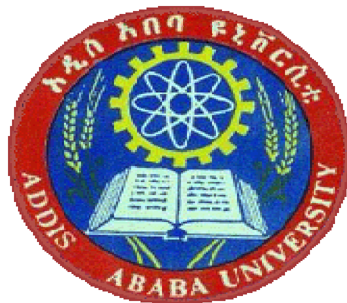
Addis Ababa University, College of Health Sciences, School of Public Health

Ethiopia Field Epidemiology Training Program (EFETP)



Compiled Body of Works in Field Epidemiology

By
Yeshitila Mogessie (BSc)

Submitted to the Graduate Studies of Addis Ababa University in partial fulfillment for the degree of Master of Public Health in Field Epidemiology

May 2014
Addis Ababa

Addis Ababa University

College of Health Sciences

School of Public Health

Ethiopian Field Epidemiology Training Program (EFETP)

Compiled Body of Works in Field Epidemiology

By
Yeshitila Mogessie (BSc)

Submitted to the Graduate Studies of Addis Ababa University in partial fulfillment for the degree of Master of Public Health in Field Epidemiology

Advisors
Lucy Boulanger (MD, Resident Advisor)
Desalegn Dalecha (MD, MPH)

May 2014
Addis Ababa

ADDIS ABABA UNIVERSITY
School of Graduate Studies

Compiled Body of Works in Field Epidemiology

By
Yeshitila Mogessie

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

Approval by Examining Board

_______________________ _________________
Chairman, School Graduate Committee

___________________________ ____________________
Advisor

___________________________ ____________________
Examiner

___________________________ ____________________
Examiner

Acknowledgments

I would like to thank my advisers Dr Lucy Boulanger (Resident Advisor) and Dr Desalegn Dalecha academic coordinator for spending their time correcting the first draft of this Body of Work and constructive comments for each output in this document.

I would like to acknowledge Addis Ababa University, School of public health, Ethiopia Field Epidemiology Program coordinators, resident advisors and Supervisors (Dr Adamu Addissie, Dr Getahun Aynalem, Dr Zegeye Hilemariam Mr. Almayehu Bekele and Mr.Jemal Hasen for their memorable comments in the class and practical attachment sessions. I also thank all individuals, organizations and the community who provided me their support during all field investigation and program evaluation activities.

At the last but not the least I acknowledge SNNPR PHEM staffs that support me friendly in the duration of the field attachment in the regional health bureau.

Table of Contents

Acknowledgments i

Table of Contents ii

List of Tables iv

List of Figures vi

List of Annexes viii

Abbreviation and Acronyms ix

Executive Summary xiii

Chapter I- Outbreak/Epidemic Investigations 1

1.1 Meningococcal meningitis Outbreak in Hawassa City, Southern Nation Nationalities and Peoples Region, Ethiopia, 2013…………………………………………………………........... 1

1.2 Outbreak of Measles in Sodo Town, Wolayita Zone, Southern Nation Nationalities and Peoples Region, Ethiopia, 2013………………………………………………………........... 15

Chapter II-Surveillance Data Analysis Report 29

2.1 Meningococcal Meningitis Surveillance Data Analysis Report in South Nations and Nationalities People Region, 2007-2012, Ethiopia……………………………………........... 29

2.2 Yellow Fever Surveillance Data Analysis Report, South Nations Nationalities and Peoples Region, November 2012- February 2014, Ethiopia………………………………………......... 45

Chapter III-Evaluation of Surveillance System 59

3.1 Evaluation of Measles and Malnutrition Surveillance System in Dawro zone, SNNPR, 2013…………………………………………………………………………………........ 59

Chapter IV-Health Profile Description Report 84

4.1 Health Profile Description of Konta Special Woreda…………………………………........... 83

Chapter V- Scientific Manuscripts for Peer reviewed Journals.. 101

5.1. Meningococcal Meningitis Outbreak in Hawassa City, South Nations, Nationalities and Peoples Region Ethiopia, 2013……………………………………………………………....... 101

Chapter VI-Abstracts for Scientific Presentation 117

6.1 Meningococcal Meningitis Outbreak in Hawassa City, South Nations, Nationalities and Peoples Region Ethiopia, 2013………………………………………………………….......... 117

6.2 Measles Outbreak Investigation in Sodo Town; Southern Ethiopia, October 2013…........ 119

Chapter VII – Narrative Summary of Disaster Situation Visited 121

7.1 Humanitarian, Health and Nutrition Need Assessment, SNNPR November, 2013….. 121

Chapter VIII – Protocol/Proposal for Epidemiologic Research Project 123

8.1 Assessment of Seroprevalence of Measles Specific Antibody (IgG) among children 12-59 month in Hawassa City, 2014…………………………………………………………......... 123

Chapter IX - Other Additional Output Reports... 135

9.1 Measles Outbreak investigation in Loma Woreda, Dawro Zone, 2014……………….......... 135

9.2 Health and Nutrition Disaster in Dasenech Woreda South Omo Zone, Southern Nation Nationalities and Peoples Region, 2013……………………………………………….. 141

9.3Training Provided 149

Annexes.. 153

List of Tables

Table1.1.0.1Meningitis case and deaths by Sub-City from 1/20/13 -03/14/13 Hawassa city administration, SNNPR 8
Table1.1.0.2Number of Meningococal Meningitis Cases (n=27) and their Controls (n=54) Paired with Socio Demographic Status, Hawassa City, SNNPR, February 2013 10
Table1.1.0.3 Number of Cases (n=27) and Controls (n=54) Paired According to Exposure Status for Meningococcal Meningitis Risk Factors, Hawassa City, SNNPR, February 2013 11
Table1.1.0.4 Multivariable Analysis of independent risk factors for Meningococcal Meningitis, based on Comparison of Cases (n=27) and Controls (n=54) Hawassa, SNNPR, 2013 11
Table1.2.1 0.5 Number of Measles Case in St Francis Children Supporting Center, Sodo Town, 2013 20
Table1.2.2 0.6Number of Cases (n=25) and Controls (n=50) Paired with risk factors to Measles in Sodo Town, 2013 24
Table1.2.3 0.7Results of Multivariate analysis for Risk Factors, Sodo town, 2013 25
Table3.1.0.1 Priority diseases reported through the surveillance system in Ethiopia 63
Table3.1.0.2Number of Server acute malnutrition cases by reporting sites from Wk32-52/ Dawro zone/2013 67
Table 3.1.0.3Surveillance Data Reporting Health Facilities by Woreda, Dawro zone, 2013 70
Table3.1.0.4.Types of confirmatory testes done at regional public health, Zonal hospital and HC laboratories, SNNPR, 2013 72
Table4.1.0.1Population structure by age group of Konta special Woreda, SNNPR, 2012/ 2013 89
Table4.1.0.2Type and number of functional health facilities Konta special Woreda SNNPR, April2013 92
Table 4.1.0.3Type and number of health professionals, and proportion to the population, Konta Special Woreda April 2013 92
Table4.1.0.4Status of basic health services and indicators of Konta special Woreda, April 201393
Table 4.1.0.5Under five top five cause's morbidity in Konta Special Woreda 2011/12 93
Table 4.1.0.6 Ten top outpatient department causes of morbidity in Konta special Woreda, SNNPR , 2011/12 94
Table 4.1.0.7 Nationally notifiable disease burden by year in Konta Special Woreda, 2013 95

Table5.1.0.1.Number of Meningococcal Meningitis Cases (n=27) and their Controls (n=54) Paired with Socio Demographic Status, Hawassa City, SNNPR, February 2013.............. 111
Table 5.1.0.2 Number of Cases (n=27) and Controls (n=54) Paired According to Exposure Status for Meningococcal Meningitis Risk Factors, Hawassa City, SNNPR, February 2013....... 112
Table5.1.0.3 Multivariable Analysis of independent risk factors for Meningococcal Meningitis, based on Comparison of Cases (n=27) and Controls (n=54) Hawassa, SNNPR, 2013 113
Table8.1.0.1Schedule for measles seroprevalence study in Hawassa City, 2014....................... 131
Table8.1.0.2 Budget Break down for Measles seroprevalence study in Hawassa City, 3014.... 132
Table 9.1.0.1 Measles Attack Rate by Highly Affected kebeles 137
Table 9.2.1 0.2. Number of acute malnutrition case screened with MUAC from age 6month-5year Dasenech district, October 27-29/2013 145
Table9.2.2 0.3.Number of Pregnant mothers screened for malnutrition, Dasenech Woreda, October 27-29/2013.. 146

List of Figures

Figure1. 1. 0.1Map of Hawassa City, SNNPR, 2013 4
Figure1. 1. 0.2Epidemic Curve of Meningococcal Meningitis by Epidemiological Week in Hawassa City, SNNPR, 2013 8
Figure1.1.0.3Meningitis attack rate by specific age group from 01/20/13-03/14/2013 at Hawassa city, SNNPR 9
Figure1, 2.0.1Number of Measles cases By Month St Francis Children Supporting Center, Sodo Town, 2013 21
Figure 1.2.0.2 Epidemic Curve of Measles Cases by Epi-week, Sodo Town, October, 2013 21
Figure1.2.0.3 Measles Age Specific Attack Rate, Sodo Town, Wolayita Zone, October, 2013 .. 22
Figure1.2.0.4Spot Maps of Measles in Sodo Town, Wolayita Zone, 2013 23
Figure 2.2 0.1 Annual Incidence of Meningococcal Meningitis by Year Southern Nations Nationalities and Peoples Region, 2007 to 2012 35
Figure 2.1.0.2 Trends of Meningococcal Meningitis Cases by Month from 2007-2012, SNNPR36
Figure2.1.0.3Percentage of Meningococcal Meningitis Case Load and Case fatality rate by Zone and Sp. Woredas From 2007-2012, SNNPR, 2013 36
Figure 2.1.0.4Spot Maps Meningococcal Meningitis by reporting zone/Special Woredas from 2007-2010, SNNPR 37
Figure 2.1.0.5 Spot Maps Meningococcal Meningitis by reporting zone/Special Woredas from 2011-2012, SNNPR 38
Figure2.1.0.6Number of Meningococcal Meningitis Outbreak Cases by Age Group in SNNPR, 2012 39
Figure2.1.0.7 Epidemic Curve of Meningococcal Meningitis Outbreak Cases Southern Nation Nationalities and Peoples region, 2012 40
Figure2.1.0.8 Spot maps of meningococcal meningitis outbreak cases by Woreda, SNNPR, 2012 41
Figure2.2.0.1Map of countries where there is risk of yellow fever transmission. (WHO 2010) . 49
Figure2.2.0.2 Epidemic curve of yellow fever by epidemiologic week SNNPR, 2014 51
Figure2.2.0.3 Yellow Fever Attack Rate by Specific Age Group SNNPR, 2013/2014 52
Figure2.2.0.4Yellow Fever Case Fatality Rates by Specific Age Groups in SNNPR, from Nov.2012 to Mar.2014 52

Figure2.2.0.5 Yellow Fever Cases and deaths by Sex SNNPR, from Nov.2012 toMar.2014...... 53
Figure2.2.0.6Spot Maps of Yellow Fever Cases and Deaths by Woreda in South Omo Zone from Dec.2012 to Mar. 2014 54
Figure2.2.0.7 Yellow Fever Cases by Woreda, SNNPR, from Nov.2012 to Mar.2014 55
Figure3.1.0.1Map of Dawro Zone by Woreda, Southern Nations Nationalities and Peoples Region, 2013 68
Figure3.1.0.2Diagram illustrating the flow of surveillance data and information throughout a health system 71
Figure3.1.0.3Trained of Surveillance Report Completeness by Epidemiological Week in Dawro Zone, 2013 77
Figure4.1.0.1Map of Konta Special Woreda by kebele, Southern Nations Nationalities and Peoples Region, 2013 88
Figure4.1.0.2 Percentage of School Dropout in Konta Special Woreda, 2013 90
Figure 4.1 0.3Organogram of District Health System of Konta special Woreda, SNNPR, 2013 91
Figure4.1.0.4Disease burden in the last 5 years in Konta special Woreda, 2013 96
Figure5.1.0.1Map of Hawassa City, SNNPR, 2013 105
Figure5.1.0.2 Epidemic Curve of Meningococcal Meningitis by Epidemiological Week in Hawassa City, SNNPR, 2013 109
Figure5.1.0.3Meningococcal Meningitis Attack Rates by Specific Age group from 01/20/13-03/14/2013 in Hawassa city, SNNPR 109
Figure9.1.0.1 Measles cases by date of onset in the first epidemic, Loma Woreda, 2013 137
Figure 9.1. 0.2Measles Epi-curve, Loma Woreda, Dawro Zone, 2014 138
Figure 9.1.0.3 Measles Attack Rate by Age Group per 100,000 populations Loma Woreda 2014 138
Figure9.1.0.4 Spot Maps of Measles Cases by Kebele in Loma Woreda, 2014........ 139
Figure9.2.0.1. Map of Dasenech Woreda by Kebele, 2013 142
Figure9.2.0.2 Number of sever acute malnutrition cases reported by epidemiological week, Dasenech Woreda, 2013 144
Figure9.2.0.3Number of acute malnutrition screened cases at Sess kebele, Dasenech District October 28/2013 145

List of Annexes

Annex 1: Meningococcal Meningitis out Break Investigation questionnaire Hawassa City, 2014 153

Annex 2: Questionnaires for Case- control study on Outbreaks of Measles in Sodo Town, Wolayita Zone, 2013 155

Annex 3: Zonal Level Surveillance System EvaluationQuestionnaire, Dawro Zone, 2013....... 158

Annex 4: Woreda Level Surveillance System Evaluation Questionnaire, Dawro zone, 2013 ... 166

Annex5:Health facility Level Surveillance System Evaluation Questionnaire, Dawro Zone, 2013 172

Annex 6: Health Post Level Surveillance System Evaluation Questionnaire, Dawro Zone, 2013 177

Annex 7: Laboratory Level Surveillance system Assessment tool........ 181

Annex 8: Informed consent form 186

Annex 9 : Questionnaires for Measles Specific Antibody (IgG) Study, Hawassa City, 2014 ... 187

Annex 10: Map of African Meningitis Belt 189

Annex 11: Declaration 190

Abbreviation and Acronyms

AAU	Addis Ababa University
AFI	Acute Febrile Illness
AFP	Acute Flaccid Paralysis
WHO-AFRO	World Health Organization Regional Office for Africa
ANC	Antenatal Care
AOR	Adjusted Odds Ratio
AR	Attack Rate
AWD	Acute Watery Diarrhea
BPR	Business Process Re-engineering
CBN	Community Based Nutrition
CDC	Center for Disease Control
CFR	Case Fatality Rate
CSA	Central Statistics Agency
CSF	Cerebrospinal Fluid
DHS	Demography and Health Survey
DPHP	Disease Prevention and Health Promotion
EC	Ethiopian Calendar
EDTA	Ethylene Diamine Tetra-Acetate
eIDSR	Electronic Integrated Disease surveillance and Response
EQA	External Quality Assurance
EPHI	Ethiopian Public Health Institute
EPI	Expanded Preprogram for Immunization
EPRP	Early Preparedness and Response Plan
Epi-Wk	Epidemiological Week
EWR	Early Warning and Response
FDRMFSS	Federal Disaster Risk Management and Food Security Sector
FMOH	Federal Ministry of Health
GC	Gregorian calendar
GO	Governmental Organization

HC	Health Center
HAD	Health Development Army
HEW	Health Extension Worker
HIV	Human Immune Virus
HMIS	Health Management Information System
HP	Health Post
HR	Human Resource
IDSR	Integrated Disease Surveillance and Response
IgG	Immunoglobulin G
IgM	Immunoglobulin M
IRC	International Rescue Committee
IRS	Indoor Residual Spray
IRB	Institutional Review Board
ITNs	Insecticide Treated Nets
IRS	Indoor Residual Pray
IU	International Units
JSNA	Joint Monitoring Strategic Need Assessment
MGD	Millennium Development Goal
MMR	Measles Mumps and Rubella
NGO	Non Governmental Organization
Nm	Neisseria meningitides
NNT	Neonatal Tetanus
OCHA	Organization for Coordination of Humanitarian
OPD	Outpatient Department
OR	Odds Ratio
PCR	Polymerase Chain Reaction
PHCU	Primary Health Care Unit
PHEM	Public Health Emergency Management
PV	Pentavalent
RHB	Regional Health Bureau
RRT	Rapid Response Team

SAM	Sever Acute Malnutrition
SARS	Sever Acute Respiratory Syndrome
SIA	Supplementary Immunizations
SNNPR	Southern Nations and Nationalities People Region
UNICEF	United Nation Children's Fund
VHF	Viral Hemorrhagic Fever
WHO	World Health Organization
WFP	World Food Program

Executive Summary

The Ethiopia Field Epidemiology Training Program (EFETP) started in 2009. The EFETP is an in-service training program in field epidemiology adapted from United States Center for Disease Control and prevention (CDC) Epidemic Intelligence Service (EIS) program. The EFETP has two main components, each of which contributes the award of the Master degree (a class-room teaching component and practical attachment or field placement component.

During the field placement component I was engaged on outbreak investigations, surveillance data analysis, surveillance system evaluation, district health profile development, while participating in disaster situation analysis, writing a project proposal development, abstracts writing for scientific conference, peer review journal writing, oral presentation in scientific conference, and giving refreshment training for Zone and Woreda level PHEM officers. I produced outputs that are compiled in this Body of Work.

Outbreak investigationI-1: Meningococcal meningitis was reported in Hawassa city from 22 January to 17 February 2013. In this out break we identified 87 cases and 4 deaths (attack rate: 26.1/ 100,000, case fatality rate: 4.6). The age adjusted attack rate was highest among persons aged 15-29 years (ASAR 37.5/100,000). We isolated Serogroup, A, C, and W135, and gram negative diplococcus, from 8 CSF specimens. The dominant sero group was Nm. type A which was 4(50%) of confirmed cases. In the case control study we identified that; out of 27 cases and 54 controls having a history of recent past ten days acute respiratory infection was significantly associated with contracting meningococcal meningitis {AOR = 4.7, 95% CI(1.5-14.9)}. Living in a room with a family size of four and above was significantly associated with the disease (AOR) =4.5, 95% confidence interval (1.005-20.6).

Outbreak investigationI-2: Measles outbreak was occurred in Sodo Town capital of Wolayita Zone. In this outbreak 53 measles cases and 5 deaths were identified. The age specific attack rate was highest among infants (893/ 100000) with CFR= 9.4%.We selected 25 cases and 50 controls for risk identification and identified that households with a family size of > 6 persons were significantly associated with the disease {AOR=4.2, 95% CI (1.2, 14.4)}. Individuals with no history of vaccination for measles showed significant association with the disease {AOR=3.7, 95% confidence interval (1.03, 13.36)}.

Surveillance Data Analysis Report II-1: Six years (2007-2012) SNNPR Meningococcal Meningitis surveillance data was analyzed. During this period a total of 1605 meningococcal meningitis cases were detected by surveillance system. The CFR was 1.2 %(19/1605). The mean annual incidence was 1.6 per 100,000 populations. Cases were reported from 18(95%) of surveillance data reporting Zones and Special Woredas. The number of cases reported in2012 increased by 3.5 times the 2007 cases.

Surveillance data analysis reportII-2: Southern Nation Nationalities and Peoples Region yellow fever surveillance data from December 2012 to March 2014 was analyzed. During this period a total of 165 cases and 62 deaths were reported. The epidemic was confirmed on 15 May 2013. A total of 38 specimens were collected for laboratory confirmation. From 38 specimens 9 were positive and 23 negative for yellow fever. The rest 6 samples result not known. From reported cases 97(58.8%) were males. Total case fatality was 37.6% and the sex specific case fatality rate was 47(48.5%) for males and 15 (22.1%) for females. The Age specific attack rate was highest in persons aged 15-44(44.37/100,000).

Evaluation of surveillance system III: The public health surveillance system is evaluated to ensure that problem of public health importance are being monitored efficiently and effectively. So we evaluated measles and malnutrition surveillance system attributes and core functions of surveillance system in Dawro zone. In 2013 the surveillance system detected 1423 SAM cases and 13 measles cases but we identified gaps for indicators in well functioning public health surveillance system. In general there was electronic data base at health facility and Woreda level. Even the available database at Zone level was aggregate of health facility reports. Data was not analyzed and there was no documented feedback that given through the surveillance system.

Health profile description report IV: Health profile provides a snapshot of the overall health of the local population. However in low income countries like Ethiopia such information especially at district level usually not available. So a study was conducted to provide health profile description of Konta special Woreda which will help for health planning. Konta special Woreda is one of the fourth special Woredas in SNNPR with a population of 108,909. The Woreda have 4 HC and 40HP with 44 administrative kebeles. Top ten leading morbidity in the outpatient department was malaria. There are 29(65.9%) malaria prone kebeles. The 2011/2012 ITNs

coverage was 100% and IRS 34%. Majority of the notifiable diseases burden was increased in the last two years. Measles and PV3 vaccination coverage was 93%and 87% respectively and health workers density per 1000 population was 1.31.

Scientific manuscript journal V: Scientific journals prepared to communicate findings or present new ideas that help improve the health, safety and well being of the population. As a result a peer review journal was prepared on a disease entitled "Meningococcal Meningitis Outbreak in Hawassa City, South Nations, Nationalities and Peoples Region Ethiopia, 2013".

Abstracts for scientific Presentation VI: Two abstracts were prepared and submitted for scientific conference. From the two abstracts "Meningococcal Meningitis Outbreak in Hawassa City, South Nations, Nationalities and Peoples Region Ethiopia, 2013" accepted at 5th AFENET conference for Oral presentation and presented. The second Abstract was "Measles Outbreak Investigation--Sodo Town, Southern Ethiopia October/2013 which was submitted to ASTMH. **Disaster situation visited VII**: I was participated in Meher Assessment from November 25 to December 09/2013 at Gureghe, Hadiya and Silite Zones and 8 selected Woredas. And I also participated in health and nutrition disaster assessment and response in Dasenech Woreda, South Omo Zone.

Proposal development for epidemiologic research VIII: In the residency time one Project proposal was prepared with a title "Assessment of Seroprevalence of Measles Specific Antibody (IgG) among children 12-59 month children in Hawassa City, 2014". The purpose of the study was measles is vaccine preventable disease which has routine EPI program .In addition to the routine vaccination there were several SIAs but SNNPR including Hawassa City experienced large epidemic in 2013/14. Measles outbreaks are known to be associated with low coverage of measles immunization (low prevalence of IgG antibody against measles. So this study was designed to assess the prevalence of Measles specific antibody IgG and the vaccination coverage that indicates the immunization coverage which will help to improve the EPI program.

Other additional outputs IX: In the residency time additional outputs done were Measles outbreak investigation in Dawro Zone, participating in Health and nutrition disaster in Dasenech Woreda, South Omo Zone; producing weekly epidemiological bulletin for SNNPR PHEM; and providing refreshment training for Zonal and Woreda level PHRM officers on deferent topics.

Chapter I- Outbreak/Epidemic Investigations

1.1 Meningococcal meningitis Outbreak in Hawassa City, Southern Nation Nationalities and Peoples Region, Ethiopia, 2013

Abstract

Background: In Ethiopia meningococcal meningitis epidemics occur cyclically every three to five years in several regions that are located within the African meningitis belt. In January 2013 Hawassa City Administration reported an increase in persons with fever, headache, and vomiting and neck stiffness. We investigated to confirm the outbreak, identify risk factors and implement control measures.

Methods: We defined a suspect case of meningococcal meningitis as any person with sudden onset of fever, vomiting and neck stiffness in Hawassa City from 22January-17 February 2013. We did active case surveillance for suspected cases from Addare and Referral Hospitals and collected CSF specimens from cases .We used Gram stain, latex agglutination and culture for confirming tests. We performed a case control study and compared meningococcal meningitis cases with their controls. We included all admitted cases that a physician diagnosed as meningococcal meningitis.

Result: We identified 87 suspected cases and 4 deaths with CFR of 4.6%. The overall attack rate was 26/ 100,000 and age specific attack rate was highest among persons aged 15-29 years (ASAR 37.5/100,000). We isolated Serogroup, A, C, and W135, and gram negative diplococcus, from 8 CSF specimens. The index case admitted on 22th January from Philadelphia kebele. We declared the outbreak on 28th January. The peak case load was on week 6 and lasted through week 11 of 2013. Out of 27 cases and 54 controls having a history of recent past ten days acute respiratory infection significantly associated with contracting meningococcal meningitis {AOR= 4.7, 95% CI(1.5-14.9) }. Living in a room with a family size of four and above was significantly associated with the disease {AOR=4.5, 95% confidence interval (1.005-20.6)}.

Conclusion: This investigation confirmed an outbreak of meningococcal meningitis and identified recent acute respiratory infection and overcrowded housing as significant risk factors

for contracting meningococcal meningitis. We can reduce the risk though community educating on reduction of overcrowding and respiratory infections. We recommended serogroup survey especially on w135 which help in the selection of vaccine type for mass vaccination in SNNPR.

Introduction

Meningococcal Meningitis is an acute bacterial disease caused by Neisseria meningitidis, also known as meningococcus. The disease often characterized by sudden onset of fever, headache and neck stiffness .The causative organism (N.meningitidis) can be found naturally occurring in the upper respiratory tracts of 5% to 30% of healthy individuals who are entirely asymptomatic. It can cause severe brain damage and is fatal in 50% of cases if untreated. More than Twelve serogroups of N. meningitidis have been identified, five of which (A, B, C, W135, and X) can cause epidemics [1, 2].

The bacteria are transmitted from person to person through droplets of respiratory or throat secretions. Close and prolonged contact – such as kissing, sneezing or coughing on someone, or living in close quarters (such as a dormitory, sharing eating or drinking utensils) with an infected person – facilitates the spread of the disease. The average incubation period is four days, but can range between 2 and 10 days [3, 4].

Higher incident of meningococcal disease has been linked to factors such as poor living conditions and overcrowded housing. Migration and travel are also considered possible facilitative means by which the circulation of pathogenic strains moves inside a country, from country to country. Especially family members of an infected person are at increased risk for meningococcal disease. Antecedent upper respiratory tract infection, low socioeconomic status and both active and passive smoking are also associated with increasing the risk. During outbreaks, bar or nightclub patronage and alcohol use have also been associated with higher risk for disease [5-7].

Meningococcal disease can vary in incidence from very rare to over 1000 cases per 100 000 population every year depending upon climate, age of the patient, geographical location and season of the year. Serogroup" A" N .meningitidis causes the highest incidence of disease. Repeated pandemics of serogroup "A" disease have taken place in Sahara and sub-Sahara countries of Africa, known as the African meningitis belt, every 5–10 years since 1905. (8) Between 2003 and 2009 from 13 countries under enhanced surveillance of meningitis except Sudan more than 271,275 cases and 24,901 deaths were reported to World Health Organization (WHO). The dominant serogroup responsible was Neisseria meningitidis A (58%) [9-11].

In Ethiopia meningitis epidemics have been described in written reports since 1901. The epidemics affect almost all regions of the country. Outbreaks were reported in 1935, 1940, 1950, 1964, 1981 and 1989 .The 1981 and 1989 outbreaks were the largest ever recorded in Ethiopia. In the 1981 outbreak 50,000 cases and 1000 deaths were reported. The affected regions were the northern and western parts of Ethiopia. Since then the disease remain endemic with recurrent outbreaks. In Ethiopia epidemics of meningococcal meningitis have been occurred in about eight year cycles but in the last five years outbreaks reported yearly from different parts of the regional states especially from SNNPR [12].

In SNNPR in the last five years outbreaks of meningococcal meningitis have occurred frequently (in2006, 844 cases and 27 deaths; in 2007,647 cases and 10 deaths; in 2008, 218 cases and 5 deaths and in 2012, 88 meningococcal meningitis cases were reported [13]. Following this on January 22, 2013 SNNPR Health Bureau received report of a suspected meningitis outbreak in Hawassa city which is the capital city of Southern Nations Nationalities and Peoples Region. Hawassa City has a population of 333,445 with the projection of 2007 census administered with 8 sub cites and 32 administrative kebeles.

On January 28, 2013 team organized from regional health bureau and WHO deployed to the city administration to investigate and control the outbreak.

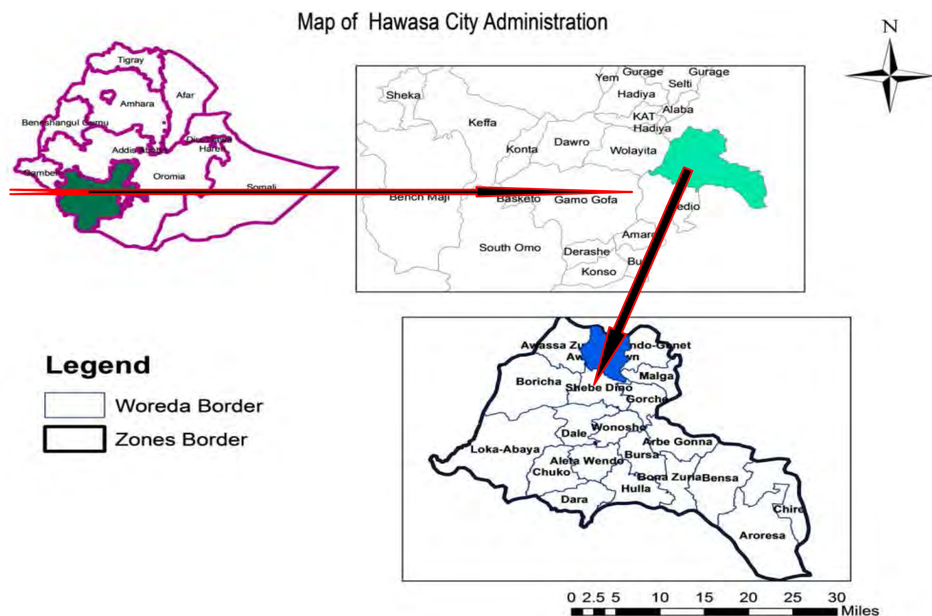


Figure1. 1. 0.1Map of Hawassa City, SNNPR, 2013

Rational of the study

Outbreaks of meningitis become a yearly event with high morbidity and mortality. Meningococcal meningitis occurred with different serogroups. So the type of serogroup responsible for the outbreak was not known. Determining the type of serogroup help to plan the type of reactive vaccine used for prevent and control of the outbreak. There are different risk factors that increase the incidence during an outbreak. So this outbreak investigation was designed to confirm the existence of the outbreak, describe the magnitude of the outbreak, assess the responsible serogroup and determining contributing risk factors that help the region for prevention and control of meningococcal meningitis outbreaks.

Objectives

General objectives

To investigate a suspected meningitis outbreak occurred in Hawassa City Administration from 28th January2013 to 17th February 2013.

Specific objectives

To confirm the existence of the outbreak

To determine the etiology /circulating sero group/responsible for the outbreak

To describe the outbreak by place, person & time

To determine possible risk factors for the outbreak in Hawassa city

To prevent and control the outbreak

Methods

Study setting:

The study was conducted in Hawassa city Administration in SNNPR from 28th January2013 to 17th February 2013.

Study population: Populations under the study were the population of Hawassa city residents.

Study design: Descriptive cross-sectional study followed by unmatched case control study design was used to investigate the outbreak.

Data collection: Cases and controls were interviewed using a structured questionnaire. For each case two controls were used. During interview for child cases, we interviewed the parents. For descriptive part outbreak line list which was reported to the regional health bureau PHEM between 01/22/2013 and 03/17/2013 were reviewed and analyzed. To confirm the outbreak cerebrospinal fluid (CSF) were collected from probable cases of meningococcal meningitis, and sent to the regional public health laboratory. Tests used for confirmation were gram stain, rapid test using latex and culture.

Operational definitions

Case:Any individual who resied in Hawassa having the signe and symptems set by WHO and a physician diagnosed with meningitis in-between 28th January 2013 to 17th February 2013.

Control: - Any apparently healthy individual who live in Hawassa city administration.

1. **Case definitions** (WHO)

1.1. **Suspected Meningococcal meningitis case**: Any person with sudden onset of fever (>38.5 C rectal or 38.0 C axillary) and one of the following signs: neck stiffness, altered consciousness or other meningeal signs. OR

Any toddler with sudden onset of fever (>38.5 C rectal or 38.0 C axillary) and one of the following signs: neck stiffness, or flaccid neck, bulging fontanel, convulsion or other meningeal signs.

1.2. Probable M. meningitis case: Any suspected case with macroscopic aspect of its CSF turbid, lousy or purulent; or with microscopic test showing Gram negative diplococcus, Gram positive diplococcus, and Gram positive bacillus; or with leukocytes count greater than 10 cells /mm3.

1.3. Confirmed meningitis case: A probable cases with N. meningitidis isolation from CSF or blood.

Inclusion

Cases: All individuals that a physician diagnosed with meningitis from 28th January2013 to 17th February 2013 and admitted in Referral and Aadare Hospitals.

Controls: Residents of Hawassa who were neighbored to the selected case.

Exclusion

Cases that were not available or discharged at the time of data collection excluded from case control study.

Data processing and analysis: Epi-Info7 and excel 2007 were used for data entry and calculating rates, ratios, frequencies and analyses data using Logistic Regressions. Tables and figures were obtained using excel and Arc GIS.

Ethical issue: Oral informed consent was obtained from each respondent.

Result

Descriptive epidemiology

We identified a total of 87 cases and 4 deaths with CFR of 4.6%. Out of identified cases 45(52%) were males. The index case was 1 year old female. She lived in Addis Ketema sub - city, Philadelphia Kebele. She has no travel history in areas where there is a suspected or confirmed meningococcal meningitis outbreak and had no contact history with suspected meningitis case. All 8 sub-cities were affected by the disease. The peak number of cases was reported on week 6 and the outbreak lasted through week 11(Figure 2). The attack rate was very high in Addis Ketema sub-city (41.9/100,000).The overall AR was 26.1/100,000 population. The age specific attack rate was highest among persons aged 15-29 years (ASAR 37.5/100,000). The average days from onset of the disease and visiting health facility for those who died of meningitis was 2.7and for all non fatal cases 1.6.

Laboratory investigation:-We collected 37 cerebrospinal fluid specimens (CSF) but only 8 specimens were positive for meningococcal meningitis. Out of these 6 positive specimens with latex agglutination, the responsible serogroups were (A=4, C=1, W135=1, and gram negative diplococcic 2 with microscopy. There was no confirmed result with PCR.

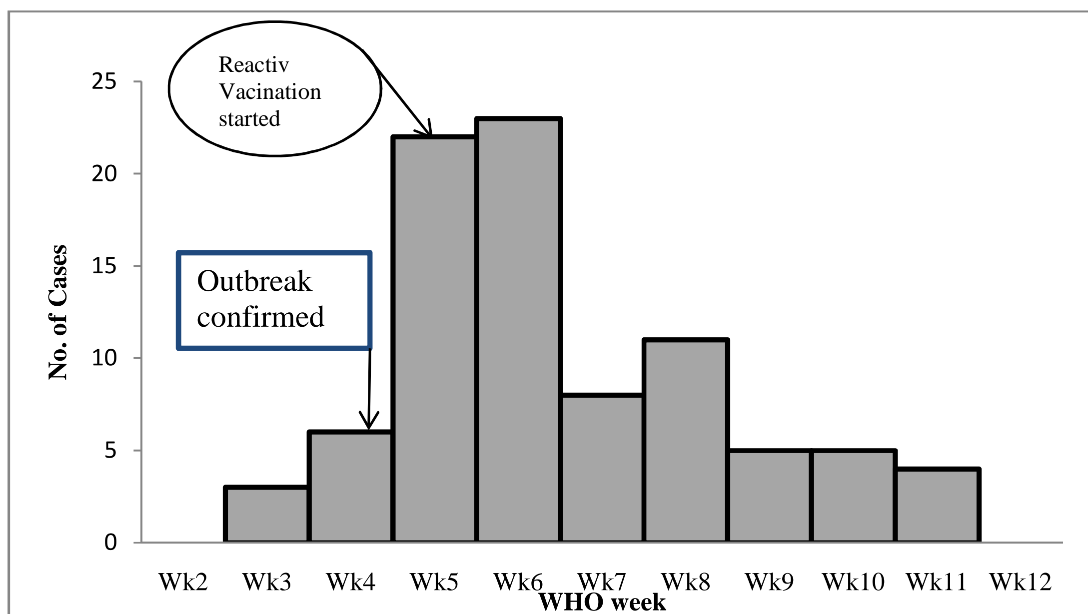


Figure1. 1. 0.2Epidemic Curve of Meningococcal Meningitis by Epidemiological Week in Hawassa City, SNNPR, 2013

Table1.1.0.1Meningitis case and deaths by Sub-city from 1/20/13 -03/14/13 Hawassa city administration, SNNPR

S.N.	Sub City	Total Population	No. Cases	No. Death	Attack Rate/100,000	CFR%
1	Addis Ketema	23,893	10	1	41.9	10
2	Haikdar	24,172	9	0	37.2	0
3	Mehal Ketema	23,611	2	0	8.5	0
4	Bahil Adarash	13,608	3	0	22	0
5	Misrak Ketema	26,302	5	0	19	0
6	Menaheria	39,183	8	0	20.4	0
7	Tabor	63,559	18	0	28.3	0
8	Habela Tulla	119,117	32	3	26.9	9.4
	Hawassa city	333,445	87	4	26.1	4.6

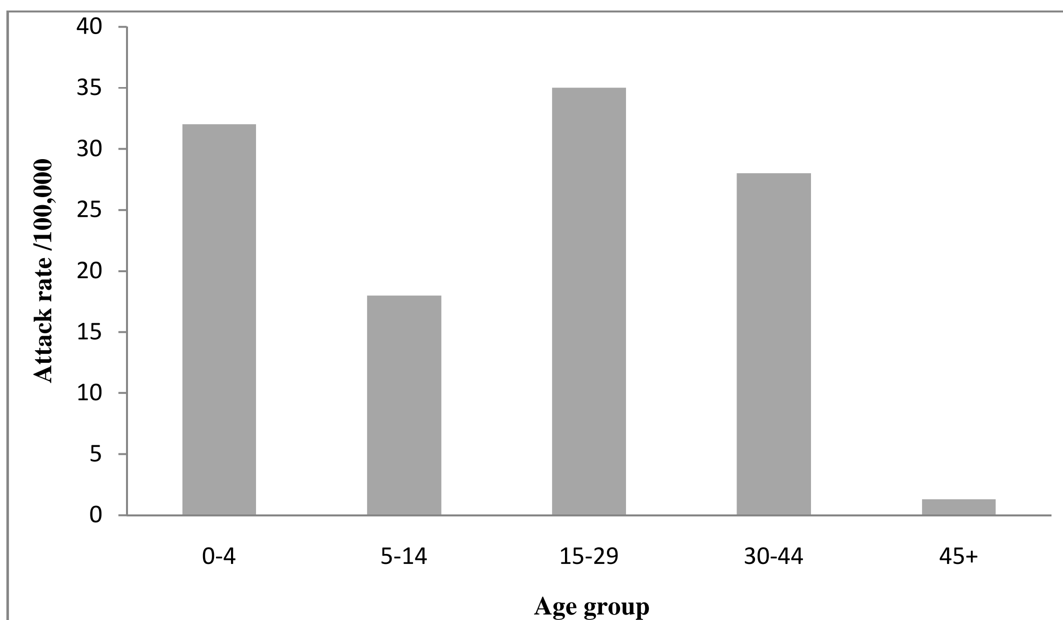


Figure1.1.0.3Meningitis attack rate by specific age group from 01/20/13-03/14/2013 at Hawassa city, SNNPR

Case control study

We recruited 27 cases (median age: 18 years) and 54 controls (median age: 25 years). Risk factors obtained from cases and controls analyzed in two Stages, Bivariate analysis followed by multivariate analysis. In the Bivariate analysis social and health factors were associated with the disease such as living in a single room, family size, having no information how meningococcal meningitis transmitted from person to person and acute upper respiratory infection (Table 3).

Multivariate Analysis

Only three independent risk factors, that have strong association with meningococcal meningitis based on 27 cases and 54 controls, were associated with contracting meningococcal meningitis in the multivariate analysis result (Table 4). Living with family size four and above per a single room had a significant association with the disease than unmatched controls who have a family member less than four [AOR =4.5, 95% CI (1.005-20.6)]. Cases that have acute upper respiratory infection have significant association with the disease [AOR=4.79(95% CI: 1.5-14.9). Cases who do not have knowledge about meningitis and its mode of transmission have association with the disease than controls [AOR=3.7(95% CI=1.07-12.88)]. Living room is one

of the assessed risk factors for meningococcal meningitis. In this study we identified that 63 % the cases with average family size of 3, and 38.8% of controls with average family size of 2.6 used single room for sleeping, cooking or every activities of the house hold.

