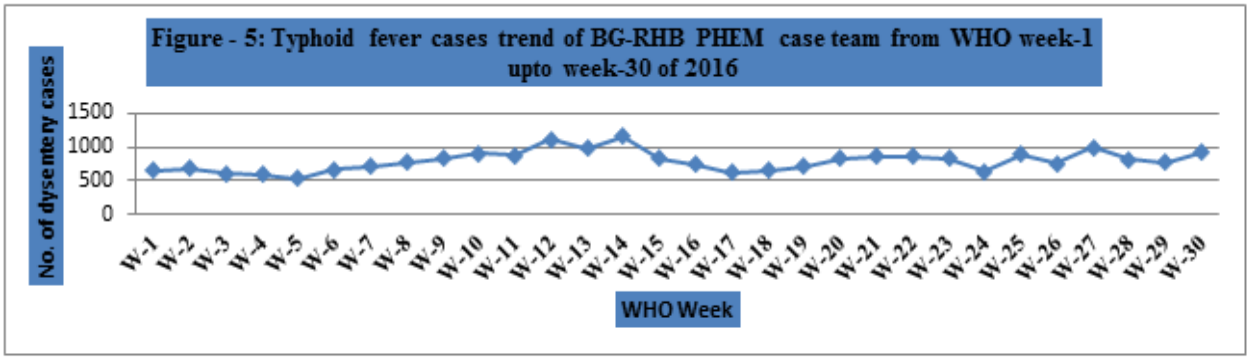
3. Dysentery

A total of **398** dysentery cases were reported in WHO week-30 **without inpatient** and no **death.** It constitute **5.4% (398*100/7,389)** from all diseases and condition under PHEM surveillance system



4. Typhoid Fever

Typhoid fever is one of the seven weekly reportable diseases in the region. A total of 917 **typhoid fever** cases **(12.4%)** were reported in this week entire the region; with **two** inpatient and **zero** death



5. Relapsing Fever

The disease has been followed weekly bases and it is one of weekly reportable disease in the region. For this epi week, there was **0 (zero)** case of relapsing fever reported within the region.

6. Typhus

Week - 30 weekly reports revealed that **339** typhus case was reported. Among those 7 were inpatients. It constitute **4.6% (337*100/7,389)** from all diseases and condition under PHEM surveillance system

7. Sever Acute Malnutrition

Sever acute malnutrition is a weekly reportable disease which occurred as a result of deficiency of nutritional problems. Children age from 6 months to 5 years with MUAC less than 11cm and/or children with bilateral edema regardless of their MUAC are suspected cases OR Children with MUAC less than 11cm and/or children with bilateral edema regardless of their MUAC are confirmed cases for SAM.

Severe acute malnutrition is the condition that is reported weekly from each reporting sites. For this **week-30;** there were **27** severe acute malnutrition cases reported; of those **cases 6** was admitted.

8. Immediately reportable diseases

There are **13 immediately reported diseases**. Those are **Acute Flaccid Paralysis (AFP) / Polio, Anthrax, Avian Human Influenza, Cholera, Dracunculiasis / Guinea worm, Measles, NNT, Pandemic Influenza A, Rabies, Smallpox, SARS, VHF, Yellow fever and maternal death.**

Among those immediately reportable diseases, there are **1 Suspected AFP** case; 1 suspected rabies case and 1 matemal death was reported from Dibate woreda; Homosha woreda and ARRA Sherkole refugee camps respectively.

9. Completeness

Completeness denotes whether all the reporting units have reported as expected. A report is said to be complete if all the reporting units within its catchments area has submitted the reports.

Completeness = Number of health facilities reported from gov. org. x 100

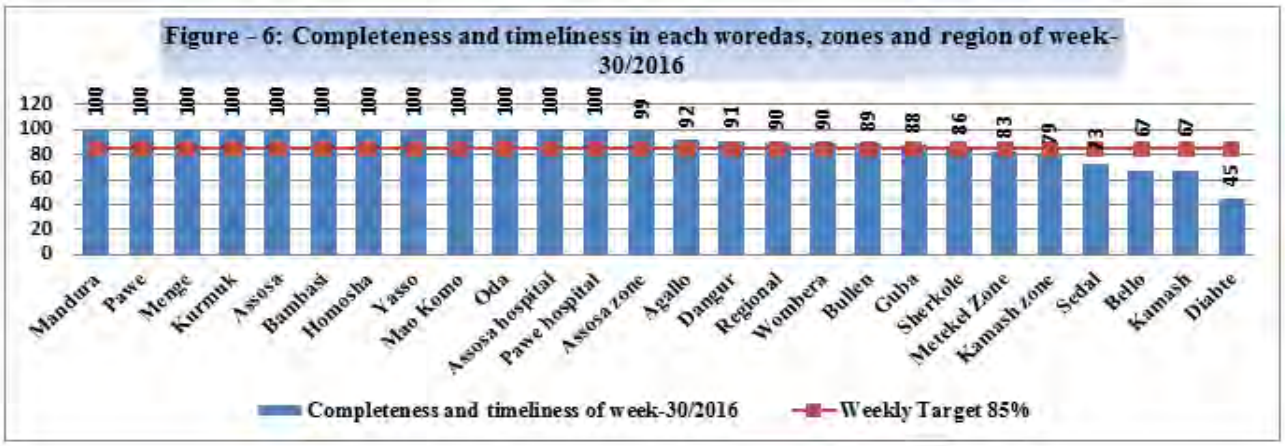
Total number of health facilities expected to report from gov. org

Completeness for **week-30** = **371 x 100 = 90%**

411

10. Timeliness

Timeliness shows how much the reported data report on time. A report is said to be on time, if all the reporting units within its catchments area has submitted the reports on its pre agreed time schedule. Based on this, our regional weekly report timeliness was **90%** on **week-30**



BENISHANGUL GUMUZ REGIONAL STATE HEALTH BUREAU

PUBLIC HEALTH EMERGENCY MANAGEMENT (PHEM) CASE TEAM

WEEKLY PHEM BULLETIN

WHO Week-7

(6-12/6/2009 EC)

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The writer and editors are ready to receive your constructive comments and suggestions which are going to be used as an input to improve our works

Highlights of the Week-7 Bulletin

- *Weekly reportable diseases cases load and distribution.*
- *Immediately reportable disease status*
- *The regional PHEM report completeness and timeliness*

Introduction

PHEM is designed to ensure rapid detection of any public health threats, preparedness related to logistic and fund administration, and prompt response to and recovery from various public health emergencies. PHEM is the process of anticipating, preventing, preparing for, detecting, responding to, controlling and recovering from consequences of public health threats in order that health and economic impacts are minimized.

This weekly bulletin provides information on case load and distribution of immediate and weekly reportable diseases and condition for decision makers, partners working in the region that enables to take immediate responses to alleviate the problem.

This bulletin will play its role by delivering of information of public health surveillance status of the region. In this regard, this bulletin was prepared by summarizing of epidemiological data of **week – 7 (06 - 12/6/2009 EC)** of both weekly and immediately reportable diseases and conditions under public health emergency management (PHEM) case team of Benishangul Gumuz Regional State.

1. Malaria

The systematically collected and analyzed data from regional PHEM case team verified that a total of **7,768 malaria suspected** cases was examined by RDT or microscopy and a total of **2,015 malaria** (clinical + parasitological confirmed) case were reported **on WHO Week-6 (from 6-12/6/2009 EC).**

From the total malaria cases, **96.6% (1,946/2,015*100)** cases were parasitological confirmed. Week-6 of 2009 EC clinical malaria treatment rate was around **3.4% (69/2,015*100).** Among confirmed cases; **plasmodium falciparum** constitutes **71.5% (1,392/1,946*100)** while the rest **28.5% (554/1,946*100)** were **plasmodium vivax**. A total of 11 malaria cases were treated as inpatient cases and there wasn't malaria death reported from the region in this week (week-7 of 2009 EC).

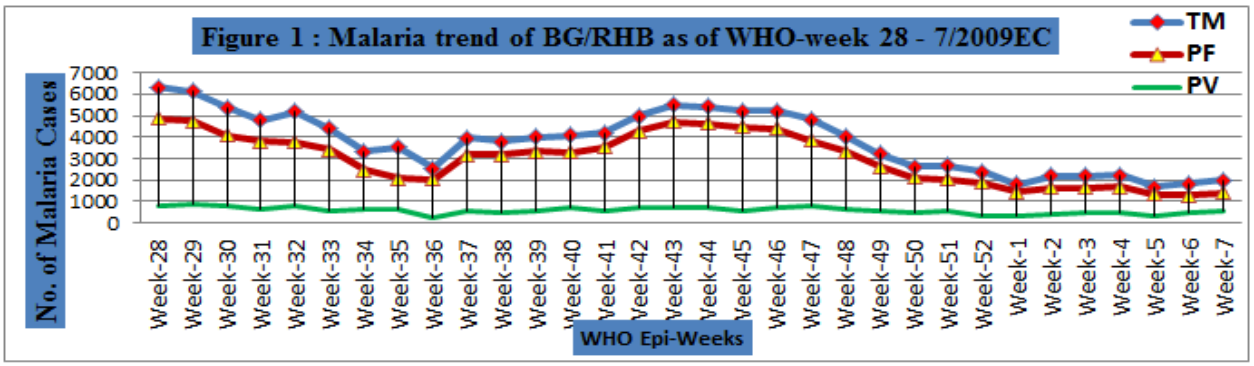
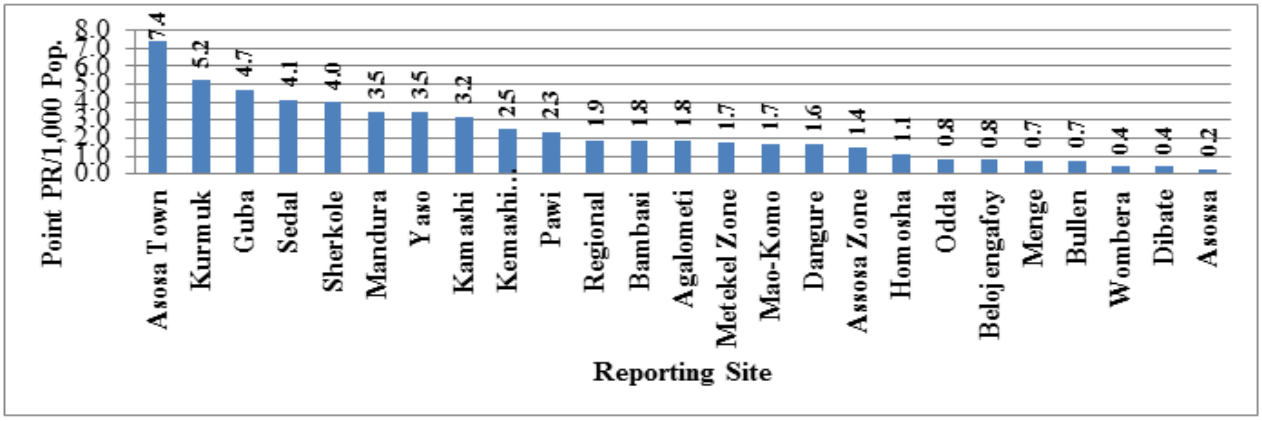