Table 1.1.0.2 Number of Meningococcal meningitis Cases (n=27) and their Controls (n=54) Paired with Socio Demographic Status, Hawassa City, SNNPR, February 2013

		Case	Controls
Gender	Male	17(63%	29(54%)
	female	10(37%)	25(46%
Religion	Orthodox	8(30%)	15(28%)
	Muslim	1(4%)	2(4%)
	protestant	17(63%)	36(67%)
	others	1(4%	1(2%)
Occupation	Daily labor	6(22%)	3(6%)
	Farmer	10(37%)	3(6%)
	Government employee	1(4%)	13(24%)
	House wife	1(4%)	7(13%)
	Privet owned	5(18%)	18((33%)
	Student	4(16%	10(19%)
Educational level	illiterate	3(12%	0
	Primary	17(63%	18(33%)
	Secondary	5(19%)	27(50%)
	Diploma	0	6(11%)
	Above Diploma	1(4)	3(6%)
Number of rooms for living	1	18(66.66%)	21(38.89%)
	2	5(18.52%	9(16.67%)
	3	2(7.41%)	16(29.63%)
	4+	2(7.41%	8(14.81%)
Family size	1	1(3.7%)	5(9.26%)
	2	1(3.7%)	8(14.81%)
	3	7(25.93%)	10(18.52%)
	4	10(37.04%)	12(22.22%)
	5	3(11.11%)	4(5.56. %)
	6+	5(18.52%)	15(9.26%)

Table 1.1.0.3 Number of Cases (n=27) and Controls (n=54) Paired According to Exposure Status for Meningococcal Meningitis Risk Factors, Hawassa City, SNNPR, February 2013

Risk factors	Case %	Control %	OR(95CI)
Gender			
Female	10(37)	25(46)	0.7(0.3-1.8)
Male	17(63)	29(54)	
Residence			
Rural	12(44)	18(33)	1.6(0.62-4.18)
Urban	15(56)	36(67)	
Knowledge about MM			
No	21(78)	21(39)	
yes	6(22)	33(61)	5.37(1.90-16.7)
AURI			
Yes	17(63)	17(31)	3.7(1.4-9.8)
No	10(37)	37(69)	
Living room			
Single	17(65)	21(39)	2.96(1.1-7.87)
Two+	9(35)	33(61)	
Family size /single room			
Four& above	10(38)	4(19)	7.08(1.6-31.3)
< Four	6(62)	17(81)	

Table1.1.0.4 Multivariable Analysis of independent risk factors for Meningococcal Meningitis, based on Comparison of Cases (n=27) and Controls (n=54) Hawassa, SNNPR, 2013

Term	AOR	95%	C.I.
Acute URI= y	4.7956	1.537	14.9632
Number of rooms >1	0.2505	0.0553	1.1358
Family size >= four	4.5507	1.0045	20.6154
Knowledge about MM transmission=NO	3.7238	1.0765	12.8809

Prevention and control activities

We were conducting mass vaccination campaign to residents for specific age group (2-30 years old). The estimated target population from age 2-30 yrs were 233,411.The vaccination coverage was 85.73%. During the mass vaccination other governmental organizations like prison and university was considered. In these organizations expected targeted population were 40,300. The vaccination coverage for this target groups was 88.37%.The vaccine type used for the mass vaccination was AC. Cases were treated with appropriate treatment set by the national and WHO treatment guide lines (protocol).

Discussion

This investigation confirmed an outbreak of meningococcal meningitis. Though different serogroups identified in a single outbreak, the dominant serogroup was Nm type A. In Africa including Ethiopia frequently reported and responsible for majority of outbreaks is Neisseria meningitis type A [14].

Upper respiratory infection 10 days prior to meningococcal meningitis was a significant risk factor to meningococcal meningitis, consistent with preceding upper respiratory infection was an important risk factor for meningococcal meningitis. Respiratory diseases such as influenza and pneumonia might weaken the immune defenses and add to the mucosa damage [14, 15].

The most affected age group is the young age groups with median age of 18.74yrs. Meningococcal meningitis mostly affects the younger age group, but during epidemics old children, teenagers and young adults are also highly affected. [15-17]

An overcrowded housing condition was highly contributed for the occurrence of the outbreaks. In this study 63% the cases and 38.8% of the controls use a single room for every activity .This study identified that residents who live in a single room with a family size of four and above were highly affected with the disease, studies support that overcrowding as measured by the number of adolescents and adults (10 years older) house hold members per room doubling of risks with the addition of 2 adolescents or adults to a six room[17,18].

Knowledge about the disease and transmission route might help them to prevent the disease because cases that do not have knowledge about transmission of meningococcal meningitis have significant association with the disease. Reactive mass vaccination from age 2 to30 years of age with AC vaccine and prompt case management controlled the outbreak. Once the epidemic threshold is reached in a district or sub-district, it is recommended to conduct mass vaccination campaign targeting the entire district, using the appropriate polysaccharide vaccine [18].

Limitations:

We could not include all meningitis case due to limited time in the outbreak investigation and other social and behavioral risk factors (Alcohol drinking and cigarette smoking and Kissing were not included in the study.

Majority of the lab results were negative because of patients were taking antibiotics (ciprofloxacin) purchasing from privet sectors.

Conclusion:

Meningitis is a disease which mostly affects the young age group from 0-30 especially from 15-29 years of age. The epidemic was aggravated by overcrowded housing condition, preceding upper respiratory infection, and knowledge about the disease and its mode of transmission.

Recommendation:

Community educating on meningococcal meningitis and its transmission as well means for reduction of risk factors for meningococcal meningitis. Reducing overcrowded living is important in reduction of meningococcal meningitis outbreak. Furthermore there should be regional level serogroup survey especially on serogroup w135.

Reference

1. Jason K.whitson. Disease research report Meningococcal disease (meningitis) 2005
2. WHO Meningococcal meningitis fact sheet 27/8/2010.
3. WHO. Managing meningitis epidemic in Africa, a quick reference guide for health authority and healthcare workers 2010
4. http//www.cdc.gov/meningitis/index,html
5. The Role of Weather in Meningitis Outbreaks in Navrongo, Ghana: A Generalized Additive Modeling Approach
6. Anna M. Moles worth, Luis E. Cuevas, Stephen J. Connor, Andrew P. Morse, and Madeleine C. Thomson. Environmental Risk and Meningitis Epidemics in Africa, Emerging Infectious Diseases • Vol. 9, No. 10, October 2003
7. Jenny MacLennan, George Kafatos, Keith Neal et al. Social Behavior and MeningococcalCarriage in British Teenagers; Emerging Infectious Diseases .www.cdc.gov/eid . Vol. 12,No. 6, June 2006
8. D.Stephens, B.Greenwood, p.Brandtzaeg. Epidemic meningitis, meningococcaemia, and Neisseria meningitidis Lancet 2007(www.thelancet.com Vole 369 June 30, 2007
9. E.Cuevas, E.C. savory, C.A. Hart, M.C. Thomson, M.A. Yassin .Effect of reactive vaccination on meningitis epidemic in south Ethiopia.2007
10. WHO: Standard operating Procedure s for enhanced meningitis surveillance in Africa version August ,2009
11. Benjamin Sultan1, Karima Labadi2, Jean-François Gue´gan3, Serge Janicot Climate Drives the Meningitis Epidemics Onset in West Africa, January 2005 | Vol 2 | Issue 1 | e6
12. Y. Brihane, D. H/Mariam. H. Kloos: Epidemiology and ecology of health and disease in Ethiopia 1st edition, 2006
13. Unpublished on job Meningitis training manuals for SNNPR.
14. Leimkugel.J, Racloz.V, Jacintho da Silva.L and Pluschke.G.Global review of meningococcal disease. A shifting etiologyJournal of Bacteriology Research Vol. 1(1), pp. 006-018, April, 2009
15. WHO. Control of epidemic meningococcal disease; WHO practical guide line 2nd edition.// http://www.who.int/emc//
16. Joanna Tully, Russell M Viner, Pietro G Coen, James M Stuart, Maria Zambon, Catherine Peckham, et al. Risk and protective factors for meningococcal disease inadolescents: matched cohort study; BMJ, doi:10.1136/bmj.38725.728472.BE (2006)
17. Lance Honish, Colin L. Soskolne, Ambikaipakan Senthilselvan, Stan Houston,Modifiable Risk Factors for Invasive Meningococcal Disease During an Edmonton, Alberta Outbreak, 1999-2002;Canadian journal of public health 2008;19(1):46-51
18. Michael Baker,Fafphm,Mcnicholas,et al.Household crowding amajor risk for epidemic meningococal disease in Aukuland children,USA. Pediatric infectious disease journal.2000;19(10):983-989

1.2 Outbreak of Measles in Sodo Town, Wolayita Zone, Southern Nation Nationalities and Peoples Region, Ethiopia, 2013

Abstract

Background: In Southern Nation Nationalities and Peoples' Region outbreaks of measles occur every year. In 2012, there were 43 IgM confirmed and 1969 epi-linked cases with incidence of 11.3/100,000 population. On October 2, 2013 the Regional Health Bureau received a report of suspected outbreak of measles from Sodo town and dispatched a team to investigate, identify risk factors and implement control measures for the outbreak.

Methods: A suspect case of measles defined as any person in Sodo town who met with the standard WHO measles case definition from epidemiologic week (37-45). A descriptive study of all cases was conducted followed by a 1:2 unmatched case-control study. A control was any person not having history of measles residing in the same community in the same period. The study employed a structured questionnaire to seek information from cases and controls and used Epi-info to calculate frequencies, odds ratios and logistic regressions.

Result: We identified 53 measles cases and 5 deaths. The overall AR was 50/100,000 population and the CFR was 9.4%.The age specific attack rate was highest among <1 year aged infants (893/ 100000) with CFR= 17.8%.Orphans living in St Francis children supporting center accounted for 34% of the cases. The case control study involved 25 cases (median age of 10 months ranging from 2 months to 17 years) and 50 controls (median age 2.8 years ranging from 4 month to 18 years).Households with a family size of > 6 persons were significantly associated with the disease [AOR=4.2, 95% CI (1.2, 14.4)]. Individuals with no history of vaccination for measles showed significant association with the disease [AOR=3.7, 95% CI (1.03, 13.36)].

Conclusion: This investigation confirmed existence of outbreak of measles and identified significant risk factors for contracting the disease such as being unvaccinated and overcrowded living. It is possible to reduce the risks through improving measles vaccination coverage and avoiding overcrowding. Infants St Francis orphanage highly affected than in the community. Orphanage should consider a quarantine room for infants coming from outside institutions for 4weeks before placing infants with others and vaccinating all staff for measles.

Introduction

Measles is an acute, highly contagious viral disease caused by measles virus. The measles virus is member of the genus Morbillivirus of the family Paramyxoviridae. Scholars believed that the virus appears to be antigenically stable because of no evidence that the viral antigens have significantly changed over time. However, sequential analysis of viral genes has shown that there are distinct lineages (genotypes) of wild type measles viruses. In consideration to this epidemiological information, identification of a specific virus genotype can suggest the origin of an outbreak [1].

Humans are the only reservoirs. Transmission is primarily person- to-person via aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons. In a non-immune person exposed to measles virus the incubation period is 10 to 12 days from exposure to the onset of fever and other nonspecific symptoms and 14 days (range 7-18 days) from exposure to onset of rash. Clinically measles presented with prodromal symptoms of fever, malaise, cough, coryza (runny nose), and conjunctivitis [1-3].

Measles is vaccine preventable disease. Vaccination is one of the most effective prevention and control mechanisms available. The vaccine is made from a live attenuated virus. When children are correctly administered 0.5 ml of potent live attenuated measles vaccine subcutaneously, serologic studies have demonstrated that measles vaccines induce sero-conversion of 85% at 9 months and above 95% after 12 months of age. The peak antibody response occurs 6 to 8 weeks after infection or vaccination. Immunity conferred by vaccination against measles has been shown to persist for at least 20 years and is generally thought to be life-long for most individuals. Infants born to mothers who have either had measles or been vaccinated are protected by trans-placental transferred antibody and Infants are generally protected until 5 to 9 months of age.

A second opportunity for vaccination is giving the chance for immunization of measles for the second time to children who may not have got the vaccine or failed to develop protection. The second opportunity can be provided through supplementary immunization activities (SIA) [3].The fourth Millennium Development Goal (MDG 4) aims to reduce the under-five mortality rate by two-thirds between 1990 and 2015. Recognizing the potential of measles vaccination to reduce child mortality, and given that measles vaccination coverage can be considered a marker

of access to child health services, routine measles vaccination coverage has been selected as an indicator of progress towards achieving MDG 4[1-3].

The Measles initiative is a collaborative effort of UNICEF, WHO, the American Red Cross, the United States Centers for Disease Control and Prevention, and the United Nations Foundation. Building on over a decade of experience in reducing measles mortality, the Measles Initiative advocates with governments and appeal to donors around the world for; two doses of measles vaccine, effective surveillance, rapid response to measles outbreaks, and effective treatment of measles cases. Epidemics of measles occur when the number of susceptible individuals in a population reaches a critical threshold. Outbreaks could occur in areas with lower vaccination coverage and higher malnutrition problem. As immunization coverage increases, the size of epidemics decreases. If the inter-epidemic period lengthens, the proportion of cases among older children increases [4].

Measles is a global health problem which accounts for more than 30 million cases and 0.9 million deaths every year, half of which in Africa. Measles is among the top five causes of death in children less than 5 years of age in many African countries. Currently outbreaks of measles reported in different states of the world. In US during January 1–August 24, 2013, a total of 159 cases were reported to CDC from 16 states and New York City. In South Africa between 2009 and 2011, with over 18,000 cases were recorded [5].

In Ethiopia outbreaks of measles reported every year. In 2012 there were 119 outbreaks with a total of 3506(615 IgM confirmed and 2891 Epi-linked) measles cases. Of these 119 outbreaks in 2012, 9(43IgM confirmed and 1969 Epi-linked measles cases with incidence of 11.3/100,000 population) were reported from SNNPR [6].

Rational of the study

On October 2, 2013 the regional health bureau received a report of laboratory confirmed outbreak of measles from Sodo Town. As soon as received the outbreak a team organized from EPHI, SNNP Regional Health Bureau and Wolayita Zone Health Department moved to the town to search additional cases, identify possible risk factors, control the outbreak and provide information for future disease prevention planning. A case-control study was used to identify contributing risk factors.

Objectives

General Objective

To investigate and control the outbreak of measles in Sodo Town and propose possible prevention and control measures.

Specific objectives

To describe the magnitude of the outbreak by place, person and time

To identify possible risk factors for the outbreak

To propose possible prevention and control measures

Methods

Study area

The study was conducted in Sodo Town which is the capital of Wolayita Zone. The town has a population of 105,591(2007: Census projection) and administered with 11 kebeles. The estimated population of <15 years age was 49,628(47%).

Study population

The population in which cases and controls obtained was the population of Sodo Town.

Study subjects

Individual's admitted with or treated for measles in Gutera Hospital, Christian Hospital, Sodo HC, Wadu HC and Geneme HC and their control with the ratio of 1;2 from Sodo town residents. All active cases available in the above health institutions at the time of data collection included in the case control study.

Study design

We used both descriptive and unmatched case control study to identify magnitude of the disease and associated risk factors

Standard Case definition

A Suspect case of measles defined as any person with fever and maculopapular (non vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes).OR any person in whom a clinician suspects measles.

Confirmed case

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

Operational case definition: **A case** was defined as any person in Sodo town who met with the standard WHO measles case definition from epi-WK (37-45).

A control was any person not having history of measles residing in the same community in the same period.

Outbreak threshold WHO-AFRO defines an outbreak of measles as the occurrence of 3 or more IgM positive measles cases in a health facility or district in one month OR the occurrence of 5 or more reported suspected cases of measles in a health facility/district in a month.

Data collection

Epidemic line lists were collected from Wolayita Zone health desk. For case control study data was collected from cases and controls using interview administered structured questionnaire. For cases and controls aged blow 15 years, we interviewed parents or caregivers.

Data processing and Analysis

Data obtained through interview administered questioner and line list was entered to Epi.Info7 for calculating rates, proportion and ratios and apply logistic regression.

Ethical clearance

Since it was a public health problem we need not to have IRB but oral consent was obtained from each respondent.

Result

Descriptive epidemiology

We identified a total of 53(5 laboratory confirmed and 48 epi-linked) measles case patients with median age of 9 months ranging from 2months to 25 years. The most affected age group was under one (52.8%).The age specific attack rate was highest in persons with age group less than one year (893/100000-) with case fatality of 9.4%. From all measles case patients 58.5 %(31) have no history of vaccination and the rest 41.5% of the case patients have at least one dose of measles vaccine exposure. The index case was 13 year old male who is IgM positive for measles specific antibody. He has no history of travel in areas where there is suspected or confirmed measles outbreak and also has no clear contact with any suspected or confirmed measles case. He is grade 6 student. He has history of 1dose measles vaccine exposure. From all under one patients 64.28 %(18/28) were reported from Christian Hospital came from St Francis children supporting center. Per interview with the children supporting center head, there were 35 infants

in residence at the time of the outbreak. All the infants in the children supporting center were below 1 years of age. Out of 35 infants 18(51.4%) developed the disease. The age specific attack rate in the children supporting center 51/100 infants with 5 deaths (CFR= 27.8%).Infants in this center were adopted from different areas and not breast fed. All the cases were reported from the main building that inhabited with 22nfants (see table 1).In the compound there were 20 nannies 5 supporting staffs, 2 nurses and35 infants.

Table1.2.1.0.5Number of Measles Case in St Francis Children Supporting Center, Sodo Town, 2013

S.N	Name of living room	Number of infants per rooms	Measles infected cases	Building 1
1	Main room	10	6	1(main building)
2	Bedroom	8	8	1(main building)
3	Child bed room	4	4	1(main building)
4	Room number 1	1	0	3 (other block)
5	Room number 3	4	0	3 (other block)
6	Room number 4	4	0	3 (other block)
7	Room number 5	4	0	3 (other block)
Total		35		

Infants who live in block 3 were aged greater than 7 month where as infants who live in the main building were less than 6 months. From the main building there was one infant admitted to Christian hospital for other disease and returned back after recovery. After 20 days he and all infants who live in the same room developed measles.

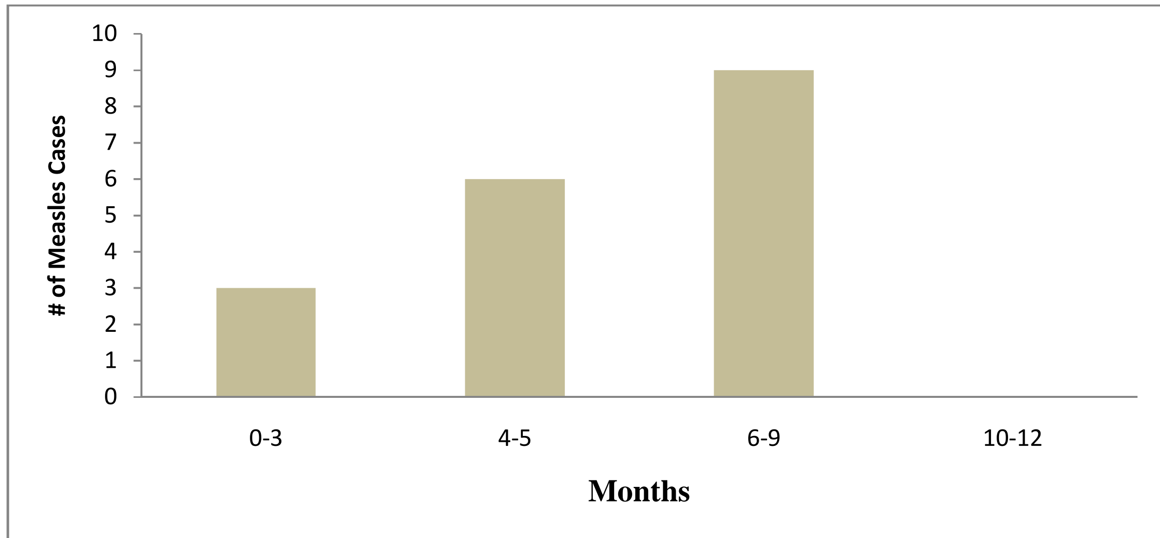


Figure1, 2.0.1Number of Measles cases By Month St Francis Children Supporting Center, Sodo Town, 2013

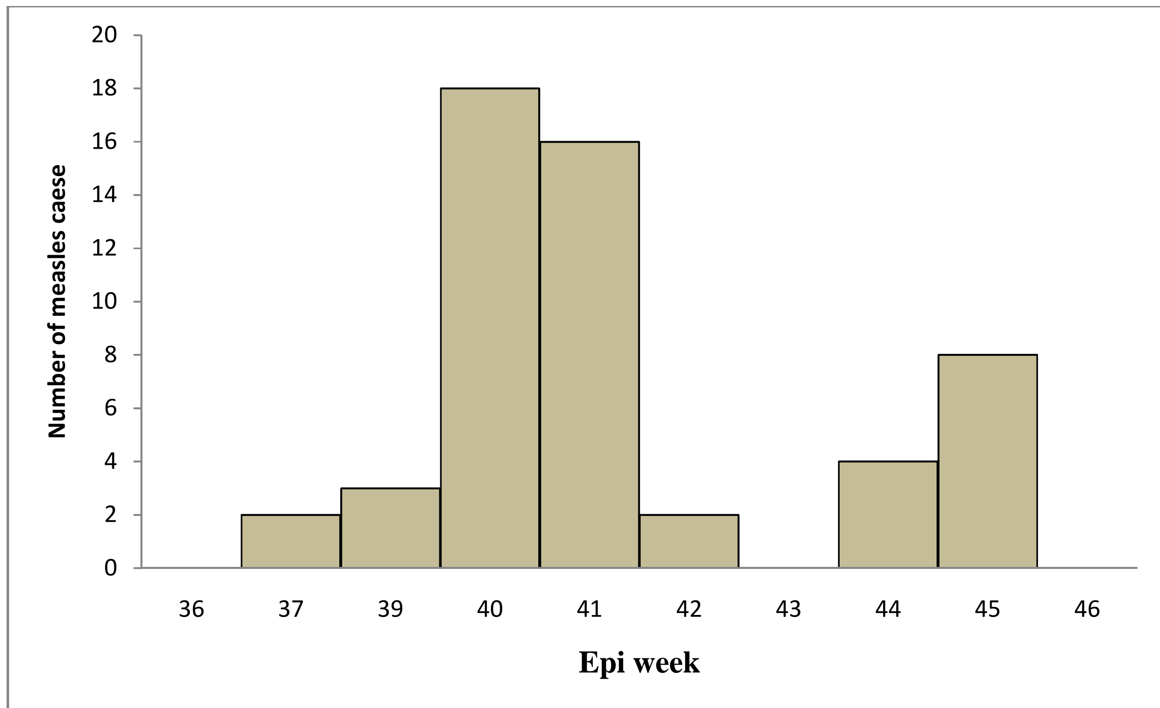


Figure 1.2.0.2 Epidemic Curve of Measles Cases by Epi-week, Sodo Town, October, 2013

The epidemic was peaked on week 40& 41 and lasted thro ugh week 45

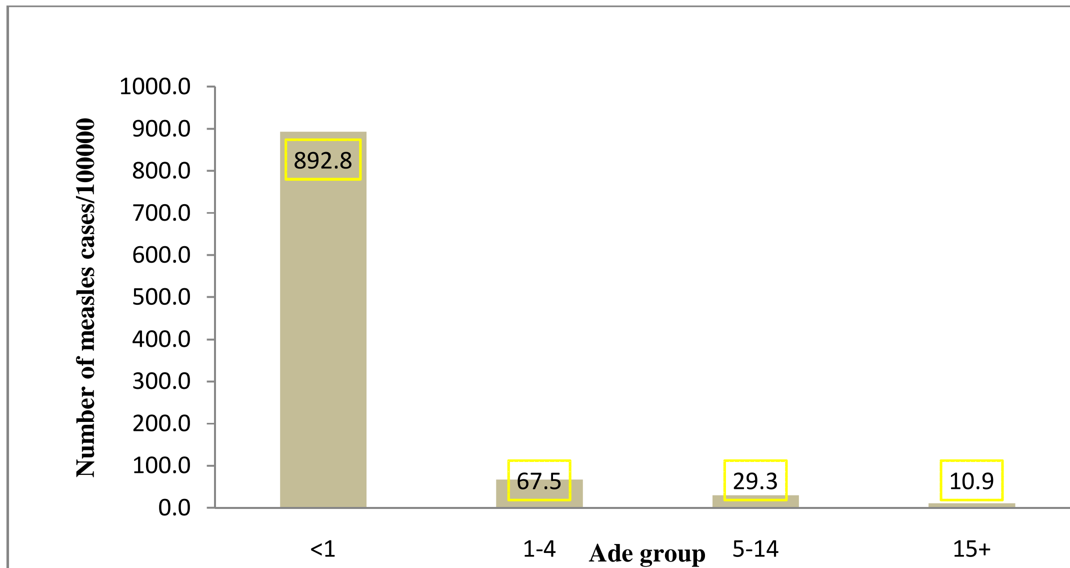


Figure1.2.0.3 Measles Age Specific Attack Rate, Sodo Town, Wolayita Zone, October, 2013

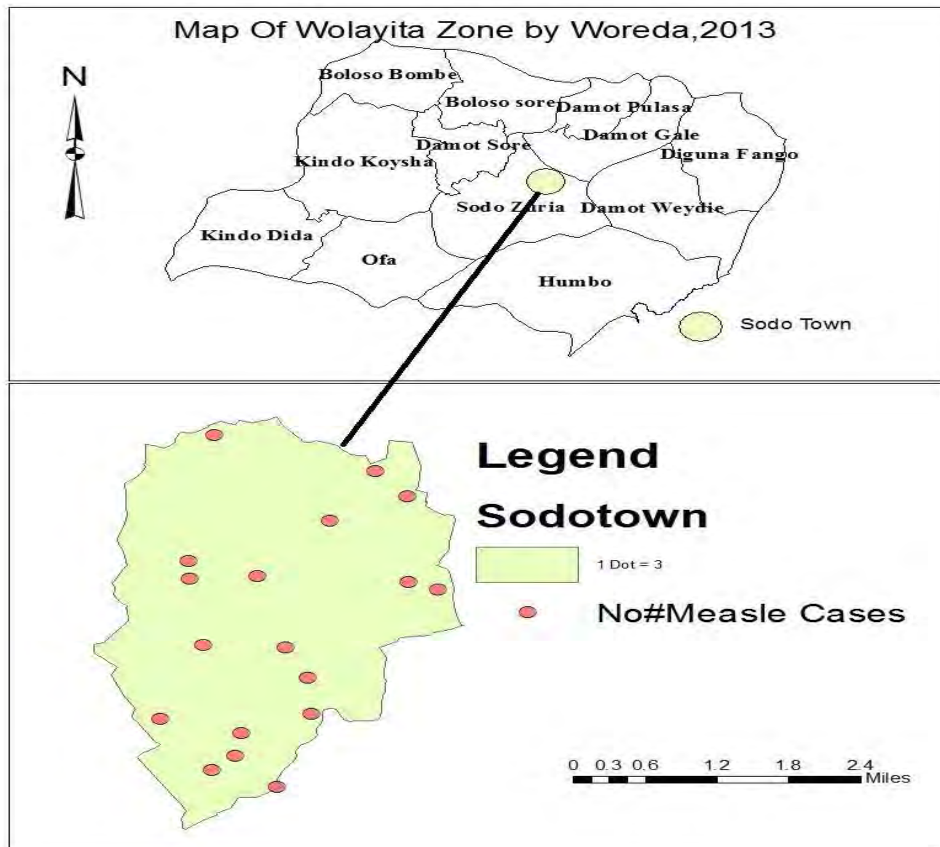


Figure1.2.0.4Spot Maps of Measles in Sodo Town, Wolayita Zone, 2013

We reviewed the EPI program for the town. In 2010, 2011 and 2012 measles vaccination coverage for <1 children were 99.8%, 103.1% and106.1 % and fully vaccination coverage for these respective years were99.8, 108.7 and 107.5%

Public health action

Measles mass vaccination and prompt active case management were used to control the outbreak. Community also mobilized in reducing contact with active cases and early visiting health facility if there is suspected measles case. For mass vaccination there were 49628 target age group (6month to <15 Years). During the campaign a total of 45494(91.67% of target groups) were vaccinated. For case management, ORS, TTC eye ointment, Vitamin A, and antibiotics (ceftraxione) were used.

Case -control

For the case control study, we recruited 25 cases with median age of 10 months ranging from (2month to 17 years), and 50 controls with median age of 2.75 years ranging from (4month to 18 years). Sex distribution; 16(64%) of cases and 26(52%) of controls were females.

Table1.2.0.6Number of Cases (n=25) and Controls (n=50) Paired with risk factors to Measles in Sodo Town, 2013

Variables	Response	Case	Control	OR	95%CI
Ever vaccinated for measles	No	20	20	6	(1.9,18.6)
	Yes	5	30		
Do you Know how measles transmitted	No	19	24	3.4	(1.2,10)
	Yes	6	26		
Do you Know measles is vaccine preventable	No	17	13	6.1	(1.6,6.4)
	Yes	8	37		
	No	9	46		
Family size person per HH	>6	19	16	6.5	(2.2,21.1)
	<=6	6	34		
Educational status	Illiterate	6	9	1.4	(0.4,4.7)
	Literate	19	41		

Table 1.2.3 0.7 Multivariate Analysis for Risk Factors, Sodo town, 2013

Term	Odds Ratio	95%	C.I.
Family member >6 /HH	4.2074	1.2328	14.3592
Vaccination status =No	3.7165	1.0331	13.3698
Do you know mode of transmission of measles =No	1.5508	0.4233	5.6811
Do you know measles is Vaccine preventable = No	1.9721	0.5295	7.3457

Discussion

The incidence rate of measles in Sodo Town was highest in infants (893/100,000) and it is greater than measles incidence in infants occurred during outbreaks in South Africa from 2009 to 2011 which was 610/100, 000 [7].

We attempted to describe factors associated with measles outbreak in Sodo Town. The last three years average one dose measles vaccination administrative coverage was greater than 90% but the vaccination coverage rate for cases was 41% and for controls only 60% .This indicates that the actual vaccination coverage may be very low. The study findings showed being unvaccinated and overcrowding were significantly associated with the disease. Studies show that the risk would be elevated (i.e. RR > 1) in highly populated areas in which the percentage of susceptible infants exceeds 20% because of poor vaccination coverage in preceding years [7]. Similar studies Conducted in different regions and countries agree that measles outbreaks associated with low coverage of vaccination, overcrowding and contact with measles cases [8-10].

Infants born to mothers who have either had measles or been vaccinated are protected by trans-placental transferred antibody and infants are generally protected until 5 to 9 months of age but measles can occur in children before the age of measles vaccination, as investigated in this study 43.4 % measles patient had measles before the age of 9 month which is 7 times higher than identified in other studies [11]. Also in this study 51.4% of orphans in St Francis Children Supporting Center developed measles. Studies supported that children in orphanages are often weak and susceptible to diseases [12].

Risk mapping and targeting emerging high-risk areas where vaccine coverage is low or declining appears a more viable strategy for preventing outbreaks in sub-Saharan Africa like Ethiopia, than mass supplemental immunization [12].

Limitation

There was limited time to investigate the outbreak that is why we could not interview all measles cases. Some of the cases were reported after the team returned back and for some of the cases we could not find in the house to house survey. The vaccination history was obtained from line list and St Francis children supporting Center and not random selection of the population for assessment of vaccination coverage as a result selection bias may be introduced in the study. Controls for some of case in the orphanage selected from the community due to lack of healthy orphans in the St. Francis children supporting center which might not representative controls.

Conclusion

Though the last three years administrative measles vaccination coverage was very high the outbreak was associated with being unvaccinated for measles and overcrowding. Infants in the St Francis children supporting center were highly affected with the outbreak than the community infants. Measles mass vaccination for age 9 month to14 years and prompt case management controlled the outbreak

Recommendation

There should be an improvement in accessing routine measles vaccination as well as supplementary immunizations. There should be periodic assessment for tracing unvaccinated children which help to revised planning problems. Orphanage should consider a quarantine room for infants coming from outside institutions for 4weeks before placing infants with others and vaccinating all staff for measles.

References

1. EHNRI. Guideline on measles surveillance and outbreak management, 3rdedition, Addis Ababa Ethiopia,2012
2. WHO.Response to measles outbreaks in measles mortality reduction settings,2009
3. WHO. AFRO Measles surveillance guideline, May 2003
4. Measles fact sheet No 286 October 2011
5. CDC. Morbidity and mortality weekly report, September 13,2013 vol.62,No.36
6. FMOH: Unpublished annual report on measles
7. Benn Sartorius, C Cohen, T Chirwa , G Ntshoe , A Puren & K Hofman .Identifying high-risk areas for sporadic measles outbreaks: lessons from South Africa; Bulletin of the World Health Organization 2013; 91:174-183.
8. Banlieng Vorasane1, Sommay Keomany1, ShahrokhIzadi, Seyed-Mohsen Zahraie, and MajidSartipi. An Investigation into a Measles Outbreakin Southeast Iran,2011
9. NDOD CorlinsEbontane,Jean Marie Edengue,SimonBaonga Ba-pouth Antoinette, OndoaBatamaNadizana Anne Christine.Investigation of measles Outbreak in the Nkolndongo Health District ,Yaounde,Cameroon:Acase control study,2012 (Abstract)
10. Daba M Feyisssa, W Deressa ,T. Deti,Y.Genemo: Measles Outbreak Investigation and Response in ArsiZone,OromiaRigion ,2012 (Abstract)
11. MayfongMayxay, Tiengthong Khomthilat1, PhoutthalavanhSouvannasing, Khamphouvanh Phounesavath1…Etc. Factors associated with a measles outbreak in children admitted at Mahosot Hospital, Vientiane, LaosChina.org.cn, June 25, 2004
12. Benn Sartorius , C Cohen , T Chirwa , G Ntshoe , A Puren& K Hofman:Identifying high-risk areas for sporadic measles outbreaks: lessons from South Africa,January,2013
13. www.cdc.gov/vaccines/pubs/surv-manual/chpt22-lab-support.htm
14. WHO.MOH, Iraq: Measles and Rubella Surveillance Field Manual,2009
15. Vainio K, Ronning K, Steen TW, Arnesen TM, Anestad G, Dudman S. Ongoing outbreak of measles in Oslo, Norway, January–February 2011. Euro Surveill2011; 16(8):pii=19804.
16. Kassahun. M, Tesfaye .B Balcha G. Masresha, Wondimagegn .K, Fatoumata Nafo-Traore´,Neghist .T, and Asnakew .Y. Progress in Measles Mortality Reduction in Ethiopia, 2002–2009

Chapter II-Surveillance Data Analysis Report

2.1 Meningococcal Meningitis Surveillance Data Analysis Report in South Nations and Nationalities People Region, 2007-2012, Ethiopia

Abstract

Background: Epidemic meningococcal disease remains a major public health challenge in the African meningitis belt including Ethiopia. Meningococcal meningitis is one of the priority diseases under surveillance in Ethiopia. Outbreaks of meningococcal meningitis reported from several regions of Ethiopia especial Southern Nation Nationalities and Peoples Region. This study was designed to analyze meningococcal meningitis surveillance data to describe the burden of the disease by place person and time which will provide information in meningococcal meningitis prevention and control activities.

Methods: The study was conducted in SNNPR regional health bureau from February to March 2013. We used descriptive cross sectional study to describe the data in terms of place,person and time. The data was obtained from Southern nations Nationalitis and Peoples Region public health emergency management rutine surveillance database and epidemic line listes. The data analysis covers the region surveillance data from 2007-2012. We used Microsoft Excel 2007 and Arc Map 10.1 to organize and present data by proportion, frequency tables and figures.

Result: During 6 years (2007-2012) a total of 1605 meningococcal meningitis cases were detected by SNNPR surveillance system. The CFR was 1.2 %(19/1605). The mean annual incidence of meningococcal meningitis was 1.6 per 100,000 populations. Except Yem Special Woreda cases were reported from all Zones and Special Woredas of the region. The case load was not uniform in the zones and special Woredas. From Western Zones BenchMaji and Kefa Zone; from central Zones Kenbata Tenbaro, Sidama, and Hadiya Zones share the highest case load. The number detected meningococcal meningitis cases were increased in the last three years. Majority (74%) of the cases were reported after existence of BPR.

We identified only one outbreak line list which was reported from Kenbata Tembaro and Wolayita Zones in 2012. During this outbreak 88 meningococcal meningitis cases were reported from affected zones. For laboratory confirmation 27 specimens were collected and of which 18

were positive for meningococcal meningitis. The responsible serogroups were sero type A=9, sero group type AC = 2, and gram negative diplococcus = 2. Five testes were reported as positive but the type of the test used and the responsible sero type were not documented. The outbreak was stared on week one, picked on week 6 and lasted through week 16, 2012. . From reported cases 52% were males. Proportionally 89% of the cases were bellow 30 years of age.

Conclusion: The number of meningococcal meningitis cases become increasing from year to years and affected majority of zones and special woredas in the region. We recommend strengthening the surveillance system to able to detect outbreaks early and respond promptly. There should also reactive vaccination especially for repeatedly outbreak reporting zones and woredas.

1. Introduction

Meningococcal meningitis is contagious acute bacterial disease caused by the meningococcus (Neisseria meningitidis), a Gram-negative bacteria. The disease often characterized by sudden onset of fever, headache and neck stiffness. Transmission is person to person by direct contact with respiratory droplets of infected person. In most cases acquired through exposure to asymptomatic carriers, relatively few through direct contact with patients with meningococcal disease. There are different serogroups responsible to meningococcal meningitis. Currently more than twelve serogroups of N. meningitidis have been identified, five of which (A, B, C, W135, and X) can cause epidemics [1-3].

Sero group make a difference on geographic distribution and occurrence of meningococcal meningitis epidemics. Serogroup A N meningitides causes the highest incidence of disease though in 2002 Burkina Faso experienced the largest ever recorded meningitis epidemic due to serogroup NmW135, which was followed in 2003 by an outbreak with mixed etiology (Neisseria meningitidis serogroup A and W135). In 2006 Neisseria meningitidis serogroup X was isolated as the cause of the outbreak in the districts of the western part of Niger, bringing in new threats for the meningitis belt countries [4].

Meningococcal disease can vary in incidence from very rare to over 1000 cases per 100 000 population every year. Higher incident of meningococcal disease has been associated factors such as poor living conditions(low socioeconomic status) and overcrowded housing, antecedent upper respiratory tract infection, and both active and passive smoking . Migration and travel are also considered possible facilitative means by which the circulation of pathogenic strains moves inside a country, from country to country. During an outbreak family members of an infected person; bar or nightclub patronage and alcohol use has also been associated with higher risk for disease [5, 6].

Epidemic meningococcal disease remains a major public health challenge in the African "meningitis belt", an area that extends from Senegal to Ethiopia .An estimated of 500 million peoples are at risk of the disease. The estimated number of cases of meningitis for the last 15 years was more than 700,000 of whom about 10% died and more than 20% with serious sequels. Between 2003 and 2009 morthan271, 275 cases and 24,901 deaths were reported WHO from 13

African countries [7]. Ethiopia experienced different outbreaks in several years. The largest epidemic ever recorded is the 1981 &1989. In 1981 50,000 cases and 990 deaths, and in 1989 45,806 cases, and 1686 deaths were recorded.

Southern Nation Nationalities and Peoples Region is one of the regions of Ethiopia found in the "meningitis belt" and have been affected by meningitis epidemics in the last 5 years. In 2008 five zones (Sidama, BenchMaji, Wolayita, Kembata Tembaro and Hadiya) were affected with meningococcal meningitis outbreak. During this outbreak at total of 218 cases and 5 deaths, were reported with Regional level CFR of 2.3% and AR of 14.8%. In 2009/2010, 17 cases of suspected meningococcal meningitis with 2 deaths were reported from Dura me Hospital, Kembata Tembaro zone. In 2012 outbreak, from Hadiya, kenbata tembaro and Wolyita zone 88 meningococcal meningitis cases were reported.

Meningococcal meningitis is one of the 20 priority diseases under surveillance in SNNPR .The Region administered with 15 zones, 4 special woredas, and 131 woredas; 21 town administrations; and 3608 rural and 324 urban kebeles. The region covers 10% of the countries land mass. The climatic condition: 6.2% dry (arid), 48% kola (semi-arid); 36.8% temperate (woynadega); 6.5 % Dega and 0.7 Wurich (cold) areas. The region found with the range of 375m-4207m altitude above sea level. The population size of the region is 17,332,584 of which 8,624,200 male and 8,708,384 are females. The annual population growth rate is 2.9%. The population density per square km is 138person.

In the region there are, 26 Hospitals (18 GO, 3 NGO, 5 privet); 563 health centers, and 3635 health posts which provide health service. Other privet health facilities 76 diagnostic laboratory centers,10 special clinics,15 NGO clinics,13 higher clinics,110 medium clinics,483 lower level clink,20 Pharmacies ,9 drug distribution centers,133 drug stores and 333 drug venders found in the region which give health service. The regional surveillance date collected mostly from governmental health facilities. Surveillance system should be strong in order to detect changing in epidemiological patterns of epidemics in timely manner and provide evidence to epidemic management and early warning.