Figure - 2: Point prevalence rate of Malaria per 1000 population by Woredas, Zones and Region in WHO week - 7/2017



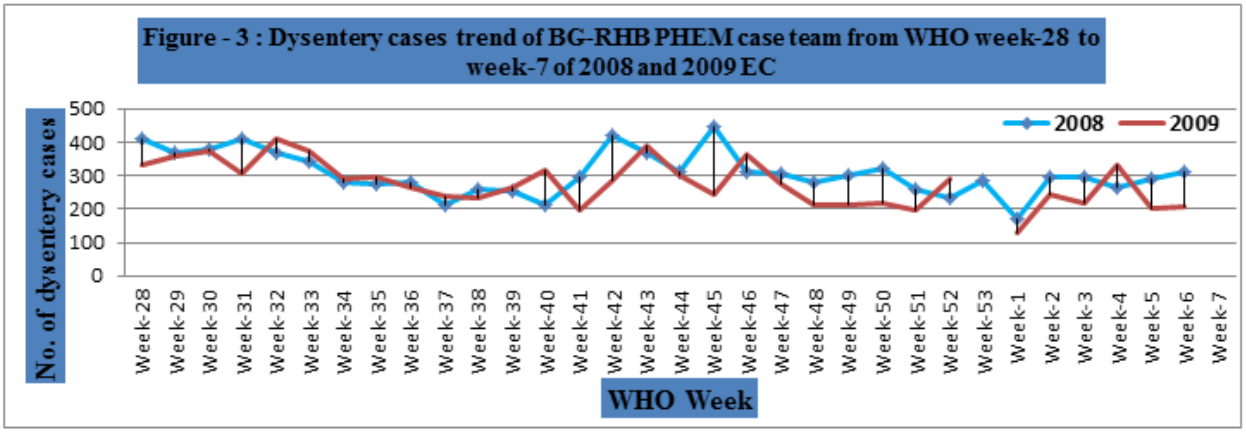
2. Meningitis

Meningococcal Meningitis action Threshold Level is; If population <**30,000** five cases in a week or doubling of cases over 3 weeks period; or if population > 30,000 attack rate (AR) of 10/100,000 population per week.

For this week **one** meningococcal meningitis case **was** reported from Pawe hospital.

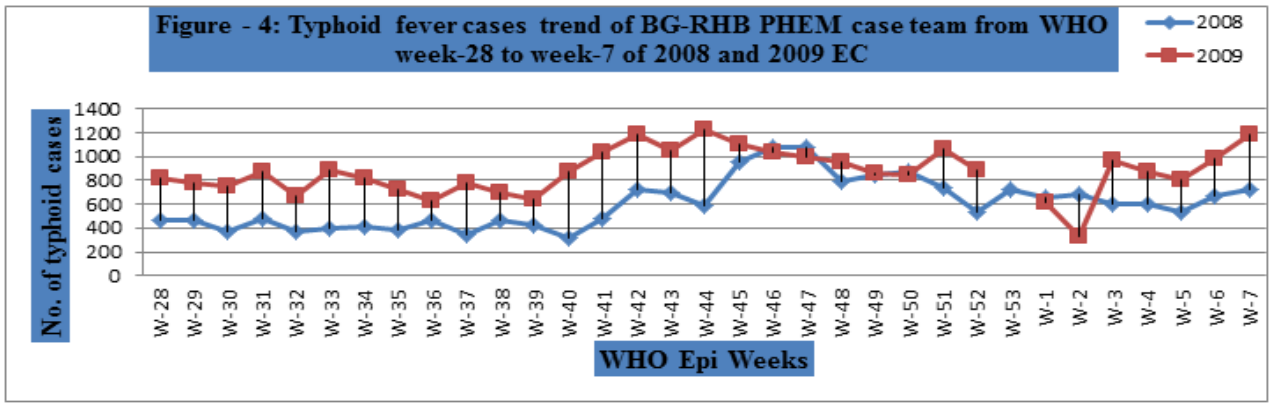
3. Dysentery

A total of **215 (it cover 5.8% from weekly reportable diseases)** dysentery cases were reported in WHO **week**-7 with 1 inpatient cases and no **d**eaths.



4. Typhoid Fever

Typhoid fever is one of the seven weekly reportable diseases in the region. A total of **1,184 typhoid fever** cases **(it constituted 318% from weekly reportable diseases)** were reported in this week entire the region; without **inpatient** and death.



5. Relapsing Fever

The disease has been followed on weekly basis and it is one of weekly reportable disease in the region. For this Epi week-7, **no** case of relapsing fever reported within the region.

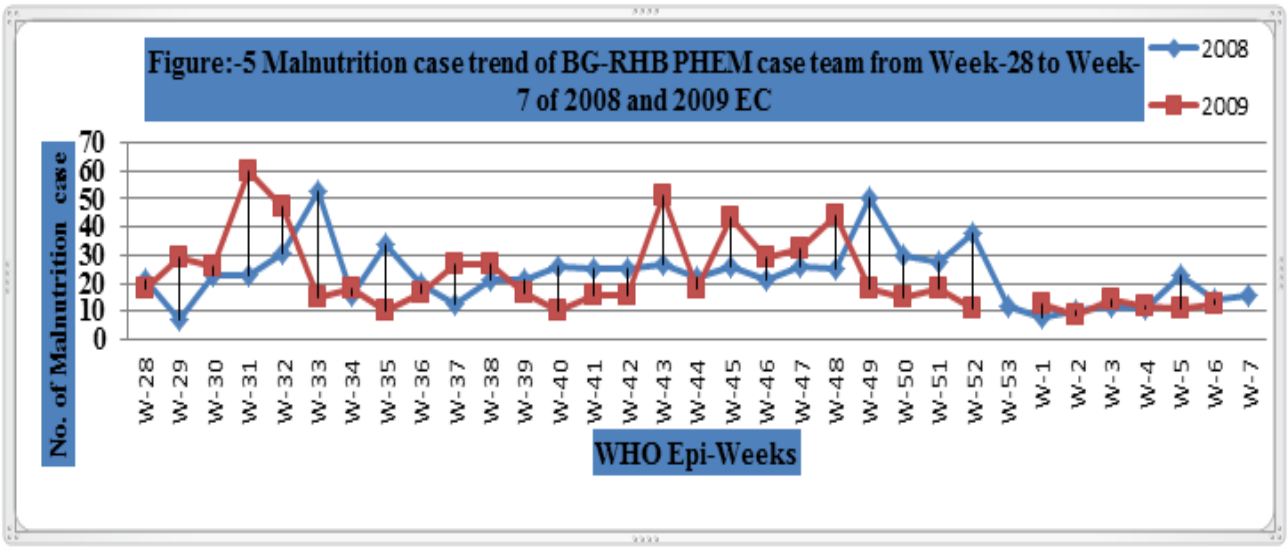
6. Typhus

Week–7 weekly report revealed that **301 (it constituted 8.1% from weekly reportable diseases)** typhus cases with three inpatient cases and no death was reported.

7. Severe Acute Malnutrition

Sever acute malnutrition is a weekly reportable disease which occurred as a result of deficiency of nutritional components.

Severe acute malnutrition is the condition that is reported weekly from each reporting sites. For this **week-7** there were **11** of severe acute malnutrition cases reported; from these **three** cases were treated as inpatient.



8. Immediately reportable diseases

There are 14 immediately reported diseases. Those are Acute Flaccid Paralysis (AFP) / Polio, Anthrax, Avian Human Influenza, Cholera, Dracunculiasis / Guinea worm, Measles, NNT, Pandemic Influenza A, Rabies, Smallpox, SARS, VHF and Yellow fever and Maternal death.

Among those immediately reportable diseases; **six epi-linked rubella** case from Sherkole; one **AFP** case from Dibate Woreda; **four suspected cases** from ARRA Sherkole and Tsore refugee camps and **one suspected rabies** case from Oda Bildigilu Woreda were reported in week-7 of 2009 EC.

9. Completeness

Completeness denotes whether all the reporting units have reported as expected. A report is said to be complete if all the reporting units within its catchments area has submitted their reports. Therefore this week report completeness is about 92.2% as calculated below.

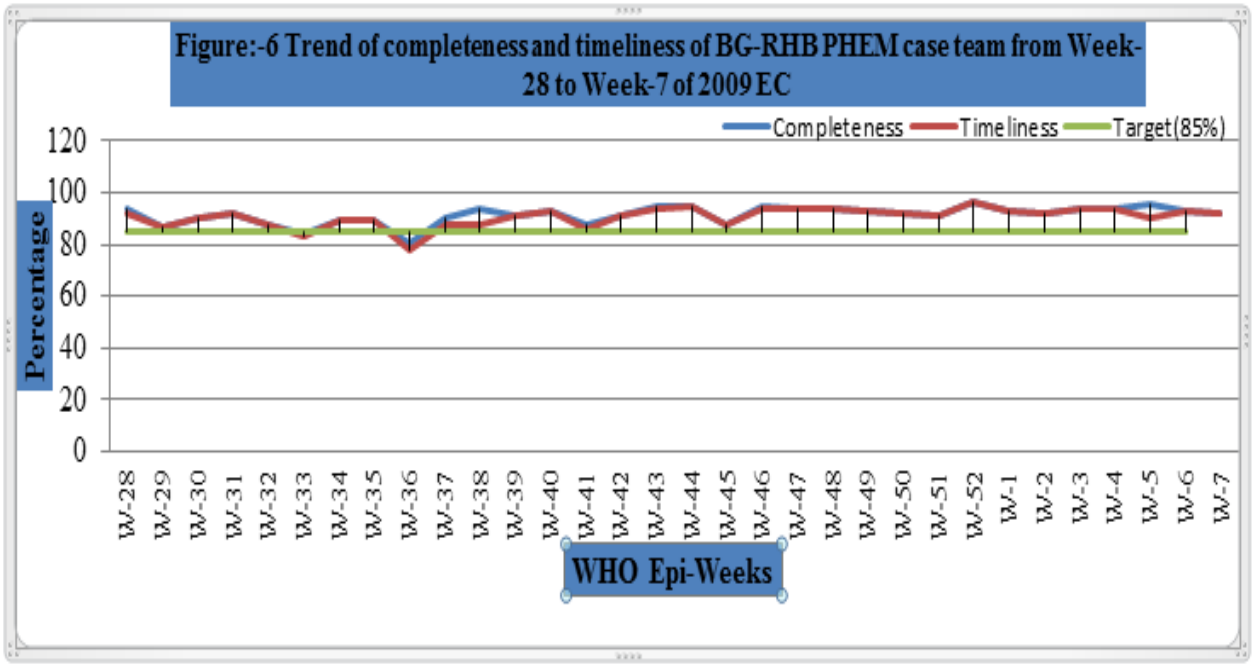
Completeness = Number of health facilities reported in that week x 100

Total number of health facilities expected to report

Completeness for **week-7**=**392/425 x 100** = **92.2 %**

10. Timeliness

Timeliness shows how much the reported data reported on time. A report is said to be on time, if all the reporting units within its catchment area has submitted the reports on its pre agreed time schedule. Based on this, our regional weekly report timeliness was **92.2%** as of **week-7.**



10. Annex

10.1. Questionnaires for Case - control study on Rubella outbreak

Questionnaires for Case - control study on Rubella outbreak in Sherkole Woreda of Assosa Zone of Benishangul Gumuz Regional State

Hello. My name is _____ we are investigating rubella outbreak and identify risk factors associated with rubella outbreak in Sherkole Woreda of Assosa Zone; BGRS; Ethiopia. The information we collect will help the government to plan the health services. Your household is selected for the survey. The survey usually takes about 15 to 25 minutes. We do not write your name, all of the answers you give will be confidential and will not be shared with anyone. You have to right to disagree on the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time. Do you have any questions?

Are you willing to participate in the interview?

Yes

No (Thank and stop)

Name and Signature of interviewer _____

Date_____

Name and Signature of the supervisor _____

Date_____

Interviewed ☐ Case ☐ Control

Patient/ Case Name_____ Date of Data collection_____

Region_____ Zone_____ Woreda_____ Kebele _____

S. No	Questions	Alternatives
1.1.	Sex	☐ Male ☐ Female
1.2.	Age	years_____ Months_____
1.3.	Occupation of the interviewed	☐ Farmer ☐ House wife ☐ Student ☐ Unemployed ☐ Daily laborer ☐ Merchant 7. Gov't ☐ Other (specify)_____
1.4.	Family Occupation (HH head)	☐ Farmer ☐ House wife ☐ Student ☐ Unemployed ☐ Daily labourer ☐ Merchant ☐ Gov't ☐ Other (specify)
1.5.	Religion	☐ Muslim ☐ Orthodox ☐ Protestant ☐ Catholic ☐ Other (specify)_____
1.6.	Ethnic group	☐ Berta ☐ Other (specify) _____
1.7.	Educational level of the patient	☐ Illiterate ☐ Read and write ☐ Elementary ☐ Secondary ☐ Above secondary ☐ Not applied
1.8.	Educational level of the family	☐ Illiterate ☐ Read and write ☐ Elementary☐ Secondary ☐ Above secondary
1.9.	Marital status	☐ Single ☐ Married ☐ Divorced ☐ Widowed
1.10.	Family size	_____

I. Socio-demographic Characteristics

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

S. No	Questions	Alternatives
2.1.	What was the symptom?	☐ Fever ☐ Rash ☐ Cough, ☐ Coryza (runny nose), ☐ conjunctivitis (red eyes)☐ Ear discharge☐ pneumonia ☐ Vomiting☐ Others_____
2.2.	**Ask ONLY if complication**	Pneumonia:☐ yes no ☐ Cornea: ☐ yes no ☐ Blindness : ☐ yes no ☐ Convolution ☐ yes no ☐ Otitis media (ear discharge): ☐ yes no ☐ Diarrhea : ☐ yes no ☐ Feeding problem☐ yes no ☐ Cataracts: ☐ yes no ☐ Glaucoma: ☐ yes no ☐ Hearing loss: ☐ yes no ☐Other: _____
2.3.	Date of rash on set	__/ /_____
2.4.	Duration of rash	__/ /
2.5.	Date seen at health facility	__/ /
2.6.	Did you (he/she) take treatment?	☐ Yes ☐ No
2.7.	If yes, treatment taken	☐ ORS ☐ Antibiotics ☐ Vitamin A ☐ Supplementary food ☐ TTC ointment ☐ Anti-pyretic ☐ Others (specify): _____
2.8.	Location when rash started?	_____
2.9.	Have you recovered after the treatment?	☐ cure ☐ partially ☐deteriorated/disabled☐ death
2.10.	Visited health facilities?	☐ yes ☐no If yes date ____/____2009 E.C.
2.11.	Illness duration before visiting the health facility	_____ in days

III. Risk factor

S. No	Questions	Alternatives
3.1	Have you been vaccinated for Measles?	☐ Yes ☐ No ☐ Unknown ☐ Not applicable
3.2.	If yes last vaccination	☐ Patient recall☐ Vaccination card
3.3	If yes; number of vaccine doses received	☐ One dose☐ Two dose ☐ Three and above
3.4.	Age of vaccination at first vaccinated.	_____
3.5.	If not vaccinated why?	☐ Service not available ☐ lack of knowledge about vaccination campaign, ☐ absence during vaccination campaign, ☐ other (specify): _____
3.6.	Did you have any travel history 7-18 days to areas with active rubella cases before onset of symptoms?	☐ Yes ☐ No
3.7.	If Yes to question 3.6. place of travel	☐ School ☐ Neighbour ☐ Market ☐ Other Kebele☐ Other (Specify): _____
3.8.	Had you contact with a person with rubella symptoms within the last 2-3 weeks?	☐ Yes ☐ No
3.9.	Do you have any travel history four days before and after rash onset	☐ Yes☐ No ☐ If yes where _____
3.10.	Do you have any contact history with someone else four days before and after rash onset	☐ Yes ☐ No ☐ If yes with whom_____
3.11.	Do you know modes of transmission for measles?	☐ Yes ☐ No ☐ If yes specify_____
3.12.	Have you ever had rubella infection?	☐ Yes ☐No ☐Don‘t know

3.13	Nutritional status of the cases	☐ Normal ☐Moderate ☐Severely malnourished
3.14.	What is the estimated area of the house?	_____
3.15.	House condition?	☐ ventilated ☐ not-ventilated
3.16.	Distance from house to Health facilities (HC or HP)?	☐ greater than 5 km ☐ equal or less than 5 km
3.17.	Where did you go first when you get ill?	☐ Health Facility ☐ Traditional Healers ☐ Holy Water ☐ Stayed at home ☐ Other :(Specify)_____
3.18	How do you think people get Rubella?	☐ Contact with a virus from ill person ☐ From God ☐ Bad attitude of other people ☐ Other(Specify): _____
3.19	Do you Know rubella is vaccine preventable?	☐ Yes ☐ No ☐ Don‘t Know
3.20	Who do you think can be affected by rubella?	☐ Children of aged less than 5 years ☐ Children of aged less than 18 years ☐ Women of any ages ☐ Any age groups of both male and women ☐ Other (specify):_____
3.21	How do you think rubella can be cured?	☐ Using modern medicine ☐ Using traditional Medicine ☐ Holly water ☐ By feeding nutritious foods ☐ Keeping the sick person indoor ☐ Other(Specify)_____

10.2. Questionnaires for Case - control study on AWD outbreak

Questionnaires for Case - control study on AWD outbreak in Sedal Woreda of Kamash Zone of Benishangul Gumuz Regional State

Hello. My name is _____ we are investigating AWD outbreak and identify risk factors associated with rubella outbreak in Sedal Woreda of Kamash Zone; BGRS; Ethiopia. The information we collect will help the government to plan the health services. Your household is selected for the survey. The survey usually takes about 15 to 25 minutes. We do not write your name, all of the answers you give will be confidential and will not be shared with anyone. You have to right to disagree on the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time. Do you have any questions?