There is a need for the surveillance systems to be strengthened in order to detect changing epidemiological patterns of meningitis epidemics in a timely manner and provide evidence to

guide case management and epidemic response. To achieve this there should be adequate funding of epidemic preparedness and response plan [7, 8].

2. Rational of the study

Surveillance is an on-going systematic collection, analysis, interpretation and dissemination to the users who need it for action and meningococcal meningitis is one of the priority diseases under surveillance which have high epidemic potential. The disease occurred as an epidemic in different zones in SNNPR. So analysis of meningococcal meningitis surveillance data is very important to see trends of the disease which help to design prevention and control strategies. This study was designed to analysis the six year (2007-2012) regional meningococcal meningitis surveillance data to describe the magnitude and distribution of the disease in the region.

3. Objectives

3.1 General objective: To analyze meningococcal meningitis surveillance data of SNNPR and epidemic line lists from 2007- 2012.

3.2 Specific objectives

To describe meningococcal meningitis surveillance data in terms of time, place & person

To describe major transmission seasons

To determine responsible sero-groups for meningococcal meningitis epidemics

4. **Methods**

Study area and period

The study was conducted in SNNPR regional health bureau from February to June 2013. SNNPR is one of the 9th regional Sates in Ethiopia. The region surveillance data were collected from 14 zones, 4 special woredas and 1 city administration.

Study designe

We used descriptive cross sectional study design.

Data source

The data was obtained from Southern nations Nationalities and Peoples Region public health emergency management meningococcal meningitis surveillance data from 2007-2012,and epidemic line lists.

Casedefinations of Meningococal Meningitis

Suspected case

Any person with sudden onset of fever (>38.5 C rectal or 38.0 C^{o} axillary) and one of the following signs: neck stiffness, altered consciousness or other meningeal signs.

OR Any toddler with sudden onset of fever (>38.5 C rectal or 38.0 C^{o} axillary) and one of the following signs: neck stiffness, or flaccid neck, bulging fontanel, convulsion or other meningeal signs.

Confirmed Case: A suspected case confirmed by isolation of Neisseria meningitides from cerebrospinal fluid or blood (9)

Data processing and analysis

We used Microsoft Excel 2007 and arc map to obtain frequencies, tables and figures.

5. Result

The regional meningococcal meningitis database from 2007- 2012 and available outbreak line lists in the specified period were analyzed to describe the burden of meningococcal meningitis in SNNPR .Variables in the line list were not computable with variables in the main database. There for the surveillance data was analyzed in to two categories (Outbreak line list data and the routine surveillance database)

1. **Analysis of data obtained from the surveillance database**

During 6 years (2007-2012) a total of 1605 meningococcal meningitis cases were detected by SNNPR surveillance system. The CFR was 1.2 %(19/1605). The mean annual incidence of meningococcal meningitis, based on 1605 cases documented in SNNPR surveillance database, was 1.6 per 100,000 populations. Except Yem Special Woreda cases were reported from all zones and special woredas of the region. The case load was not uniform in the zones and special woredas. From Western Zones BenchMaji and Kefa Zone; from central Zones Kenbata Tenbaro, Sidama, and Hadiya Zones share the highest case load. Before the staring of BPR meningococcal meningitis cases were reported to the surveillance system in monthly basis. Starting from January 2010 the region used weekly basis of reporting. The number detected meningococcal meningitis cases were increased in the last three years. Majority (74%) of the cases were reported after existence of BPR.

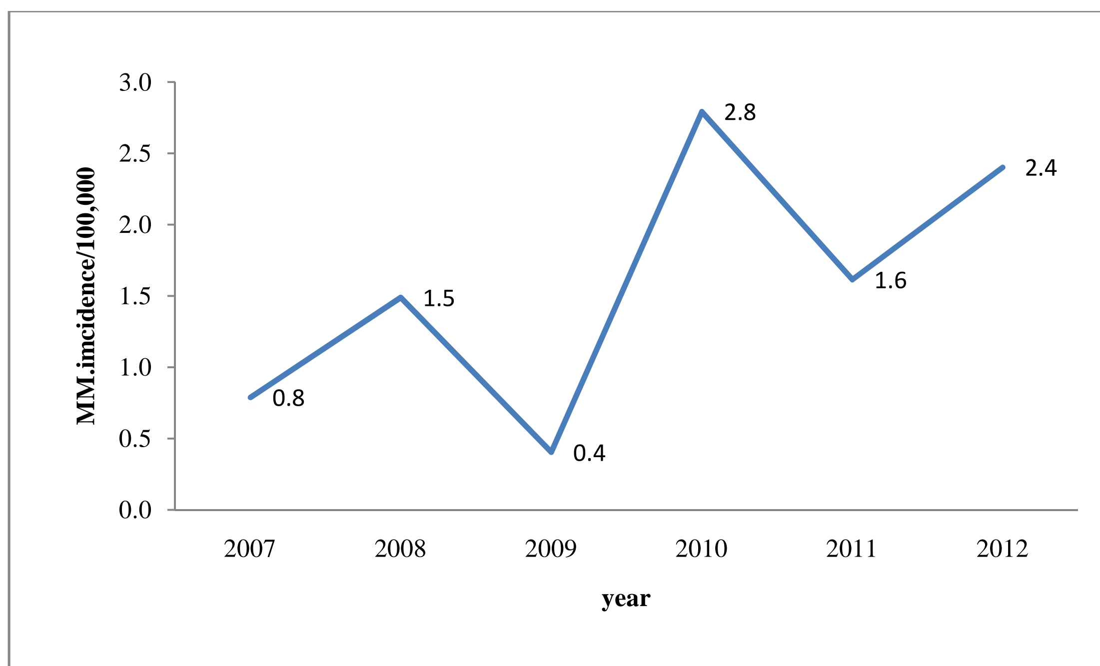


Figure 2.2 0.1 Annual Incidence of Meningococcal Meningitis by Year Southern Nations Nationalities and Peoples Region, 2007 to 2012

Though meningococcal meningitis cases reported in each month the height cases were reported in specific months from Specific Zones. In February 2007 from BenchMaji zone 15 cases; in 2008 from February to March 141 cases from Sidama Zone; in February 2009 from Kenbata Tembaro Zone 26 cases, in 2010 from September to December 102 cases from Benchmaji Zone; in2011 from January to April 48 cases from Kenbata Tembaro Zone and in 2012 from January to may 95 case from Kenbata Tembaro zone reported to the Region.

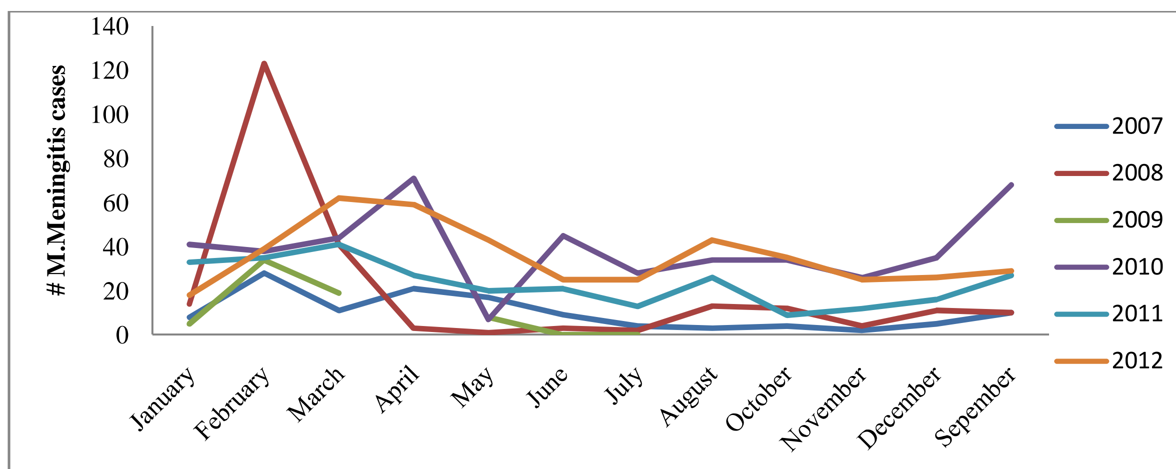


Figure 2.1.0.2 Trends of Meningococcal Meningitis Cases by Month from 2007-2012, SNNPR

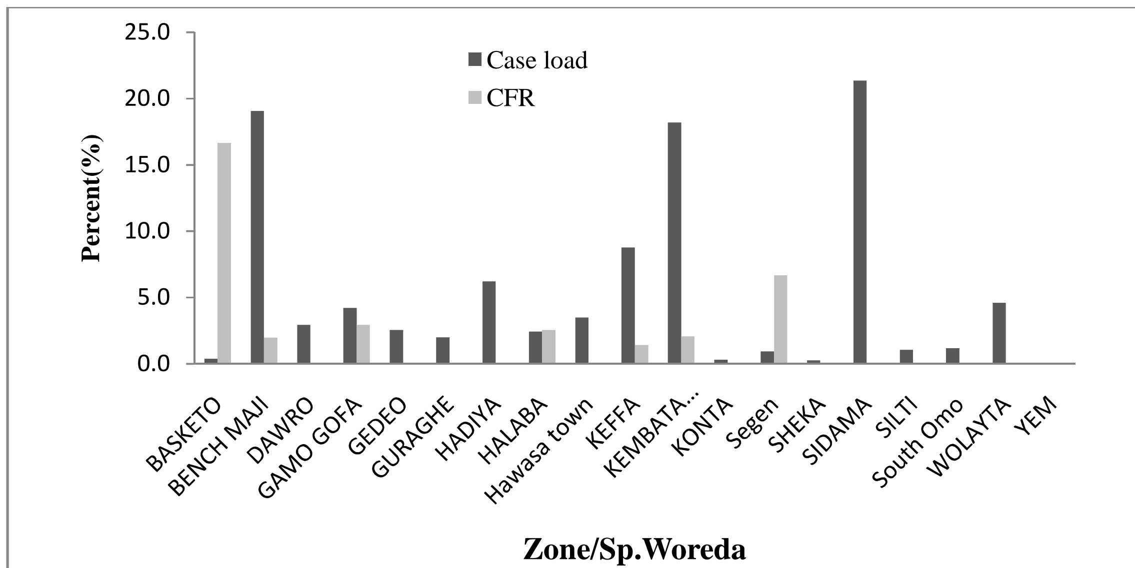


Figure2.1.0.3Percentage of Meningococcal Meningitis Case Load and Case fatality rate by Zone and Sp. Woredas From 2007-2012, SNNPR, 2013

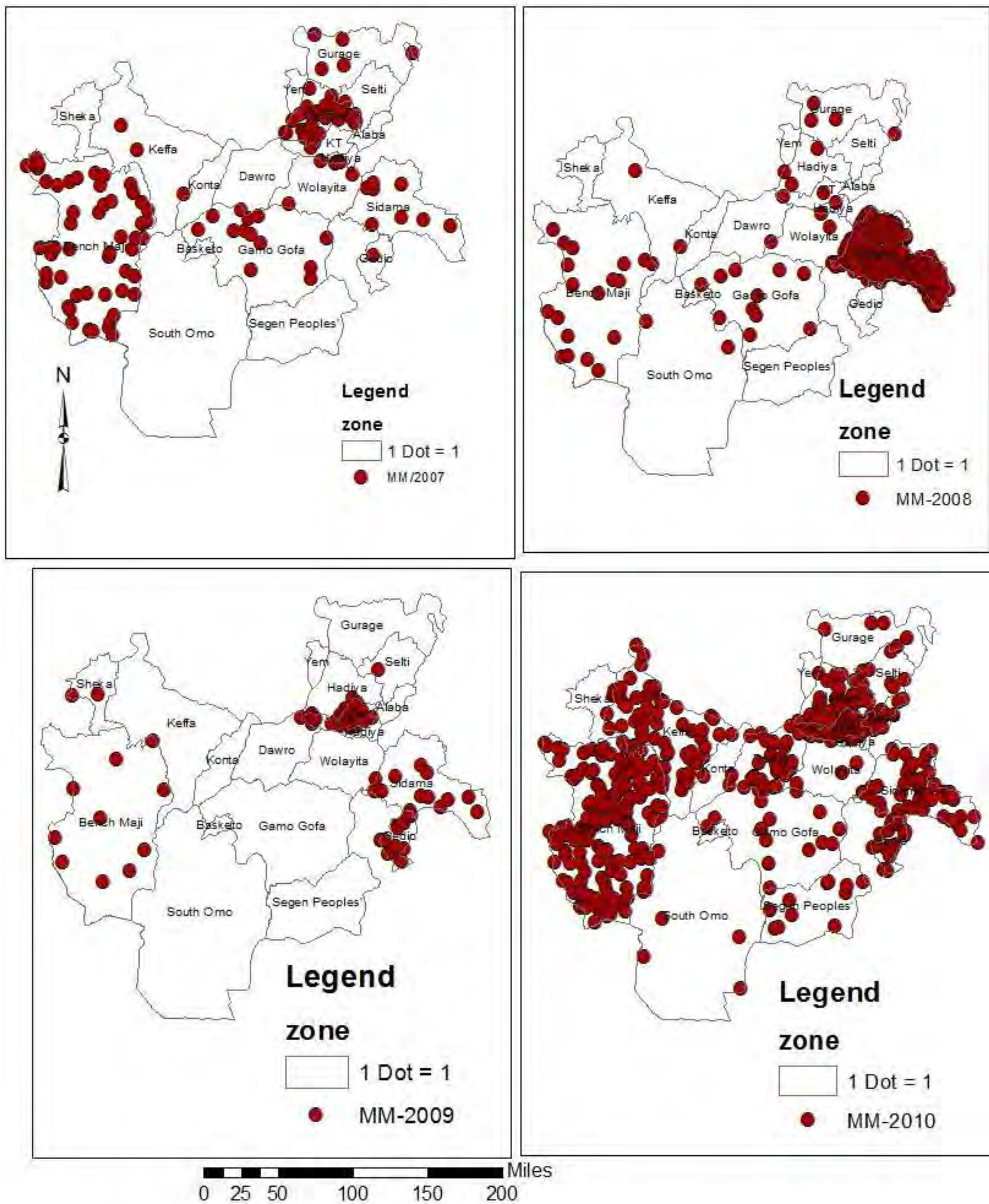


Figure 2.1.0.4Spot Maps Meningococcal Meningitis by reporting zone/Special Woredas from 2007-2010, SNNPR

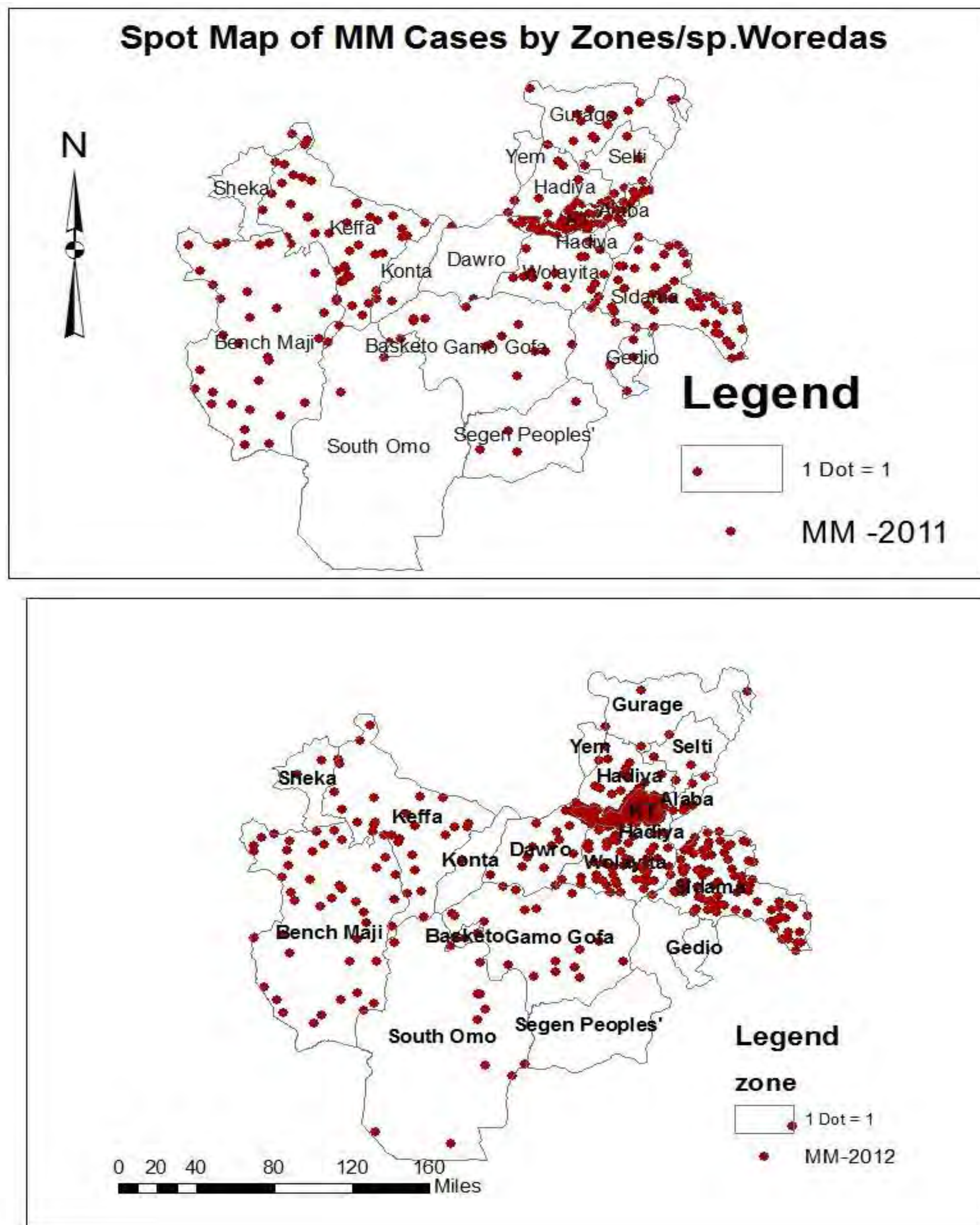


Figure 2.1.0.5 Spot Maps Meningococcal Meningitis by reporting zone/Special Woredas from 2011-2012, SNNPR

2. Description of the outbreak line lists data

At regional level there is no surveillance data manager. The surveillance data was not properly organized and documented. As a result we identified only one outbreak line list which was reported from Kenbata Tembaro and Wolayita Zones 2012. During this outbreak 88 meningococcal meningitis cases were reported from affected zones. For laboratory confirmation

27 specimens were collected and of which 18 were positive for meningococcal meningitis. The responsible serogroups were sero type A=9, sero group type AC = 2, and gram negative diplococcus = 2. Five testes were reported as positive but the type of the test used and the responsible sero type were not documented. The outbreak was stared on week one, picked on week 6 and lasted through week 16 /2012. The outbreak was controlled after 16 week. From reported cases 52% were males. Proportionally 89% of the cases were bellow 30 years of age.

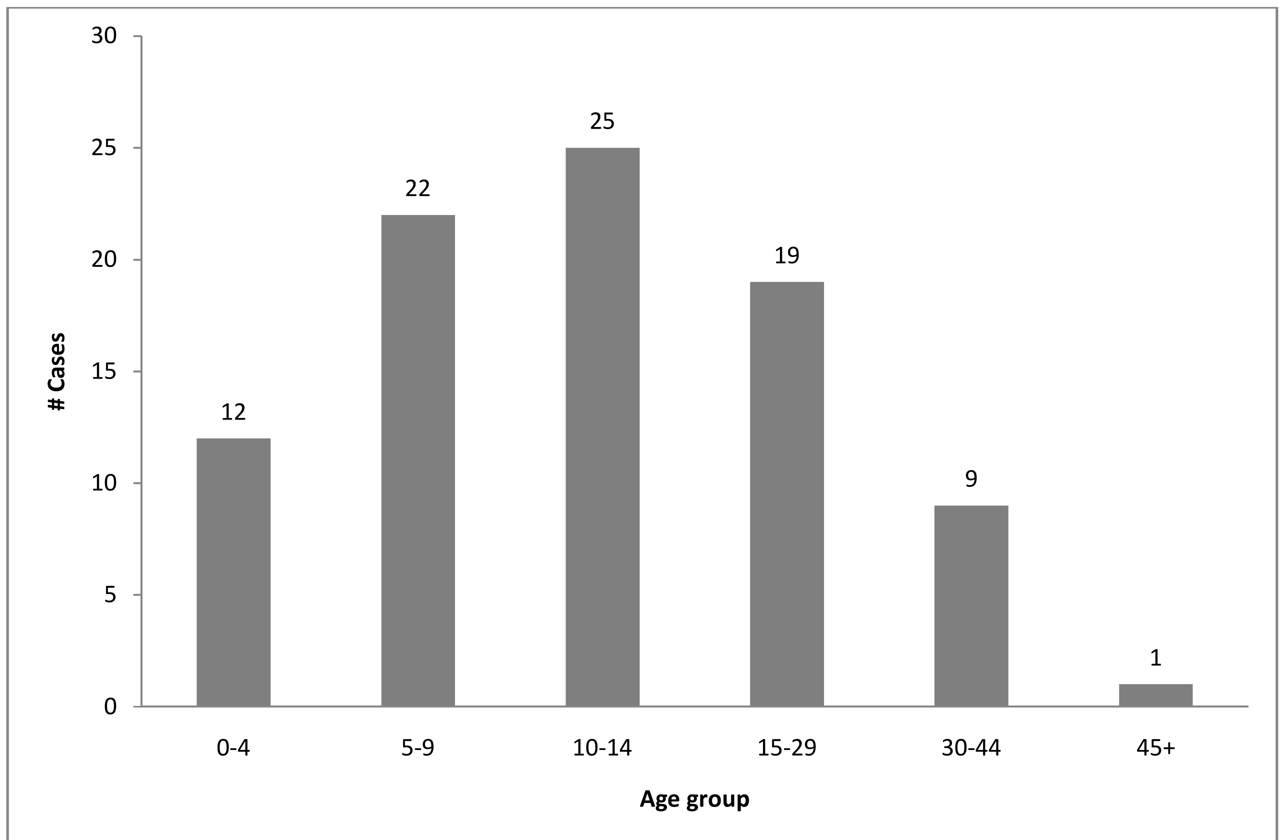


Figure2.1.0.6Number of Meningococcal Meningitis Outbreak Cases by Age Group in SNNPR, 2012

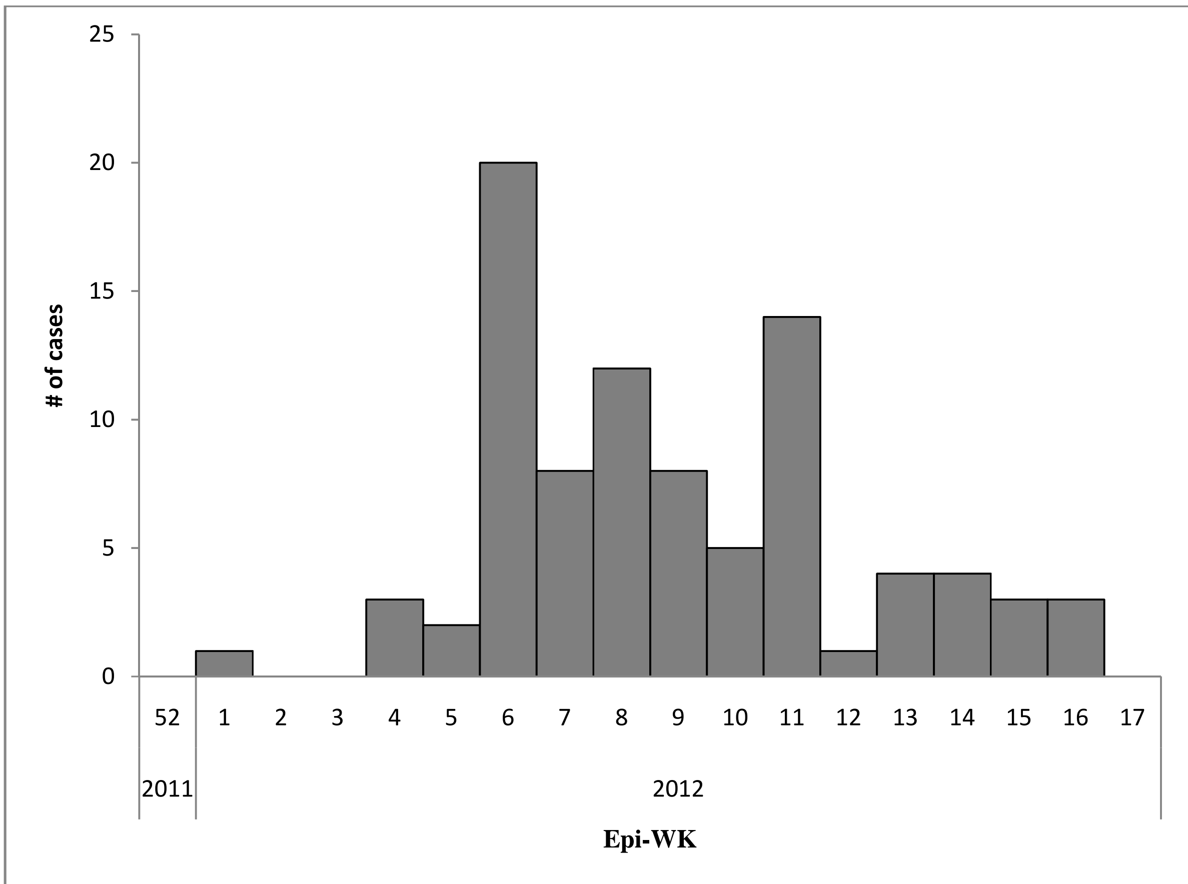


Figure2.1.0.7 Epidemic Curve of Meningococcal Meningitis Outbreak Cases Southern Nation Nationalities and Peoples region, 2012

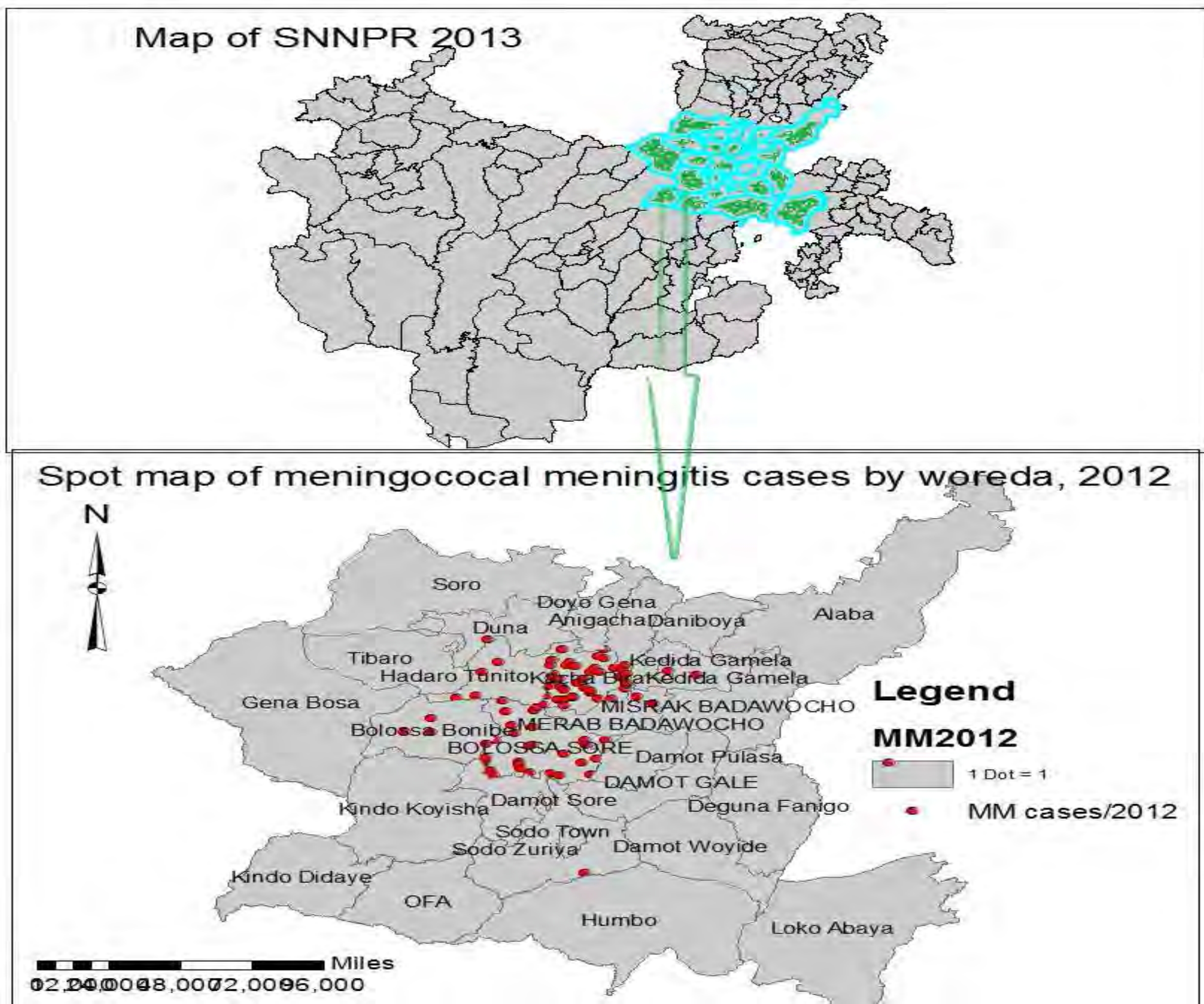


Figure2.1.0.8 Spot maps of meningococcal meningitis outbreak cases by Woreda, SNNPR, 2012

Discussion

This study describes the spatial distribution of meningococcal meningitis case load and outbreaks at zonal and Special Woreda level in Southern Nations Nationalities and Peoples Region. The number of cases reported each year becomes significantly increased in the last three years. In different years cases were reported from specific zones especially Sidama, Benchmaji and Kenbata Tembaro Zones. Though there is no study on risk factors of meningococcal meningitis in SNNPR; studies suggest that the occurrence of epidemics in the localized area linked to population density socio economic status and humidity of the environment [10-13]. Meningococcal meningitis cases were reported in each month but the highest cases load was

reported from January to April. It is similar with other studies that meningococcal meningitis occurs from December to May in the Sahel" meningitis belt" with large epidemics every 5–10 years and attack rates rises up to 1000 infections per 100,000 people. Factors associated for seasonal variation was high temperatures coupled with low humidity that may favor the conversion of carriage to disease as the meningococcal bacteria in the nose and throat are better able to cross the mucosal membranes into the blood stream[14,15]

The surveillance data was not properly arranged and documented. From 2007-2012 only one the 2012 outbreak line list was available but in 2007 total cases reported were 122 but within the same year WHO reported 647 cases and 10 deaths. In 2008 WHO reported that there were epidemic at Sidama, Wolayita, Kenbata ,Benchmaji and Hadiya , with 218 cases and 5 deaths but we could not find line lists in the regional database but in the main database 141 cases were reported from Sidama Zone from February to March/2008. It was difficult to determine which serogroup was responsible to outbreaks or sporadic cases. But in the 2012 meningococcal meningitis outbreak the dominant serogroup in the confirmed cases was type A. The 2013 SNNPR regional public health laboratory activity report supports that among 18 culture positive CSF specimens, 9 (50%) were N. Meningitides type-A. Similarly study on meningococcal meningitis outbreak investigation in West Arsi Zone confirmed that 59% of patients with N. meningitis confirmed as sero type A. The annual incidence of the disease was1.6 per 100,000 populations which is nearly equal with 5years hospital based surveillance study conducted in Salvador, Brazil which was 1.7 per 100,000 populations. Meningococcal meningitis affected mostly the young age group in the 2012 outbreak .The result of Nm. outbreak line list data analysis indicate that 89% of the Nm cases were below 30 years of age with the highest pick from 10-14 years age. It is also similar with other studies [16-18].

7. Limitations

There was no organized database at the Region level. Even the available data was aggregated report of cases by zone and special woredas as a result it was difficult to analyze with important variables like age, sex, occupation, and the lowest administrative structures like Woreda and kebele.

8. Conclusion

Meningitis case load becomes increasing from year to years and affected majority of zones and woredas in the region which need strong follow up and strengthening of prevention and control activities. The surveillance system showed progress in detecting cases after BPR but still need improvement in data quality.

9. Recommendation

There should be organized database at all level in the surveillance system which makes easy for analysis at the time of required. The surveillance system should be strengthening on early case detection and verification of epidemics. There should be follow up study on possible risk factors especially climatic factors. We also recommend reactive vaccination for repeatedly affected zones and woredas.

References

1. Y. Brihane, D. H/Mariam. H. Kloos: Epidemiology and ecology of health and disease in Ethiopia 1st edition, 2006
2. Bandaru NR, Ibrahim MK, Nuri MS, Suleiman MB .Etiology and occurrence of acute bacterial meningitis in children in Benghazi, Libyan Arab Jamahiriya. East Mediterr Health J 1998; 4:50-7
3. Jason K. Whitson Disease Research Report: Meningococcal Disease (Meningitis) Biology 240Summer 2005
4. Control of epidemic meningococcal disease. WHO practical guidelines.2ndedition
5. You MD. Ampicillin in the treatment of meningitis due to Haemophilus influenza: an appraisal after 6 years of experience. J Pediatr 1969; 74:848-51
6. www.thelancet.com.vol 369 June 30, 2007.
7. WHO Standard Operating Procedures for Enhanced Meningitis Surveillance in Africa 2009
8. Unpublished meningococcal meningitis training manuals for SNNPR Health Workers 2012
9. EHNRI. Public Health Management Guideline for ETHiopia,2012 Addis Ababa Ethiopia
10. WHO. Managing meningitis epidemics in Africa N0vember 2010
11. ELSEVIER. Effect of reactive vaccination on meningitis epidemics in Southern Ethiopia July 2007/www.elsevierhealth.com/journals/jinf/
12. http://www.cdc.gov/meningitis/index.html
13. Anna M. Moles worth, Luis E. Cuevas, Stephen J. et al. Environmental Risk and Meningitis Epidemics in Africa, 2003;9(10);1287-1293
14. The Role of Weather in Meningitis Outbreaks in Navrongo, Ghana: A Generalized Additive Modeling Approach September 2012, Volume 17
15. Leimkugel J, Hodgson A,Forgor AA, Pflu¨ ger V, Dangy JP, et al.(2007) Clonal waves of Neisseria meningitidis colonization and disease in the African meningitis belt: An eight-year longitudinal study in northern Ghana. PLoS Med 4(3): e101. Doi: 10.1371/journal. Pmed. 0040101
16. Soraia M. Cordeiroa, Alan B. Nevesa, Cássio T. et al. Hospital-based surveillance of meningococcal meningitis in Salvador, Brazil; Trans R Soc Trop Med Hyg. 2007 November ; 101(11): 1147–1153
17. WHO. Meningococcal disease: 2013 epidemic season in the African Meningitis Belt
18. Gemechu Befa Addressing public health priorities in Africa through FLETPs,2013; AFENET conference Abstracts; page 70

2.2 Yellow Fever Surveillance Data Analysis Report, South Nations Nationalities and Peoples Region, November 2012- February 2014, Ethiopia

Abstract

Background: In Ethiopia yellow fever had not been reported for more than 45 years prior to 2012. But recently an outbreak of yellow fever was reported from south Omo Zone of Southern Nations Nationalities and Peoples Region. This descriptive cross sectional study designed to describe yellow fever surveillance data by place, person, and time.

Methods: This Cross sectional study was done in Southern Nation Nationalities and Peoples Region. The data used for the analysis was obtained from yellow fever line lists reported from11/23/2012 to 2/10/2014 to SNNPR public health surveillance system. We used Excel and Epi info 7 to calculate rates, proportions and frequencies. We also used Arc-GIS mapping to describe the distribution of the disease by place.

Result: We identified a total of 165 cases and 62 deaths from 11/23/2012 to 02/10/2014. The epidemic was confirmed on 15 May 2013. A total of 38 specimens were collected for laboratory confirmation. From 38 specimens 9 were positive and 23 negative for yellow fever. The results of 6 samples are not known. From reported cases 97(59%) were males. Total case fatality was 38% and the sex specific case fatality rate was 47(49%) for males and 15 (22%) for females. The Age specific attack rate was highest in person's aged 15-44(44/100,000).The index case was reported from Geza kebele Debub Ari Woreda. She was a 32-year-old woman who presented with nausea; vomiting and jaundice .She was seen at Jinka hospital on11 /23/2012. Her final outcome was death at the health facility. In this data analysis the last two cases were reported on 2/10/2014. These two cases were from Damiker Kebele in Male Woreda, South Omo Zone. Four cases were reported from woredas outside South Omo Zone (Konso=2, Mirab Abaya=1 and Geze Gofa=1). After mass vaccination with a zonal coverage of 89.5%, South Omo Zone reported 26(92%) yellow fever cases that were not vaccinated against yellow fever.

Conclusion: The proportion of yellow fever deaths was higher in males (76%) than females. In south Omo Zone, individuals or groups who were not vaccinated against yellow fever have the highest proportion to have yellow fever infection. We recommend yellow fever vaccination in

south Omo Zone for unvaccinated or susceptible groups. There should be initiating a case-based surveillance system that can detect cases in high risk areas of the region (neighboring Zones and special woredas of South Omo Zone). Further there should be entomologic studies and animal testing to identify responsible vectors and reservoirs of yellow fever in SNNPR.

Introduction

Yellow fever is an infectious viral disease caused by an arbovirus of the genus Flavivirus (family Flaviviridae). The disease characterized with short duration and varying severity. The mildest cases may be clinically indeterminate; typical cases are characterized by a sudden onset of fever, chills, headache, backache, generalized muscle pain, prostration, nausea and vomiting. The case fatality rate ranges from 20%-50 % [1, 2].

There are two clinical phases of yellow fever

Acute phase

While some infected people have no symptoms at all, the first phase is normally characterized by fever, headache, muscle pain (with prominent backache), shivers, loss of appetite, nausea and/or vomiting. Often, the high fever is paradoxically associated with a slow pulse (Faget's sign). Most patients improve after 3–4 days and their symptoms disappear, but 15% enter the toxic phase.

Toxic phase

Fever reappears; the patient rapidly develops jaundice and complains of abdominal pain with vomiting. Bleeding can occur from mouth, nose, eyes and/or stomach. Once this happens, blood appears in the vomit and faeces. Kidney function deteriorates; this can range from abnormal protein levels in the urine (albuminuria) to complete renal failure with no urine production (anuria). Half the patients in the toxic phase die within 7–10 days after onset. The remainder recovers without significant organ damage [3].

There is no specific curative treatment for yellow fever; however, the disease is vaccine-preventable. Yellow-fever vaccine side effects are rare. Ten days after vaccination, it provides immunity that last ten years and probably even for life. An emergency vaccination campaign must be organized as soon as a yellow-fever epidemic is confirmed [3, 4].

There are two cycles of yellow fever, the urban cycle and the jungle cycle. Reservoirs in the jungle cycle are primarily monkeys where the vector is the jungle mosquito, and in urban areas, humans are the primary reservoir and the Aedes aegypti mosquito is the vector.

The yellow fever virus is transmitted by the bite of certain mosquitoes of the genus Aedes. It infects primates (humans and monkeys) who, after a short period of viraemia (2 to 9 days) then acquire lasting, lifelong immunity. Circulation of the virus in the forest is assured by the renewal

of the monkey population through the birth of non-immune monkeys. Risk factors which contribute to the occurrence of the outbreak are population movement , Vector mosquito migration, environmental change which contribute favorable environment to vector mosquito breeding, the type of vector, vegetation cover, existence of reservoir primates, the presence of the virus in the country or importation opportunity, vaccination status or vulnerability of the community[5-8].

Yellow fever is a Zoonotic disease endemic to areas of tropical Africa and South America which has caused numerous epidemics with high mortality rates throughout history. The world health organization (WHO) estimates that globally there will be 200,000 cases of yellow fever with 30,000 deaths each year, 90% of which occur in Africa. Epidemics of yellow fever reported from different countries in Africa. Currently yellow fever is estimated to infect between 840,000 to 1.7milion individuals in Africa each year, resulting in approximately 84,000 to1, 7000 cases and 29,000 to 60,000 deaths. After 30 years of the last yellow fever in 1970s Uganda experienced the reemergence of this deadly viral epidemic that started in November 2010. During these epidemic 190 cases and 48 deaths were reported [9, 10].

The World Health Organization included Ethiopia in the Africa epidemic yellow fever region in the early 1950s due to its geographical location and climatic condition. The vector, the Aedes mosquito, was found to exist throughout the country up to 2000 meters in altitude. The principal vector of yellow fever in Ethiopia is A.simpsoni [11].

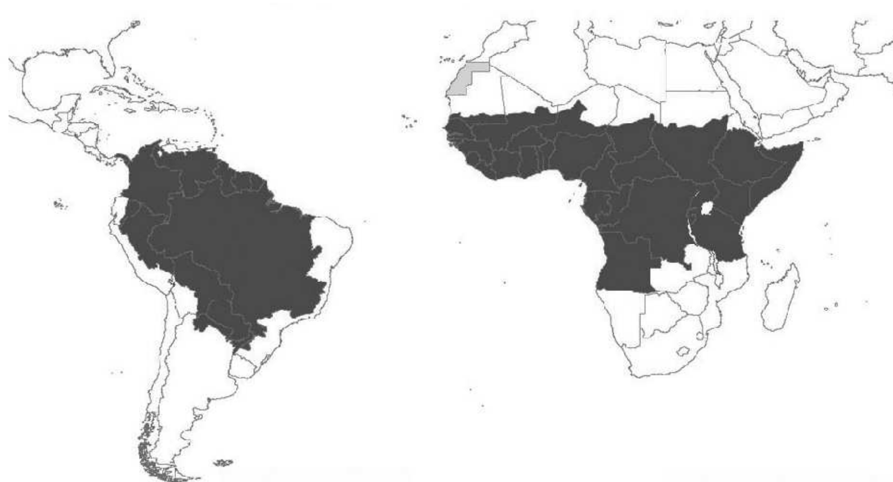


Figure2.2.0.1Map of countries where there is risk of yellow fever transmission. (WHO 2010)

In Ethiopia the last epidemic of yellow fever was reported in the early 1966 near the north east shore of Lake Abaya the current Gamu Gofa Zone in SNNPR and around the town of Akobo i1n Ilubabor the current Gnuwere Zone in Gambella Region. During that epidemic about 2200 cases and 450 deaths were reported. The outbreak of yellow fever which began in 2012 in south Omo Zone is the first outbreak since the 1966 and still sporadic cases reported from this Zone. [11]

Rational of the study

Yellow fever is one of the notifiable diseases in Ethiopia. Surveillance data should be analyzed interpreted and used for action. Analyzing surveillance data helps to generate hypothesis for further analytical studies that help to identify possible risk factors. It also used to strengthening the prevention and control activities. Yellow fever re-emerged in 2012 in Ethiopia, in the South Omo Zone of SNNPR. At regional level the surveillance data was not analyzed .Therefore this descriptive cross-sectional data analysis was designed to describe the magnitude of yellow fever by place person and time in SNNPR since its re-emergence after 45 years.

Objectives

General objective: To analyze yellow fever surveillance data from Nov.2012 to March 2014, in Southern Nations Nationalities and Peoples Region.

Specific objectives

To describe the magnitude of yellow fever by place, person and time
To provide possible recommendation that used for prevention and control of yellow fever

Methods

Study area

The study was conducted in South Nation Nationality and Peoples Region which is one of the 9th regional states in Ethiopia. It is administered by 14 Zone 4 Special Woredas and 1 City Administration.

Study design: We used a descriptive cross-sectional study design

Data source

The data used for the analysis was obtained from yellow fever outbreak line lists reported from South Omo Zone PHEM to the regional Health Bureau PHEM from11/28/2012 to 2/10/2014.

Standard case definition of Yellow fever (PHEM) (12)

A suspected case is any person with acute onset of fever followed by jaundice with two weeks of onsets of symptoms. Hemorrhagic manifestation and renal failure may occur.

Confirmed case

A suspected case with laboratory confirmation (positive IGM antibody/ viral isolation) or epidemiological link to confirmed cases or epidemics.

Data processing and analysis

The data was analyzed using Epi info to calculate frequencies, Tables and Figures

Ethical issues: Permission was obtained from the SNNP Regional Health Bureau PHEM to analyze the data. A non-research determination was made as this was an epidemic disease control activity.

Results

We identified a total of 165 cases and 62 deaths from 11/23/2012 to 02/10/2014. The epidemic was confirmed on 15 May 2013. A total of 38 specimens were collected for laboratory confirmation. From 38 specimens 9 were positive and 23 negative for yellow fever. The results of 6 samples were not known. From reported cases 97(58.8%) were males. Total case fatality was 37.6% and the sex specific case fatality rate was 47(48.5%) for males and 15 (22.1%) for females. The Age specific attack rate was highest in person's aged 15-44(44.37/100,000).The index case was reported from Geza kebele Debub Ari Woreda. She was a 32-year-old woman who presented with nausea; vomiting and jaundice .She was seen at Jinka hospital on11/ 28/2012 and confirmed with Epi-link. Her final outcome was death at the health facility. In South Omo Zone yellow fever mass vaccination was given in May 2013 with a Zonal coverage of 89.5%. After one month of the mass vaccination a total of 28 cases were reported from different Woredas of South Omo zone. Of 28 cases 26(92%) of yellow fever cases were not vaccinated against yellow fever.

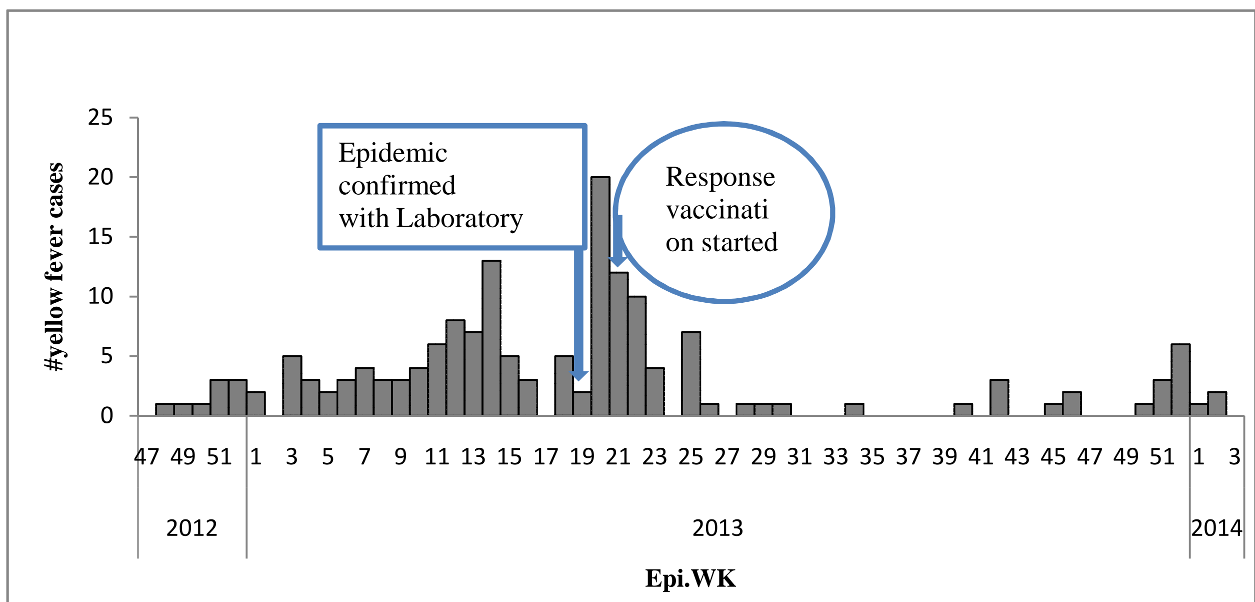


Figure2.2.0.2 Epidemic curve of yellow fever by epidemiologic week SNNPR, 2014

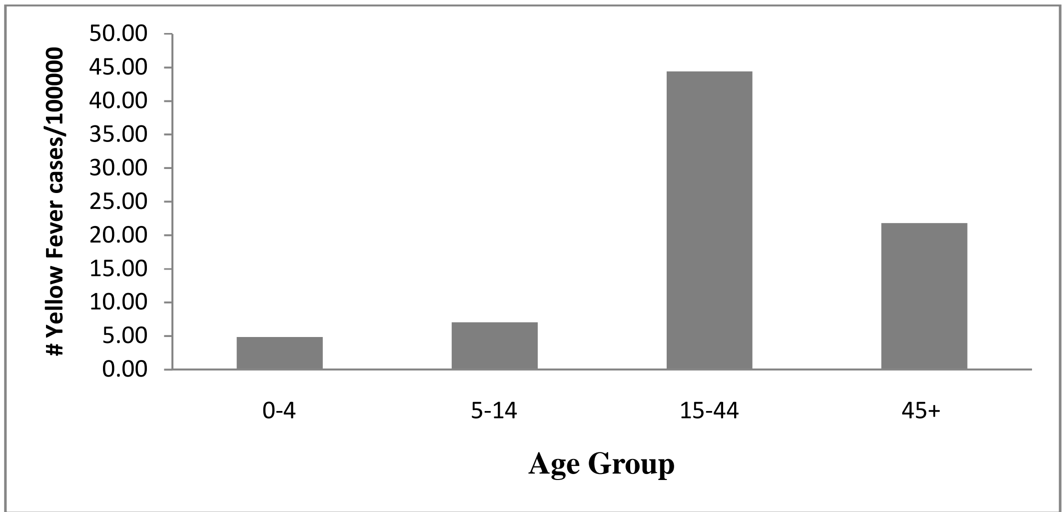


Figure2.2.0.3 Yellow Fever Attack Rate by Specific Age Group SNNPR, 2013/2014

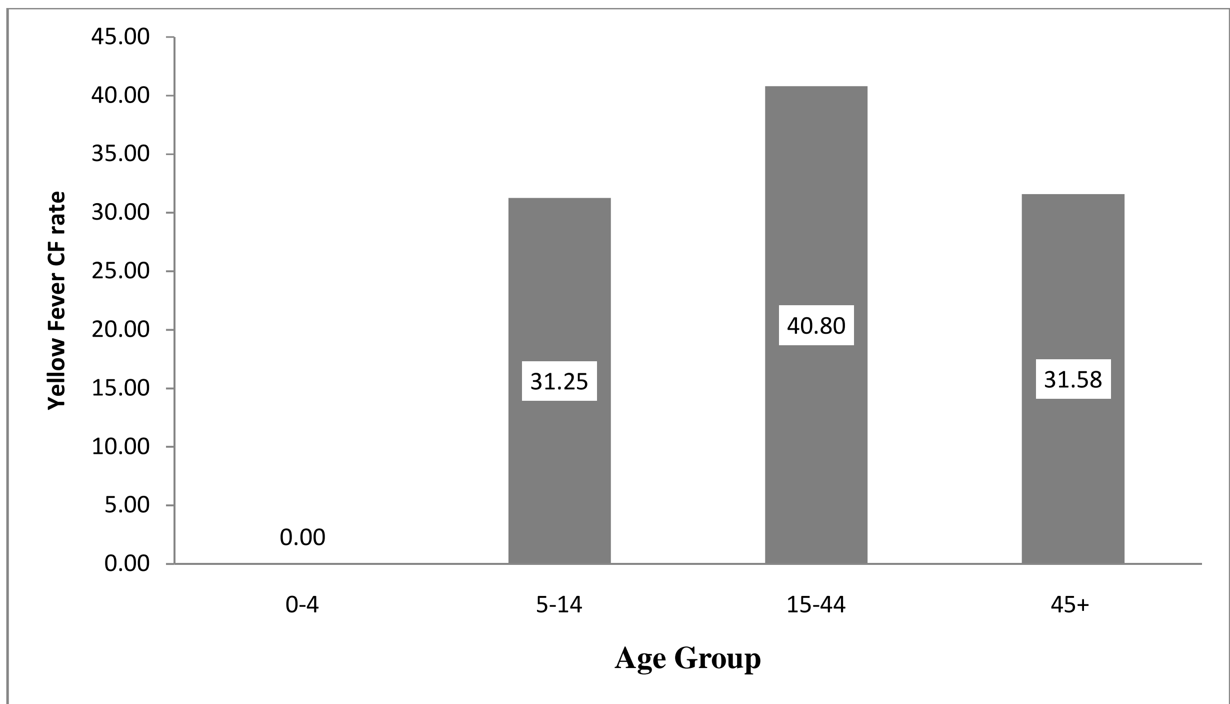


Figure2.2.0.4Yellow Fever Case Fatality Rates by Specific Age Groups in SNNPR, from Nov.2012 to Mar.2014

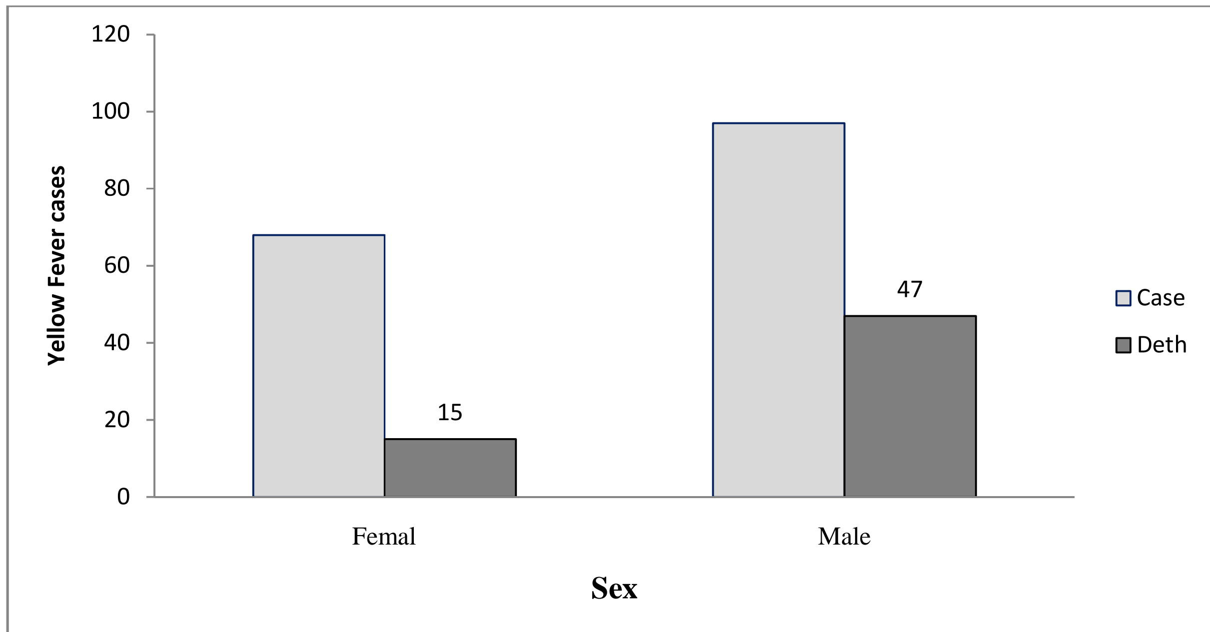


Figure2.2.0.5 Yellow Fever Cases and deaths by Sex SNNPR, from Nov.2012 toMar.2014

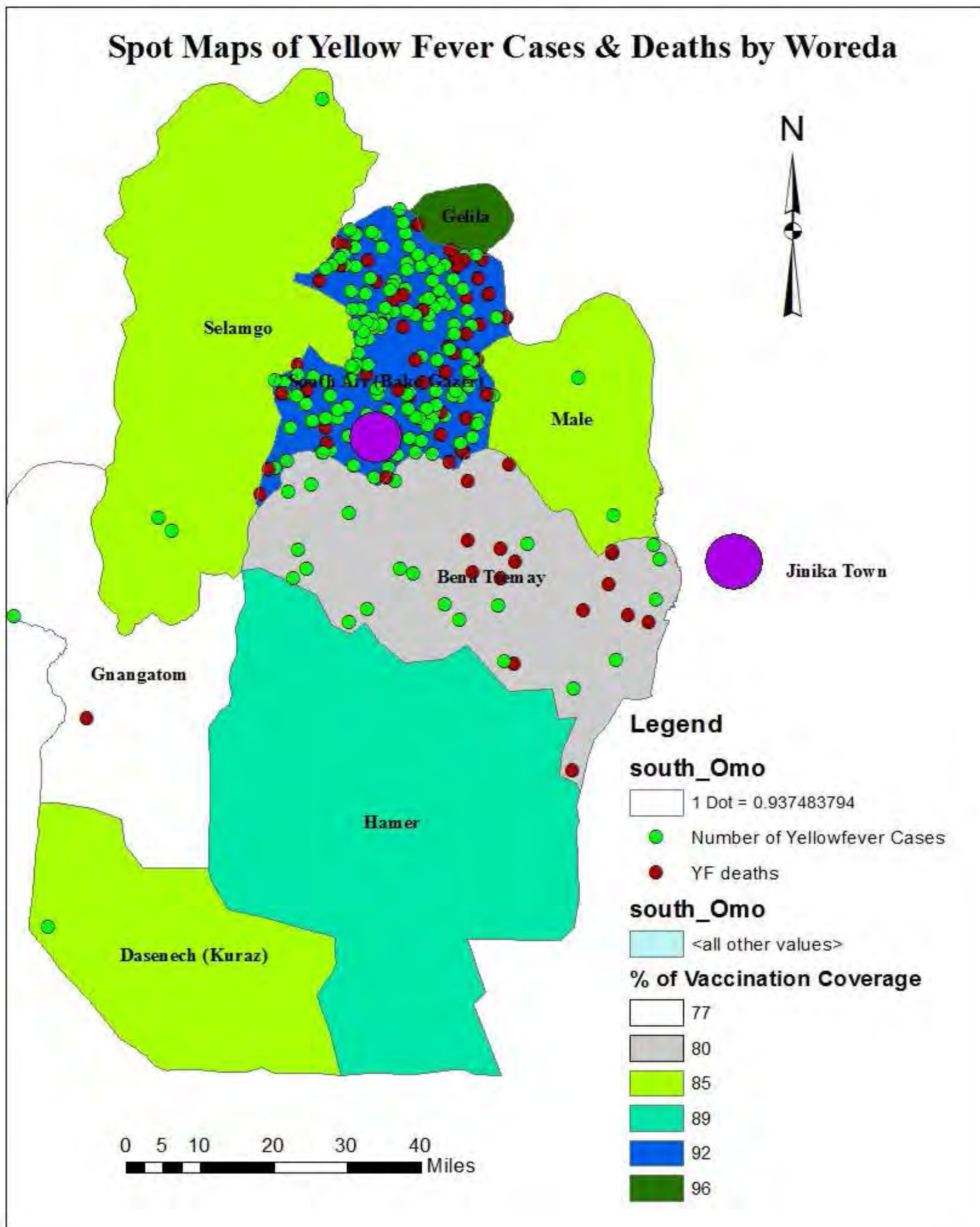


Figure2.2.0.6Spot Maps of Yellow Fever Cases and Deaths by Woreda in South Omo Zone from Dec.2012 to Mar. 2014

.

Four cases of yellow fever were reported from three woredas in the neighboring woredas of South Omo zone. From Gamo Gofa Zone Mirab Abya and Geze , and from Segen Zone Konso Woreda. South Omo zone has 8 Woreda and 1 Town Administration. Except Hammer and North Ari all woredas were affected with the outbreak

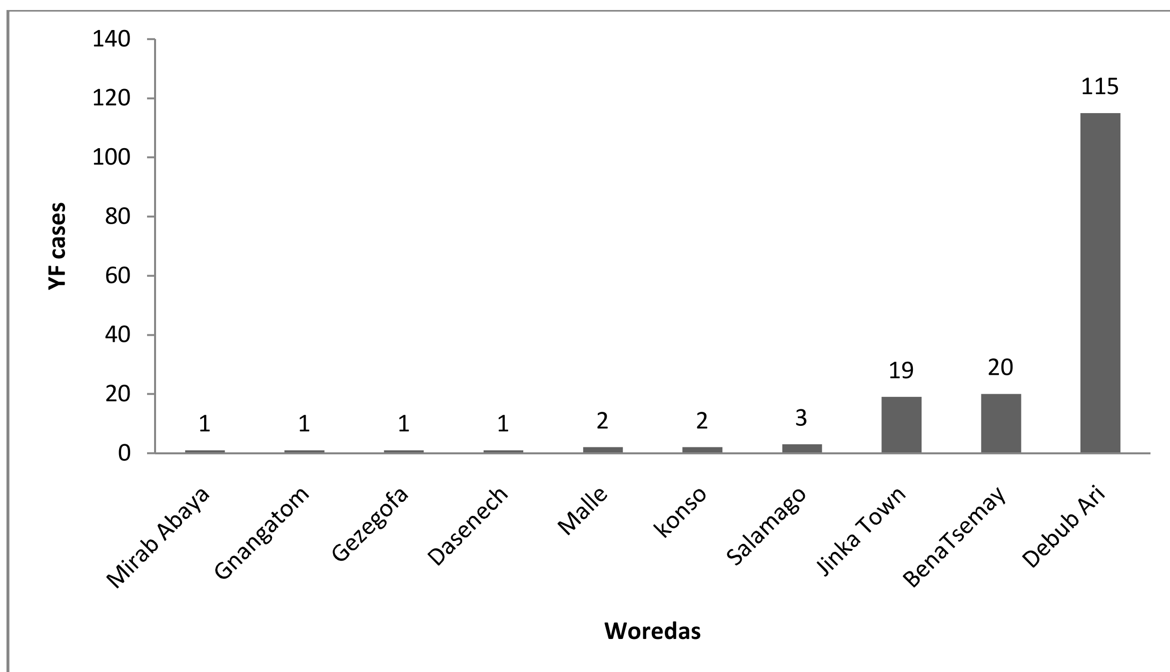


Figure2.2.0.7 Yellow Fever Cases by Woreda, SNNPR, from Nov.2012 to Mar.2014

Public health interventions

Major intervention approaches used for the outbreak management were vector control and mass vaccination.

Vector control; Outbreak management used in the first phase was the spraying of houses with Deltamethrine. The spray was conducted in Debub Ari Woreda four kebeles (Shebi, Geza, Aykamer and Alga). A total of 5028 Dwelling houses and 4671 other structures were sprayed.

Mass vaccination: Following the confirmation that cause of the outbreak was yellow fever, immediate action was taken with a mass vaccination campaign to entire zonal level residents. The vaccination coverage was 543,558(89.5%).

Discussion

Ethiopia experienced a devastating yellow fever epidemic 45 years ago in 1966 however there had not been any yellow fever outbreak reported until this outbreak occurred in South Omo Zone, SNNR in 2012-14. This outbreak began in WHO week 48 of 2012 however suspect cases were not reported until WK 20 of 2013. But unlike some countries experienced in yellow fever outbreak investigation the outbreak was confirmed after 5 months [13].The highest CFR rate was reported in Benatsemay Woreda (75%). If we have strong entomological survey that able to detect the presence of virus in the vector as well as early detection of IgG and IgM from individuals it would have been early controlled. The proportion of death due to yellow fever was higher in males 47(76%) than females. It is not clear what risk factors were associated with high case fatality rate in males as an analytic study was not conducted. Yellow fever is vaccine preventable and there is effective prevention.

In Ethiopia there is no routine vaccination for national yellow fever. The main intervention used for the outbreak was mass vaccination. The mass vaccination reduced the case load but sporadic cases still reported from the zone. In areas where WHO identified at risk for yellow fever recommended to implement case -based surveillance and priority should be given to collect specimens from new or neighbouring areas (other than the areas where epidemics are already confirmed)[14].

In South Omo Zone yellow fever mass vaccination was given on May 2013 with Zonal coverage of 89.5% but since 06/21/2013 to March 2014 a total of 28 cases reported from different woredas of the Zone. Of the 28 cases 26(92%) have no history of vaccination. Residents of yellow fever enzootic area and areas where migration to these areas originates all people over age of one year living in urban, rural or jungle area should be immunized against yellow fever with a minimum coverage of 95% [15].

Limitation

The study was conducted using secondary data which was reported to the regional PHEM which might have some limitation on data quality.

Conclusion

The outbreak extended and become endemic to South Omo Zone.

In south Omo, individuals or groups who were not vaccinated against yellow fever have the highest proportion to have yellow fever infection.

Recommendation

We recommend yellow fever vaccination in south Omo Zone for unvaccinated or susceptible groups. There should be initiating a case-based surveillance system that can detect cases in high risk areas of the region (neighboring Zones and special woredas of South Omo Zone). There should be entomologic studies and animal testing to identify possible vectors and reservoirs of yellow fever in SNNPR that help to strengthening the prevention and control of the disease. Vector control program should be strengthened. Further study is needed to identify what risk factors are associated with the re-emergence of yellow fever in Ethiopia after 45 years.

Reference

1. David L.Heymann. Control of Communicable Diseases Manual, 2008
2. CDC .WHO . Yellow Fevert Vaccine Recommendation of Advisory Commite on Immunization Practices(ACIP).WMMR.2010;59(RR-7):2-10
3. WHO. Communicable disease Epidemiology, Horn of Africa, Emergency-affected countries, 2007
4. WHO. Investigation of yellow fever epidemics in Africa field guide .2008
5. Guidelines for the prevention of yellow fever importation into South Africa,2010
6. WHO Recommended Surveillance Standards .2nd ed./99.2 available at http://www.who.int/emc/
7. Kansas: Yellow Fever Disease Management and Investigative Guidelines Version 07/2012
8. International Federation of Red Cross and Red Crescent Society: Uganda Yellow fever epidemic 4 January 2011.
9. WHO. District guidelines for yellow fever surveillance. Available at http://www.who.int/emc
10. Tini Garske, Maria D Van Kerkhove, Sergio Yactayo, Olivier Ronveaux, Rosamund F Lewis, J Erin Staples, et al. Yellow fever burden estimation summary report.
11. Yemane .B.Damene.H. Epidemiology and Ecology of Health and Disease in Ethiopia; 2006.p. 635-643.
12. E-FMoH. Public Health Emergency Management Guideline 2012
13. Clayton O. Onyango, Victor O. Ofula, Rosemary C. Sang, Samson L. Konongoi, Abdourahmane Sow, Kevin M. De Cock: Yellow Fever Outbreak, Imatong,SouthernSudan,2004
14. WHO.WHO-recommended standards for surveillance of vaccine preventable diseases.2003
15. PAHO .WHO .Control of Yellow Fever Field Guide.2005: Scintific and Techinical Publication No.603

Chapter III-Evaluation of Surveillance System

3.1 Evaluation of Measles and Malnutrition Surveillance System in Dawro zone, SNNPR, 2013

Abstract

Back ground: Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding health and health-related event for use in public health action. The public health surveillance system is evaluated to ensure that problem of public health importance are being monitored efficiently and effectively. Therefore the public health surveillance system evaluated periodically and the evaluation includes recommendation for improving quality, efficiency, and usefulness. So this study was designed to evaluate measles and malnutrition surveillance system; core function and attributes of surveillance system in Dawro zone.

Methods: A cross sectional study design was used to evaluate the core, supportive and attributable of the surveillance system for measles and malnutrition. The Zonal surveillance unit and Zonal Hospital surveillance unit were purposively included in the study. In discussion with Zonal Surveillance unit we selected 1 district from best, better and poorly performing districts based on 2012/2013 annual performance followed by randomly selection of 1 HC from each selected Woredas. We also selected 2 HP randomly from each selected health center catchments. Data was obtained through observation, document review and interviewing surveillance officers and focal persons using semi structured questionnaire modified from WHO surveillance system evaluation tool.

Result: In 2013 a total of 1423 sever acute malnutrition and 13 suspected measles cases were reported to the zone PHEM. There was no death reported due to measles and malnutrition. From evaluated surveillance units (n=14) the national malnutrition and measles guidelines were available for 1(7.1%) and 3(24.1%) of surveillance units respectively. From all health facilities (n=10), 8(80%) have clinical register of which in 6(75%) health facilities cases were properly registered and 5(62.5%) facilities report was matched with the registry. Surveillance units that use the appropriate report form were 13(92.8).Data was not analyzed at all level of the surveillance unit. Outbreaks were not investigated based on outbreak guide line and there was no

analyzed and documented report. There was no allocated budget for epidemic response based on the plan. There was no documented feedback from zone to lower level. PHEM, Measles, Malnutrition and Malaria Guidelines were available in 4(28%) surveillance units. The timelines of the surveillance system was not monitored at all level as a result immediately reported cases were reported in weekly basis.

Conclusion: Measles and malnutrition guidelines did not distribute uniformly to all surveillance units. There is no data base and data manager at all level. The existing data base is not suitable for epidemiological analysis in terms of place person and time. Surveillance data was not properly collected, documented, analyzed. We recommend that there should be data base at all level and reporting format should revised that able to have all important variables.

1. Introduction

Disease surveillance is the ongoing systematic collection, analysis, and interpretation of health data. It includes the timely dissemination of the resulting information to those who need them for action. Surveillance is also essential for planning, implementation, and evaluation of public health practice [1].

In Ethiopia the importance of disease surveillance in guiding health planning and interventions was recognized for a long time and it was supported with legal issues. The "Quarantine" rules were proclaimed in 1947 with emphasis on disease surveillance. Following this other legal notice was issued in 1951, binding all public health practitioners in the country to report communicable diseases. The "Public Health Proclamation No.200/2000" orders any individual who knows the existence of communicable diseases in his/her vicinity to report immediately to the nearest health institution and the institution receiving the report to take the necessary measures and report to the appropriate health authority[2].

In Ethiopia anti-epidemic service was established 1948 for prevention and control of communicable diseases. In 1951, 35 priority diseases were selected and classified into first and second class to be notified to MOH, immediately or weekly as necessary. In the mid-1970`s the anti-epidemic unit was changed to epidemic control and surveillance unit under communicable diseases control division. During this time there was a vertical disease specific surveillance. After the health system reform in 1994 nineteen diseases (including those which were under vertical programs) were selected for surveillance. After two years in 1996, the Government of Ethiopia introduced Integrated Disease Surveillance (IDS) strategy focusing on 17 priority communicable diseases. With the concept of IDSR is all surveillance activities are coordinated and streamlined rather than using scarce resources to maintain separate vertical activities and resources are combined to collect information from a single focal point at each level [2].

The purpose of disease surveillance is to detect sudden changes in disease occurrence and distribution; learn more about the natural history, clinical spectrum and epidemiology of a disease; follow long-term trends of the 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. In addition to communicable diseases, non-communicable diseases such as hypertension and diabetes are emerging threats in the Africa Region. As well, 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. Reasons for conducting public health surveillance can include the need to assess the health status of a population, establish public health priorities, and reduce the burden of disease in a population by appropriately targeting effective disease prevention and control activities [1-4].

The government of Federal democratic Republic of Ethiopia has embarked a country wide reform initiative aimed at bringing effectiveness and efficiency in execution of various works using BPR as a tool. Public Health Emergency Management (PHEM) is one of the 7 core processes identified by the FMOH and its agencies for the fulfillment of sectoral vision and missions. The public health surveillance system is run by this core process (PHEM). PHEM is designed to ensure detection of any public health threats, preparedness related to logistics and fund administration, prompt response to and recovery from various public health emergencies. In 2012 the FMOH (EPHI) prepared a guideline. The guideline prepared to give guidance to all public health officers, stakeholders and development partners who taking part in public health emergency management, on how to implement the PHEM activities in standardized way[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. Surveillance could not be carried out for all diseases and conditions there for priority should be given to those diseases that have interest at national and international levels. Currently ii Ethiopia, 20 high priority diseases are selected to be included in the routine surveillance. Diseases were selected in regard to public importance, epidemic potential, international concern and diseases under eradication and elimination under surveillance [5, 6].

Table3.1.0.1 Priority diseases reported through the surveillance system in Ethiopia

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

Measles is one of the public health importance diseases that selected due to its high epidemic potential. Measles is still responsible for preventable morbidity and mortality thought the country. In certain high-risk populations, case-fatality rates as high as 30% have been reported in infants aged less than 1 year of age. Malnutrition (including vitamin A deficiency), underlying immunodeficiency and lack of access to medical care are all factors leading to the high case-fatality rates observed in many parts of the world.One of the Strategies used for sustained measles morbidity and mortality reduction is case based measles surveillance. Sever acute malnutrition also selected for surveillance due to it s public health significant. Malnutrition is one of the aggravating factors for measles outbreak and other diseases [7, 8].

2. Rationale of the study

The public health system is continuously challenged by recurrent and unexpected disease outbreaks and is facing the challenge of managing health consequences of natural and human made hazards. In the region most public health data are not properly collected even it was collected not analyzed and used for action especially at zonal and Woreda level. Regionally Dawro zone public health surveillance system was not evaluated. As a result it is difficult to estimate how match the surveillance system attributes are strong or not. Measles and Sevier acute malnutrition are some of the public health problem in the zone. From wk1 to wk28 a total of 940 SAM cases reported from the zone. In areas where there is severe acute malnutrition there is high probability of getting measles outbreaks. In the neighboring zones (Gamogofa) there was an epidemic of measles from January to May/2013. In addition the last three years aggregated zonal surveillance report timeliness and completeness was mostly below WHO standard (90%). Unless there is strong surveillance system it is difficult to detect epidemics early. So this cross sectional study is designed to evaluate measles and severe acute malnutrition surveillance system in Dawro Zone which is one of the 15th Zones in SNNPR.

3. Objectives

3.1General objective

To evaluate the surveillance system for measles and malnutrition, in Dawro zone SNNPR from August 27- September 5/2013

3.2Specific objectives

To describe existing surveillance system for measles and acute malnutrition in Dawro the zone

To assess core and support functions of the surveillance system

To assess surveillance system attributes simplicity, flexibility, data quality, acceptability, sensitivity, predictive value positive, representativeness, timeliness, and stability.

To identify gaps in the surveillance system and forward recommendations to improve the system

4. Methods

Study setting

The study was conducted from August 27- September 5/2013 in Dawro zone. Dawro zone is one of the 15 zones in SNNPR .The zone has 5 rural Woreda, 1city administrations, 22 HC 177HP and 1 zonal hospital

The study units were zonal and Woreda health offices; and health facilities of Dawro zone.

Study design: A cross sectional study design was used using the CDCs "updated guidelines for evaluating public health surveillance system" published in 2001 as a framework for the evaluation to achieve the stated objective of the study.

Sampling technique: The Zonal surveillance unit and Zonal Hospital surveillance unit were purposively included in the study. In discussion with Zonal Surveillance Unit we selected 1 district from best, better and poorly performing districts based on 2012/2013 annual performance followed by randomly selection of 1 HC from each selected Woredas. We also selected 2 HP randomly from each selected health center catchments.

Data collection: Data was obtained through observation, document review and interviewing surveillance unit officers and focal persons using semi structured questionnaire modified from WHO surveillance system evaluation tool.

Data analysis and presentation: Excel 2007 and Arc Map were used to calculate proportions and organize tables and figures.

Ethical issues: Official permission was obtained from AAU, RHB and the respective institutions selected for evaluation.

5. Result

Dawro zone receive surveillance data from 1 hospital, 22 health centers and177 health posts. The population under surveillance for measles was the population of all people who reside in Dawro zone and for sever acute malnutrition all children age 6 month to 5 years.

The core functions of the surveillance system (case detection and registration, data reporting, data analysis, outbreak investigation, epidemic preparedness and response; existence and functionality of RRT and the surveillance feedbacks were evaluated. For measles and sever acute malnutrition detection standard case definitions were available in some specific surveillance units. Standard case definitions for measles and SAM categorized into two (Standard case

definition and Community case definition. Community case definition is designed to be used by health extension workers and the community.

Standard case definition for measles

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

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

Community case definition for measles is any person with fever and vesicular, maculopapular or postural rashes in any part of the body.

Sever acute malnutrition: Children age from 6 month to 5 years with MUAC less than11 cm and/or children with bilateral edema regardless of MUAC.

Community case definition for SAM

Children age 6month to 5 years with MUAC less than 11 cm and bilateral leg edema or children age 6month to 5 years with bilateral leg edema.

Having this, in 2013 a total of 1423 sever acute malnutrition and 13 suspected measles cases were detected by the surveillance system. There was no death reported due to measles and malnutrition. From evaluated surveillance units (n=14) the national malnutrition and measles guidelines were available for 1(7.1%) and 3(24.1%) of surveillance units respectively. At health post level only moderate malnutrition cases treated and recorded but severe malnutrition cases referred to the next level and moderate malnutrition cases did not reported to the surveillance system. Case confirmation was done for measles at central level (EPHI) and from 13 specimens 5 were positive for measles specific antibody.

Table3.1.0.2Number of Server acute malnutrition cases by reporting sites from Wk32-52/ Dawro zone/2013

Reporting sites	In patient	Out patient	Total
Gena Bosa	10	243	253
Isara	2	56	58
Loma	5	38	43
Mareka	3	62	65
Tercha Hospital	7	3	10
Tercha Town Ad.	0	3	3
Tocha	6	46	52
Total	33	451	484

We also evaluated the supportive function of the surveillance system (availability of national measles and SAM surveillance manuals, Whether surveillance officers have trained on measles and SAM surveillance, the presence of supportive supervision at all level and the availability of logistics like computer, statistical package, printers and data manager, and we identified that national surveillance manuals were available in a few surveillance units. Trained staff 11(78%) of respondents (surveillance focal persons and officers) were trained on PHEM.

The attributes of the surveillance system that indicate the quality of the surveillance (completeness, Representativeness, Stability, predictive value positive and acceptability) were some of the indicators used in the evaluation. Each administrative kebele have Hp that serves the community but due to geographical barriers it might difficult to access all households at kebele level. The annual completeness of the surveillance system was 86.7% with oscillation of each epidemiological week (figure3). The positive predictive value for measles surveillance was 38.7%.

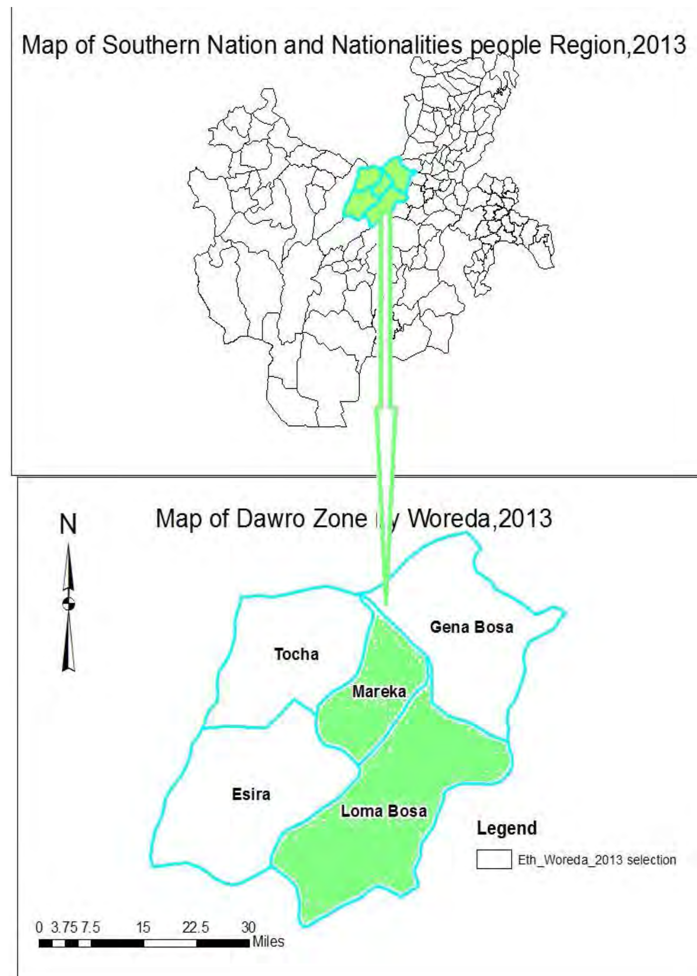


Figure3.1.0.1Map of Dawro Zone by Woreda, Southern Nations Nationalities and Peoples Region, 2013

1. Core functions of the surveillance system

1.1 Case detection and registration

Health facilities that have clinical register (n=10) were 8 for under5 and 4 for all age group. Urban health extension workers have no clinical registers even there is no defined health facility that they can perform as rural health extension workers. But they report weekly reports to the respective health center; data collected from their daily house to house activities. In the rural health posts there is a clinical register for under5 cases but for adults they use tally sheet only supported by code of family folder.

Health facilities that register properly (n=8) were 6. During the evaluation time we observed that some health posts do not properly register cases for e.g. if they detect Malnourished cases during door to door survey, they report to CBN but not included in the actual registry as a result not reported in the weekly report. Some health facilities register cases when they discharged.

The availability of standard case definition per health facility (n=10) was 4 of which one have only NNT, AFP and measles standard case definitions. Three health facilities use standard case definitions posting as wall chart. Though there is a standard case definition in the health facility especially at hospital and health center level; there were not available to each department (under5and adult OPD, IPD and lab unit).All health facility diagnose cases based on HMIS disease calcification supported by chart booklets except for AFP, measles and NNT.

1.2 Case confirmation

Woredas and health centers are responsible to collect specimens and transport it legally. We identified that (n=4) health facilities have only the capacity to collect stool and blood (serum) specimens for AFP and Measles respectively. Those health facilities also heave instruments for collecting stool and blood specimens for those specific diseases. There is no special transport media at all level in the Zone. Means of transport used for transporting specimens were public transport.