Are you willing to participate in the interview?

Yes

No (Thank and stop)

Name and Signature of interviewer _____

Date_____

Name and Signature of the supervisor _____

Date_____

Outbreak Investigation check list for AWD

Interviewed ☐ Case ☐ Control

Socio-demographic information

1.Patient's name---------- ID Number----------
2. Patients address: Woreda ----------Kebele---------- Got ----------
3. Sex Male ☐ Female ☐ Age (Years):----------
4. Occupational status ----------
5. Educational status--- unable to write and read ☐ Primary ☐ Secondary ☐ Tertiary ☐
6. Total family members: _____
7. Ethnic group _____
8. Religious**:** Orthodox–☐ Protestant-- ☐ Muslim---☐ Catholic--- ☐ other_____
9. Marital status :Single-☐ Married--☐ Widowed----☐ Divorced----☐

A. Clinical Information If Case

10. Date first seen at a health facility for this disease (dd/mm/yyyy)----------
11. Date of onset of symptoms (dd /mm/yyyy)----------
    - Diarrhea Yes ☐ No ☐
    - Vomiting Yes ☐ No ☐
    - Abdominal cramp Yes ☐ No ☐
    - Dehydration/**observe for signs of DHN/** Yes ☐ No ☐
    - Other (Specify)----------
12. Is sample collected Yes ☐ No ☐ If yes, specify type of Specimen taken:----------
13. Lab results:----------
14. Did you receive any treatment? Yes ☐ No ☐ if yes, specify ----------
15. Patient outcome (Improved, Worsened, Same)
16. Classification 1. Case 2. Non case

B. Risk factors

1. Did you wash hands with soap/detergent before having meal and preparing food? Yes/No
2. Did you wash hands with soap/detergent after latrine? Yes/No
3. Did you have access to latrine? Yes/No
4. If yes for Q3 did you use it properly? Yes /No
5. Was there interruption of water supply (in this season than any other before? Yes/No
6. Did you have traveling history a week before illness? Yes/No
7. If yes for Q5 is there similar illness in the visited place? Yes/No
8. Did you have Close contact with a case/person with similar illness? Yes/No
9. Did you Eating /drinking in another's home in a week before/ your illness? Yes/No
10. Did you take raw fruits or vegetables; fruit drinks, a week before/ illness? Yes/No
11. Did you use water treatment chemicals? Yes/No
12. What did you use for storage of water in your house? 1. Jerikon 2. Pot 3. Bucket 4. Other --
13. What are your water sources for drinking, bathing, and cleaning kitchen utensils?
11. River 2. Pipe 3. Well 4. Spring
14. Do you know mode of transmission and prevention methods of acute watery diarrhea? Yes/ No If yes mansion mode of transmission and prevention methods----------
15. Do you know treatment options of acute watery diarrhea? Yes/ No

10.3. Questionnaires for Health Profile Assessment

Questionnaires for Health Profile Assessment Checklist

I. Regional Profile

Ser. No.	Questions	Responses
1.1.	Region	
1.2.	Zone	
1.3.	District	
1.4.	Respondent/s	
1.5.	Interviewer	

II. Historical Background of the Area

Ser. No.	Questions	Responses
2.1.	How & why the name given (Woreda and each Kebele)	
2.2.	How and when the District was formed	
2.3.	Any other historical aspect	

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

Ser. No.	Questions	Responses
3.1.	District map	
3.2.	Location (distance)	
3.3.	Direction	
3.4.	Altitude	
3.5.	Surface Area	
3.6.	Geographical coordinate (Latitude and Longitude	
3.7.	Annual rain fall (average)	
3.8.	Annual temp (average)	
3.9.	Climatic zones	
3.10.	District boundaries	

Socio-Economic Background

Ser. No.	Questions	Responses
4.1.	Profile of the study area	
4.2.	Administration	
4.3.	Land use pattern	
4.4.	Settlement pattern	
4.5.	Administration (Total no. of Kebeles; Rural and Urban)	
4.6.	Demographic characteristic	
4.7.	Population Projection Total Population (Male and Female) Urban Total (Male and Female) Rural Total (Male and Female) Total population by Kebele (each kebele population)	
4.8.	Age Distribution	
4.9.	Ethnic and religious composition	
4.10.	Housing characteristic	
4.11.	Economic condition	
4.12.	Marketing	
4.13.	Main income sources Agricultural Activities Cultivated area Cropping seasons Tradition gold panning/ mining Small trade Other	
4.14.	Households Income Agriculture Government Employer Traditional gold panning Daily Laborer Different business Jobless Average Income	
4.15.	Future Development Plan of the Area	
4.16.	Gender	
4.17.	Community based organization	

IV. **Social service**

Education

Number of educational institution

	Students		Teachers	
	Male	F	M	F
K.G				
Primarily School (1 -4 grade)				
Junior school (5 -8 grade)				
Secondary (9 – 10 grade				
Preparatory (11 – 12)				
Alternative basic education				

- ✓ Total School Age Children (target) Male _____ Female _____
- ✓ Total Enrolment _____Male _____Female_____
- ✓ School dropout in year 2007 E.C Male _____ Female _____
- ✓ If there is school dropout why
- ✓ Number of schools with water supply
- ✓ Schools with functional latrines (male & female)

- **Transport**
  - ✓ Accessibility (main roads) -------- Type of road ----------
  - ✓ How many kebeles have access to transportation
- **Telecommunication**
  - ✓ How many kebeles have access to fixed telephone?
  - ✓ How many kebeles have access to mobile phone? (coverage)
- **Post Office ---- Bank --------Micro Finance**
- **Power supply**
  - ✓ How many Kebele get power supply_____?
- **Potable Water supply**
  - ✓ Potable water supply coverage (Woreda and Each kebeles)
  - ✓ Type of water schemes (Woreda and Each Kebeles; functional and nonfunctional)

V. Health service institutions and infrastructure

- Type of health institution
- **Woreda sector office organogram structure**
- **Woreda health office organogram structure**
- **Health budget allocation**:
  - ✓ Total budget allocated for the district _____
  - ✓ Total budget allocated for health _____(____%)
  - ✓ Total budget allocated for emergency_____
  - ✓ Funds from NGO
- **Health structure human resource**

Health Professional	Number
Physicians (GP+ specialist)	
Health officers	
All Nurses	
Mid-wife Nurses	
Medical lab	
Pharmacy	
Environmental Health	
Health Education	
HEW	
Other	

- **Top 10 diseases of morbidity and mortality**

Morbidity cases in adult OPD			Pediatrics/ <5 year		
Rank	**Diseases**	**%**	**Rank**	**Disease**	**%**
1			**1**		
2			**2**		
3			**3**		
4			**4**		
5			**5**		
6			**6**		
7			**7**		
8			**8**		
9			**9**		
10			**10**		

- **Top ten of admissions**

Adult			Pediatrics/ <5 year		
Rank	**Morbidity**	**Mortality**	**Rank**	**Morbidity**	**Mortality**
1			**1**		
2			**2**		
3			**3**		
4			**4**		
5			**5**		
6			**6**		
7			**7**		
8			**8**		
9			**9**		
10			**10**		

- **Vital statistics and health indicators (Each Kebeles)**

- **Health Promotion and disease prevention and control program performance of 2007**
  - ✓ Public Health Emergency Management
  - ✓ Malaria prevention and control program
  - ✓ Expand Immunization Program and Cold chain management program
  - ✓ Health Extension Program
  - ✓ Health education program
  - ✓ Maternal and Child Health Program
  - ✓ Neglected tropical disease prevention and control Program
  - ✓ Hygiene and Sanitation promotion program
  - ✓ TB/ HIV prevention and control program
  - ✓ Nutrition program
- **Disaster situation in the District**
  - ✓ Was there any disaster (natural or manmade) in the District in the last one year?
  - ✓ Any recent disease outbreak/other public health emergency?
  - ✓ If yes cases_____ and deaths_____

10.4. Questionnaire for Surveillance System Evaluation

Questionnaires for Surveillance System Evaluation
Zonal, Woreda, HC and HP Level

- **Region:** _____
- **Zone:** _____
- **Respondent name and position:** _____
- **Phone Number:** _____

1. General

1.1.	Is there surveillance system in place?	Yes	No
1.2.	Are there a national manual/ PHEM guideline for surveillance?	Yes	No
1.3.	If yes, describe (last update, diseases included, case definitions, surveillance and control, integrated or different for each disease): _____ _____		

2. Case Detection and Registration

2.1.	Do you have standard case definitions for the Country's priority diseases like malaria, and measles?	Yes	No	Unknown	Not applicable
	If the answer is yes for Q 1; observe the presence of the standard case definition of malaria, and measles? _____				

3. Data reporting

3.1.	Is there recommended reporting forms of surveillance data in the zone at all times for the coming 12 months?	Yes	No	Unknown	Not applicable
3.2.	Is the Regional health bureau responsible for providing surveillance forms to the health facilities?	Yes	No	Unknown	Not applicable
3.3.	If yes, have you lacked appropriate surveillance forms at any time for the coming 12 months?	Yes	No	Unknown	Not applicable

3.4.	What are the reporting entities for the surveillance system? (Multiple response treated equally):	Governmental Health Facilities	NGO Health Facilities	Military Health Facilities	Private Health Facilities	Others (Specify)

3.5.	Was there any report of the immediately reportable diseases in the past 1 month? If yes list _____	Yes	No

3.6.	If yes, for Q 3.5; with in what time is the report received after detection of the diseases?	Less than 1 hour	2 - 24 hour	1- 2 days	3 - 7 days	After 1 week