1.3 Data reporting

The report formats were provided by central level. There was a shortage of report form for 3(21%) reporting units in the last 6 month. From evaluated public health surveillance system units (n=14) those use the appropriate report form were 13(92.8%).

Though it was not complete from evaluated 10 health facilities 8 have clinical registry for all type of diseases. Cases were correctly reported to the next level from 5 health facilities. In all evaluated health posts AFI cases were not reported in the weekly report. Means of reporting used were telephone and hard copy. Suggested solutions that help to strengthen reporting system were through availing computer; providing internet access; improving network coverage and sustainability; supportive supervision; and providing training on notifiable diseases for all health staff.

Table 3.1.0.3Surveillance Data Reporting Health Facilities by Woreda, Dawro zone, 2013

Surveillance data Reporting Health Institution				
Woreda	Health posts	Health Centers	Hospital	Total
Gena Bosa	36	4	0	40
Isara	29	4	0	33
Loma	37	5	0	42
Mareka	37	4	0	41
Tercha Town Ad.	2	1	1	4
Tocha	36	4	0	40
Total	177	22	1	200

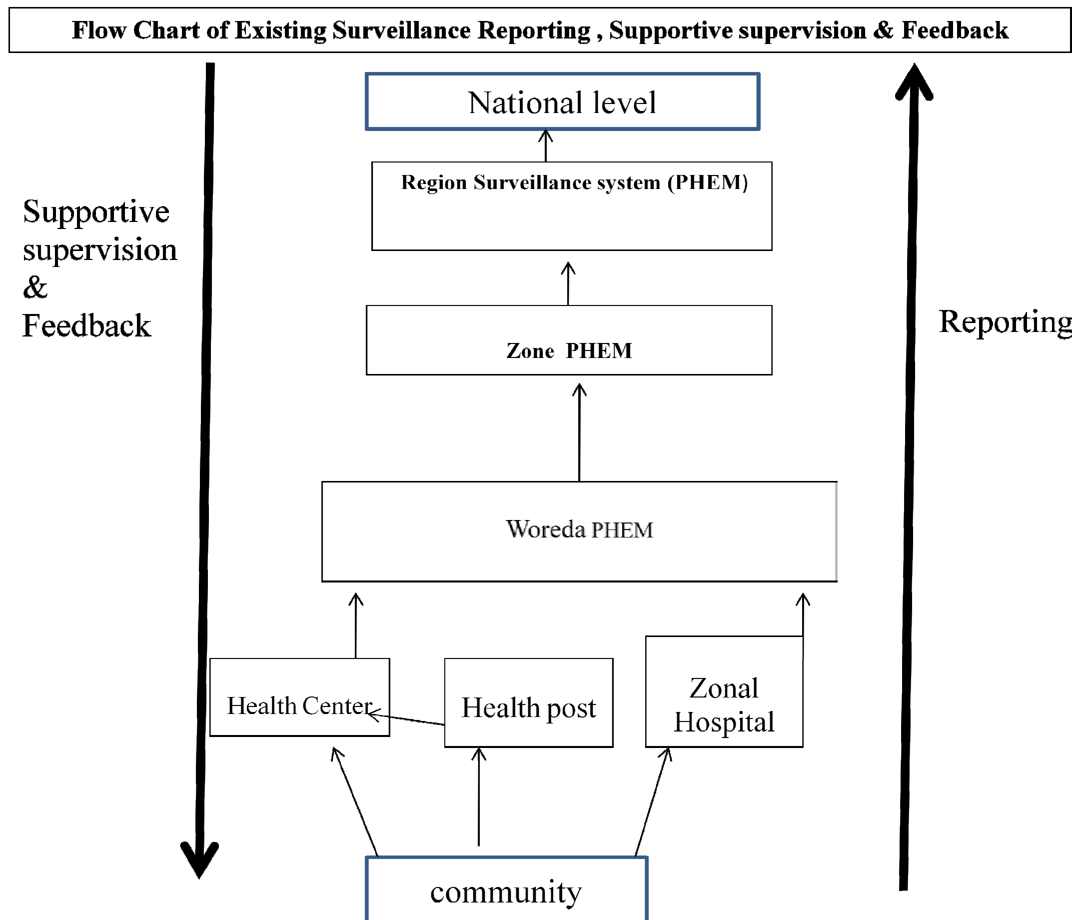


Figure3.1.0.2Diagram illustrating the flow of surveillance data and information throughout a health system

1.4 Data analysis

In the evaluated surveillance unites (n=14) there was no data analyzed by place, person and time for each notifiable diseases collected weekly and immediately. Only zonal level have quarterly and annual report that expressed by graph and tables for specific diseases. There is no clearly stated action threshold for each notifiable disease base on local context.

1.5 Outbreak Investigation

In the last one year at zonal level there were two suspected outbreaks (measles and malaria). For measles outbreak there was line list of 63 measles case reported from Tocha Woreda

from16/11/04/-27/12/04 but there was no line list or document for malaria. Intervention used for measles outbreak was mass vaccination in 3 kebeles, active case management and writing early warning letter to neighboring Woredas; and action taken for malaria was mass febrile treatment and monitoring ITNS utilization. There was no written document that shows what type of action and with in what speed the response taken. Similarly from evaluated Woredas (n=3); one Woreda experienced malaria outbreak. In the evaluated Woredas and zonal level there was no documented and formal outbreak investigation.

Laboratory

Incorporate strong laboratory services for accurate diagnosis especially for diseases supported by lab (confirming a suspected outbreak is one of the good features of a surveillance system. At Zonal level there is no public health laboratory but Zonal Hospitals and health centers help in specimen collection transportation and lab confirmation for specific tests. Health centers and Zonal Hospital laboratories mostly engaged on medical laboratory activities. As a result public health important confirmatory testes like measles IgM done central level. In2013 the surveillance system detected 13 suspected measles cases and specimen was collected for laboratory from each cases for lab confirmation but only 5(38.5%) were positive for measles specific antibody.

Table 3.1.0.4Types of confirmatory testes done at regional public health, Zonal hospital and HC laboratories, SNNPR, 2013

Disease	Specimen type	Assay Performed	Gesa HC	Tercha Hospital	Regional public health laboratory
Meningitis	CSF	Cell count	No	yes	No
		Latex agglutination	No	No	Yes
		Gram stain	No	yes	Yes
		Culture	No	No	Yes
		Identification test	No	No	No
		A-M Susceptibility	No	No	No
Watery diarrhea(cholera)	faeces	Microscopy of wet preparation	No	yes	Yes
		Culture-TCBS	No	No	No
		Culture-Alk. Peptone	No	No	No

Malaria	blood	Stereotyping Thin/Thick film microscopy	No Yes	No yes	No EQA
Measles	Serum Throat swab Conjunctival swab	IgM By EIA Other serological test Virus isolation	No	No	No
Yellow fever	Blood Postmortem liver	IgM Virus Isolation	No	No	No
Typhoid or Brucellosis	Blood Faeces	Widal Culture	Yes No	Yes No	No Yes

1.6 Epidemic preparedness

Plan: Except Tercha City Administration the zonal health department and each Woreda have written epidemic preparedness plan.

RRT & epidemic management committee: At zonal and Woreda level respondent replied that there is epidemic management committee and also RRT at zonal, Woreda, Hospital and health center level .But we could not find indicator that show the functionality of both RRT and epidemic management committee at all level.

Budget: There is no budget allocated for epidemic response. Respondent replied that at the time of the problem budget will be allocated otherwise there is no trained of prepositioning for all expected epidemics.

1.7 Epidemic Response and Control

Data was not analyzed, interpreted and used for action at all level (zone to health facility). There was no response done based on analyzed data.

1.8 Feedback

At regional level there was health bulletin which produced every week and delivered to lower level surveillance system. But at zone level in all visited surveillance system units, there was no

feedback received from higher level. There was no document that shows feedback given from the higher level.

2. Supportive functions the surveillance system

2.1National Surveillance Manual

PHEM, Malaria, Measles and malnutrition guidelines were available in one health center, two Woreda PHEMs, and Zonal PHEM level. In all evaluated health posts there was no surveillance guideline. At zonal level there is only malaria & measles case management protocol. At HCs and hospital level (n=4) Measles and SAM case management protocol were available in 1 (25%) and 2(50%) health facilities respectively.

2.2 Training

Training is one of the capacity building mechanisms to strengthening the surveillance system. From all respondents 11(78%) respond that they were trained on PHEM (public health surveillance). Regional, Zonal and Woreda level majority of PHEM officer have training at least one times per year through workshops and review meetings but health center and HP focal, (where public health priority diseases detected, screened and sent to the next level) have no training about PHEM.

2.3Supportive supervision

From visited health posts (n=6) only two got supportive supervision in the last 6 months. These two health posts have supportive supervision feedback logbook. From evaluated HF (n=4) and Woredas (n=3), 2 HF and 2 Woreda got supportive supervision in the last six month respectively. The region and Dawro Zone were not supervised. They also did not conduct supportive supervision to the lower level. Reasons not to conduct supportive supervision were transport, budget and occupied with other emergency situations.

2.4 Logistics

For surveillance system we use technologies that facilitate documentation, analysis, reporting and communication (computer, Fax, Printer, Photocopy machine and telephone) which need electric power. Electric power available from zonal to HC level but at HP level there was no electric power supply. Transport vehicles also very important for supportive supervision, active case search and in case of outbreak investigation. There is no independently assigned vehicle for surveillance system in all visited, Zone, Woredas and HC level. At HP level there is no vehicle.

Data management

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 and statistical packages. At Woreda and HC levels there is no statistical packages even computers are not only independent to the surveillance system. At all level there is no electronic data base and no assigned data manager. Priority diseases are not registered electronically with required variables that help to analysis at the time of required.

Communications

Communication tools are important for public health surveillance system to receive information and respond on it timely. Regional and zonal level surveillance system use Telephone, Email fax, and eIDSR for communication. At Woreda and HC level the only available communication tool is land phone and personal mobile phones. Health extension workers expected to conduct community IDSR but there was no communication tool at HP level. They use their mobile phone to communicate emergency and other health activities.

Hygiene and sanitation materials

During emergency situation especially where there is displacement and water born outbreaks like AWD hygiene and sanitation materials required. There are no sanitation materials at al level but at health posts, health centers and hospital level detergents and personal protective equipments available for routine purpose.

Budget line

At Zonal Surveillance unit there was budget line for the surveillance system but it was very small compared to the regional surveillance unit budget share for PHEM in 2013/2014 (7.3% at regional and 1.22% for Zonal surveillance unit). At Woreda level budget is only for salary and operational costs allocated at office level.

3. Attributes and level of usefulness

3.1 Usefulness: The surveillance serves for a population of 600,121 at zonal level. From this population a total of 1217 cases and 0 deaths of sever acute malnutrition cases were reported. But SAM cases reported through surveillance system and CBN program varied in number (there were unreported cases to the surveillance system. In 2013 through case based report 13 suspected measles specimens were sent to EHNRI for lab confirmation of which 5 were positive for measles specific antibody IgM, but only two suspected measles cases were reported in the main surveillance system. Though interrupted in reporting the surveillance system was useful to detect outbreaks.

3.2 Simplicity: Reporting formats used were simple and can take 10-15 minute to fill the format but it takes long time for lab confirmation because measles IgM done at central level and mostly they received the result feedback within 3months.

3.3 Flexibility: The current report format was flexible and difficult to add additional in formations required by a surveillance system especially if new disease emerged it is difficult to send to the next level with most required variables like age, sex ,address and clinical symptoms.

3.4 Satisfaction on the surveillance system (Acceptability)

Focal persons complain that they could not apply surveillance activity as designed in public health surveillance guide line due to financial, transport, technology and technical problems. Solutions suggested were integrating the surveillance system with other processes especially disease prevention and health promotion process. They also suggested that there should be refreshment training as other health departments.

3.5 Representativeness: The surveillance system is structurally representative because there is HP in each kebele but have limitations due to operational and accessing the whole communities in the required time and place. Reports were not constantly reported (Figer3).

3.6Timeliness: There were no records that show timeliness and it is impossible to measure the timeliness of the surveillance system at all level. Every notifiable disease has time to report to the next level but immediately reportable diseases reported weekly. On the other hand confirmatory test for measles specific antibody (IgM) done at EHNRI) central level which takes

up to 2 month to get feedback. Mostly community IDSR is challenged because of health extension workers could not report to the next level as stated in the national guide line.

3.7 Stability: The surveillance system is not stable. Report were collected and aggregated by zone but currently Woredas collect weekly reports and report to the next level by health facility level and finally zones upload reports by health facility level to the region through eIDSR. The eIDSR was interrupted due to internet and power supply problems and forced to report Woreda aggregates.

3.8 Sensitivity: It was difficult to assess the sensitivity of measles and SAM surveillance system but the completeness of surveillance which is synonymous to sensitivity was 86.7%. Predictive value positive for measles surveillance system was 38.5%.

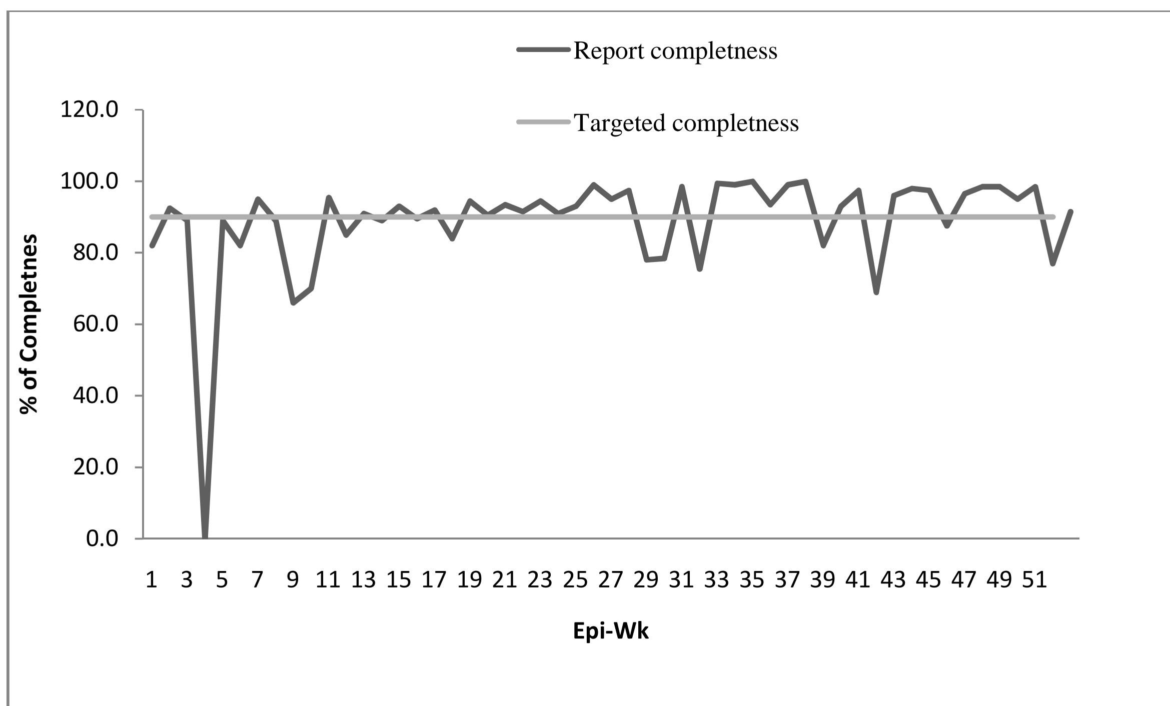


Figure3.1.0.3Trained of Surveillance Report Completeness by Epidemiological Week in Dawro Zone, 2013

6. Discussion

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 [10]. At the health facility level data was collected and recorded in registry books and were not entered to electronic data base. As a result surveillance data was not analyzed, interpreted and used for action even it is difficult to analyze in the future because registers were old and tore. The data entered at zonal level was aggregate and in a report form which has no single column and row for required variables. The surveillance system has a report form to collect data from the lower level. From visited surveillance units 92.8% use the appropriate report form and 21% faced shortage of report form in the last six months.

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 misguided and wasteful [11].

Majority of the supportive function of the surveillance system were not function properly. Each priority diseases should be detected and managed based on the guideline. Guidelines were available for specific diseases. Even the available guidelines were not available in some districts and health facilities. Unless we have guidelines at all level especially at health facility level it is difficult to have common understanding on case definitions meanings used in the public health surveillance system. Skilled manpower and technologies are some of the least to be addressed by the public health community to advance public health surveillance system in the 21 century [11, 12].From all respondents 58% replied that they were trained on public health surveillance (PHEM). Except for zonal PHEM 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. Supportive supervision is one of the activities in the annual work plan that helps to strengthening the capacity of the staff and ensue the right skills and resources used appropriately.

Operational budget is one of the supportive functions of the surveillance system. There was budget line at zonal and Region level but there was no budget for surveillance at Woreda and health facility level. Even the budget allocated for zonal level was very small as a result the zone could not support the lower level. 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[13-14].

We investigated that the time lines of all notifiable disease was not monitored or it was difficult to get when the disease was detected and reported to the next level. Timeliness is one of quality measure of any surveillance system and should be monitored regularly. It is a key element of the surveillance system that indicates the system's ability to take appropriate action on public health problems, based on the urgency and the type of responses needed [15].

7. Limitation

We could not evaluate the sensitivity and specificity of the surveillance system because variables required for calculating specificity and sensitivity was not complete.

8. Conclusion

National guidelines did not distribute uniformly to all surveillance units. There should be data base and data manager at all level. The existing data base is not suitable for epidemiological analysis in terms of place person and time because it has no raw data. Health workers at health facility level have no knowledge about nationally notifiable diseases. Surveillance data was not properly collected, documented, analyzed and used for action. So Dawro Zone surveillance systems need strong supportive supervision.

9. Recommendation

National surveillance guidelines should avail to all level of the surveillance unit in Dawro zone
There should be electronic data base at all level preferably health centers and hospitals.
The database should have all relevant variables (age, sex, address, clinical symptoms and other additional variables based on the type of disease (e.g. vaccination status for measles).

The regional health bureau should conduct supportive supervision to the lower surveillance units.
There should be refreshment training to strengthening the surveillance system especially at HP and HF level where cases initially detected.
The surveillance system should budgeted and equipped with the minimum communication and electronic tools (telephone, computer and fax)
Training should be given to surveillance officers and focal persons that help them how to organize and analyze surveillance data.

Reference

1. WHO. Technical Guideline for integrated disease surveillance and response in the African Region. 2nd ed. Atlanta, Georgia, USA; 2010
2. FDRE-MOH. Integrated Disease Surveillance and Response, National Technical Guideline, 2002: A.A; Version 1.1
3. CDC. Updated guidelines for evaluating public health surveillance systems
4. Ruth Ann Jajosky and Samuel L Groseclose. Evaluation of reporting timeliness of public health surveillance systems for infectious diseases,2004
5. EHNRI. public health Emergency management ,guideline for ethiopia,2012
6. WHO. Communicable disease surveillance and response systems Guide to monitoring and evaluating, 2006
7. FDRE-EHNRI. Guideline on Measles Surveillance and Outbreak Management. 3rd ed. Addis Ababa; 2012.
8. Ethiopia-FMOH .Protocol for Rapid Assessment of Sere Acute Malnutrion;2007
9. Lisa M.Lee, Stephen M. Teutsch,Michael E. st.Louis ;Principles and Practice of public Health Surveillance 3rd ed. Oxford University Press;2010
10. CDC. CDC's Vision for Public Health Surveillance in the 21st Century,MMWR.vol.16July 27, 2012
11. WHO. Recommended Surveillance Standards. Second edition/WHO/CDS/CSR/ISR/99.2
12. Importance of Surveillance and Detection in Public Health Initiatives.2012,[Cited March2014] ; Available from: http://www.uniteforsight.org/surveillance/module1
13. Importance of Partnerships in Enhancing Global Surveillance Systems.2012, [Cited,march2014]; Available fromhttp://www.uniteforsight.org/surveillance/module 8
14. Evaluation of the Surveillance Function at the Public Health Agency of Canada.2013,[Cited march 2014] ; Available from:http://www.phac-aspc.gc.ca/about_apropos/evaluation/reports-rapports/2012-2013/sf-fs/section-1-eng.php
15. Hyo-Soon Yoo, Ok Park, Hye-Kyung Park, et al .Timeliness of national notifiable diseases surveillance system in Korea: a cross-sectional study 2009

Chapter IV-Health Profile Description Report

4.1 Health Profile Description of Konta Special Woreda

Abstract

Background: Health profile provides a snapshot of the overall health of the local population. However in low income countries like Ethiopia such information especially at district level usually not available .This study was conducted to provide health profile description of Konta special Woreda which will help for health planning.

Methods: This descriptive cross-sectional study was conducted in Konta special Woreda from April 22-29 /2013.The information was collected from health, agriculture, Culture and tourism, water resource management, finance and economy and education office annual reports and documents. Both qualitative and quantitative data was obtained using health profile data collection checklists. Data was analyzed and organized using excel and Arc Map.

Result: Population of the Woreda in 2012 based on 2007 census projection estimated to be108, 909 .From the total population 98,563(90.5%) live in rural. The Woreda is administered with 42 rural and 4 urban kebeles. There were 40 health posts and 4 health centers. According the 2007 census report the dependency ratio was 82%. Access to drinking water supply and excreta disposal was 29.6% and 92.8% respectively. At Woreda level 11(23.9%) kebeles graduated as open defecation free kebeles. Top ten leading morbidity in the outpatient department was malaria. There are 29(65.9%) malaria prone kebeles. The 2011/2012 ITNs coverage was 100% and IRS 34%. Majority of the notifiable diseases burden was increased in the last two years. Measles and PV3 vaccination coverage was 93% and 87 % respectively and health workers density per 1000 population was 1.31.

Conclusion: Malaria is number one priority health problem which is constantly leading the top ten diseases in the district followed by infectious diseases that can prevent by the community themselves. It is possible to reduce the disease burden through empowering the community in the disease prevention and control programs and disease surveillance.

1. Introduction

Health Profiles are designed to help local government and health services identify problems in their areas and decide how to tackle them. Health profile is base for formulation and implementation of policy and strategy by generating evidence-base data. The promotion and application of epidemiological theories on development and management of public health programmers is the need of the day. The health profile description highlights several important aspects of public health data. Data will be collected, analyzed, and disseminated for decisions resulting from best information available. Morbidity, mortality, socio-demographic and vital statistics and other data will be collected, and that will help us to address important public health problems and to facilitate effective public health action [1, 2].

Health profiles are produced at local authority level because they are intended for use by elected councilors, directors of public health, council officers and other members of the Joint Strategic Needs Assessment (JSNA) process and by members of the health and wellbeing boards. Health profiles are now an established part of planning for health improvement [3]. Districts are the lowest autonomous governmental structures which run majority of public health activities. District health data are important for advocacy, planning, implementation and evaluation of health care program [3-5].

2. Rational of the study

Health profile provides a snapshot of the overall health of the local population, and highlight potential problems through comparison with other areas and with the national average. However in low income countries like Ethiopia such information especially at district level is usually not complete and comprehensive [6, 7].There for this study was conducted to generate health information which help Konta special Woreda and other stakeholders to improve the public health.

3. Objectives

General objective

To describe health profile of Konta special Woreda from 04/22-04/29/2013

Specific objective

To describe the demographic and socio-economic status of the Woreda

To describe the disease burden of the Woreda

To describe primary health care services status in the Woreda

To determine priority health problems in the Woreda

4. Methods

Study setting

The study was conducted in Konta special Woreda from April 22-29 /2013. Konta special Woreda is one of the 4th Special Woredas in Southern Nation Nationalities and peoples Region. The Woreda has a population of 108,909 and administered with 44 Kebeles.

Study Design

We used a descriptive cross-sectional study design to describe the health profile of the Woreda.

Data source

Data was obtained from health, agriculture, culture and tourism, water resource management, finance and economy and education offices.

Data collection

The data was collected through interviewing sectors head, experts and reviewing documents using health profile data collection checklists.

Data analysis and organization: - We used Excel sheet for the analysis of frequencies tables and figures. We also used Arc Map to describe the administrative area Woreda.

Ethical Issus: Permission was obtained from AAU, RHB and respective administrative organizations.

5. Results

5.1 Description of the district

5.1.1 Geographic and Demographic Characteristics

Konta special Woreda is one of the four special Woredas in Southern Nations Nationalities and Peoples Region. The Konta ethnic group originates in south western Ethiopia, in Konta special Woreda. The name Konta designates the people and the land. Konta is located 460 km from Addis Ababa and 367 km from the region capital Hawassa. Its main town Ameya situated at 2090m altitude at the foot of Mount Damota, which was established 1921. Konta Special Woreda bordered by:- Oromiya (Jima Zone) in the north; Kaffa zone in the west; Dawro zone in the east; Gamugofa zone in south east and South Omo zone in south west. The estimated area of the Woreda is approximately 2254.2 km^2. The population density is 42 /km^2.

Climatic condition of the Woreda is 6% Dega (cold zone), 54% weyinadega (temperate) and 40% kola (tropical). Attitudinally the Woreda situated from 870-2850 m above sea level. The annual rainfall ranges from 720ml-1300ml with average of 1250ml. The average temperature is 21.5^{o}c. Residents of konta settled in each climatic zone (8% in Dega, 52% weyinadega and the rest 40% of the population live in kola.

Among the few young national parks of Ethiopia, Chebera-Churchura National park is found in the Woreda. The Park established in 2005 GC. It covers 1990km^2. The park covered with different vegetations and inhabited with 37 kinds of wild mammals like Elephant, and 237 species of birds.

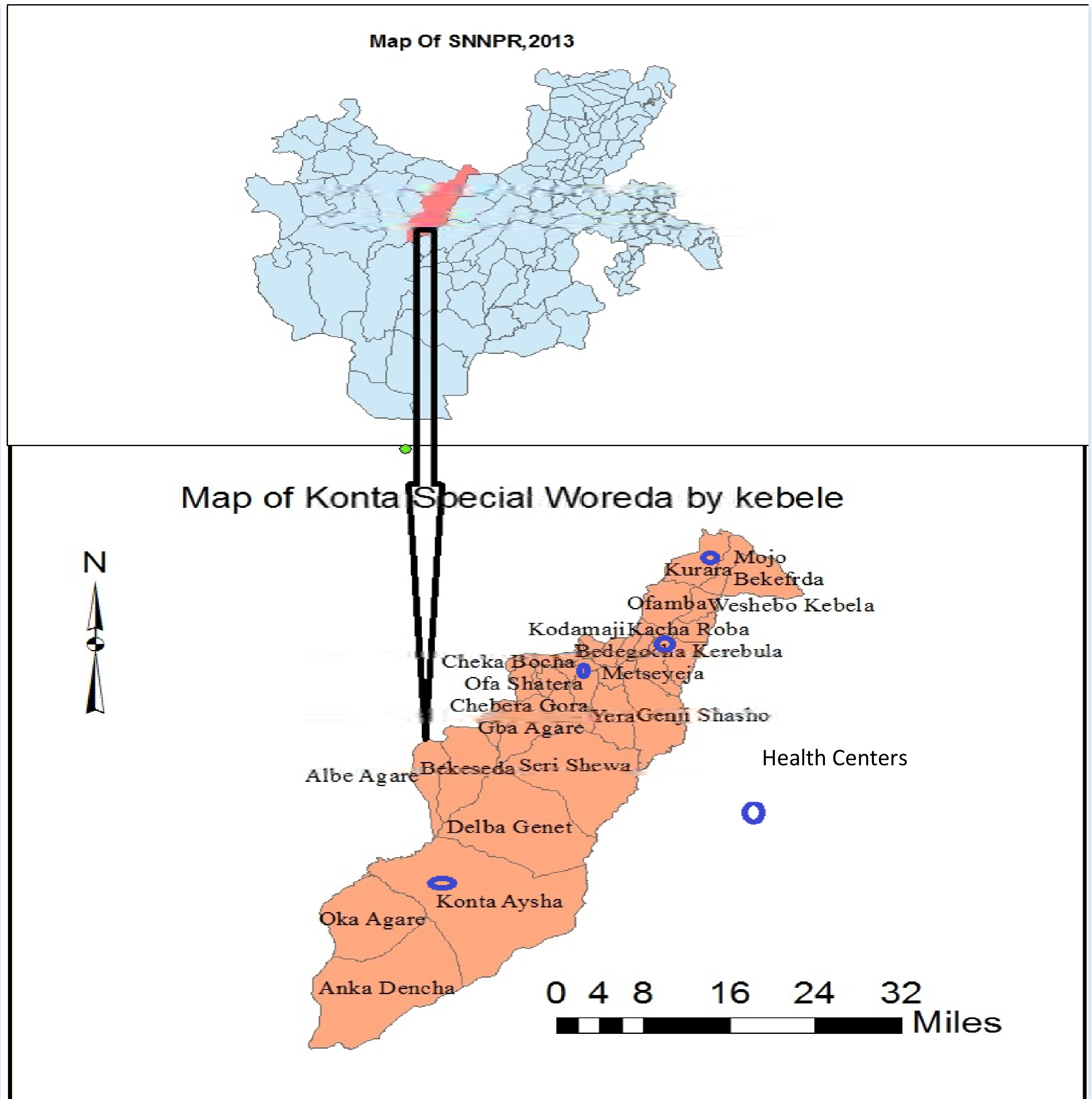


Figure4.1.0.1Map of Konta Special Woreda by kebele, Southern Nations Nationalities and Peoples Region, 2013

Population of the Woreda in 2012 based on 2007 census projection estimated to be108, 909 of which 53,801(49.3%) males and 55,108 (50.7%) females. Children < 15 years were 43.75% and

adults > 64 year 1.32%. From the total population 10346(9.5%) live in urbane and 98,563(90.5%) live in the rural. The Woreda is administered with 42 rural and 4 urban kebeles. According the 2007 census report the dependency ratio was 82%.

Table4.1.0.1Population structure by age group of Konta special Woreda, SNNPR, 2012/ 2013

Age group	Number	Percentage (%)	Source
<1 year	3,344	3.07	Who
1-4 years	16,990	15.6	Who
5-14 years	27,578	25.32	
15-59 years	58,191	53.43	
>= 60 years	2809	2.58	

5.1.2 Education

Modern educational system was started in 1975 at Ameya elementary school. In the Woreda junior secondary school (9-10) was started in 2001. Currently in the Woreda junior2 (9-10), elementary 34(1-8), first cycle 19(1-4) and 1 preparatory schools were available of which 56(98.2%) were governmental. School enrolment percentage for the year 2012/13 was 101.4%.The school dropout was 9% and 3.8% in2011/ 2012 and 2012/2013 mid-semesters respectively. In 2012/2013 the highest dropout rate was recorded among grade 11 students. Among dropout students in both physical years 63% and 57% were males respectively. In 2012/2013 from the total students 15442(51%) were males.

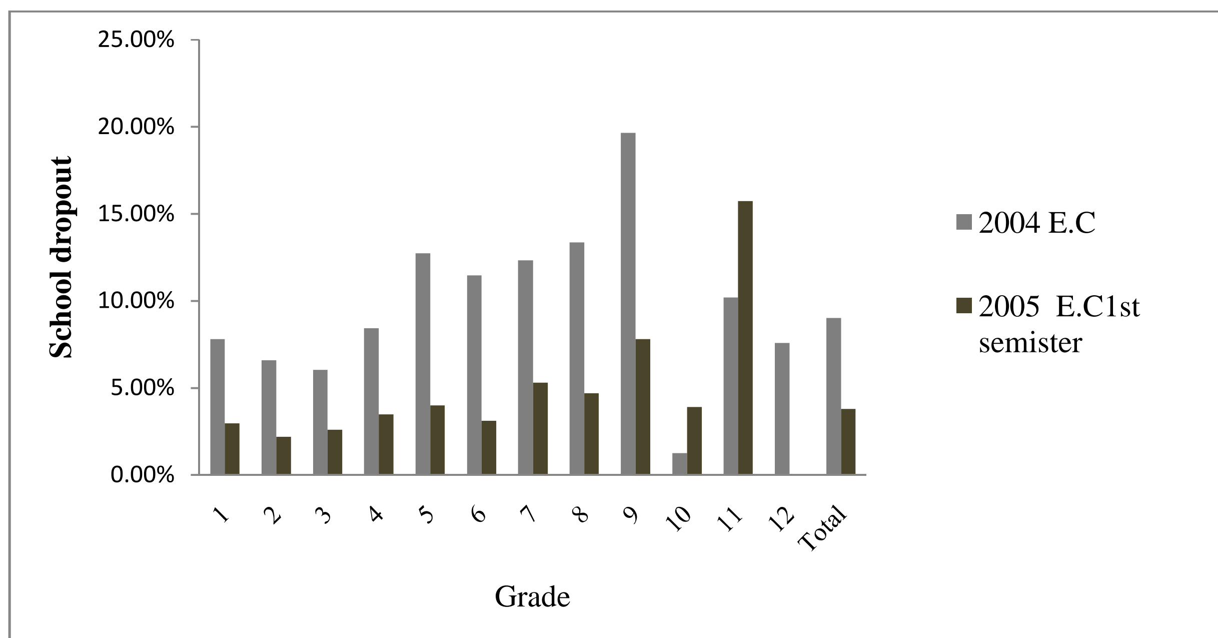


Figure4.1.0.2 Percentage of School Dropout in Konta Special Woreda, 2013

5.1.3 Socio-economic

The main economic source of the Woreda is traditional agriculture practice. Agricultural products (crop production and animal husbandry) are the main activities. Crops like teff, Bean, Maize, Inset and Godere and animal husbandry like cow, goat and sheep are commonly practiced economic activities. Fruit production like papaya for cash started in the recent few years.

5.1.4 Infrastructures

In the Woreda some of the basic infrastructures like electric power supply available for 2 urban and four rural Kebeles. Telecommunication (land telephone is available in the main town (Ameya) and 85% mobile coverage. Since 2011 commercial bank Ethiopia started the service in the Woreda. There is also Omo micro finance which gives service for the community.

5.1.5 Health system and health status

The District health system performs PHCU activities which designed in the national health tire system. After decentralization districts have power to decide on their budget so as to run any public health important activities. For 2012/2013 fiscal year 4,725,652.88(8.57%) of the Woreda budget was allocated to the Woreda health. From allocated budgets salary 77.4%, running cost 18.7 % and capital budget 3.9%.Each Health centers (Ameya, Chida, Kontakoysha and Kirara) have "A" account that can deposit incomes collected by each health centers. Majority of the health activities are community-centered which focused on prevention and control. To improve the public health training on the health extension packages have been given to households. Trained and graduated households teach their neighbors what they know and help them to perform the basic health practices at household level. Based on this 8132(36.8%) health development armies (HDA) graduated. The density of health workers per 1000 population is 1.31 which is better than the national 0.84 but it is bellow the WHO standard (2.3/1000).

5.1.5.1 Woreda health office structure and human resource

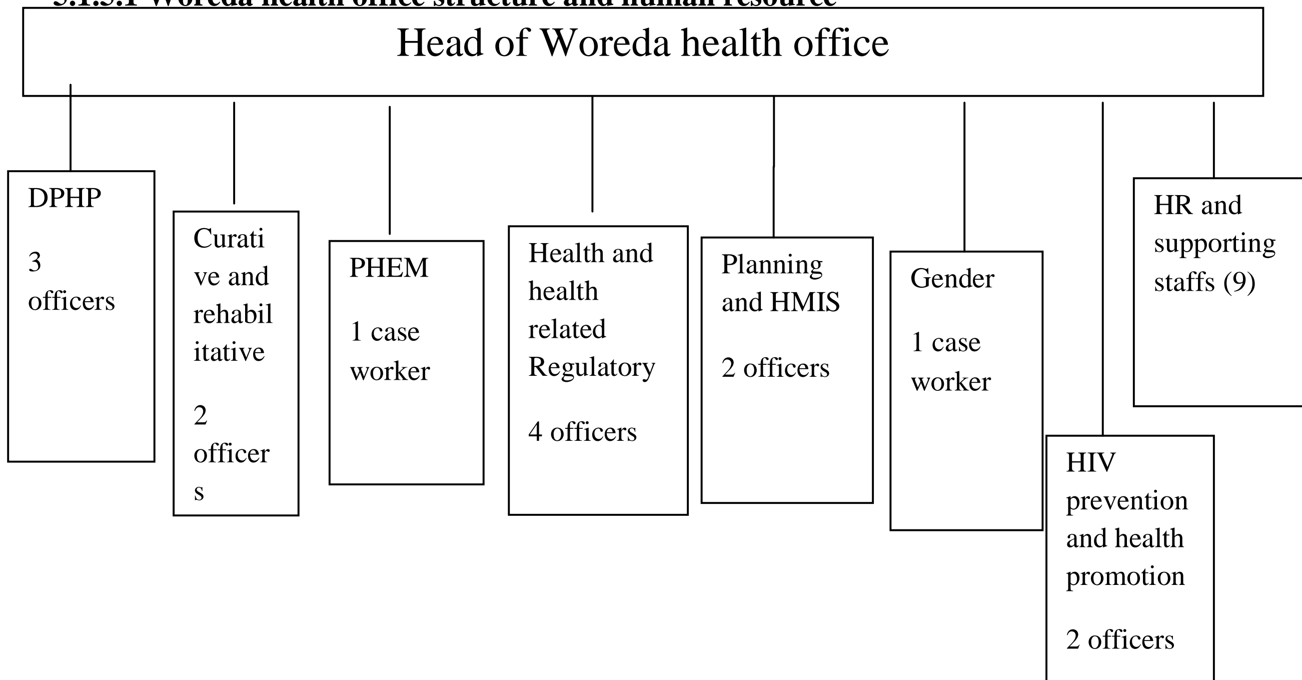


Figure 4.1 0.3Organogram of District Health System of Konta special Woreda, SNNPR, 2013

Table4.1.0.2Type and number of functional health facilities Konta special Woreda SNNPR, April2013

Type of health facility	Number	Remark
District Hospital	0	Under construction
Health centers	4	Gov
Health Posts	40	Gov
lower clinics	1	Privet
drug stores	1	Privet
Drug vender	1	Privet

Table 4.1.0.3Type and number of health professionals, and proportion to the population, Konta Special Woreda April 2013

Type of health Professional	Num ber	Health professional to population ratio	Health workers/1000 population	2009 national indicator
Physician	0	-	-	-
Health officers	9	1:12101	0.0826	0.0205
Nurses (Clinical& public)	33	1:3300	0.3030	0.2576
Midwife nurses	8	1;13613	0.0735	0.0176
Health extension workers	75	1:1452	0.6886	0.3943
Pharmacist	2	1:54455	0.0184	0.0081
Pharmacy technician	5	1:21782	0.0459	0.0258
Environmental health all type	6	1:18152	0.0551	0.0159
Lab technologist	2	1:54455	0.0184	0.0110
Lab technician	3	1:36303	0.0275	0.0249
Total	143		1.31	0.7757

Table4.1.0.4Status of basic health services and indicators of Konta special Woreda, April 2013

Indicator	Status of Woreda	Remark
PV3	93%	Woreda annual performance report
Measles	87%	2012/2013
Full immunization coverage	85.4%	"
ANC coverage	91%	"
Skilled delivery attendance	7.2%	"
Delivery attended by HEW	44.8%	"
Contraceptive prevalence	73.8%	"
Maternal mortality rate		Data not available
Prenatal mortality rate		"
Infant mortality rate		"
HIV prevalence rate	0.21	9 month report
Under 5 mortality rate		Data not available
Access to safe water supply	29.6%	
Access to excreta disposal	92.8%	
Potential accessibility health service coverage	100	Primary health care at 10k radius

Hygiene and sanitation practices like constricting pit latrines in areas where people gathering and rood sides are constricted. At Woreda level 11(23.9%) kebeles graduated as open defecation free kebeles. Access to excreta disposal and drinking water supply coverage was 92.8% and29.6% respectively.

Table4.1.0.5 Under five top five cause's morbidity in Konta Special Woreda 2011/12

Disease	No. Cases
Pneumonia	1,350
Malaria all type	962
Diarrhea all type	941
Acute febrile illness (AFI)	354
Helminthiasis	265
Acute upper respiratory infections	183
Infections of the skin and subcutaneous tissue	130

Table 4.1.0.6 Ten top outpatient department causes of morbidity in Konta special Woreda, SNNPR , 2011/12

2004 E.C		2005 E.C	
Disease	No. Cases	Disease	No. Cases
Malaria all type)	3,463	Malaria all type	9676
Diarrhea (all)	1,663	Pneumonia	4543
Acute febrile illness (AFI)	1,293	Acute febrile illness (AFI)	3912
Pneumonia	1,849	Diarrhea (all type)	2793
Helminthiasis	613	Helmenthiasis	1425
Trauma (injury, fracture etc.)	559	Typhoid fever (AFI)	1382
Typhoid fever (AFI)	534	Trauma (injury, fracture etc.)	1187
Infections of the skin and subcutaneous tissue	356	Infections of the skin and subcutaneous tissue	1002
Urinary tract infection	302	Dyspepsia	967
Dyspepsia	282	Diseases of the musculoskeletal system and connective tissue	940

Malaria is the leading top ten causes of outpatient visit in the Woreda. The number of reported cases becomes increased in the last 5 years (fig2).The main activities done for prevention and control of malaria was ITNs and IRS. The 2011/2012 coverage for ITNs and IRS was 100% and 34% respectively. Major malaria transmission season is from April to June each year especially in Kirara and Chida health centers catchment kebeles.

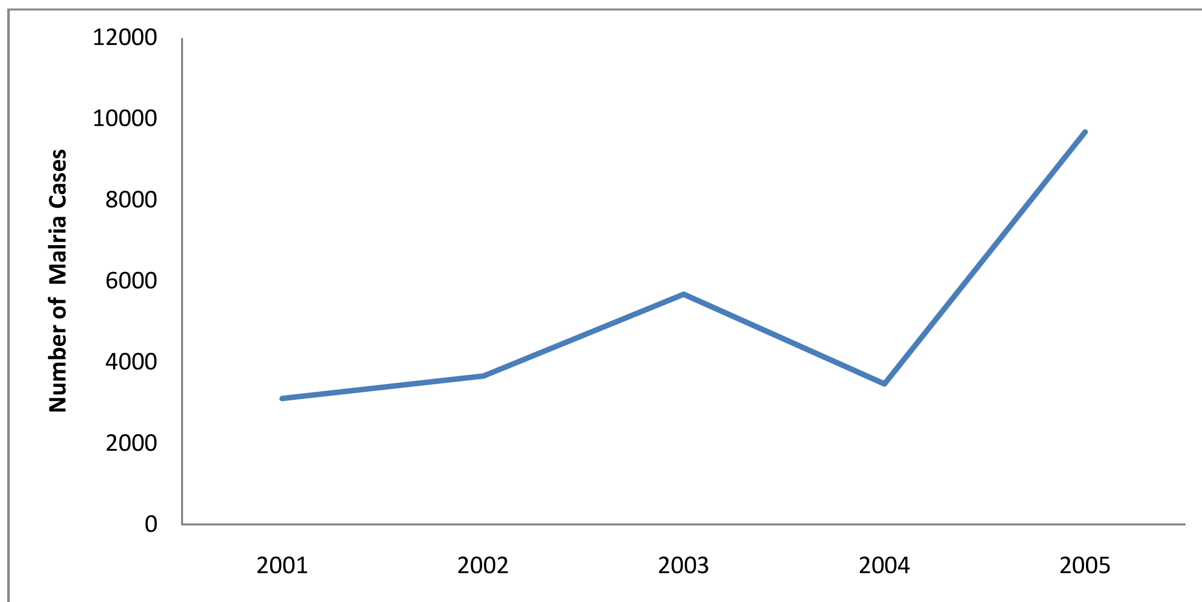


Figure4.1. Malaria trend from 2001 to 2005 EC in Konta special Woreda, SNNPR

Table 4.1.0.7Nationally notifiable diseases burden by year in Konta Special Woreda, 2013

Type of diseases	2004E.C	2005E.C
Malaria all type	3463	9676
Typhoid fever	534	1382
Dysentery	345	654
Epidemic Typhus	168	401
Measles	36	13
SAM	20	81
M. Meningitis	12	4
Relapsing fever	3	24
AFP	1	1

Majority of the nationally reportable diseases were increased in 2005 EC compared to 2004

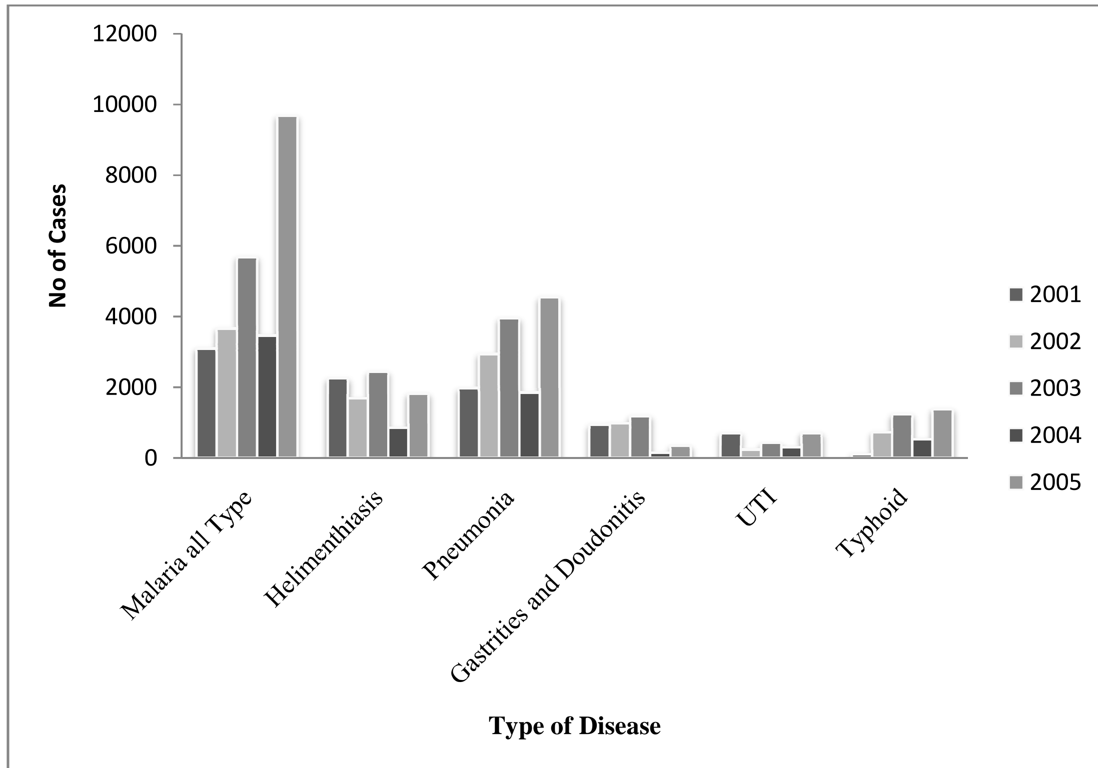


Figure4.1.0.4Disease burden in the last 5 years in Konta special Woreda, 2013

6. Discussion

Vaccination is one of the strategies used to reduce infant mortality. The vaccination indicators PV3 and measles vaccination coverage was higher than the national target 82% .The countries measles vaccination program is from 9month to 12 month. With in this age group in 100% coverage only 85% develop immunity [8].So with in this assumption the immunization coverage will be around 74%. One of the measles elimination strategy is maintaining immunization coverage >95% for at least one dose measles vaccine in all children

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 become increased in the last five years. It is also one of the national health problems. In 2004 the disease has been reported as the first cause of illness and death accounting for15.5% of outpatient visits, 20.4% of admissions and 27% of deaths. The ITNS coverage is 100% and there is also IRS operation but there is malaria

outbreak in the Woreda this might be due to poor utilization of ITNs which need further investigation.

Majority of the health problems in the Woreda (table 6) were infectious diseases that can be prevented through water and sanitation. But the Woreda drinking water supply coverage is 29.6 % which was below the national coverage (50.8%) [9,10]. Water and sanitation is the basic needs which used in reduction of infectious disease like water borne and fecal orals. Access to traditional pit latrine was 92.8% which was better than the national coverage (82%). However those graduated as open defecation free kebeles are only 23.9%. This shows that hygienic utilization is very low.

Appropriate budget allocation is very important for quality health service. Budget and human resource is the basis to achieve the health sector millennium health development goal. Budget share for health was very low (8.57%) compared to the region and the national. The regional and National budget share for the year 2011 was 12% and10% respectively [11]. Human power density for the health sector was 1.31/1000 population which was higher than the national average which is 0.84 but it was bellow the standard set by WHO (2.3/1000 population).At the district level there is no hospital and physician as a result sever cases referred to Jima hospital which is around 112 km from main town (Ameya). The ratio of physicians or health workers to persons in the population is an indication of the capacity of health system and accessibility of health service to the people live in the district [12].

Access to primary health education became improved (from one elementary school in 1975 to 57 in 2012/2013 which has a significant role for increasing educational level of the community. Educational level is strongly related to health statuses that help residents for better life choice [12]. The 2005 EC mid semester school dropout was very high (15.75%) for grade 11 students which are nearly equal to the 2003 EC national annual dropout (16.3%). Dropout rate increases as grade level increases especially from grade 5-10. Students leave the area to neighboring zones searching labor job. Dropout is waste of resource which has negative impact on the economic development as well as health development program [13].

7. Limitation

We could not describe mortality and morbidity for specific indicators (maternal mortality, infant mortality and under five mortality) because data was not available.

8. Conclusion

Nationally notified diseases burden was increased in the last two years especial malaria is the leading and number one health problem in the district. Measles vaccination coverage was very low which will results high susceptible group for measles outbreak. Majority of the health problems were infectious diseases that are easily preventable. It is possible to reduce the disease burden through encouraging the community to full participate in disease prevention and control activities and disease surveillance.

9. Recommendation

The routine EPI program should be strengthened in addition there should be supplementary immunization to catch up those didn't get vaccination. There should be assessment on ITNs utilization so as to solve the problem in the local contexts which help to solve malaria not to be major health problem. Access to drinking water supply system should be improved which is vital for reduction of majority of infectious diseases. Training of health development armies should strengthen so as to develop community health ownership. Multi sectoral integrated approach should be used to solve the school dropout.

Reference

1. Desalenge D. Health profile description of Misrak Badewacho Woreda, Hadiya zone, Sothern Ethiopia, 2012(unpublished)
2. Abdulnasir, A .District Health Profile Description of Oromia region, District of Jimma town, 2011(unpublished)
3. http://www.healthprofileinstitute.com/hpa_method_benefits.htm
4. . http://www.apho.org.uk/?QN=P_HEALTH_
5. Mengistu Asnake, Tewabech Bishaw.The Addis Ababa Declaration on Global Health Equity: A call to action, Ethiopia.J.Health Dev.2012;26:235-236
6. Oxfam. Country profile: Ethiopia 2012
7. Taos County Community Health Profile ,2010 available from www.taoscares.com
8. WHO. Measles and Rubella Surveillance Field Manual MOH IRAQ,2009
9. WHO. Human Resource for Health-Country profile Ethiopia,2010
10. CSA, Ethiopian Demographic and Health Survey2011
11. FDREMOH. Health and health related indicators,2011
12. Utah department of health .20011 Utah State Health Profile,2012
13. EFMOE. Educational Statistics Annual Abstract,2011/2012

Chapter V- Scientific Manuscripts for Peer reviewed Journals

5.1. Meningococcal Meningitis Outbreak in Hawassa City, South Nations, Nationalities and Peoples Region Ethiopia, 2013

Authors: Yeshitila, Mogessie[1], Desalegne.D[2] and Jemal.H[3]

Address: [1]Addis Ababa University School of Public Health, Ethiopia Field Epidemiology Training Program (cohort 4 resident); [2]Addis Ababa UNIVERSITY school of public health, Ethiopia field epidemiology training program coordinator, [3]South nations and nationality people region public health emergency management core process owner head.

Email:yeshitilamogessie@yahoo.com,desalengeju@yahoo.com,boulangerl@et.cdc.gov, jemamhas@yahoo.com

Key words: Meningococcal meningitis, outbreak, case control study

Abstract

Background: In Ethiopia meningococcal meningitis epidemics occur cyclically every three to five years in several regions that are located within the African meningitis belt. In January 2013 Hawassa City Administration reported an increase in persons with fever, headache, and vomiting and neck stiffness. We investigated to confirm the outbreak, identify risk factors and implement control measures.

Methods: We defined a suspect case of meningococcal meningitis as any person with sudden onset of fever, vomiting and neck stiffness in Hawassa City from 22January-17 February 2013. We did active case surveillance for suspected cases from Addare and Referral Hospitals and collected CSF specimens from cases .We used Gram stain, latex agglutination and culture for confirming tests. We performed a case control study and compared meningococcal meningitis

cases with their controls. We included all admitted cases that a physician diagnosed as meningococcal meningitis.

Result: We identified 87 suspected cases and 4 deaths with CFR of 4.6%. The overall attack rate was 26/ 100,000 and age specific attack rate was highest among persons aged 15-29 years (ASAR 37.5/100,000). We isolated Serogroup, A, C, and W135, and gram negative diplococcus, from 8 CSF specimens. Out of 27 cases and 54 controls having a history of recent past ten days acute respiratory infection significantly associated with contracting meningococcal meningitis {AOR= 4.7, 95% CI(1.5-14.9) }. Living in a room with a family size of four and above was significantly associated with the disease {AOR=4.5, 95% confidence interval (1.005-20.6)}.

Conclusion: This investigation confirmed an outbreak of meningococcal meningitis and identified recent acute respiratory infection and overcrowded housing as significant risk factors for contracting meningococcal meningitis. We can reduce the risk though community educating on reduction of overcrowding and respiratory infections. We recommended serogroup survey especially on w135 which help in the selection of vaccine type for mass vaccination in SNNPR

Note: The scientific manuscript was written with double space and references style was Vancouver with superscript based on scientific manuscript writing guideline**.**

Introduction

Meningococcal Meningitis is an acute bacterial disease caused by Neisseria meningitidis, also known as meningococcus. The disease often characterized by sudden onset of fever, headache and neck stiffness .The causative organism (N.meningitidis) can be found naturally occurring in the upper respiratory tracts of 5% to 30% of healthy individuals who are entirely asymptomatic. It can cause severe brain damage and is fatal in 50% of cases if untreated. More than Twelve serogroups of N. meningitidis have been identified, five of which (A, B, C, W135, and X) can cause epidemics [1, 2].

The bacteria are transmitted from person to person through droplets of respiratory or throat secretions. Close and prolonged contact – such as kissing, sneezing or coughing on someone, or living in close quarters (such as a dormitory, sharing eating or drinking utensils) with an infected person – facilitates the spread of the disease. The average incubation period is four days, but can range between 2 and 10 days [3, 4].

Higher incident of meningococcal disease has been linked to factors such as poor living conditions and overcrowded housing. Migration and travel are also considered possible facilitative means by which the circulation of pathogenic strains moves inside a country, from country to country. Especially family members of an infected person are at increased risk for meningococcal disease. Antecedent upper respiratory tract infection, low socioeconomic status and both active and passive smoking are also associated with increasing the risk. During outbreaks, bar or nightclub patronage and alcohol use have also been associated with higher risk for disease [5-7].

Meningococcal disease can vary in incidence from very rare to over 1000 cases per 100 000 population every year depending upon climate, age of the patient, geographical location and

season of the year. Serogroup" A" N .meningitidis causes the highest incidence of disease. Repeated pandemics of serogroup "A" disease have taken place in Sahara and sub-Sahara countries of Africa, known as the African meningitis belt, every 5–10 years since 1905. (8) Between 2003 and 2009 from 13 countries under enhanced surveillance of meningitis except Sudan more than 271 275 cases and 24 901 deaths were reported to WHO. The dominant serogroup responsible was Neisseria meningitidis A (58%) [9-11].

In Ethiopia meningitis epidemics have been described in written reports since 1901. The epidemics affect almost all regions of the country. Outbreaks were reported in 1935, 1940, 1950, 1964, 1981 and 1989 .The 1981 and 1989 outbreaks were the largest ever recorded in Ethiopia. In the 1981 outbreak 50,000 cases and 1000 deaths were reported. The affected regions were the northern and western parts of Ethiopia. Since then the disease remain endemic with recurrent outbreaks. In Ethiopia epidemics of meningococcal meningitis have been occurred in about eight year cycles but in the last five years outbreaks reported yearly from different parts of the regional states especially from SNNPR [12].

In SNNPR in the last five years outbreaks of meningococcal meningitis have occurred frequently (in2006, 844 cases and 27 deaths; in 2007,647 cases and 10 deaths; in 2008, 218 cases and 5 deaths and in 2012, 88 meningococcal meningitis cases were reported [13]. Following this on January 22, 2013 SNNPR Health Bureau received report of a suspected meningitis outbreak in Hawassa city which is the capital city of Southern Nations Nationalities and Peoples Region. Hawassa City has a population of 333,445 with the projection of 2007 census administered with 8 sub cites and 32 administrative kebeles.

On January 28, 2013 team organized from regional health bureau and WHO deployed to the city administration to investigate and control the outbreak.

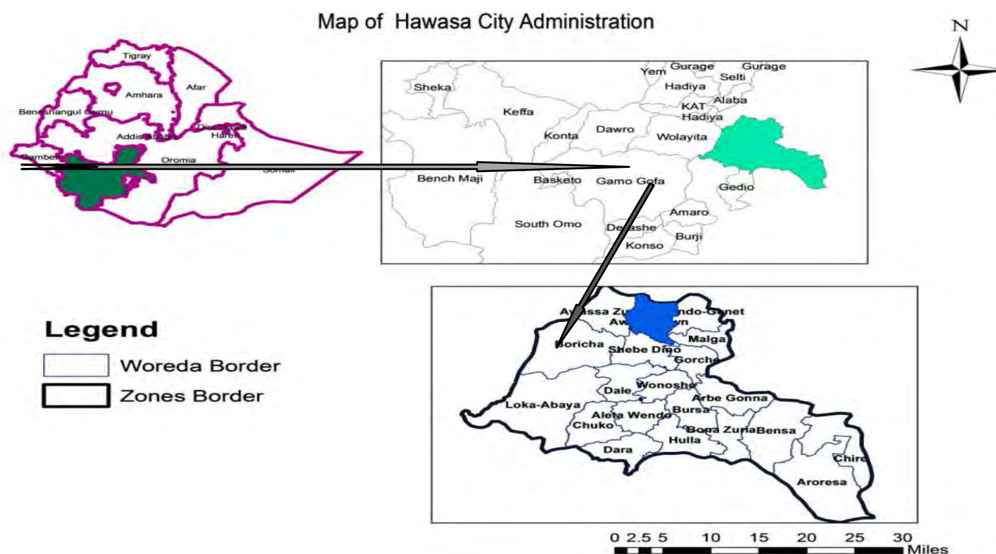


Figure5.1.0.1Map of Hawassa City, SNNPR, 2013

Rational of the study

Outbreaks of meningitis become a yearly event with high morbidity and mortality. Meningococcal meningitis occurred with different serogroups. So the type of serogroup responsible for the outbreak was not known. Determining the type of serogroup help to plan the type of reactive vaccine used for prevent and control of the outbreak. There are different risk factors that increase the incidence during an outbreak. So this outbreak investigation was designed to confirm the existence of the outbreak, describe the magnitude of the outbreak, assess the responsible serogroup and determining contributing risk factors that help the region for prevention and control of meningococcal meningitis outbreaks.

Objectives

General objectives

To investigate a suspected meningitis outbreak occurred in Hawassa City Administration from 28th January2013 to 17th February 2013.

Specific objectives

To confirm the existence of the outbreak

To determine the etiology /circulating sero group/responsible for the outbreak

To describe the outbreak by place, person & time

To determine possible risk factors for the outbreak in Hawassa city

To prevent and control the outbreak

Methods

Study setting:

The study was conducted in Hawassa city Administration in SNNPR from 28th January2013 to 17th February 2013.

Study population: Populations under the study were the population of Hawassa city residents.

Study design: Both descriptive and unmatched case control study designs were used to investigate the outbreak.

Data collection: Cases and controls were interviewed using a structured questionnaire. For each case two controls were used. During interview for child cases, we interviewed the parents. For descriptive part outbreak line list which was reported to the regional health bureau PHEM between 01/22/2013 and 03/17/2013 were reviewed and analyzed. To confirm the outbreak cerebrospinal fluid (CSF) were collected from probable cases of meningococcal meningitis, and sent to the regional public health laboratory. Tests used for confirmation were gram stain, rapid test using latex and culture.

Operational definitions:-

Case:Any individual who resied in Hawassa having the signe and symptems set by WHO and a physician diagnosed with meningitis in-between 28th January 2013 to 17th February 2013.

Control: - Any apparently healthy individual who live in Hawassa city administration.

1. **Case definitions** (WHO)

1.1. **Suspected Meningococcal meningitis case**: Any person with sudden onset of fever (>38.5 C rectal or 38.0 C axillary) and one of the following signs: neck stiffness, altered consciousness or other meningeal signs. OR

Any toddler with sudden onset of fever (>38.5 C rectal or 38.0 C axillary) and one of the following signs: neck stiffness, or flaccid neck, bulging fontanel, convulsion or other meningeal signs.

1.2. Probable M. meningitis case: Any suspected case with macroscopic aspect of its CSF turbid, lousy or purulent; or with microscopic test showing Gram negative diplococcus, Gram positive diplococcus, and Gram positive bacillus; or with leukocytes count greater than 10 cells /mm3.

1.3. Confirmed meningitis case: A probable cases with N. meningitidis isolation from CSF or blood.

Inclusion

Cases: All individuals that a physician diagnosed with meningitis from 28th January2013 to 17th February 2013 and admitted in Referral and Aadare Hospitals.

Controls: Residents of Hawassa who were neighbored to the selected case.

Exclusion: Cases that were not available or discharged at the time of data collection excluded from case control study.

Data processing and analysis: Epi-Info7 and excel 2007 were used for data entry and calculating rates, ratios, frequencies and analyses data using Logistic Regressions. Tables and figures were obtained using excel and Arc GIS**.**

Ethical issue: Oral informed consent was obtained from each respondent.

Result

Descriptive epidemiology

We identified a total of 87 cases and 4 deaths with CFR of 4.6%. Out of identified cases 45(52%) were males. The index case was 1 year old female. She lived in Addis Ketema sub - city, Philadelphia Kebele. She has no travel history in areas where there is a suspected or confirmed meningococcal meningitis outbreak and had no contact history with suspected meningitis case. All 8 sub-cities were affected by the disease. The peak number of cases was reported on week 6 and the outbreak lasted through week 11(Figure 2). The attack rate was very high in Addis Ketema sub-city (41.9/100,000).The overall AR was 26.1/100,000 population. The age specific attack rate was highest among persons aged 15-29 years (ASAR 37.5/100,000).

The average days from onset of the disease and visiting health facility for those who died of meningitis was 2.7and for all non fatal cases 1.6.

Laboratory investigation

We collected 37 cerebrospinal fluid specimens (CSF) but only 8 specimens were positive for meningococcal meningitis. Out of these 6 positive specimens with latex agglutination, the responsible serogroups were (A=4, C=1, W135=1, and gram negative diplococcic 2 with microscopy. There was no confirmed result with PCR.

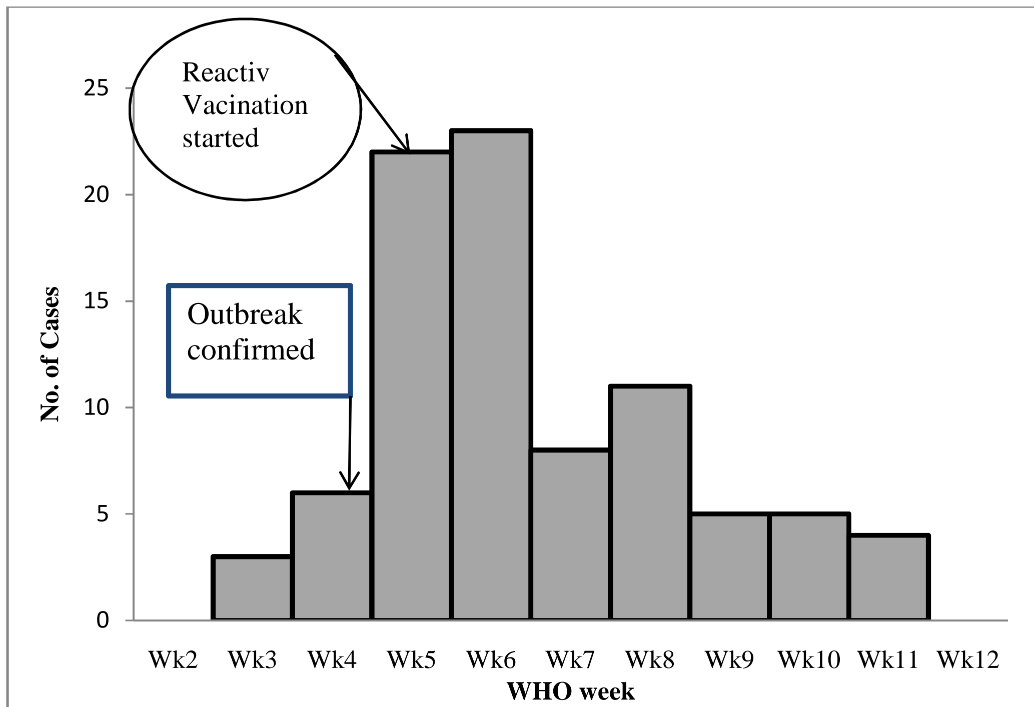


Figure5.1.0.2 Epidemic Curve of Meningococcal Meningitis by Epidemiological Week in Hawassa City, SNNPR, 2013

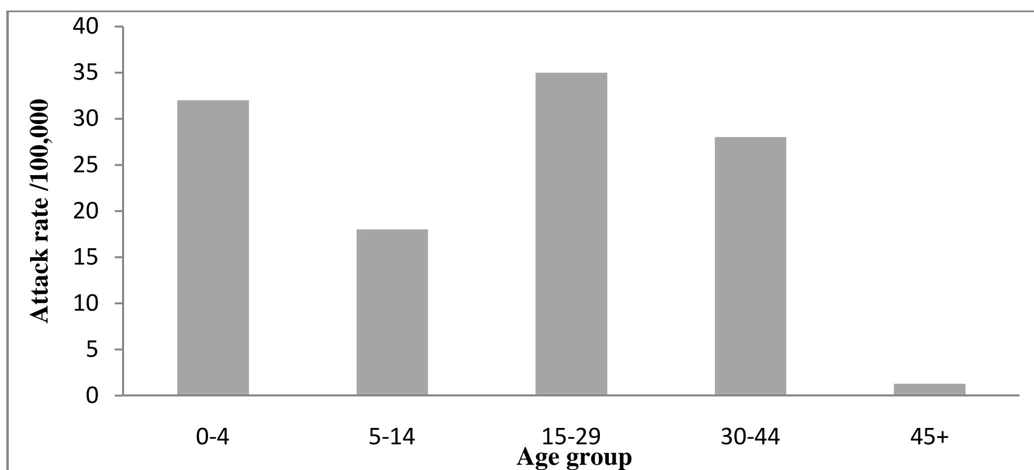


Figure5.1.0.3Meningococcal Meningitis Attack Rates by Specific Age group from 01/20/13-03/14/2013 in Hawassa city, SNNPR

Case study control

We recruited 27 cases (median age: 18 years) and 54 controls (median age: 25 years). Risk factors obtained from cases and controls analyzed in two Stages, Bivariate analysis followed by multivariate analysis.

In the Bivariate social and health factors were associated with the disease such as living in a single room, family size, having no information how meningococcal meningitis transmitted from person to person and acute upper respiratory infection (Table 3).

Multivariate Analysis

Only three independent risk factors, that have strong association with meningococcal meningitis based on 27 cases and 54 controls, were associated with contracting meningococcal meningitis in the multivariate analysis result (Table 4). Living with family size four and above per a single room had a significant association with the disease than unmatched controls who have a family member less than four {AOR =4.5, 95% CI (1.005-20.6)}. Cases that have acute upper respiratory infection have significant association with the disease {AOR=4.79, 95% CI (1.5-14.9)}. Cases who do not have knowledge about meningitis and its mode of transmission have association with the disease than controls {AOR=3.7, 95% CI (1.07-12.88)}. Living room is one of the assessed risk factors for meningococcal meningitis. In this study we identified that 63 % the cases with average family size of 3, and 38.8% of controls with average family size of 2.6 used single room for sleeping, cooking or every activities of the house hold.

Table5.1.0.1.Number of Nm Cases (n=27) and their Controls (n=54) Paired with Socio Demographic Status, Hawassa City, SNNPR, February 2013

		Case	Controls	
Gender	Male	17(63%	29(54%)	P=0.57
	female	10(37%)	25(46%	
	Orthodox	8(30%)	15(28%)	P=0.95
Religion	Muslim	1(4%)	2(4%)	
	protestant	17(63%)	36(67%)	
	others	1(4%	1(2%)	
	Daily labor	6(22%)	3(6%)	
	Farmer	10(37%)	3(6%)	
Occupation	Government employee	1(4%)	13(24%)	p=0.001
	House wife	1(4%)	7(13%)	
	Privet owned	5(18%)	18((33%)	
	Student	4(16%	10(19%)	
Educational level	illiterate	3(12%	0	
	Primary	17(63%	18(33%)	P=0.0015
	Secondary	5(19%)	27(50%)	
	Diploma	0	6(11%)	
	Above Diploma	1(4)	3(6%)	
Number of rooms for living	1	18(66.66%)	21(38.89%)	
	2	5(18.52%	9(16.67%)	
	3	2(7.41%)	16(29.63%)	
	4+	2(7.41%	8(14.81%)	
Family size	1	1(3.7%)	5(9.26%)	
	2	1(3.7%)	8(14.81%)	
	3	7(25.93%)	10(18.52%)	
	4	10(37.04%)	12(22.22%)	
	5	3(11.11%)	4(5.56. %)	
	6+	5(18.52%)	15(9.26%)	

Table 5.1.0.2 Number of Cases (n=27) and Controls (n=54) Paired According to Exposure Status for Meningococcal Meningitis Risk Factors, Hawassa City, SNNPR, February 2013

Risk factors	Case %	Control %	OR(95CI)
Gender			
Female	10(37)	25(46)	0.7(0.3-1.8)
Male	17(63)	29(54)	
Residence			
Rural	12(44)	18(33)	1.6(0.62-4.18)
Urban	15(56)	36(67)	
Knowledge about MM			
No	21(78)	21(39)	
yes	6(22)	33(61)	5.37(1.90-16.7)
AURI			
Yes	17(63)	17(31)	3.7(1.4-9.8)
No	10(37)	37(69)	
Living room			
Single	17(65)	21(39)	2.96(1.1-7.87)
Two+	9(35)	33(61)	
Family size /single room			
Four& above	10(38)	4(19)	
< Four	6(62)	17(81)	7.08(1.6-31.3)

Table5.1.0.3 Multivariable Analysis of independent risk factors for Meningococcal Meningitis, based on Comparison of Cases (n=27) and Controls (n=54) Hawassa, SNNPR, 2013

Term	AOR	95%	C.I.
Acute URI= y	4.7956	1.537	14.9632
Number of rooms >1	0.2505	0.0553	1.1358
Family size >= four	4.5507	1.0045	20.6154
Knowledge about MM transmission=NO	3.7238	1.0765	12.8809

Prevention and control activities

We were conducting mass vaccination campaign to residents for specific age group (2-30 Years old). The estimated target population from age 2-30 yrs were 233,411.The vaccination coverage was 85.73%. During the mass vaccination other governmental organizations like prison and university was considered. In these organizations expected targeted population were 40,300. The vaccination coverage for this target groups was 88.37%.The vaccine type used for the mass vaccination was AC. Cases were treated with appropriate treatment set by the national and WHO treatment guide lines (protocol).

Discussion

This investigation confirmed an outbreak of meningococcal meningitis. Though different serogroups identified in a single outbreak, the dominant serogroup was Nm type A. In Africa including Ethiopia frequently reported and responsible for majority of outbreaks is Neisseria meningitis type 'A' [14].

Upper respiratory infection 10 days prior to meningococcal meningitis was a significant risk factor to meningococcal meningitis, consistent with preceding upper respiratory infection was an important risk factor for meningococcal meningitis [14, 15]. Respiratory diseases such as influenza and pneumonia might weaken the immune defenses and add to the mucosa damage. The most affected age group is the young age groups with median age of 18.74yrs. Meningococcal meningitis mostly affects the younger age group, but during epidemics old children, teenagers and young adults are also highly affected [15-17].

An overcrowded housing condition was highly contributed for the occurrence of the outbreaks. In this study 63% the cases and 38.8% of the controls use a single room for every activity .This study identified that residents who live in a single room with a family size of four and above were highly affected with the disease, studies support that overcrowding as measured by the number of adolescents and adults (10 years older) house hold members per room doubling of risks with the addition of 2 adolescents or adults to a six room[17,18]. Knowledge about the disease and transmission route might help them to prevent the disease because cases that do not have knowledge about transmission of meningococcal meningitis have significant association with the disease. Reactive mass vaccination from age 2 to30 years of age with AC vaccine and prompt case management controlled the outbreak. Once the epidemic threshold is reached in a district or sub-district, it is recommended to conduct mass vaccination campaign targeting the entire district, using the appropriate polysaccharide vaccine.

Limitations:

We could not include all meningitis case due to limited time in the outbreak investigation and other social and behavioral risk factors (Alcohol drinking and cigarette smoking and Kissing were not included in the study.

Majority of the lab results were negative because of patients were taking antibiotics (ciprofloxacin) purchasing from privet sectors.

Conclusion:

Meningitis is a disease which mostly affects the young age group from 0-30 especially from 15-29 years of age. The epidemic was aggravated by overcrowded housing condition, preceding upper respiratory infection, and knowledge about the disease and its mode of transmission.

Recommendation:

Community educating on meningococcal meningitis and its transmission as well means for reduction of risk factors for meningococcal meningitis. Reducing overcrowded living is important in reduction of meningococcal meningitis outbreak. Furthermore there should be regional level serogroup survey especially on serogroup w135.

Reference

1. Jason K.whitson. Disease research report Meningococcal disease (meningitis) 2005
2. WHO Meningococcal meningitis fact sheet 27/8/2010.
3. WHO. Managing meningitis epidemic in Africa, a quick reference guide for health authority and healthcare workers 2010
4. http//www.cdc.gov/meningitis/index,html
5. The Role of Weather in Meningitis Outbreaks in Navrongo, Ghana: A Generalized Additive Modeling Approach
6. Anna M. Moles worth, Luis E. Cuevas, Stephen J. Connor, Andrew P. Morse, and Madeleine C. Thomson. Environmental Risk and Meningitis Epidemics in Africa, Emerging Infectious Diseases • Vol. 9, No. 10, October 2003
7. Jenny MacLennan, George Kafatos, Keith Neal et al. Social Behavior and MeningococcalCarriage in British Teenagers;Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 12,No. 6, June 2006
8. D.Stephens, B.Greenwood, p.Brandtzaeg. Epidemic meningitis, meningococcaemia, and Neisseria meningitidis Lancet 2007(www.thelancet.com Vole 369 June 30, 2007
9. E.Cuevas, E.C. savory, C.A. Hart, M.C. Thomson, M.A. Yassin .Effect of reactive vaccination on meningitis epidemic in south Ethiopia.2007
10. WHO: Standard operating Procedure s for enhanced meningitis surveillance in Africa version August ,2009
11. .Benjamin Sultan1, Karima Labadi2, Jean-François Gue´gan3, Serge Janicot Climate Drives the Meningitis Epidemics Onset in West Africa, January 2005 | Vol 2 | Issue 1 | e6
12. Y. Brihane, D. H/Mariam. H. Kloos: Epidemiology and ecology of health and disease in Ethiopia 1st edition, 2006
13. .Unpublished on job Meningitis training manuals for SNNPR.
14. Leimkugel.J, Racloz.V, Jacintho da Silva.L and Pluschke.G.Global review of meningococcal disease. A shifting etiologyJournal of Bacteriology Research Vol. 1(1), pp. 006-018, April, 2009
15. .WHO. Control of epidemic meningococcal disease; WHO practical guide line 2nd edition.// http://www.who.int/emc//
16. .Joanna Tully, Russell M Viner, Pietro G Coen, James M Stuart, Maria Zambon, Catherine Peckham, et al. Risk and protective factors for meningococcal disease inadolescents: matched cohort study; BMJ, doi:10.1136/bmj.38725.728472.BE (2006)
17. Lance Honish, Colin L. Soskolne, Ambikaipakan Senthilselvan, Stan Houston,Modifiable Risk Factors for Invasive Meningococcal Disease During an Edmonton, Alberta Outbreak, 1999-2002;Canadian journal of public health 2008;19(1):46-51
18. Michael Baker,Fafphm,Mcnicholas,et al.Household crowding amajor risk for epidemic meningococal disease in Aukuland children,USA. Pediatric infectious disease journal.2000;19(10):983-989

Chapter VI-Abstracts for Scientific Presentation

6.1 Meningococcal Meningitis Outbreak in Hawassa City, South Nations, Nationalities and Peoples Region Ethiopia, 2013

Authors: Yeshitila, Mogessie[1], Desalegne.D[2] and Jemal.H[3]

Address: [1]Addis Ababa University School of Public Health, Ethiopia Field Epidemiology Training Program (cohort 4 resident); [2]Addis Ababa UNIVERSITY school of public health, Ethiopia field epidemiology training program coordinator, [3]South nations and nationality people region public health emergency management core process owner head.

Email:yeshitilamogessie@yahoo.com,desalengeju@yahoo.com,boulangerl@et.cdc.gov, jemamhas@yahoo.com

Key words: Meningococcal meningitis, outbreak, case control study

Abstract text:

Background: In Ethiopia meningococcal meningitis epidemics occur cyclically every three to five years in several regions that are located within the African meningitis belt. In January 2013 Hawassa City Administration reported an increase in persons with fever, headache, and vomiting and neck stiffness. We investigated to confirm the outbreak, identify risk factors and implement control measures.

Methods: We defined a suspect case of meningococcal meningitis as any person with sudden onset of fever, vomiting and neck stiffness in Hawassa City from 22January-17 February 2013. We did active case surveillance for suspected cases from Addare and Referral Hospitals and collected CSF specimens from cases .We used Gram stain, latex and culture for confirming tests. We performed a case control study and compared suspected cases with unmatched controls. We included all admitted cases that a physician diagnosed as meningitis.

Result: We identified 87 suspected cases and 4 deaths with CFR of 4.6 %. The overall AR was 26.1/ 100,000 and the age specific attack rate was highest among persons aged 15-29 years (AAR 37.5/100,000). We isolated Serogroup, A, C, and W135, and gram negative diplococcus, from 8 CSF specimens. The peak case load was on week 6 and lasted through week 11 of 2013.

Out of 27 cases and 54 controls having a history of recent Past ten days acute respiratory infection significantly associated with contracting meningococcal meningitis {AOR = 4.7, 95% CI(1.6-14.3)}. Living in a room with a family size of four and above was significantly associated with the disease {AOR =5.5, 95% CI (1.3-23.1)}.

Conclusion: This investigation confirmed an outbreak of meningococcal meningitis and identified recent acute respiratory infection and overcrowded housing as significant risk factors for contracting meningococcal meningitis. We can reduce the risk though community educating on reduction of overcrowding and respiratory infections. We recommended serogroup survey especially on w135 which help in the selection of vaccine type for mass vaccination in SNNPR

6.2 Measles Outbreak Investigation in Sodo Town; Southern Ethiopia, October 2013

Authors: M. Yeshitila [1], D .Desaleng.[2], D. Yohannes.[3]

Address: [1]Ethiopia FETP, School of Public Health, Addis Ababa University; [2] Ethiopia FETP, school of public health, Addis Ababa University, [3]WHO Ethiopia Country Office.
Email:yeshitilamogessie@yahoo.com,desalengju@yahoo.com,boulangerl@et.cdc.gov, jemamhas@yahoo.com

Abstract

Background: In Southern Nation Nationalities and Peoples' Region outbreaks of measles occur every year. In 2012, there were 43 IgM confirmed and 1969 epi-linked cases with incidence of 11.3/100,000 population. On October 2, 2013 the Regional Health Bureau received a report of suspected outbreak of measles from Sodo town and dispatched a team to investigate, identify risk factors and implement control measures for the outbreak.

Methods: A suspect case of measles defined as any person in Sodo town who met with the standard WHO measles case definition from epidemiologic week (37-45). A descriptive study of all cases was conducted followed by a 1:2 unmatched case-control study. A control was any person not having history of measles residing in the same community in the same period. The study employed a structured questionnaire to seek information from cases and controls and used Epi-info to calculate frequencies, odds ratios and logistic regressions.

Result: We identified 53 measles cases and 5 deaths. The overall AR was 50/100,000 and the CFR was 9.4%.The age specific attack rate was highest among <1 year aged infants (893/ 100000) with CFR= 17.8%. The case control study involved 25 cases (median age of 10 months ranging from 2 months to 17 years) and 50 controls (median age 2.8 years ranging from 4 month to 18 years).Households with a family size of > 6 persons were significantly associated with the disease [AOR=4.2, 95% CI (1.2, 14.4)]. Individuals with no history of vaccination for measles showed significant association with the disease [AOR=3.7, 95% CI (1.03, 13.36)].

Conclusion: This investigation confirmed existence of outbreak of measles and identified being unvaccinated and living in large family size was significant association with the disease. Orphanage should consider a quarantine room for infants coming from outside institutions for 4weeks before placing infants with others and vaccinating all staff for measles. The town administration should improve the routine measles vaccination through defaulter tracing.