3.7.	Means for reporting to next level (Multiple response treated equally):	E-mail	Telephone	Fax	Radio	Others (Specify)
3.8.	How do you report immediately and weekly and/ or other information to higher level? (Multiple response treated equally):	E-mail	Telephone	Fax	Radio	Others (Specify)

3.9.	Did you have address of regional PHEM officers?	Yes	No
3.10.	How frequently are you communicating with the regional PHEM officers on emergencies and other daily activities? _____		

3.11.	Did you have address of woredas/health facility PHEM officers/ focal person?				Yes	No
3.12.	If yes observe the lists and their address of Woreda PHEM officers and health facilities PHEM focal person? _____					
3.13.	How frequently are you communicating with the woredas/health facility PHEM officers/ focal person on emergencies and other daily activities? _____					
3.14.	When are you expected to send weekly report to the Regional PHEM unit? Every Specify: _____					
3.15.	When are you expected to receive weekly report from woredas? Specify: _____					
3.16.	How is the Zone communicating the woredas/health facility PHEM officers in case of immediately reportable diseases?	E-mail	Telephone	Fax	Radio	Others (Specify)
3.17.	Did you send summary or short report to the administrative /program owner or other responsible organs on planning, prevention and control activities addressing important issues at community level that have arisen through the surveillance system?				Yes	No
3.18.	If answer for Q 3.17 is yes to whom did you send? _____					
3.19.	If you faced any problems on communicating and reporting, list them _____ _____					
3.20.	List the alternative that you take to tackle the challenges? _____ _____					
4. Data analysis						
4.1.	Had you trained on surveillance system/ PHEM structure/ PHEM basic level				Yes	No
4.2.	If answer for Q of 4.1. is yes When: _____ For how long: _____ Topics: _____					
4.3.	Did you give any onsite training / orientation about surveillance system for the woredas or health facility PHEM officer/ focal persons?				Yes	No
4.4.	If yes observe any documents _____					
4.5.	How many woredas have permanently assigned surveillance officer or focal person? _____					
4.6.	How many of them trained on surveillance and epidemic management? _____					
4.7.	If no permanently assigned surveillance officer or focal person, how surveillance activates was done at Woreda level?					

	_____							
4.8.	Was data compiled and registered?						Yes	No
4.9.	If yes observe documents _____							
4.10.	Did you have computer on your department (PHEM unit)?						Yes	No
4.11.	If yes specify the type						Desktop	Laptop
4.12.	What is the data entry and compilation instrument?		Manual		Computerized		Other (specify)	
4.13.	Did you have computer skill on	Ms. Word	Ms. Excel	Ms. Power Point			Epi-info	Other (specify)
4.14.	Did you analyze data of the surveillance system (cased based, routine, outbreak ….)?						Yes	No
4.15.	If answer for 4.14. is yes, observe whether or not data is analyzed by time, place and person _____							
4.16.	If you analyze surveillance data how frequently?	Weekly	Every two week	Monthly	Quarterly	Every 6 month	Annually	No regular time
4.17.	Did you perform trend analysis for priority diseases?						Yes	No
4.18.	If yes for Q # 4.17; observe and list the diseases which has line graph							
4.19.	Did you have denominators for data analysis?	Total population	Male	Female	Under 5	Population by Woreda	Hard to reach area population	
4.20.	Did you notify the results of your analysis to the higher level PHEM?						Yes	No
4.21.	Did you notify the results of your analysis to the lower level PHEM?						Yes	No
4.22.	If answer for Q # 4.20 and 4.21. Is No, what is the reason?	Lack of knowledge	Shortage of time	Less attention to data analysis	Shortage of materials	Analysis is not familiar	Negligence	Other (specify)

5. Outbreak Investigation

5.1.	How many outbreaks were occurred in 2007 EFY and 2008 EFY? _____					
5.2.	How many of them were investigated? _____					
5.3.	List the diseases _____ _____					
5.4.	Did you have outbreak investigation check list?				Yes	No
5.5.	If all outbreak not investigated; what was the possible factors not investigated? _____ _____					
5.6.	Where was laboratory confirmation of cases done?	Regional laboratory	Hospital	EPHI	Health center	Other (Specify)
5.7.	Who was responsible to	Rapid	Staffs of	Experts	Health	Other

	investigate an outbreak?	response team (RRT)	woredas health office	organized randomly	facility staffs	(Specify)

Fill the table below if any outbreak investigation done

Name of out break	Affected Kebele/Woreda	No. of cases		No. of deaths		Start date of the out break
		Male	Female	M	Female	

5.8.	Had you faced any challenge in outbreak investigation in 2007 EFY and 2008 EFY?	Yes	No
5.9.	If answer for Q 5.8. is yes, List the challenges _____ _____ _____ List the alternatives that you take to tackle the challenges _____ _____		

6. Epidemic preparedness(relevant for epidemic prone diseases)

6.1.	Did you have plan for epidemic response and preparedness?	Yes	No
6.2.	If yes observe _____		
6.3.	Was there an emergency stock of drugs and supplies at all times in the past 1 year?	Yes	No
6.4.	If yes observe any document for evidence? _____		
6.5.	If answer for Q 6.3. Is No, how did you control epidemics? _____		
6.6.	Had you experienced shortage of drugs, vaccines and supplies in 2007 EFY and 2008EFY?	Yes	No
6.7.	Was an epidemic management committee established at zonal level?	Yes	No
6.8.	Did the epidemic management committee have regularly scheduled meeting time?	Yes	No
6.9.	If yes observe minute book _____		
6.10.	How many woredas are established epidemic management committee and meet regularly? _____		

6.11.	Was Rapid response team established at zonal level?		Yes	No
	Did the Rapid response team have regularly scheduled meeting time during epidemics?		Yes	No
6.12.	Observe minute book or other document:_____			
6.13.	How many woredas have established Rapid Response Team? _____			
6.14.	Did you have case management protocol for epidemic prone diseases (measles and malaria)?	Yes	No	Not Applicable
6.15.	Do have multi sectorial emergency preparedness and response task force committee?	Yes	No	Not Applicable
6.16.	If Yes for Q 6.15; in what frequency did the task force meet during outbreaks? _____			
6.17.	Were partners working together with your office on emergencies		Yes	No
6.18.	If answer for Q 6.17 is yes; what type of supports did they give to your office?			
6.19.	Was there a budget for epidemic response in the last year?		Yes	No
6.20.	Had you a car assigned for emergencies (PHEM)?	Yes	No	Not functional
6.21.	If answer for Q 6.18 is NO, how did you address emergencies? _____ _____			
6.22.	Had you faced any Challenges on epidemic preparedness and response in 2008EFY?		Yes	No
6.23.	If answer for Q 6.22. is yes List the challenges _____ _____ _____ What measures did you take to tackle the challenges? _____ _____ _____			
	7. Response to epidemics			
7.1.	Does the zonal health office responded or epidemics within 48 hours of notification of most recently reported outbreaks?		Yes	No
7.2.	Observe the documents if yes: _____			
7.3.	Were epidemic management committees evaluating their epidemic preparedness and response activities during the past year		Yes	No
7.4.	Check written document if yes: _____			
	8. Supervision and Feedback			
8.1.	Did you have supervision plan in 2008 EFY?		Yes	No
8.2.	Check documents if yes: _____			
8.3.	If answer for Q 8.1. Is No, how did you supervise?			

	_____		
8.4.	If Q 8.1. Is yes, did you supervise the woredas and health facilities?	Yes	No
8.5.	If Q 8.1. No, what is the reason? _____		
8.6.	If Q 8.1. Is yes, how many times did you supervise each woredas and health facilities in 2008 EFY? Woreda health officer _____ Health facility _____		
8.7.	Had you received supervision from regional PHEM case team in the past year or currently	Yes	No
8.8.	If Q 8.7.is yes, how many times in 2008 EFY? _____ _____		
8.9.	Did you have regular supervision checklist?	Yes	No
8.10.	If yes observe it: _____		
8.11.	Did you send feedback of your supervision findings to the woredas and health facilities which commenting/ indicating their strong and weak sides?	Yes	No
8.12.	If yes observe it: _____		
8.13.	If Q 8.11. Is No, why? _____ _____		
8.14.	If answer for Q 8.11. Is yes, for how many woredas and health facilities did you send a feedback in 2008 EFY? Woreda _____ Health facilities _____		
8.15.	Had you received feedback from higher level supervisors in 2008 EFY?	Yes	No
8.16.	If Q 8.15. Is yes, how many feedbacks did you received in 2008 EFY? _____		
8.17.	Had you faced any challenge on supervision and feedback in 2008 EFY?	Yes	No
8.18.	If answer for Q 8.17. is yes: List the challenges _____ _____ _____ List the measures that you take to tackle the challenges _____ _____ _____		
9. Resources			
9.1.	Did you have Computer	Yes	No
9.2.	Did you have printer	Yes	No
9.3.	Did you have Photocopier	Yes	No
9.4.	Did you have Telephone service	Yes	No

9.5.	Did you have fax		Yes	No
9.6.	Did you have Radio call		Yes	No
9.7.	Did you have Satellite phone		Yes	No
9.8.	Budget line		Yes	No
9.9.	Other logistics available for PHEM surveillance system? _____ _____			
10. Surveillance				
10.1.	Do you have a computerized surveillance network at this level?	Yes	No	Not Applicable
10.2.	Is there a budget line for surveillance in the zonal Health office budget?	Yes	No	Not Applicable
10.3.	If yes, what is the proportion: _____			
10.4.	How could surveillance be improved? _____ _____ _____			
11. Questionnaire for Attributes and level of Usefulness				
11.1.	Total population under surveillance_____ 2008 EFY			
11.2.	What is the yearly 2008 EFY Prevalence of the following the selected weekly and immediately reportable disease in your zone? Malaria cases _____ death _____ Measles cases _____ death _____			
11.3.	Does the surveillance system help to detect outbreaks of priority diseases early on time to permit accurate diagnosis?		Yes	No
11.4.	Does the surveillance system help to estimate the magnitude of morbidity and mortality related to these diseases, including identification of factors associated with these diseases?		Yes	No
11.5.	Does the surveillance system help to Permit assessment of the effect of prevention and control programs?		Yes	No
11.6.	Observe (confirmation): interventions and diseases trends analyzed		Available 2	Not available
12. Describe Each System Attributes:				
12.1. **Simplicity**				
12.1.1.	Is the case definition of the priority diseases (malaria, measles) easy for case detection by all level health professionals?		Yes	No
12.1.2.	The surveillance system allows all levels of professionals to fill data?		Yes	No
12.1.3.	Does the surveillance system help to record and report data on time?		Yes	No
12.1.4.	Does the surveillance system (Reporting format) have necessary information for investigation?		Yes	No
12.1.5.	How long it takes to fill the format?	<5 minute	10-15 minutes	>15 minutes
12.1.6.	How long does it take to have laboratory confirmation of Measles: _____Malaria:_____			

12.2. **Flexibility**			
12.2.1.	Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty?	Yes	No
12.2.2.	Do you think that any change in the existing procedure of case detection and reporting formats will be difficult to implement?	Yes	No
12.2.3.	Is the system easy to add new variables?	Yes	No
12.2.4.	Is the surveillance system easy to integrate with other systems?	Yes	No
12.2.5.	Is the surveillance system easy to add new disease on report?	Yes	No
12.2.6.	Is the system easy to add new information technology?	Yes	No
12.3. Data Quality: (Completeness of the reporting forms/and validity of the recorded data)			
12.3.1.	Are the reporting site / data collectors trained/ supervised regularly?	Yes	No
12.3.2.	Observe: Review the last months report of these diseases Average number of unknown or blank responses to variables in each of the reported forms: _____ Percent of reports which are complete (that is with no blank or unknown responses) from the total reports: _____		
12.3.3.	Are all woredas reporting (including late report)?	Yes	No
12.3.4.	Are all facilities reporting?		
12.3.5.	Percent of woredas that send report of each week in 2008 EFY: _____		

Total weekly reports received from woredas of 2008 E.F.Y. (Completeness)							
WHO Epi - Weeks	Total Gov. Site Expected to Report	Total Gov. Site Reported Completely	Coverage	WHO Epi - Weeks	Total Gov. Site Expected to Report	Total Gov. Site Reported Completely	Coverage
Week - 1				Week – 27			
Week - 2				Week – 28			
Week – 3				Week – 29			
Week - 4				Week – 30			
Week - 5				Week – 31			
Week - 6				Week – 32			
Week – 7				Week – 33			
Week – 8				Week – 34			
Week – 9				Week – 35			
Week – 10				Week – 36			
Week – 11				Week – 37			
Week – 12				Week – 38			
Week – 13				Week – 39			
Week - 14				Week – 40			
Week – 15				Week – 41			
Week – 16				Week – 42			

Week – 17				Week – 43			
Week – 18				Week – 44			
Week – 19				Week – 45			
Week – 20				Week – 46			
Week – 21				Week – 47			
Week – 22				Week – 48			
Week – 23				Week – 49			
Week – 24				Week – 50			
Week – 25				Week – 51			
Week – 26				Week – 52			

12.4. Acceptability

12.4.1.	Do you think all the reporting agents accept and well engaged to the surveillance activities?				Yes	No
12.4.2.	If yes, how many are active participants (of the expected including all private clinics)? _____					
12.4.3.	If No for Q # 12.4.1; what is the reason for their poor participation in the surveillance activity? (Multiple response treated equally)	Lack of understanding of the relevance of the data to be collected	No feedback / or recognition given by the higher bodies for their contribution; i.e. no dissemination of the analysis data back to reporting facilities	Reporting formats are difficult to understand	Report formats are time consuming	Other (Specify):
12.4.4.	Were all participants using the standard case definition to identify cases?				Yes	No
12.4.5	If yes, what is your evidence _____					
12.4.6.	Were all the reporting agents send their report using the current and appropriate surveillance reporting format?				Yes	No
12.4.7.	If yes Q 5 observe the documents: _____					
12.4.8.	Were all the health professionals aware about the surveillance system?					
12.4.9.	If yes how they aware: _____					

12.5. Representativeness

12.5.1.	What is the health service coverage of the zone? _____%			
12.5.2.	Do you think, the populations under surveillance have good health seeking behavior for these diseases?		Yes	No
12.5.3.	Was the surveillance system enabled to follow the health and health related events in the whole community?		Yes	No
12.5.4.	If answer for Q 12.5.3 is no, who do you think is well benefited by the surveillance system?	Urban	Rural	Both
12.5.5.	If answer for Q 12.5.3 is no, why _____			
12.5.6.	Are all the Socio demographic variables included in the surveillance		Yes	No

	reporting format?				
12.5.7.	If the answer for Q 12.5.6 is No, which	Place	Person	Time	Other (Specify)
	12.6. **Timeliness**				
12.6.1.	Are all woredas /health facilities reporting on time?			Yes	No
12.6.2.	Percent of governmental health facilities (hospitals, health centers and health posts) woredas that report on time _____				
12.6.3.	Percent of health facilities that report on time _____				

Total weekly reports received from woredas of 2008 E.F.Y. (Timeliness)							
WHO Epi - Weeks	Total Gov. Site Expected to Report	Total Gov. Site Reported Completely	Coverage	WHO Epi - Weeks	Total Gov. Site Expected to Report	Total Gov. Site Reported Completely	Coverage
Week - 1				Week – 27			
Week - 2				Week – 28			
Week – 3				Week – 29			
Week - 4				Week – 30			
Week - 5				Week – 31			
Week - 6				Week – 32			
Week – 7				Week – 33			
Week – 8				Week – 34			
Week – 9				Week – 35			
Week – 10				Week – 36			
Week – 11				Week – 37			
Week – 12				Week – 38			
Week – 13				Week – 39			
Week - 14				Week – 40			
Week – 15				Week – 41			
Week – 16				Week – 42			
Week – 17				Week – 43			
Week – 18				Week – 44			
Week – 19				Week – 45			
Week – 20				Week – 46			
Week – 21				Week – 47			
Week – 22				Week – 48			
Week – 23				Week – 49			
Week – 24				Week – 50			
Week – 25				Week – 51			
Week – 26				Week – 52			

12.7. **Stability**

12.7.1.	Was any new restructuring affected the procedures and activities of the surveillance of these diseases?	Yes	No
12.7.2	Was there lack of resources that interrupt the surveillance system?	Yes	No
	If yes what was it and how do you solve it Lacked resources _____ _____ _____ How do you solved _____ _____ _____		
12.7.3.	Was there any time /condition in which the surveillance is not fully operating?	Yes	No
12.7.4.	If the answer yes for Q 12.7.3. When/what is the condition that talks the system not to function properly? _____ _____		
12.7.5	Is there a surveillance fully working officer or focal person (PHEM unit)?		
12.7.6.	When the surveillance system is not fully operating? _____ _____		
	What activities make the surveillance system is not fully operating? _____ _____		

10.5. Questionnaire for Mehere Assessment

Rapid Meher Assessment of Health and Nutrition 2016

Regional/ Zonal Level Questionnaire

Interviewer Name _____ Interview Date (DD) ____/ (MM)_____/ (YY) 2016 Main contact at this location; Name _____ Institution _____ Region _____ Zone _____ Position _____ Tel _____e-mail: _____				
Section I: Socio-Demographic Profile				
Total Population	M:_____	F:_____	Total: _____	Under 5: _____
	No. of women of reproductive age (age 15 – 45): _____			
	No. of pregnant women: _____			
Special population (if any)	Pastorals: ___	Refugees: ____	IDPs: _____	Migrant worker: __
No. of HCs: _____; No. of HPs: _____; No. of mobile health and nutrition team: _____;No. of HEWs: _____				
Water availability in HCs	No. of HCs: _____	No. of HCs with water access: _____	No. of HCs without water access: _____	

Section II: Health Profile		
2.1. Coordination and management system		
Is there a PHEM officer at regional/ zonal level If yes how many: _____	Yes No	
Dose the RHB/ Zonal health department report as scheduled data? Observe copies and comments: _____	Yes No	
Are there PHEM officer/ focal person at woreda and HC level? If yes how many are there in the woreda: _____ If yes how many are there in the HCs: _____	Yes No	
Do the woreda, health facilities and HEWs regularly report PHEM report as scheduled data? Observe copies and comments: _____	Yes No	
Are all relevant government, NGOs and UN agencies represented at regional PHEM?	Yes	No
Is there a multi-sectorial health coordination forum? If yes how frequently meet: _____	Yes No	
Is there a public health emergency preparedness and repose plan?	Yes	No
Does it include reproductive health?	Yes	No
Is there accessible emergency response fund for PHEM at regional level? If yes how much allocated: _____	Yes No	
2.2. Mention anticipated epidemic? Is yes please indicate zone/ woreda at risk and risk population per anticipated risk (use the back slid)	Yes No	
2.3. Public Health Emergency Management		
Is there a public health and nutrition emergency preparedness and repose plan?	Yes	No
If yes, is the plan budgeted/ funded If yes how much allocated: _____	Yes No	
Is there a trained staffs on PHEM basic level? (Regional/ Zonal/ Woreda and HFs)	Yes	No
If yes, specify No. of trained personal per level Regional: Male: _____ Female: _____; Zonal: Male: _____ Female: _____; Woreda Male: _____ Female: _____; Health Facilities Male: _____ Female: _____		
Is there a regional/ zonal trained rapid response team (RRT) If yes, specify the no. Total: _____; Male: _____ and Female: _____	Yes No	