Key words: Measles outbreak, Case control study

Chapter VII – Narrative Summary of Disaster Situation Visited

7.1 (Meher) Humanitarian, Health and Nutrition Need Assessment, SNNPR November, 2013

Summary

The government of Ethiopia has been conducting multi agency emergency health and nutrition assessment to address the emergency health and nutrition need of the country. The assessment is conducted twice in a year following post harvesting season Belg and Meher. The assessment is leaded by Federal Disaster Response Management and Food Security Coordination office in collaboration with the Ethiopian Ministry of Health, SNNP Regional health bureau, SNNP regional early warning, National Metrology Agency and respective bureaus, WHO, UNICEF, OCHA, IRC, Red-cross and World vision.

The assessment was conducted from November 25- December 09/2013. Our team was composed of FDRMFSS, SNNPR health bureau/ PHEM/, WFP, IRC, Red -cross, National Metrology agency and SNNPR EWR. We assessed 3 Zones (Hadiya, Silte and Guraghe) and 8 selected Woredas from each zone in SNNPR.

The objective of this assessment was to identify areas where emergency health and nutrition assistance needed for the upcoming six months and to determine the gap in the capacity of the health system in addressing anticipated risks

From assessed zones (n=3) only 2 have multi-sectoral coordination forum but all governmental and nongovernmental organization were not well represented. The forum has no schedule meeting in all assessed zones. Similarly from 8 Woredas only 5 have multispectral coordination forum. In all assessed Zones and Woredas there were epidemic preparedness plan but only 2 Woredas allocated budget for anticipated emergency plan. There was an ongoing measles outbreak in Silite Zone 3 Woredas. Measles is contagious disease that has a potential to spread to neighbouring Zones and Woredas. Anticipated diseases that have potential to cause outbreaks were measles, meningococcal meningitis and malaria. The case load for malaria showed increasing from August to September in Silte and Hadiya zone malarious Woredas. In Guraghe zone there were an increased number of malaria cases in September but reduced in October. ITN coverage was very low which is blow 80%. The available ITN was distributed before 3 years which need replacement. The IRS coverage was below 60% because of Chemical

shortage. Safe drinking water supply is of the basic need and has a potential for reducing water born outbreaks. From 8 Woredas 7 have drinking water supply coverage below 42% which is very low.

Recommendation

Appropriate budget should be allocated for identified emergency situations

Training should be given to all RRT team members and PHEM staffs at all level

Strengthening the multi sectoral PHEM coordination forum at all level

Strengthening routine EPI to prevent measles outbreak

Improving the water supply coverage and quality especially in areas there is no option to get safe water.

Chapter VIII – Protocol/Proposal for Epidemiologic Research Project

8.1 Assessment of Seroprevalence of Measles Specific Antibody (IgG) among children 12-59 month in Hawassa City, 2014

Summary

Background: Globally measles is responsible for more than 30 million cases and 0.9 million deaths every year. In 2008 globally 164,000 measles deaths were reported to World health organization. In Africa before the introduction of measles vaccination, greater than 1 million cases were reported annually. In Ethiopia outbreaks of measles reported every year from different regions of the country. Since November 2013 to January 2014 Hawassa City administration reported a total of 309 measles cases. From reported cases 60% have history of at least one dose of measles vaccination exposure. There are no studies that have examined the level immunization coverage using seroprevalence despite having high level of vaccination coverage in Hawassa city administration.

Objective: This study is designed to determine the prevalence measles antibody among children age 12-59 months.

Methods: Population based cross-sectional study design will be used to determine the prevalence of IgG antibody against measles. The study will be conducted in Hawassa city from May to August 2014. A total of **437** children from age 12 to 59 months, who residing in Hawassa city will be included in the study.

Blood samples (3 ml of whole blood) will be collected in EDTA-microtainer tubes and will transported to the public health laboratory in a cool box for measles antibody (IgG) confirmation. A questionnaire will be used to collect information on socio-demography, vaccine status when vaccination card / EPI registration history available. SPSS version 16 will be used to analysis proportions frequencies, percentages and linear regression for seroprevalence among different age categories.

Ethical clearance will obtained procedurally from AAU & federal IRB. Individuals have the right to refuse to be out of the study at any time. Consent paper will be obtained from each respondent. The result will communicated to decision makers through presentation on annual meetings.

Work plan: The study will be conducted from May to August with a total cost of 85,910 ETB

Introduction

1. 1 Background

Measles is an acute vaccine preventable disease caused by virus of the genus Morbillivirus of the family Paramyxoviridae. It is highly contagious disease characterized by fever, coryza, cough, conjunctivitis, enanthema (Koplik's spots) on the buccal and labial mucosa; and maculopapular rash appearing in a shower distribution over a period of 3 days. Humans are the only reservoirs. Transmission is primarily person- to-person via aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons [1, 1].

Hawassa City Administration is the capital of Southern Nations, nationalities and Peoples Region and Sidama Zone; located 275km from Addis Ababa in the south. It has a population around 341,659 which administered with 8 sub-cities, 21urban and 11rural kebeles. The health service coverage of Hawassa city is 92%. There are 2 hospitals, 10 health centers, 15 health posts and 3 NGO health facilities providing health service including routine EPI program.

1.2. Statement of the problem

Globally measles is responsible to for more than 30 million cases and 0.9 million deaths every year. In 2008 globally 164,000 measles deaths were reported to World health organization. In Africa before the introduction of measles vaccination, greater than 1 million cases were reported annually. As of 2009, measles vaccination was widely used thought Africa. However, outbreaks continued to occur. In Africa an estimated 28,000 measles-related deaths still occur each year[3].The WHO UNICEF coverage estimates for measles vaccination for Ethiopia indicate an increase from 37% in 2000 to around 80% in 2010. But measles remain endemic with periodic epidemics in the Horne of Africa (including Ethiopia).In Ethiopia outbreaks of measles reported every year from different regions of the country. In 2010-2011 a total of 9,756 measles cases were reported nationally. In 2012 there were also 119 outbreaks with a total of 3506(615 IgM confirmed and 2891 Epi-linked) measles cases. From these outbreaks 9 with 2012(43 IgM confirmed and 1969 Epi-linked measles cases were reported from SNNPR [4, 5, 6]. Regionally from September 2013 to February 2014 a total of 6478 measles patients were reported.

According to Hawassa City administration annual health report; measles vaccination coverage of the city estimated was greater than 80% in the last four years. Despite having high coverage of measles vaccination, the city experienced measles epidemic from November2013 to January 2014. During this epidemic a total of 309 cases were reported. The most affected age group was from 5-14 which 55% of the cases. Generally 79.6% the cases were below 15 year age. From reported cases 183(60. %) of the cases have a history of at least one dose of measles vaccination exposure.

Measles outbreaks are known to be associated with low coverage of measles immunization (prevalence of IgG antibody against measles), malnutrition, poor cold chain system, overcrowding and low level of Vitamin A intake. Vaccination coverage is determined using different indicators, administrative records from Expanded Program Immunization (EPI), house hold survey such as demographic and health survey (DHS) and multiple indicator cluster survey. Each study has limitation and difficult to identify susceptible children [7]. Therefore sero-prevalence survey help to clearly identify individuals those have immunity against measles and indicate the vaccination coverage.

There are no studies that have examined the level immunization coverage despite having high level of vaccination coverage in Hawassa city administration. There are different activities to improve the vaccination coverage in collaboration with GOs and NGOs. However these efforts are not supported with scientific evidences. As a result we are not sure at what level the immunization coverage and the level of sero- conversion rate for our vaccination program. The present study is intended to contribute bridging information gaps, as well as the prevalence of IgG antibody against measles.

1.3 Literature review

Measles is a leading cause of childhood morbidity and mortality worldwide. Despite the remarkable progress made in the control of the disease, measles continues to claim morbidity and mortality of large number of children every year. Majority of these deaths occur in the world's poorest countries; particularly, in sub-Saharan Africa. As of 2008, globally, measles caused an estimated of, 200,000 deaths annually, of which around 30,000 were occurred in Africa. Measles

is also among the top causes of death in children less than 5 years of age in many African countries [8, 9].

Infants born to mothers who have either had measles or been vaccinated are protected by trans-placental acquired maternal antibodies. This protection lasts six to nine months on average, after which the child becomes susceptible to measles infection. A person is naturally immune if he or she has had contact with the measles virus and has developed antibodies against it or actively acquired after measles vaccination. In Africa including Ethiopia the routine EPI program is at 9 month. When correctly administered at 9 months of age, measles vaccine confers life-long protection to approximately 85% of those vaccinated. Childhood immunization programmers have led to a dramatic decrease in measles morbidity and mortality. On the other hand epidemics of measles occur when the number of susceptible individuals in a population reaches a critical threshold and outbreaks may occur in pockets of low coverage which are likely to occur in certain geographic areas, such as urban slums, remote rural areas or islands; or in certain population groups, such as ethnic and racial minorities, nomadic peoples, or persons with religious or philosophical objections to immunization[9,10]

Loss of maternal IgG antibody within few months of life provides large susceptible population for circulation of measles virus. A study conducted in Central Africa Republic showed that maternally derived measles IgG antibodies were present in only 14.8% of infants aged 0-3 months and were absent in all infants aged 4-8 months. Sero-negativity to measles antibody was seen some difference across age in several studies(from 57.3% for children aged 9 months to 5 years, to 50.6% for children aged 6-9 years and 45.6% for children aged 10 years and above [11]. Conversely, study conducted on sero-prevalence showed that children aged 1 and 2 years had the highest odds of being sero-negative. The comparison of results between measles specific IgG antibodies showed that the association between Sero-negativity and young age was strongest for measles. The odds of being seronegative for measles was 3.69 (95% CI 2.94–4.63) in children aged 1–2 years compared to adolescents aged 14–17 years [12].

Serological study used to predict the serological type before mass vaccination and also used to assess the sero-conversion rate after mass vaccination .Different countries used sero survey to monitor their vaccination program. A study conducted for measles IgG Abs titers before the

second MMR vaccination 58.2% children were sero-negative and after second MMR vaccination 7.6 % remained sero-negative. After 4-12 weeks of vaccination, 73 (86.9 %) of the sero-negative children became sero-positive and 61 (13.1 %) remained sero-negative [13].

1.4 Justifications/ significance of the study

Different countries use Sero-prevalence studies to determine measles vaccination coverage and identify susceptible individuals across specific age groups which aimed to modify the vaccination strategy. In Ethiopia routine EPI program started in 1980[14]. In addition to the routine EPI program around 7 measles SIA programs conducted from 1998 to 2013. In the first SIA (1998) a total of 256,698 children, 9-59 months old, were vaccinated in 9 densely populated urban towns. In 2010 Nationwide SIAs a total of 9,110,937 children ,9-47 month, were vaccinated with a coverage of 106% .Recently from May to June 2013 there was also a nationwide SIAs for 9-59 month old children. On the other hand SNNPR including Hawassa City Administration experienced large epidemic in the last 5 years especially 2013/2014. There is no recent measles seroprevalence study at Regional or Hawassa city level. So this study helps to identify susceptible individuals or the immunization status against measles which provide information to strengthening the vaccination program [15].

2. Objectives

2.1General objective

To assess Sero-prevalence of measles specific antibody among children age 12 to 59 month in Hawassa City Administration.

2.2 Specific objectives

To determine prevalence of IgG antibodies against measles among infants from the age12 to 59 month in Hawassa city

To determine measles immunization coverage among vaccinated children in Hawassa city.

3. Methods

3.1Study design

A Cross sectional study design will be used to determine the prevalence of IgG antibody against measles among children 12-59 months of age.

3.2 Study settings

Study area and period: The study will be conducted in Hawassa city from May to August 2014.

Source population: The population of children aged 12 to 59 months, who residing in Hawassa city administration. The population under 5 year is expected to be around 53,298 which are 15.6% of the population.

Study population: The population of randomly selected children aged 12 to 59 months.

3.3 Inclusion and excision

Inclusion: All children from 12month to 59 month age who residing in Hawassa City administration.

Exclusion: Individuals with severe health problem will be excluded from the study

3.4 Variables

Dependant variable: The presence/positive for of IgG antibody against measles

Independent variable: Age, Sex, Vaccination status, History of measles vaccination (Routine EPI, during campaign); History of measles Infection Economic status, lower=1 medium=2 Higher=3; Parents' educational status, marital status, nutritional status, history of vitamin A intake

3.5 Operational definition

Low income level= monthly income per person from 420-2000ETB

Medium income= monthly income per person from 2151-4900

Higher income level = monthly income per person from 5000 and above

3.6 Sample size

$n = Z^2 p (1-p) / w2$

P= prevalence of measles antibody

n= required sample size

W= marginal error

In the sample size determination 95%CI of α=0.05 was considered.

Z=1.96 W=0.05, P=55%

P was taken from a study result for measles IgG prevalence [16].

n = (1.96)2 0.55 (1-0.55) / (0.05)2=380

15% non respondent=380*15%=57

Total sample size will be **437**

3.7 Sampling procedure

Population bases simple random sampling method will be used to recruit study subjects. House hold registry or family folder will be used as sampling frame. Randomly selected households with targeted age group will be included in the study. If random selection falls to households with no eligible age group the next house hold will be included to the study.

3.8 Data collection process

After obtaining informed consent from parents, blood samples (3 ml of whole blood) will be collected in EDTA-microtainer tubes and will transported to the public health laboratory in a cool box and measles IgG titer of all serum samples will be determined by the Siemens Enzygnost anti-measles IgG test using an automated processor. All samples will be tested with kits of the same lot number. The result of the ELISA will be expressed quantitatively as an antibody concentration (m IU/ml) of optical density (OD) according to the manufacturer's instructions. Samples will be categorized as seropositive, equivocal or seronegative according to the cut-off values proposed by the manufacturer. WHO Standard for LIAISON® measles IgG cut off value equates to 175 m IU/ml [15-19]. A questionnaire will be completed and information on vaccine status will be collected when a vaccination card / EPI registration history available. Data collectors will be trained nurses.

3.9 Quality control measures

Training will be given on the questionnaire and specimen collection before the actual collection day. Specimens will be collected and transported using standardizes sample transporting equipments (cold box). There will be supervision during data collection. The data will entered with trained two persons independently (double entry) and will be cleaned before analysis. There will be also pretest at Hawassa Zuria Woreda before the actual data collection days.

3.10 Data processing and analysis

SPSS version 16 will be used to analysis proportions frequencies, percentages and linear regression for seroprevalence among different age categories.

3.11 Ethical consideration

Ethical clearance will obtained procedurally from AAU to federal IRB. Individuals have the right to refuse to be out of the study at any time. Permission paper will be submitted to each responsible body ahead of data collection. Consent paper will be obtained from each respondent.

Information about the study and its importance will be disseminated before and through Data collection using available public media.

3.12 Study result dissemination plan

The result will communicated to decision makers through defense, presentation on annual meetings and hard and soft copies will provided to AAU, SNNPR health bureau and Hawassa City Health office

4. Work plan

Table8.1.0.1Schedule for measles seroprevalence study in Hawassa City, 2014

S. N	Activity	Responsibility	May2014	June2014	July2014	August 2014
1	Literature review, and development of research question	PI				
2	Draft protocol preparation	PI				
3	Final protocol submission for IRB	PI				
4	Securing IRB approval and funding	PI,				
5	Training data collectors, Supervisors and piloting	PI				
6	Data collection	Data collators				
7	Data entry and cleaning	Data clerk				
8	Data analysis	PI& Data collectors				
9	Draft report writing	PI				
10	Final Report writing and dissemination of findings	PI				

5. Budget

Table8.1.0.2 Budget Break down for Measles seroprevalence study in Hawassa City, 3014

S.N	Budget category	Unit cost	Multiplying factors	Total Cost (Birr)
1	personnel	Per diem	Participant	
	Principal Investigator	400	1x15x400	6000.00
	Supervisor	400	1x15x400	6000.00
	Data collectors	200	10x14x200	28,000.00
	Data entry/ Clerk	200	2x 15x200	6000.00
	Lab technologist	400	1x15x400	6000.00
	Sub-Total			52,000.00
2	Transport	Cost per km	Number of km	
			(no. vehicles x no. days x no. km)	
	Car	4Bir	3x15x60x4	10,800.00
	Sub total			10,800.00
3	Supplies	Cost per item	Number	
	Questionnaire photocopy	3 Birr per questionnaire	400	1200.00
	Clip board	100Bir/pcs	10	1000.00
	pen	5bir/pcs	30X5	150.00
	Pencil	2bir/pcs	10x2	20.00
	Eraser	1birr/pcs	10x1	10.00
	Sharper	1birr/pcs	10x1	10.00
	Marker	180/1pk	180x1	180.00
	Printing	2birr//sheet	80X2	160.00
	Binding	7 birr/pad	4x7	28.00
	Reagent(measles kit)	40Birr/test	400	16,000.00
	AD syringe 3ml	2birr/pcs	426	852.00
	Sample transporting Tube	2birr/pcc	400	80.00
	Sub total			19690.00
4	Training Cost	Cost per item	Number of days	
	Hall Rent	500	3	1500
	Tea / Coffee	32bir/participant (20x32)	3	1920
	Sub total cost			3420.00
	Grand total			85,910.00

Reference

1. WHO. Measles and Rubella Surveillance Field Manual,2009
2. Dejene Hailu, Abrham Alano, Abebe G/Mariam, ..etal. Measles Module For the Ethiopian Health Center Team,2005
3. Changing Epidemiology of Measles in Africa Cited on February2014 ;available at http://jid.oxfordjournals.org/ by guest
4. CDC. Morbidity and mortality weekly report ;Measles- horn of Africa-210-2011,Agust 31,2012,vol.01.No.39 page 678
5. EHNRI. Guideline on measles surveillance and outbreak management, 3rd edition, Addis Ababa Ethiopia,2012
6. CDC. Morbidity and mortality weekly report, September 13,2013 vol.62,No.36
7. FMOH: Unpublished annual report on measles
8. Kyla T Hayford1, Mohammed S Shomik, Hassan M Al-Emran…etal.Measles vaccination coverage estimates from surveys, clinic records, and immune markers in oral fluid and blood: a population-based cross-sectional study,Bangladish,2013
9. WHO. Response to measles outbreaks in measles mortality reduction settings,2009 WHO
10. WHO. AFRO Measles surveillance guideline, May 2003
11. WHO/ AFRO. African Regional Guidelines for Measles Surveillance.2011
12. Aleixandre Manirakiza1, Jean Marie Kipela2, Stephen Sosler..etal. Seroprevalence of measles and natural rubella antibodies among children in Bangui, Central African Republic,2011
13. BU Ahmadu, GM Ashir, MG Mustapha, Y Mava, IH Saidu, JP Ambe. A sero-survey to identify the window of vulnerability to measles in infants in north-eastern Nigeria,2012
14. Abdul-Munem Y. Al-Dabbagh, Salwa Sh. Abdul-Wahid, Karim Al-Jashamy. SERO-CONVERSION AFTER SECOND MEASLES' CONTAINING VACCINE IN A SELECTED SAMPLE OF HEALTHY IRAQI CHILDREN ,2011
15. FMOHE. Measles Supplemental Immunization Activity Field Guide, 2013
16. Sana Sheikh, Asad Ali, Anita K. M. Zaidi, Ajmal Agha, Asif Khowaja.et al. Measles Susceptibility in Children in Karachi, Pakistan, 2011 April 18; 29(18): 3419–3423. doi:10.1016/j.vaccine.2011.02.087
17. .R. Sultana, M. M. Rah man_, Z. Hassan_ & M. S. Hassan: Prevalence of IgG Antibody against Measles, Mumps and Rubella in Bangladeshi Children: Bangladeshi,
18. Christina Poethko-Mu¨ ller, Annette Mankertz. Seroprevalence of Measles-, Mumps- and Rubella-Specific IgG Antibodies in German Children and Adolescents and Predictors for Seronegativity, August 6, 2012CD 2/22/2014
19. Min-Shi Lee & D. James Nokes. Predicting and comparing long-term measles antibody profiles of different immunization policies.

Chapter IX - Other Additional Output Reports

9.1 Measles Outbreak investigation in Loma Woreda, Dawro Zone, 2014

Background

Measles is an acute vaccine preventable disease caused by virus of the genus Morbillivirus of the family Paramyxoviridae. It is highly contagious disease characterized by fever, coryza, cough, conjunctivitis, enanthema (Koplik's spots) on the buccal and labial mucosa; and maculopapular rash appearing in a shower distribution over a period of 3 days. Humans are the only reservoirs. Transmission is primarily person- to-person via aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons.

Globally measles is responsible to for more than 30 million cases and 0.9 million deaths every year. Though there is decreased number of reported measles cases in all WHO member staffs; large outbreaks were occurred in several Africa region (AFR) countries by 2008. In 2008 globally 164,000 measles deaths were reported to World health organization.

The WHO UNICEF coverage estimates for measles vaccination for Ethiopia indicate an increase from 37% in 2000 to around 80% in 2010.But measles remain endemic with periodic epidemics in the Horne of Africa (including Ethiopia).

In Ethiopia outbreaks of measles reported every year from different regions of the country. In 2010-2011 a total of 9,756 measles cases were reported nationally. In 2012 there were also 119 outbreaks with a total of 3506(615 IgM confirmed and 2891 Epi-linked) measles cases. From these outbreaks 9 with 2012(43 IgM confirmed and 1969 Epi-linked measles cases were reported from SNNPR. In SNNPR from September 2013 to February 2014 a total of 6478 measles patients were reported. Majority of the cases were reported from Wolayita zone.

Loma Woreda is one of the 5th Woredas in Dawro Zone .It is located around 285km from Hawassa in the west. The Woreda has a population of 133341. It is administered with 37 rural kebeles. There are 5 HC and 37 HP that provide health care service to the community including EPI program. The potential health service coverage is greater than 90%. The Woreda annual report showed that measles vaccination coverage was 95% and 92 % in 2004 and 2005 respectively.

On February first Dawro zone reported an increase number of measles cases from Loma Woreda which is border to Kindodidaye Woreda which was highly affected with measles outbreak. This investigation was done to describe the magnitude of the outbreak and asses precipitating factors for the occurrences of measles outbreak in Loma Woreda.

Objectives

To describe the epidemic in terms of place person time

To determine possible risk factors for the outbreak

To evaluate the epidemic response at Woreda level

Methods

Line list data was entered to excel sheet and analyzed to describe the magnitude. We also used Arc GIs for analysis the data by place.

Data was obtained through, observation, interview using interview administer questionnaire, and discussion with health workers and health officials.

Result

Loma Woreda experienced two Epidemics. The first epidemic stared on October 26/2/2006 and ended on November 16/2006. During this period only 54 cases were reported. From reported cases the highest age group was 5-15(57%) followed by 1-4 (39%). The outbreak was controlled with active case management and mass vaccination from 6month to 59months.But after two month large number of measles patients reported from neighboring kebeles. The second epidemic started on January 23/2006 and still it is ongoing. The epidemic was different within kebeles. The epidemic affected more than 23 kebeles but some kebeles highly affected (see table 1). As of 04/07/2006 we found a total of 754 measles cases. The age specific attack rate was highest among children aged less than five (1014/100,000). From all reported cases 20 %(127) have zero and 13 %(89) have unknown history of measles vaccination. Majority of the cases were reported from Dissa health center catchments. As of march 04/2006 Dissa HC reported a total of 488 measles cases. In this HC the burden of case management was very high and faced to shortage of antibiotics for severe cases and there was also a shortage of TTC eye ointment.

Table 9.1.0.1 Measles Attack Rate by Highly Affected kebeles

Kebele	No. cases	Population	AR/100,000
Kai Gerera	164	3050	5377
Wasera Telo	100	2397	4172
Disa Kera	163	5757	2831
Sayki Boho	45	3575	1259

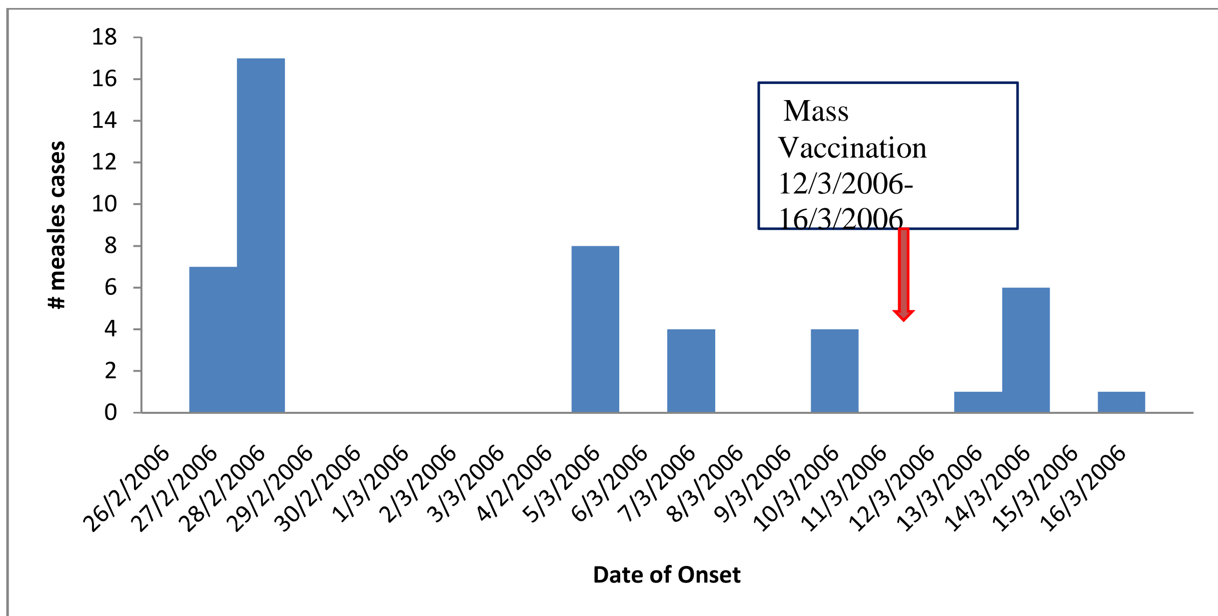


Figure9.1.0.1 Measles cases by date of onset in the first epidemic, Loma Woreda, 2013

After this epidemic for more than two months cases were not reported. On January 24/5/2006 cases reported again from above 5 years of age and neighboring kebeles of previously affected k kebeles.

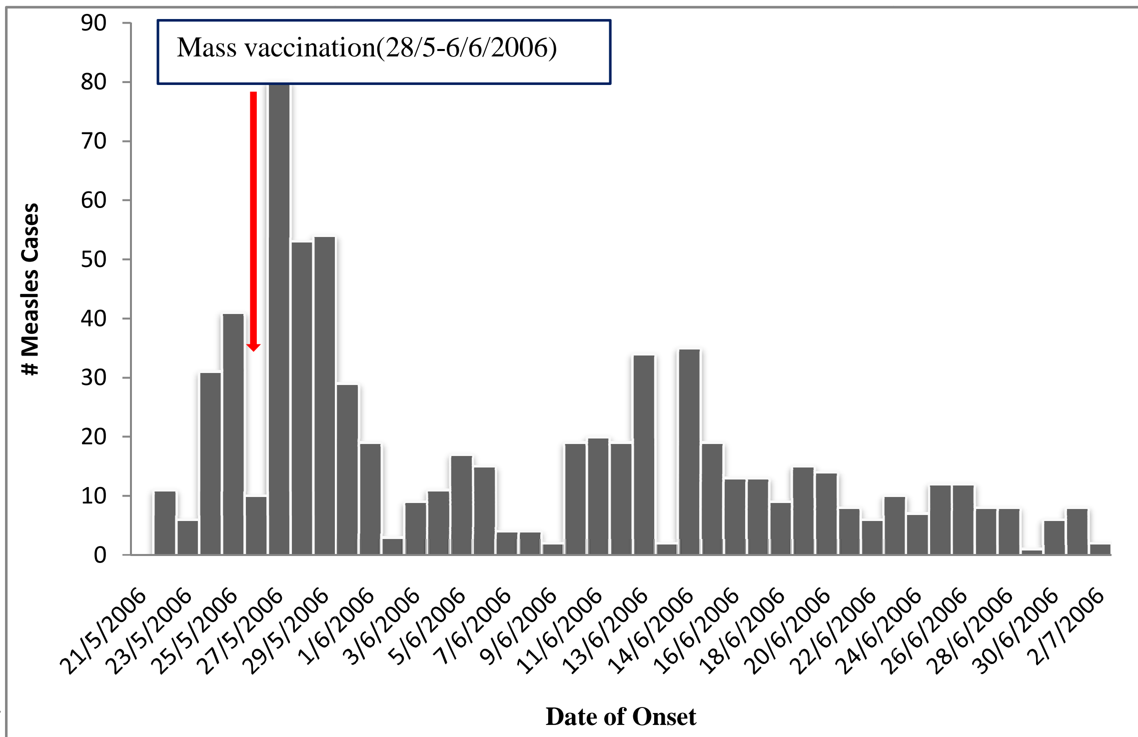


Figure 9.1. 0.2Measles Epi-curve, Loma Woreda, Dawro Zone, 2014

During measles epidemic response measles vaccination was given to children from age 6month to 59 month. The vaccination coverage was greater than 95%. But children from age 5-14 equally affected as that of under five (fig 3).

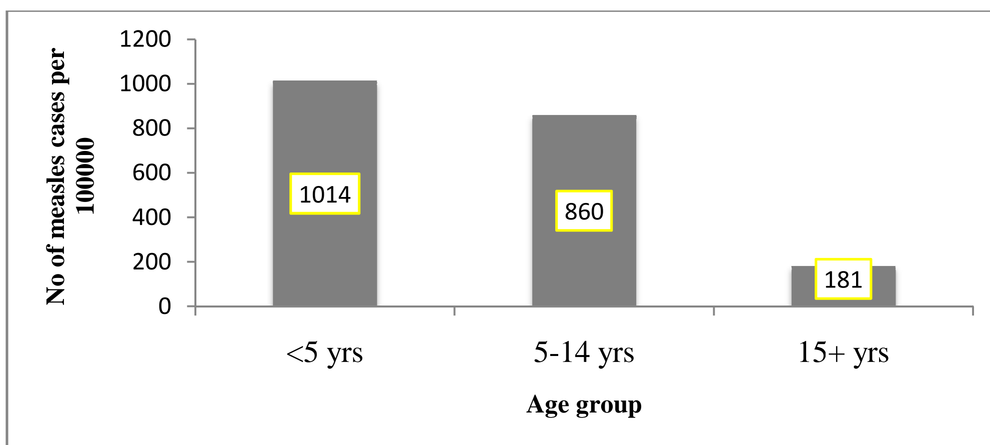


Figure 9.1.0.3 Measles Attack Rate by Age Group per 100,000 populations Loma Woreda 2014

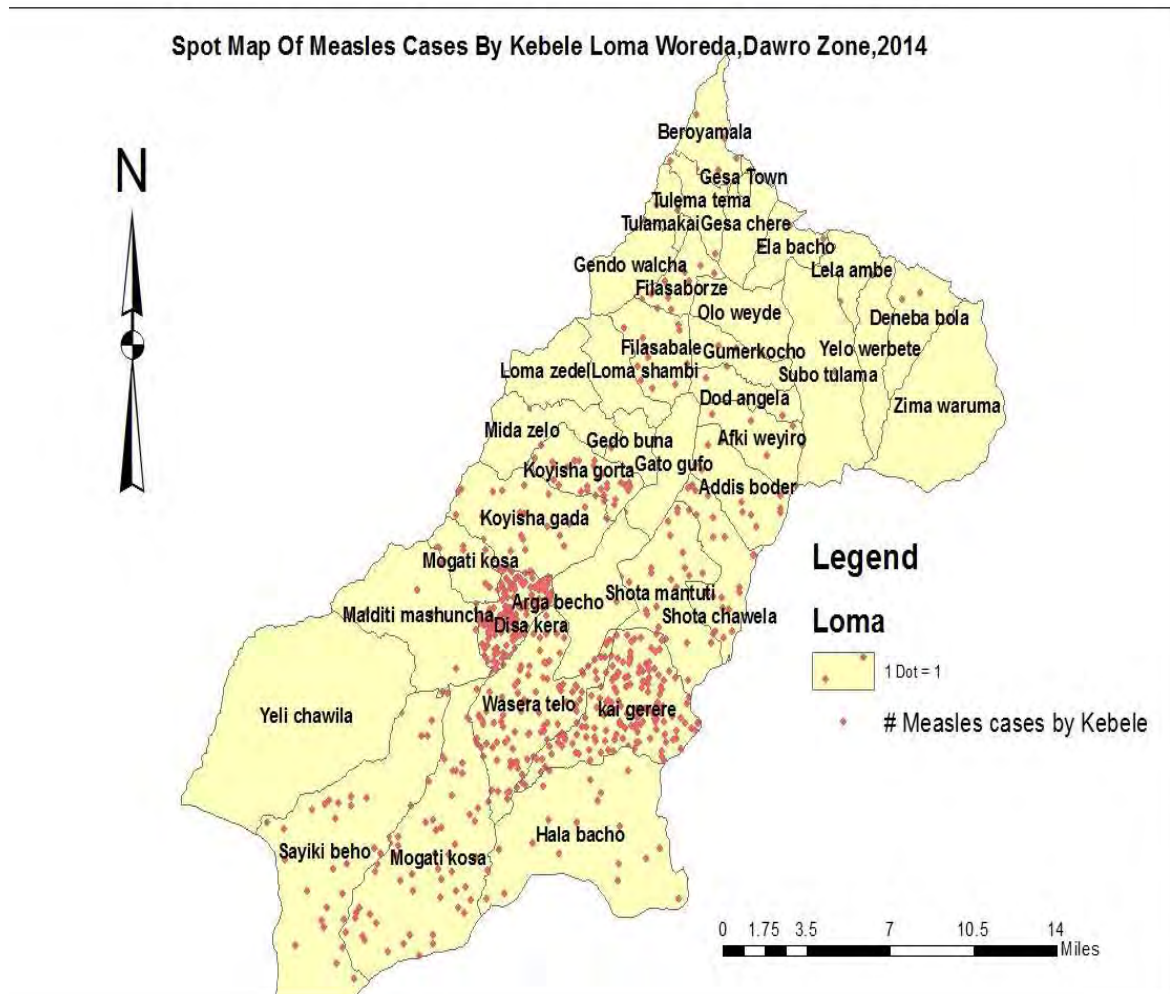


Figure9.1.0.4 Spot Maps of Measles Cases by Kebele in Loma Woreda, 2014

Strengths

The vaccination response was fast though it is not targeted the eligible age group for the epidemic.

Line lists were collected from each kebele and reported to the Woreda level

Gaps and challenges Identified

- The epidemic response was not comprehensive that able to stop the outbreak and prevent future epidemic in new kebeles b/c-

- The mass vaccination was given to under five children only. But the attack rate for age group 5-14 was high which need vaccination.
- Though the mass vaccination was given earlier the outbreak still ongoing.
- The community was not aware about the epidemic and its prevention and control.

- Outbreak cases registered without vaccination history
- Outbreak line lists are not properly organized ,analyzed and used for action
- Majority of the kebeles conduct the routine EPI through outreach program which vaccines stay in vaccine carriers for 2 to 3 days.

Conclusion

The outbreak is continued though there is a reduction of number of cases in the daily basis. This might help circulation of the epidemic to kebeles that are not affected currently especially in the high land areas. If the epidemic extended there will be a chance to recirculation to less than one year aged infants those not eligible at the time of the mass vaccination.

Recommendation

There should be mass vaccination for 5-14 year age groups especially for kebeles bordering the highly affected kebele.

As part of epidemic response the community should be sensitized about the epidemic, its mode of transmission and prevention and control methods.

The surveillance system should be strengthened through technically and financially so as to detect epidemics and respond it appropriately.

9.2 Health and Nutrition Disaster in Dasenech Woreda South Omo Zone, Southern Nation Nationalities and Peoples Region, 2013

Introduction

Under nutrition is a “catch-all” term for a deficiency of any of the essential nutrients (protein, essential fatty acids, electrolytes, minerals and vitamins) or energy. It not only encompasses stunting, wasting (type II deficiency) but also clinical illness brought about by deficiencies of any of the specific essential nutrients which may not be associated with any anthropometric change (and can occur in obese people). Different forms of under nutrition are not necessarily exclusive and often co-exist within the same individual.

Wasting occurs when a person has lost weight and become excessively thin; it is indicated by a low weight for height or MUAC. This form of acute malnutrition is either moderate (MAM) or severe (SAM) depending upon how severe the wasting becomes.

It is severe acute malnutrition if the wasting is severe (W/H < 70% NCHS median or a low MUAC< 11 cm) or there is oedema. Acute Malnutrition is defined as moderate acute malnutrition if the wasting is less severe (W/H between 70% and 80 %(11-11.9 cm) NCHS median); oedematous cases are always classified as severe. For every SAM cases there are other four moderate acute malnutrition cases.

Severe malnutrition is both a medical and a social disorder. Successful management of the severely malnourished patients requires that both medical and social problems be recognized and corrected. If the illness is viewed as being only a medical disorder, the patient is likely to relapse when he/she returns home and the rest of the family will remain at risk of developing the same problem. Therefore, successful management of severe malnutrition does not require sophisticated facilities and equipment neither highly qualified personnel. It does, however require that each child be treated with proper care and affection and also solving starvation problem.

On October 25/2013 the regional health bureau received a rumor of malnutrition accompanied with starvation in Dasenech Woreda, South Omo Zone. Following the information a team was deployed to the area with necessary response medicals.

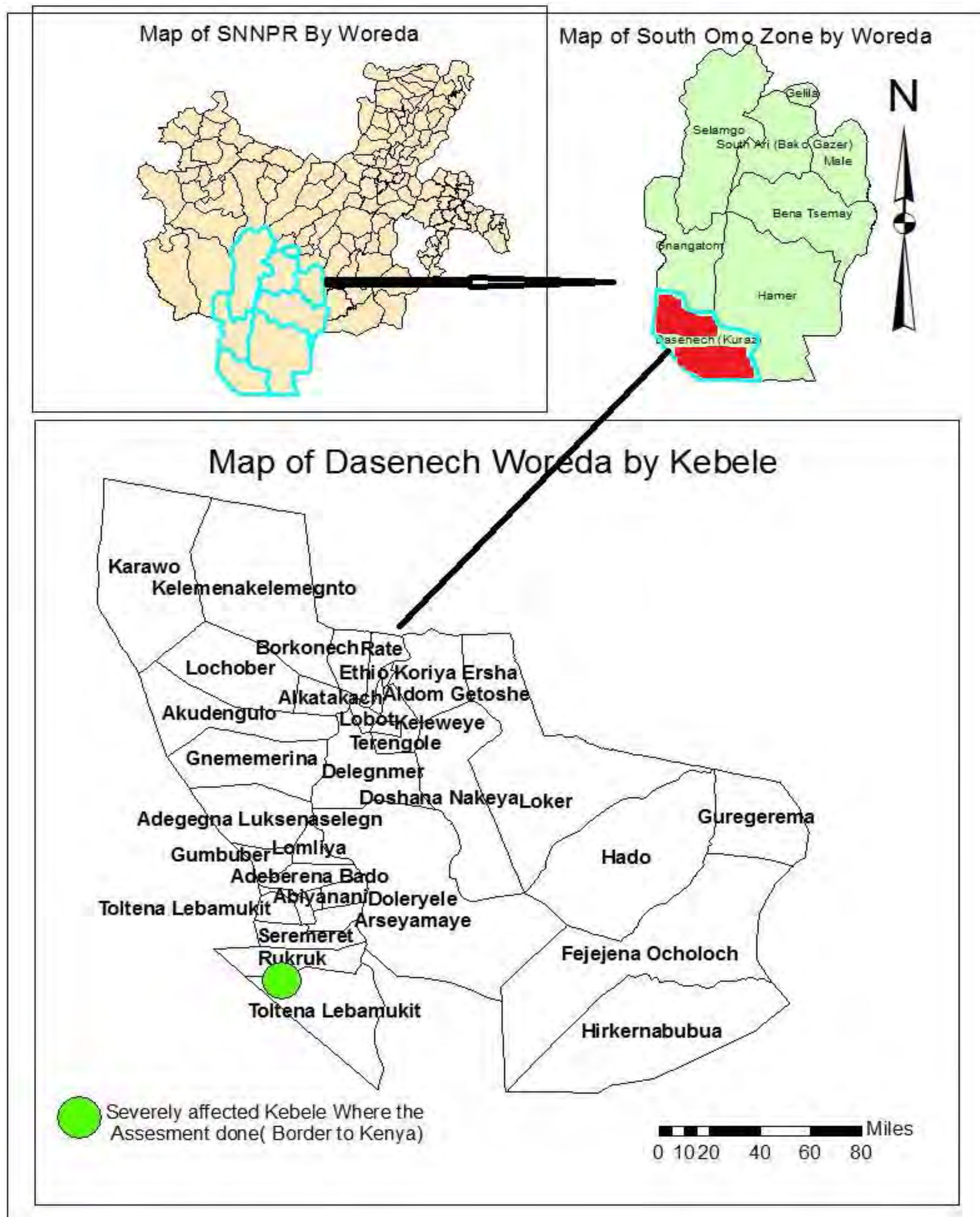


Figure9.2.0.1. Map of Dasenech Woreda by Kebele, 2013

Objective

General objectives

To assess magnitude and control of sever acute Malnutrition in Dasenech Woreda South Omo Zone.