Is there a trained staff on emergency nutrition management at all level	Yes No
If yes, specify No. of trained personal per level Regional: Male: ______ Female: ______; Zonal: Male: ______ Female: _____;	

2.4. Disease outbreak

Was there any outbreak in the last 3 months?	Yes No
If yes, specify the type of disease Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	
Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	
Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	
Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	
Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	
Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	
Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	
Is there any ongoing outbreak of any disease?	Yes No
If yes, specify the type of disease Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	
Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	
Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	
Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	
Type of outbreak: _______________No. of case: ________No. of death: _______Period: DD___/ MM ____ YY ____	

Drugs and medical supplies

Descriptions	Items	Total required	Available	Gap
Vaccines	Meningitis vaccine			
Drugs	Coartem			
	Artesunate (rectal)			
	Artesunate (injection)			
	Aremether (IM)			
	Quinine (OP)			
	Quinine (IV)			
	Chloroquine			
	Ceftriaxone			
	Oily CAF			
	Doxycycline			
	RL			
	ORS			
	Vitamin A			
Nutrition supplies	F100			
	F75			
	PUTF			
	Resomal			
	Routine antibiotics at SC/ OTP (the list can be annexed)			
Laboratory supplies	RDT (Malaria)			
	Pastorex (Meningitis)			
	LP test			
	TI bottles			
Kit	CTC kit (AWD)			

RH medical supplies/ drugs	Individual clean delivery kit			
	Emergency medicines and supplies to support care of rape survival?			

Section III: Risk factors

Diseases	Risk factors for epidemic to occur	
Malaria	Malaria endemic area	Yes No
	Presence of malaria mosquito breeding site	Yes No
	Interrupted or potential interrupting river	Yes No
	Unprotected irrigation in the area	
	LLINs coverage < 80% No._____; Coverage: _____	
	Indicate the coverage of IRS in 2008 EFY No._____; Coverage: _____	
	Was there any prevention and control activities	Yes No
	No. of malarious Kebeles and total population in these Kebeles No. of Kebeles: _____; Total population: _____	
Meningitis	Was there meningitis epidemic in the last three years? If yes, specify the data: _____	Yes No
	Has vaccination been conducted in the last three years?	Yes No
	If yes, indicate the data and No. of people vaccinated _____	
	Vaccination DD____/ MM_____/YY_____	
AWD	Was there AWD epidemics in the last three years?	Yes No
	If yes, specify DD____/ MM_____/YY_____	
	Latrine coverage No._____; Coverage: _____	
	Latrine utilization No._____; Coverage: _____	
	Safe water coverage No._____; Coverage: _____	
Measles	Is there ongoing measles outbreak?	Yes No
	What is the measles vaccination number and percentage of 2008 EFY of less than one year? No._____; Coverage: _____	
	Has SIA been conducted in 2008 EFY?	Yes No
	If yes, Indicate the month and number of children vaccinated including the age group? MM_____/ YY _____ and Age group: _____	

Any other observations you made on health emergencies or any risks of epidemics?

_____

_____

What were the major challenges in your response experience?

_____

_____

Section IV: - Nutrition (SAM and MAM management in regional/ zonal- May to October 2016)

SAM Management

4.1. Facilities with SAM management in regional/ Zonal

Months	Total No. of Hospitals	Total No. of Health Centers	Total No. of Health Posts	No. of SC	No. of OTP	Total No. of OTP/SC reported
May/ 2016						
June/ 2016						
July/ 2016						
August/ 2016						
September/ 2016						
October/ 2016						

4.2. Admission and performance of the therapeutic feeding for SAM management

Months	Total SAM Cases		Percentage of SAM children cured		Percentage of SAM children defaulted		Percentage of SAM children died		Percentage of SAM children non-respondent		Percentage of SAM children other	
	2007 E.C.	2008 E.C.	2007 E.C.	2008 E.C	2007 E.C.	2008 E.C	2007 E.C.	2008 E.C	2007 E.C.	2008 E.C	2007 E.C.	2008 E.C
May												
June												
July												
August												
	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.	2008 E.C.	2009 E.C.
September												
October												

4.3. Availability of therapeutic supplies

Questions	Response
Is there sufficient supplies for 3 months	Yes No
RUTF	Yes No
F100	Yes No
F75	Yes No
Second line drugs	Yes No
Is there sufficient woreda level storage for SAM treatment at woreda level?	Yes No
Water availability at SC	Yes No
Other	Yes No

4.4. Reporting

Is there weekly SAM report? If yes, observe	Yes No

4.5. Training

Questions	Response
Is there HWs have been trained on SAM management in regional/ zonal Regional: Male: _____ Female: _____; Zonal: Male: _____ Female: _____;	Yes No
Is there HEWs have been trained on SAM management? If yes, Total No. trained: _____; Coverage: _____	Yes No

MAM management

4.6. TSFP program in the woreda

Questions	Response
Is this a priority 1 woreda?	Yes No
Was there a TSFP distribution last month?	Yes No
Is there a sufficient TSFP supply for the next 1 month (RUSF, CSB+/ oil or CSD+++)?	Yes No
Is there woreda level storage of TSFP supplies for at least 2 months of supplies?	Yes No
Are children discharged from OTP referred to TSFP?	Yes No
Is this a pilot (second generation) TSFP woreda?	Yes No
Has the woreda been supported by a NGO in the last 3 months?	Yes No

4.7. MAM admission

Months	Priority 1 Woreda		Total MAM cases		Total No. of food distribution points in the woreda
	2007 E.C.	2008 E.C.	2007 E.C.	2008 E.C.	
May					
June					
July					
August					
	2008 E.C.	**2009 E.C.**	**2008 E.C.**	**2009 E.C.**	
September					
October					

4.8. Screening

When was the last screening conducted in the woreda? DD/____MM/_____/YY_____
Was screening modality is used in the woredas? EOS: _____; CHD: _____: Routine: _____
Vitamin A coverage: _____
De-worming coverage: _____

4.9. Screening performance

Months	Total Children 6 – 59 months	No. of screened children	Screening coverage	No. of children with odema and MUAC <11 CM (SAM)			No. of children with no odema and MUAC <11 to 11.9 CM (MAM)	% proxy GAM for children	% proxy GAM for children
				MUAC <11 CM	odema	Total			
May/ 2008									
June/ 2008									
July/ 2008									
August/ 2008									
September/ 2008									
October/ 20008									

4.10. Screening performance for pregnant and lactating women (PLW) in the woreda

Months	Target PLW	No. of screened PLW	Screening Coverage	No. of PLW MUAC below 23.0 cm	% of proxy GAM for PLW
May/ 2008					
June/ 2008					
July/ 2008					
August/ 2008					
September/ 2008					
October/ 20008					

4.11. Any other observations you made or any risks of emergency nutrition?

_____
_____
_____

4.12. What were the major challenges in your emergency nutrition response experience?

_____
_____
_____

Section V: Flooding

Questions	Response
Was there flood disaster in the last 6 months in the region/ zone	Yes No
If yes, how many woredas affected: _____	
Mentioned the name of woredas affected with flood?	
If yes, No. of population affected?	
Human death due to flood?	Yes No
If yes, how many no.: _____	
Are there displaced people due to flooding	Yes No
If yes, how many PLW: _____; Children less than 5 year: _____; Children less than 2 year: _____; Children less than 6 months: _____; Children between 6 – 23 months: _____;	
Was there outbreak in the flood affected area? If yes,	Yes No
Type of outbreak: _____No. of case: _____No. of death: _____Period: DD___/ MM ____ YY ____	
Type of outbreak: _____No. of case: _____No. of death: _____Period: DD___/ MM ____ YY ____	
Type of outbreak: _____No. of case: _____No. of death: _____Period: DD___/ MM ____ YY ____	
Type of outbreak: _____No. of case: _____No. of death: _____Period: DD___/ MM ____ YY ____	

Any comments:

_____
_____
_____

Summary: Requirements/ Meher Assessment needs 2016

Regional/ Zonal	Type of health and nutrition emergency	Total estimated beneficiaries	Required finance

Region	Zone	Woreda at risk	Type of risk	At risk population

10.6. Questionnaires for Epidemiological Research Project

Addis Ababa University; School of Public Health, Department of EFETP

The Questionnaire was prepared for assessment of ownership and factors associated with utilization of insecticide treated nets at household level in Menge Woreda of Assosa Zone, Benishangul Gumuz Regional State, and Western Ethiopia

Hello. My name is _____ we are conducting the assessment of ownership and factors associated with utilization of insecticide treated nets at household level in Menge Woreda of Assosa Zone, Benishangul Gumuz Regional State, Western Ethiopia

in your Woreda. The information we collect will help the government to plan the health services. Your household is selected for the survey. The survey usually takes about 15 to 25 minutes. We do not write your name, all of the answers you give will be confidential and will not be shared with anyone. You have to right to disagree on the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time. Do you have any questions?

Are you willing to participate in the interview?

Yes

No (Thank and stop)

Name and Signature of interviewer _____

Date_____

Name and Signature of the supervisor _____

Date_____

Questionnaires for assessment of ownership and factors associated with utilization of insecticide treated nets at household level in Menge Woreda of Assosa Zone, Benishangul Gumuz Regional State; Western Ethiopia

I. Socio-demographic Characteristics

Ser. No	Variables	Responses	Skip part
101	Place of resident	0= Urban 1=Rural	
102	Kebele		
103	House Number code in CSA		
104	Sex of the respondent	0=Male 1=Female	
105	Age of the respondent		
106	Ethnicity	0= Berta 1= Amhara 2=Oromo 3= Other	
107	Educational level:	0= Unable read and write 1= Able to read and write 2=Elementary 3= Secondary and Above	
108	Occupation:	0=Farmer 1=House wife 2=Student 3=Daily laborer 4=Merchant 5=Government 6=Unemployed 7=Other	
109	Religion:	0=Muslim 1=Orthodox 2= Others	
110	Marital status of the respondent:	0=Single; 1=Divorce; 2=Married; 3= widowed	
112	Responsibility of the respondent in the house	0=Husband; 1= Wife; 2= Elder Child; 99=Other	
113	How many people live in the house?		

Ser. No	Variables	Responses	Skip part
114	Estimated annual income of the household		
115	Are there pregnant woman in the house?	0= Yes 1= No	
116	If the response is yes for Q 115 How many pregnant woman/women		
117	Are there children less than 5 years of age	0= Yes 1= No	
118	If the response is yes for Q 117 How many child/children below 5 years		
119	Does your household have?		
	A radio?	0= Yes 1= No	
	A television?	0= Yes 1= No	
	A fixed telephone?	0= Yes 1= No	
	A mobile telephone?	0= Yes 1= No	

II. Risk Factors Assessment Questionnaires

Ser. No	Variables	Responses	Skip part
201	Does your household have any mosquito nets that can be used while sleeping that is distributed in the last three years?	0= Yes 1= No	
202	If Q201 is Yes How many mosquito nets does your household get?	0=one 1=two 2=three 3=greater than three	
203	Observe how many of the LLITNs were there in the household?	0=one 1=two 2=three 3=greater than three	
204	If the Observed is less than expected (Q202 and Q203) reasons for unavailability of ITNs?	0=sold 1=used for other purpose 2=give for others 3=stolen	
205	Did you purchase the net?	0= Yes 1= No 99=I don't know	
206	If Q 205 is Yes, how much did you pay for the net when it was purchased?	0= < 50 Birr 1= 50 – 100 Birr 2=. > 100 Birr 99=I don't know	
207	Please observe or ask the general Conditions of the net.	0= Good (no holes) 1= Fair (no holes that fit a torch battery) 2= Poor (1-4 holes) 3=Unsafe (>5 holes that fit a 4= Unused (still in package) 99= unknown	
208	How long ago did your household obtain the mosquito net?	0= less than 3 years ago 1= more than 3 years ago	
209	Did anyone sleep under this mosquito net last night (at least one of the available ITNs)?	0= Yes 1= No	

Ser. No	Variables	Responses	Skip part
210	If Yes in Q210 Who was slept under ITNS?	0= Elderly people	
		1=head of household	
		2= young children	
		3=pregnant women	
		4= who obtained / bought the net	
		5= people who contribute the most money to the household person other	
		99= I don‘t know	
211	Frequency of using their ITNs**?**	0=Always	
		1=Sometimes	
		2=If Mosquitoes is seen in the house	
		3=if somebody was sick	
		4=during transmission season	
		99=other (specify)	
212	If Q210 is No, Why did no-one sleep under this mosquito net last night?	0= no malaria	
		1=no nuisance/insects	
		2= no space for net	
		3=irritation due to chemical of ITN	
		4=suffocation / too hot	
		5=difficult hanging net	
		6=shape	
		7= absence from home	
		8= Absence of bed	
		98=don_t know	
		99= other (specify)	
213	How many separate rooms are in this household? Include all rooms, including kitchen, toilet, sleeping rooms, salon		
214	How many rooms in this household are used for sleeping? Include only rooms which are usually used for sleeping		
215	How many sleeping rooms were ITNS hanged?		

III. Knowledge and Practice Question

Ser. No	Variables	Responses	Skip part
301	Main transmission mechanism of malaria?	0= Eating immature sugarcane	
		1= Mosquito bite	
		2=cold or changing weather	
		3= Drinking dirty water hunger	
		4= (empty stomach)	
		5= (empty stomach)	
		99=Other (Specify	
302	Have you ever caught malaria in the past two year?	0=Yes	
		1=No	
303	Did anyone in your family travel away from home in the last one month?	0=Yes	
		1=No	
304	If Yes, Did she/he use ITN while on travel?	0=Yes	
		1=No	
305	How can we prevent malaria infection?	0= DDT spray	
		1= Source reduction	
		2= Drugs (prophylaxis)	
		3= ITN s utilization	
		4= Not known	
		5= drink alcohol	
		99= If other, specify	
306	Ever heard/seen education messages about ITNs	0=Yes	
		1=No	
307	Think that sleeping under ITN have benefit?	0=Yes	
		1=No	
308	Sleeping under ITN has benefits?	0=Yes	
		1=No	
309	If yes Q. 208 what is the benefit?	0=don't get bitten by mosquito	
		1=don't get bothered by other insects	
		2=don't get malaria	
		3=To get warmth	
		99=other	
310	Believe that sleeping under ITN has problem	0=Yes	
		1=No	

Ser. No	Variables	Responses	Skip part
311	If Q310 is yes Problems associated with sleeping under ITN	0= Difficult to get up at night	
		1= It is too hot	
		2= It takes time to tuck a net each night	
		3=No enough air when sleeping under	
		4=it Mosquito can still bite through ITN	
		5=it Mosquito can still bite through	
		6=No comfort	
		99= other	
312	How does ITNs prevent malaria transmission?	0= Physical barriers	
		1=Kills mosquito	
		2= irritate mosquito	
		3= Not known	
		99= If other, specify	
313	Dose the household own ITNs?	0=Yes	
		1=No	
314	If **YES,** to 313 above, how many?	0=One	
		1= Two	
		2= Three and above	
315	Ever heard/seen education messages about ITNs?	0=Yes	
		1=No	
316	If yes Q.315 Source of information for ITN	0= Mass media	
		1= Health Extension Workers	
		2=Kebele leader	
		3=Neighborhood	
		99= If other, specify	
317	Did They Wash Their ITNS? In the last One year?	0=Yes	
		1=No	
318	If Yes, Q. 317 frequency of Washing per year?		
319	What color of ITNs do you prefer for use?	0=White	
		1= Blue	
		99= If other, specify	
320	What shape of ITNs do you prefer for use	0=conical	
		1= rectangular	
		99= If other, specify	

IV. Checklist for Direct Observations

Ser. No	Category	Response
401	Number of beds or places of sleep	0= One
		1=Two
		2= Three and above
402	Number of bed nets observed in the Household	0= One
		1=Two
		2= Three and above
403	Number of beds /places of sleep observed with bed nets	0= One
		1=Two
		2= Three and above
404	The type of bed net that household owned	0=Re treatable
		1=Permanently treated
405	Is the bed net hanged(placed) properly over the bed or sleeping area	0=Yes
		1=No
		99= Other
406	Is there any hole(throne) in the bed net	0=yes
		1=No
407	Did the child found sleeping under the net?	0=yes
		1=No
408	Did the pregnant woman slept under the net?	0=yes
		1=No

10.7. Water Quality Report Form

Water Quality Monitoring Form of Bacteriological

Bacteriological Result Report of Water Sample Analysis

BACKGROUND DATA:

*Sample Serial No*_____

Date of collection _____ *Time of collection:* _____*GPS*_____

Time of incubation started: _____

1. Region: _____
2. Name of the project:_____
3. Location _____
4. Partner Organization: _____
5. Type of the scheme_____ of Beneficiary:_____
6. Date /Year of completion: _____
7. Site of collection: _____
8. Nature of the Sample: a, Chlorinated
    1. Yes, when (recent one) _____ by whom? _____
    2. No:_____ No information_____ ____
9. The Scheme Managed by: _____

RESULTS

Coli form at 37^{o}C with in 16 hrs count ____Organisms /100ml

Presumptive coli form at 44^{o}C with in 16 hrs _____ Organisms /100ml

Other organisms isolated _____

COMMENTS

(_____) Bacteriological Potable

(_____) Bacteriological non-potable

(_____) Chlorination Recommended

(_____) Disinfection recommended

Sanitary condition of the scheme area _____

LIST OF MONITORING TEAM

1. Name: _____
   Sign: _____
   Date: _____
2. Name: _____
   Sign: _____
   Date: _____

Water Quality Monitoring Form of Sanitary Survey

Sanitary survey form for assessment of contamination
Risk at a water point and source
General information
Location of water point
Woreda: _____
Kebele: _____
GPS reading: _____
Year of construction: _____
Date of visit: _____
Was a water sample taken?: _____
If yes Date of the sample _____
Analysis made by:_____
Results of water sample: Bacteriological non potable
Bacteriology: _____
Physicochemical: _____

B. Identification of sanitary risk factors

1. Are the water point / source located at the bottom of a slope or on lower ground?
   1. No (____) 2.Yes (____)
2. Is the ground around the water point swampy and wet?
   1. No (____) 2. Yes (____)
3. Is the slab or apron around the water point damaged or cracked?
   1. No (____) 2.Yes (____)
4. Is there inadequate or no drainage away from the water point?
   1. No (____) 2. Yes (____)
5. Is the water point unfenced?
   1. No (____) 2. Yes (____)
6. Do people drink directly from the spout/tap or place their fingers inside the spout/tap to help the water flow adequately?
   1. No (____) 2. Yes (____)
7. Do taps unattached to plastic tube to guide the flow?
   1. No (____2.Yes (_____)
8. Are there any other possibilities for water Contamination? Specify _____

C. Total score of sanitary risks

Note: One (1) point is given for each _Yes‘ answer. Add up the total number of _Yes‘ answers to get the sanitary risk score.
Note: Sanitary risk score:
6 – 7 = very high-risk of contamination
4 – 5 = high-risk of contamination
2 – 3 = some risk of contamination
0 – 1 = low risk of contamination
Name and Signature of the inspector: _____