Specific objectives

To confirm the existence of SAM Outbreak in Dasenech Woreda

To describe the magnitude of the outbreak by place, person and time

To contained the outbreak

Methods

Study area

The study was conducted in Dasenech district which is one of the 9th districts of south Omo Zone. The district has population of 62981. As soon as the regional health bureau received the rumor of malnutrition outbreaks on October 25/2013 the regional health bureau assigned a team to investigate the occurrence of the malnutrition in collaboration with zonal, Woreda health office and health center health officials.

Study design

We used a descriptive cross sectional study design.

Data collection

Data was obtained through discussion, review of records and screening of children from age 6month to 5 years and pregnant mothers from selected kebeles for malnutrition using MUAC.

Data processing and Analysis

Arc map and Excel were used to obtain tables figures and frequencies

Result

The average report completeness of the District in last 15 days was 68.75%. Though the routine surveillance system completeness is lower than the standard (90%) there was increment of sever acute malnutrition admitted cases starting from week 34. See Fig.1. The district was affected with extended dry weather condition which resulted drought. Residents explained that their cattle die of starvation as result of drought. There is no grass for animals to eat. We observed that a lot of animal Caracas nearby settlements which was very nuisance. They tried to bury some of the Caracas but still need more. Residents complain that there is no milk for their children as result of loss of their cattle. There is no food to eat. According to the district food security early

warning and response action plan report 59,048 peoples were screened for food ration at Woreda level. They designed 11 clusters to distribute the ration.

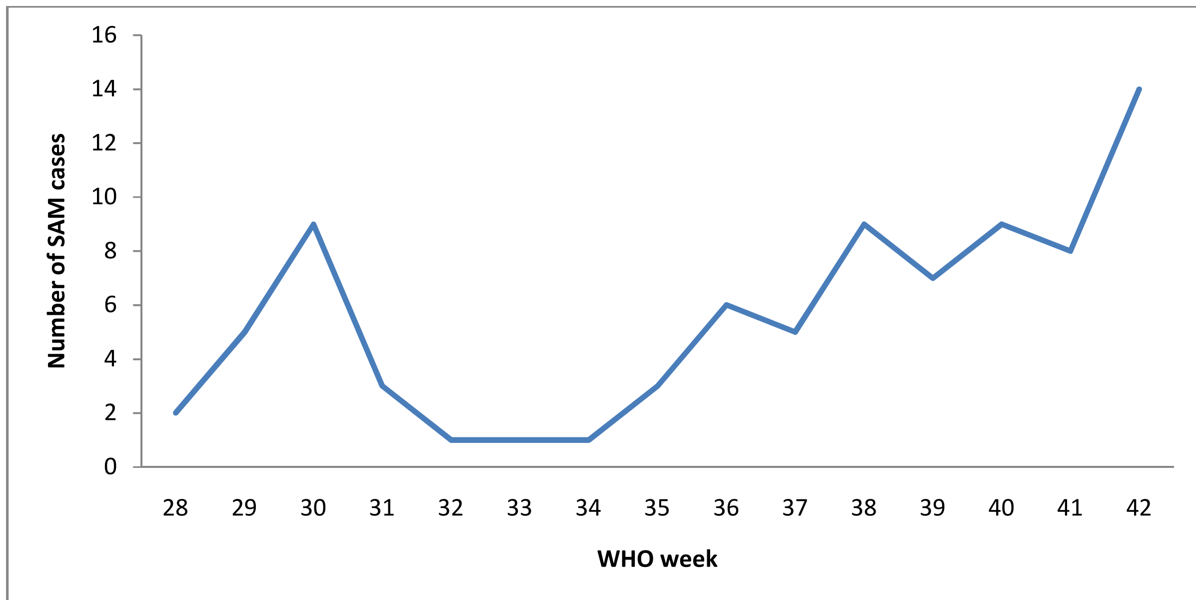


Figure9.2.0.2 Number of sever acute malnutrition cases reported by epidemiological week, Dasenech Woreda, 2013

We screened 413 children for acute malnutrition using MUAC. Out of screened children 138 children were positive for acute malnutrition with median age of 2year ranging from (6 month-5Years). From the 138 acute malnutrition cases 46 were sever acute malnourished and the rest 92 were moderate acute malnourished cases. We also screened 68 pregnant mothers for MUAC, of which 11 (16.2%) were below the standard.

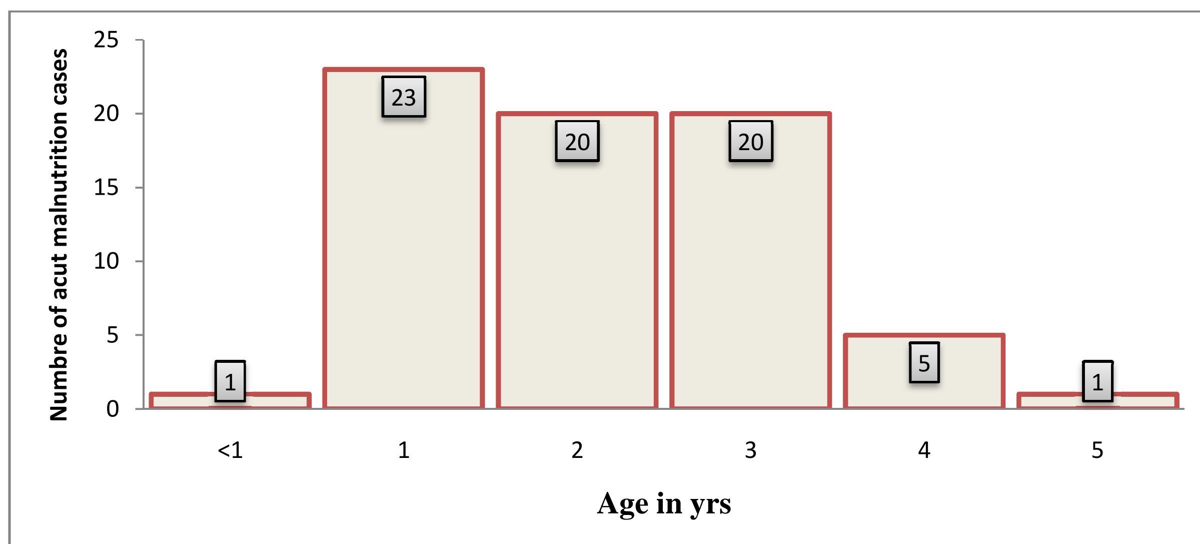


Figure9.2.0.3Number of acute malnutrition screened cases at Sess kebele, Dasenech District October 28/2013

More case of acute malnutrition was reported from Rukruk and Ocholoch kebeles.There will be change in the number of cases if the assessment addressed all at risk kebeles

Table 9.2.1 0.2. Number of acute malnutrition case screened with MUAC from age 6month-5year Dasenech district, October 27-29/2013

SN	Name of Kebele	Number of children screened	<11 cm	11-11.9 cm	Malnourished cases	>12 cm	Percentage of positive cases
1	Rukruk(SES)	90	20	50	70	20	77.8
2	Ocholech	20	6	5	11	9	55.0
3	Terengele	35	1	2	3	32	8.6
4	Rek	38	1	1	2	36	5.3
5	kapusha	53	3	5	8	45	15.1
6	Nakiya	75	5	18	23	52	30.7
7	Akodengele	66	0	2	2	64	3.0
8	Lokoro	7	1	2	3	4	42.9
9	Upo	19	7	7	14	5	73.7
10	Ubuwa	10	2	0	2	8	20.0
	Total	413	46	92	138	275	33.4

Table 9.2.2 0.3. Number of pregnant mothers screened for malnutrition, Dasenech Woreda, October 27-29/2013

SN	Kebele	Number of Screened	<18	Normal	%
1	Rukruk(SES)	-	-		
2	Ocholech	-	-	-	
3	Terengele	8	3	5	37.5
4	Rek	16	3	13	18.8
5	kapusha	11	1	10	9.1
6	Nakiya	12	4	8	33.3
7	Akodengele	21	0	21	0.0
8	Lokoro	-	-	-	
9	Upo	-	-	-	
10	Ubuwa	-	-	-	
	Total	68	11	57	16.2

Problems & Challenges identified

- The surveillance report completeness was lower than the standard which resulted poor detection of active cases.
- Out of 40 kebeles only 16 kebeles have health post and 5pastorial health workers and 28 HEW at Woreda level which is difficult to access the health service.
- Scattered population settlement and some of the residents were bounded with Omo River, which is difficult to access with land transport (E.g. Siramret and Toltole Kebeles).
- There was food shortage (starvation) that caused the increment of acute malnutrition.
- There was no communication facility at Libemuket HC (radio or Phone).
- There is only one health center at Woreda level which has SC to treat SAM cases.
- There was stagnant water due to over flow of Omo River which is good for malaria mosquito breeding and diarrheal disease.
- There were two vaccination campaigns (AFP and Meningitis) conducted without additional budget which resulted the district out of budget for running the current outbreak.

Action taken

- We reactivated Woreda epidemic response committee. We discussed that the response should multi sectoral especially, water, food security, health offices and other social affairs.
- Pre -positioning of therapeutic food and some essential antibiotics
- Strengthening the RRT and assigned to 3 clusters to screen cases from each suspected kebeles and monitor its performance daily with assigned command post.
- We screened 413children and 68 pregnant mothers for malnutrition.
- Health workers were assigned at kebele level for active case search and prompt response.

Recommendation

- The surveillance system should strengthen at Keble level so as to detect early and prompt respons.
- There should be additional SC at convenient sits. E.g. SES kebele is around 40 km away from the existing SC. So there should be additional SC at Libemuket HC which is around 15km.
- The food problem should be solved as early as possible otherwise it is difficult to stop malnourished cases.
- There should also strict follow up on malaria prevention and control measures especially the availability of ITNs.
- There should be strong supportive supervision and motivating health workers because the environment is very challenging.
- There should be a guide line for managing the outbreak or to manage cases of malnutrition.
- There should be strong active case search and reporting until the starvation problem contained.
- Financial problem of the district should be solved which help to strengthen the outbreaks response.
- Availing communication means for Libemuket HC.(Radio-call)

Reference

1. EFOH. Protocol for the Management of Sever Acute Malnutrition, 2007

2. ACF. Guidelines for the Integrated Management of Sever Acute Malnutrition: In-and Out-Patient Treatment.

9.3 Training Provided

A. Program Specific Trainings

Introduction

Early warning is the process with set of defined activities that help to provide, anticipated health hazard or health threats, information in order to minimize its potential impact or prevent disaster. The purpose of early warning is to enable the provision of timely and effective information to the public and to responders through identified institutions that allow preparing effective response to reduce the risk.

Surveillance is systematic ongoing collecting, organized, analyzing, and dissemination of health data (information) that used for planning, implementation, and evaluation of health service or intervention. It is also defined as information for action. A functional disease surveillance system is essential for understanding problems and taking action. Understanding about public health surveillance system helps health workers that work in the surveillance system for priority setting, initiate prompt response to epidemics and improve the quality of the surveillance system functions.

Preparedness is defined as the range of "deliberate, critical tasks and activities necessary to build, sustain, and improve the operational capability to prevent, protect against, respond to, and recover from incidents".

- The public health emergency preparedness capabilities includes
- Putting in place the necessary logistic and funding
- Building the essential systems specific to protection, prevention and response
- Equipping public health personnel and respondents with the necessary knowledge and tools, and
- Educating the public on related measures to be taken to prevent and control the event.

Outbreak investigation is a set of procedures used to identify public health threat.

The purpose of outbreak investigation is;-

- Stop the outbreak
  - Ensure public's health / Prevent spread of disease
  - Usually requires:
    - Identifying the agent, reservoir, source, and/or mode of transmission

- Determining who is at risk for disease, place, time
- Identifying the exposures or risk factors that increase risk of disease

➢ Prevent future outbreaks

➢ Improve surveillance and outbreak detection

Rational of the training

There is high turnover staff from PHEM to other departments and other reasons. Due to this health workers that have not trained assigned to PHEM at Zone and Woreda level. So to fill this gap comprehensive refreshment training was organized in collaboration of SNNPR PHEM and I was assigned to give training in two clusters (Wolayita Sodo and Butajira)

1. **Wolayita Cluster**

Topics covered 1.Overviews of public health surveillance system

2. Outbreak Investigation
3. Early warning and Surveillance
4. Epidemic Preparedness

Training period =19-26/2013 for 07 Days

Participants: - Woreda and Zonal public health officers from

-Basketo special Woreda

- Dawro zone and Woredas
- Halaba Special Woreda
- Kenbata tembaro zone and Woredas

Number of Participants

Planned; 30

Attended; 30

Achievement 100%

Training Venue: Wolayita Zone Gutera-Cultural Hall

2. Butajira Cluster

Topics Covered 1.Overviews of public health surveillance system

2. Outbreak Investigation
3. Early warning and Surveillance
4. Epidemic Preparedness

Training period = from July 08-15/2013 for 07 Days

Participants: Woreda and Zone Level Public health officers from

- Guraghe Zone and Woreda
- Silte Zone and woreda
- Zone and Woreda and
- Yem special Woreda

Number of Participant

Planned 35

Participated 35

Achievement 100%

Training venue: Butajira Health Center Hall

B. Disease specific trainings provided in 2014

Epidemics of Meningitis, Measles and Malaria occurred in SNNPR and the region was busy in outbreak management especially 2013 and 2014. During the outbreak time the region identified that:-

- Outbreaks were not early detected and reported to the next level
- Outbreak line lists were not properly recorded or were incomplete
- Outbreak data was not analyzed and used for action at zone and Woreda level
- Epidemic management was not with standards used for each diseases and targeted groups

There for SNNPR PHEM process organized regional based refreshment trainings in 6 clusters. The first cluster where I provide the training was Yirgalem cluster.

The purpose of the training was to have common understanding about the burden of the diseases, epidemic threshold, epidemic prevention and management, analyze and interpret line lists data collected during outbreak time, early detection and reporting of suspected outbreaks at regional level that help to improve the quality of the surveillance system.

Topics covered: - 1. Epidemiology of Meningococcal Meningitis in Ethiopia

2. Meningococal meningitis Post Epidemic Management

3 .Meningococcal meningitis Surveillance

4. Measles Epidemic prevention and Control

5. Epidemiology of Malaria

6. Malaria epidemic Management

7. RRT and their responsibility

Training Period January 22-25/2014 for 06 days

Participants PHEM officers and public health focal persons from

- Sidama Zone, all Woredas Zonal hospital and Selected 21 Health centers
- Hawassa City PHEM and Selected Health center and Hospitals

Number of participants-

Planned 55

Attended 50

Achievement 91%

Training Hall: - Fura training institute (Yirgalem)

Annexes

Annex 1: Meningococcal Meningitis out Break Investigation questionnaire Hawassa City, 2014

ID Number_________, Case _, Control ____ Date _________________

I -Socio Demographic Data

1. Name _________________ Age_________ Sex________

2. Address:-Region Zone Woreda Kebele

3. Occupation:-Student_____Daily Laborer_ Government Employer ____ Farmer ____Other, Specify______

4. Educational statues:

Illiterate _____ KG _ Primary_____ Secondary _ Diploma ____ Diploma and Above _

5. Religion: - Orthodox_____ Muslim ____Protestant____ Other specify__________________

6. Marital Status:-Married ___ unmarried ______ Divorce_____Widowed____

II-Clinical Assessment

7. Is the respondent Sick Yes _____ No___ If Yes CFS taken Yes__ No____ If yes Serotype_____ if no sick skip to question 14?

8. Is the patient visit other area before a week Illness? Yes___No_______,

9. If Yes Date_forhow long you stayed ___________

10. Is anybody visited your house from other area before, a week Illness? Yes____ No___

11. If Yes Date__________________, for how long she/he stayed _______

12. Date of onset _________ Date of Admission________ Number of days stays at home before visiting Health institution _________

13. Is the patient has the following Sign and symptoms during admission?

Fever Yes____No ___ Headache Yes No____ Stiffen neck, Yes__ No___

Vomiting , Yes_____No____ sensitive to light, Yes______ No___ Altered mined, Yes___ No___

Bulging Fontanel (for infant) Yes___ No___

Kerning Sign, Yes___ No___Brudiniski sign, yes__ No___

Riske assessment

14. Have you any acute respiratory tract infection in the past 10 days prior to this disease? Yes____No____

15. Living condition: - Type of house thatch ______CIS_____

Privet House, Yes____ No___ Camp Yes__ No___ Prison Yes__ No___

16. Number of Rooms: - A, one Room B, Two Rooms C, Three Rooms D, Above Three

17.Average Household member living together A, One B, Two c, Three D, Four E .Fife and over

18. Economic Condition (, Annual income)

A, 500 EBr B, 500-1000 EBr C, 2000-5000EBr D, Over 5000EBr E, I don't know

19. Nutritional status: If <5 were supported by OTP, Yes___ No___

20. Season of the outbreak,___________________________

III-knowledge

20. Do you know what Meningococcal Meningitis ? Yes__No____

21. Do you know MM mode of transmit ion, A, by food B, By Evil spirit C, Droplet /air D, I don't know

22.-What are sign symptoms of Meningitis?
A, Fever, Yes______ No,___
B, Head ache, Yes______ No,___
C, Vomiting, Yes______ No,___
D, Stiffness of the neck Yes_ No,___
23. Do you know the causative agent of meningitis ? A. By Mosquito Bite B. Virus C. Bacteria. E. I don't know
24. from where you got this information? A, Radio B, TV C, Health institution D, from friend
E, Health extension at House level
IV-, Attitude
25. Do you believe that treating Meningitis patient at Hospital cure, Yes___ NO?__
26. Do you believe that meningitis vaccine preventing from meningitis, Yes___ NO?__
V-Practice
27. What do you do if one of your family members complains with Fever, Headache, and Vomiting and neck stiffness?
A.I sends to Traditional Healer C, I send to the nearest Health institution
B. I use holy water to treat D. I stay at home until improved
28. What do you do to prevent you r families from meningitis?
A, Stay at Home B .Vaccinating MM vaccine if available C, Local Medication D, I don't know
E, Improved crowdedness
29. Have you any contact with a person sick with meningitis? Yes_____ No

Annex 2: Questionnaires for Case- control study on Outbreaks of Measles in Sodo Town, Wolayita Zone, 2013

Case status= Case___________ Control_____________
Name_____________________________ Date of Data collection____________________
Region________________ Zone_______________ Woreda______________
Kebele__________ Got___
Respondent Status Case___________ Mother ____ Father___________ Other_________
Longitude: ________________ Latitude: _______________________

I. Socio-demographic Characteristics

S.no	Question	Alternatives	Category
1.1	Sex	1.Male 2.Female	B
1.2	Age	Years____ Month________	B
1.3	Occupation	1. Farmer 2. House wife 3.Student 4.Unemployed 5. Daily laborer 6.Merchant 7. Government 8. Others(specify)	B
1.4	Educational level	1.Unable to read write 2.Read & write 3. Elementary 4.Secondary 5. college and above	B
1.5	Parent Educational status: Mother	1.Unable to read write 2.Read & write 3. Elementary 4.Secondary 5. college and above	B
1.6	Parent Educational status: Father	1.Unable to read write 2.Read & write 3. Elementary 4.Secondary 5. college and above	B
1.7	Marital status	1.single 2.Maried 3.Diverced 4.Widowed 5. Under age of 18	B
1.8	Is there any sick person with rash, Fever, running nose or conjunctivitis	1. Yes 2.No	B
1.9	If Yes , number of sick person	_______________	B
1.10	Were the case/ control Sick for Other disease 1 week back this disease	1. yes 2.No	B

II .Clinical history of the disease

2.1	What was the symptoms	1.Fever 2.Rash 3.cough 4.Coryza(runny nose) 5.Conjunctivities(Red eyes 6.Diarrhea	C

		7.Pneumonia 8.Blurning of vision 9.Ear discharge 10.vomiting 11. croup	
2.2	Date of onset of fever	________/____/__________	C
2.3	Date of onset of rash	________/____/__________	C
2.4	Date seen at health facility	________/____/__________	C
2.5	Did you/he/she take treatment	1. Yes 2. No	C
2.6	If Yes, treatment taken	1.ORS 2.Antibiotics 3.Vitamin A 4.TTC ointment 5. Anti pyretic 6. supplementary food	C
2.7	Did you /he/she recovered after treatment	1.cured 2.partially improved 3. Deteriorated 4. Death	C

III. Risk factor

3.1	Did You ever vaccinated for measles?	1.Yes 2.No 3.Unknown 4. Not applicable	B
3.2	If yes last vaccination date	1.________/_______/___ by card 2.________/_______/____ by history	B
3.3	Number of vaccine doses received	1.One dose 2. Two dose 3. Three and above	B
3.4	Age at the first dose		
3.5	Did you ever have measles infection?	1. Yes 2. No 3. Unknown	B
3.6	Did you have any travel history 7-8 days to areas with active measles cases before onset of symptoms	1.yes 2.No If yes where	c
3.7	Did you have any contact with confirmed or suspected cases of measles	1.yes 2.No	B
3.8	If yes in Qe.3.6 ,How	1. living together 2.Sleeping together 3.Playing together 4. admitted with suspected measles cases	B
3.9	Do you have any travel history four days before and after rash onset?	1. Yes 2. No 3. If yes, where_____________	C
3.10	Do you have any contact history with	1.Yes	C

	someone else four days before and after rash	2.No If yes, when?	
3.11	If yes for Qe.3.8 with whom	1. school friends 2.Neighbours 3. Market 4.other specify	C
3.12	Do you know modes of transmission for measles?	1.Yes 2.No	B
3.13	Nutritional status(MUAC)	_____cm	B
3.14	How many people sleeping together in a single room?	----------------------	B
3.15	Average Sleeping room size	__________	B
3.16	Where do you go first if you get ill for measles?	1. health facility 2. Traditional Healer 3. Holy water 4. Stayed at home 5. other specify	B
3.17	If answer for Q 3.16 other than health facility, why?		B
3.18	How do you think people get measles?	1. contact with sick person 2. Wrath of God 3. Curse of other people 4. Other specify	B
3.19	Do you know measles is vaccine preventable?	1.yes 2.No 3. Do not known	B
3.20	Who do you think that can be affected by measles?	1.Children of aged less than 5 years 2. Children of aged less than 18 years 3.Women of any age 4. Any age group 5. other_____________	B
3.21	How do you think measles can be cured?	1. Using modern medicine 2.Using traditional medicine 3. Holy water 4.By feeding nutritious food 5. Keeping the sick person indoor 6. other____________	B
3.22	When do you go to health facility if get ill for measles	1. Immediately 2. After a week	B

Annex 3: Zonal Level Surveillance System Evaluation Questionnaire, Dawro Zone, 2013

Identifiers: Respondent

Date

Interviewer

General

I. Availability of a National Surveillance Manual

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

II. Case Detection and Registration

3. Do you have standard case definitions for the Country's priority diseases like; typhoid, typhus, SAM, malaria, and measles?
   Yes / No / Unknown / Not applicable
4. Observation [1 to n priority diseases] Observed the standard case definition for (each priority disease) Yes No Unknown Not applicable

III. Data reporting::

Presence of recommended reporting forms in the country at all times over the past 6 months

5. Is the central level responsible for providing surveillance forms to the health facilities? Yes No Unknown Not applicable
6. If yes, have you lacked appropriate surveillance forms at any time during the last 6 months? Yes No Unknown Not applicable
7. What are the reporting entities for the surveillance system?
   a. Public health facilities(GO)
   b. NGO health facilities
   c. Military health facilities
   d. Private health facilities
   e. Others_________________________
8. Percent of district reports(either directly or through an intermediate level) received each reporting period at the central level during the past 3 months:
   Number of reports in the last 3 months compared to expected number

Weekly: /12 times the number of districts

Immediately: /------ times the number of districts

9. On time (use national deadlines)

Number of weekly reports received on time: /12 times the number of districts

10. Was there any report of the immediately reportable diseases in the past 1 month? Yes/ No
11. If yes, with in what time is the report received after detection of the case/ diseases?
    a. Less than 1 hour
    b. 2-24 hour
    c. 1- 2 days
    d. 3- 7 days
    e. After 1 week

12. Percent of districts that have means for reporting to next level by e-mail, telephone, fax or radio
    ____
13. Capacity to report to next level by e-mail, telephone, fax or radio:
    How do you report?
    a. Mail
    b. Fax
    c. Telephone
    d. Radio
    e. Electronic
    f. Other

IV. Data analysis

Does the regional level:

14. Describe data by person (case based, outbreaks, and sentinel)?
    (Obs) Observed description of data by age and sex:
    Yes No Unknown Not applicable
15. Describe data by place?
    (Obs) Observed description of data by district (tables, maps)
    Yes No Unknown Not applicable

16. Describe data by time?
    (Obs)Observed description of data by time:
    Yes No Unknown Not applicable
17. Perform trend analysis?
    Obs Observed line graph of cases by time
    Yes No Unknown Not applicable
18. List disease(s) for which line graph is observed
    ____
    ____
19. Have an action threshold defined for each priority disease?
    Do you have an action threshold defined for typhoid typhus, Measles, AFP (polio), malaria, SAM? Yes No Unknown Not applicable
20. Who is responsible for the analysis of the collected data? _________________________
21. How often do you analyze the collected data?

a. Daily
b. Weekly
c. Every 2 weeks
d. Monthly
e. Quarterly
f. As needed……..

22. Have appropriate denominators?
    Obs Observed presence of demographic data (E.g. population by district and hard to reach groups)
    Yes No Unknown Not Applicable

V. Outbreak Investigation

Percent of suspected outbreaks that were investigated in the past 6 months

23. Number of outbreaks suspected in the past year:__________________________
24. List the diseases: ____
25. Of those, number investigated: __________________
    (Observe reports and take copies if possible)

Of the investigated outbreaks in the past 1 year, percent in which risk factors were looked for:

26. Number of outbreaks in which risk factors were looked for:_____________

Of the investigated outbreaks in the past 1 year, percent in which findings were used for action

27. Number of outbreaks in which findings were used for action:______________
    [Observe report]
28. Of districts that investigated an outbreak, percent that looked for risk factors
    Number of districts that looked for risk factors [observe in reports] ____
29. Of districts that investigated an outbreak, percent that used the data for action (action include containing outbreak, improving surveillance, community actions)
    Number of districts that used the data for action [observe in final report] ____

VI. Epidemic preparedness(relevant for epidemic prone diseases)

30. Existence of a Regional/Zonal plan for epidemic preparedness and response
    Obs Observed a written plan of epidemic preparedness and response
    Yes No Unknown Not applicable
31. Existence of emergency stocks of drugs, vaccines, and supplies at all times in past 1 year:
    Has the region had emergency stocks of drugs, vaccines, and supplies at all times in past 1 year?
    Yes No Unknown Not applicable

32. Experience of a shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)
    Has the country experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)?
    Yes No Unknown Not applicable

33. Existence of a standard case management protocol for AWD, Malaria, SAM, typhoid, typhus, measles
    Obs Observed the existence of a written case management protocol for at least 1 priority disease
34. If yes, list:____

35. Presence of a budget line for epidemic response
    Is there a budget line for epidemic response?
    Yes No Unknown Not applicable
36. I. Existence of a regional epidemic management committee
    Observed minutes (or report) of meetings of epidemic management committee
    Yes No Unknown Not applicable

37. Existence of a regional rapid response team for epidemics
    Does the country have a rapid response team for epidemic?
    Yes No Unknown Not applicable

VII. Response to epidemics

38. Ability of the regional level to respond within 48 hours of notification of most recently reported outbreak:
    Obs Observed that the central level responded within 48 hours of notification of most recently reported outbreak (from written reports with trend and intervention)

    Yes No Unknown Not applicable

39. Ability of the regional epidemic management committee to evaluate its preparedness and response activities:
    (Obs) Has epidemic management committee evaluated its preparedness and response activities during the past year (Observe written report to confirm)?

    Yes No Unknown Not applicable

VIII. Feedback

Existence of a report or bulletin that is regularly produced to disseminate surveillance data:

40. How many feedback bulletin or reports has the regional level produced in the last year?
    ____

41. Obs: Observed the presence of a report or bulletin that is regularly produced to disseminate surveillance data
    Yes No Unknown Not applicable

IX. Supervision

Percent of supervisors that made the required number of supervisory visits in the past 6 months

42. How many supervisory visits have you made in the last 6 months? _____________
    Obtained required number of visits from regional level ______________
43. The most usual reasons for not making all required supervisory visits. (Text) ____ ____ ____

X. Training

Percent of health personnel trained in disease surveillance

44. What percent of your subordinate personnel have been trained in surveillance? __________
45. Have you been trained in disease surveillance?
    Yes No Unknown Not applicable
46. If yes, specify when, where, how long, by whom? ____ ____

Percent of health personnel that have received post-basic training in epidemic management

47. Have you received any post-basic training in epidemic management?
    Yes No Unknown Not applicable
48. If yes, specify when, where, how long, by whom? ____ ____
49. Obtain and analyze the content of the surveillance and epidemic management training
    Strengths____
    Weaknesses _______________________________________
    Opportunities ______________________________________
    Threats ____

XI. Resources

Percent of sites that have:

50. Data management
    - Computer
    - Printer
    - Photocopier
    - Data manager

Statistical package

51. Communications
    Telephone service
    Fax
    Radio call
    Satellite phone
    Computers that have modems
52. Budget line ____
53. Logistics ____

XII. <u>Surveillance</u>

Have a functional computerized surveillance network

54. Do you have a computerized surveillance network at this level?
    Yes No Unknown Not applicable

Budget for surveillance

55. Is there a budget line for surveillance in the Regional Health Bureau budget?
    Yes No Unknown Not applicable
56. If yes, what is the proportion: %

Opportunities for strengthening surveillance

57. How could surveillance be improved?
    ____
    ____

XIII. <u>Surveillance Co-ordination</u>

Existence of focal unit for surveillance at RHB level

58. Obs Is there a focal unit for surveillance at the MOH central level? [Observe Organogram of MoH to confirm]
    Yes No Unknown Not applicable
    Opportunities for integration
59. What opportunities are there for integration of surveillance activities and functions (core activities, training, supervision, guidelines, resources etc.)?
    ____
    ____
    ____

Questionnaire for Attributes and level of Usefulness:

1. Total population under surveillance_____________
2. What is the incidence / Prevalence of -------in your area/region
   - Typhus ________cases _________Deaths ________
   - Malaria ________cases _________Deaths ________
   - SAM) ________cases _________Deaths ________

- Measles ________cases _________Deaths ________
- Typhoid_________ cases__________ deaths______

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

Does the surveillance system help?

1. To detect outbreaks of these selected priority diseases early? Yes/ No
2. To estimate the magnitude of morbidity and mortality related to this disease, including identification of factors associated with these diseases? Yes/ No
3. Permit assessment of the effect of prevention and control programs? Yes/ No
   Observe (confirmation):
   - interventions and diseases trends analyzed ---Available //Not available

II. Describe Each System Attributes:

i. Simplicity:

1. Is the case definition of typhoid ,typhus, SAM, malaria, and measles easy for case detection by all level health professionals? Yes/ No
2. What are the organizations which need to receive reports of the surveillance data
3. Do you feel that additional data collected on a case are time consuming? Yes/No
4. How long it takes to fill the format? a, <5 minute b-10-15minuts c- >15 minutes
5. How long does it take to have laboratory confirmation of
   A. Typhoid
   B. Measles
   C. Typhus
   D. Malaria

ii. Flexibility:

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

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

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

iv. Acceptability:

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

   ____

   ____

v. Representativeness:

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

vi. Timeliness:

1. ---------------
2. -----------------

vii. Stability:

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

Annex 4: Woreda Level Surveillance System Evaluation Questionnaire, Dawro zone, 2013

Identifiers
District
Date province/Woreda
Interviewer Respondent
surveillance system

Percent of districts with available national surveillance manual

1. Is there a national manual for surveillance at this site?
   Obs Observe national surveillance manual:

   Yes No unknown Not Applicable

I. Case confirmation____

   Percent of districts that have the capacity to transport specimens to a higher level lab

2. Does the district have the capacity to transport specimens to a higher level lab?
   Yes No Unknown Not applicable

   Percent of districts with guideline for specimen collection, handling and transportation to next level

3. Does the district have guidelines for specimen collection, handling and transportation to the next level?
   Yes No Unknown Not applicable

II. Data reporting____

   Percent of sites that have forms recommended for the country for that site at all times over the past 6 months

4. Have you lacked forms recommended for the country at any time during the last 6 months?
   Yes No Unknown Not applicable

   Percent of health facilities that reported each reporting period to the district level during the past 3 months:

5. Number of reports received in the last 3 months compared to expected number
   Weekly: ___________________ /12 times the number of health facilities
   Immediately: _______________________/----- times the number of health facilities

   On time (use national deadlines)

6. Number of weekly reports submitted on time: ____/12 times the number of health facilities
7. Number of immediately reports submitted on time: __________/3 times the number of health facilities
8. Percent of districts that have means for reporting to next level by e-mail, telephone, fax or radio
   How do you report:

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

Strengthening reporting

9. How can reporting be improved?
____
____

III. Data analysis____

10. I. Percent of sites that:
Describe data by person (case based, outbreaks, sentinel)
Obs Observed description of data by age and sex
Yes No Unknown Not applicable

11. Describe data by place
Obs Observed description of data by place (locality, village, work site etc)
Yes No Unknown Not applicable

12. Describe data by time
Obs Observed description of data by time
Yes No Unknown Not applicable

13. Perform trend analysis
Obs Observed line graph of cases by time
Yes No Unknown Not applicable

14. List:
____
____

15. Have an action threshold for each priority disease
Do you have an action threshold for any of the country priority diseases?
Yes No Unknown Not applicable

16. If yes, what is it? __________cases ________% increase _______rate
(Ask for 2 priority diseases)_
____
____

17. Have appropriate denominators
Obs Observed presence of demographic data at site (E.g. population <5 yr, population by village, total population)
Yes No Unknown Not applicable

18. Who is responsible for data analysis? ______________________

19. How often do you analyze the collected data?
    a. Daily
    b. Weekly
    c. Every 2 weeks
    d. Monthly
    e. Quarterly
    f. As needed……..

IV. Outbreak investigation____

20. Percent of suspected outbreaks that were investigated in the past 6moths:
    Number of outbreaks suspected in the past year6 months:______________
    Obs Of those, number investigated (Observe reports and take copies if possible): ___________________

21. Percent of districts that have ever conducted an outbreak investigation
    [Number of districts assessed that have ever conducted an outbreak investigation, Number of districts assessed to obtain indicator]
22. Has your district ever investigated an outbreak?
    Yes No Unknown Not applicable

V. Epidemic preparedness____

23. Percent of districts that have a plan for epidemic preparedness and response
    (Obs) Observed a written plan of epidemic preparedness and response
    Yes No Unknown Not applicable

24. Percent of districts that have emergency stocks of drugs and supplies at all times in past 1 year
    Has the district had emergency stocks of drugs and supplies at all times in past 1 year?
    Obs Observed the stocks of drugs and supplies at time of assessment
    Yes No Unknown Not applicable

25. Percent of districts that experienced a shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)
    Has the district experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)?
    Yes No Unknown Not applicable

26. Presence of a budget line for epidemic response or access to funds for epidemic response
    Is there a budget line or access to funds for epidemic response?
    Yes No Unknown Not applicable

27. Percent of districts that have an epidemic management committee
    Obs Observed minutes (or report) of meetings of epidemic management committee
    Yes No Unknown Not applicable

28. Percent of districts that have rapid response team for epidemics
    Does the district have a rapid response team for epidemics?
    Yes No Unknown Not applicable

VI. Responses

29. Percent of sites that implemented prevention and control measures based on local data for at least one reportable disease or syndrome
    Has the district implemented prevention and control measures based on local data for at least one reportable disease or syndrome?
    Yes No Unknown Not applicable

30. Percent of districts that responded within 48 hours of notification of most recently reported outbreak
    Obs Observed that the district responded within 48 hours of notification of most recently reported outbreak (from written reports)
    Yes No Unknown Not applicable

31. Percent of districts that achieved acceptable case fatality rates (e.g. 10% for Meningococcal CSM 1% for Cholera) during the most recent outbreak
    Obs Observed that the district achieved an acceptable case fatality rate for most recent outbreak (Observe from outbreak report)
    Yes No Unknown Not applicable

32. Percent of epidemic management committees that have evaluated their preparedness and response activities during the past year
    Obs Has epidemic management committee evaluated their preparedness and response activities during the past year? (observe written report to confirm)
    Yes No Unknown Not applicable

VII. Feedback

33. Percent of sites that have written report that is regularly produced to disseminate surveillance data
    How many feedback written reports has the district produced in the last year?
    Obs Observed the presence of a written report that is regularly produced to disseminate surveillance data (district and higher)
    Yes No Unknown Not applicable

34. Percent of sites that have received a report or bulletin from a higher level during the past year on the data they have provided
    How many feedback bulletin or reports has the district received in the last year?
    Obs Observed at least 1 report or bulletin at district from a higher level during the past year on the data they have provided
    Yes No Unknown Not applicable

VIII. Supervision

35. Percent of individuals supervised in the past 6 months
    How many times have you been supervised in the last 6 months?
    Obs Observed supervision report or any evidence of supervision in last 6 months
    Yes No Unknown Not applicable

36. Of those supervised in the previous 6 months, percent of individuals for which the supervisor from the next higher level reviewed surveillance practices appropriate to their level
    Obs Observed supervision report or any evidence for appropriate review of surveillance practices
    Yes No Unknown Not applicable

37. Percent of supervisors that made the required number of supervisory visits in the past 6 months
    How many supervisory visits have you made in the last 6 months? _______
    (Obtain required number of visits from central level)_________________
38. The most usual reasons for not making all required supervisory visits. (Text)
    Reason 1____
    Reason 2____
    Reason 3____

IX. Training ____

39. Percent of health personnel (in position of responsibility) trained in disease surveillance
    Have you been trained in disease surveillance?
    Yes No Unknown Not applicable

40. If yes, specify when, where, how long, by whom?
    ____

41. Proportion of districts with staff trained in surveillance and epidemic management
    What percent of your personnel in the district have been trained in surveillance and epidemic management? _____________________________________

X. Resources____

42. I. Percent of sites that have:
    Logistics
    a. Electricity
    b. Bicycles
    c. Motor cycles
    d. Vehicles
43. Data management
    a. Stationery
    b. Calculator
    c. Computer

d. Printer
e. Statistical package

44. Communication
    a. Telephone service
    b. Fax
    c. B radio
    d. Computers that have modems
45. Information education and communication materials
    a. Posters
    b. Megaphone
    c. Flipcharts or Image box
    d. VCR and TV set
    e. Generator
    f. Screen
    g. Projector (Movie)
    h. Other:
46. Hygiene and sanitation materials
    a. Spray pump
    b. Disinfectant

XI. Surveillance co-ordination:____

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

XII. Satisfaction with surveillance system___________________________________

48. Satisfaction with the surveillance system
    Are you satisfied with the surveillance system?
    Yes No Unknown Not applicable

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

---

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

Annex5: Health facility Level Surveillance System Evaluation Questionnaire, Dawro Zone, 2013

Identifiers

Type of health facility

Date District

Interviewer Region/province

Respondent

Name of health facility Surveillance system

---

1. Percent of health facilities with national surveillance manual

   Is there a national manual for surveillance at this site?

   Obs Observe national surveillance manual:

   Yes No Unknown Not applicable

I. Case detection and registration

2. Percent of health facilities that have a clinical register

   Obs Observed the existence of a clinical register

   Yes No Unknown Not applicable

3. Percent of health facilities that correctly register cases

   Obs Observed the correct filling of the clinical register during the previous 30 days

   Yes No Unknown Not applicable

4. Percent of health facilities that have standardized case definitions for the country's priority diseases

   Do you have a standard case definition for: (each priority disease) typhoid, typhus, SAM, measles, malaria?

   Yes No Unknown Not applicable

5. Obs Observed the standard case definition for: (each priority disease)

   Yes No Unknown Not applicable

6. Percent of health facilities that use standardized case definitions for the country's priority diseases

   Obs Observed the respondent correctly diagnosing one of the country's priority diseases using a standard case definition

   Yes No Unknown Not applicable

   (Select one of the priority diseases in the facility's clinical register and ask how they diagnosed it — interviewer should have the standard case definition from MOH)

II. Case confirmation

7. Percent of health facilities that have the capacity to collect specimens (sputum stool, blood/serum and CSF)

   Are you able to collect sputum Y N U N/A

   Stool Y N U N/A

   Blood Y N U N/A

   CSF at this facility? Y N U N/A

8. Obs Observed the presence of materials required to collect

   Stool Y N U N/A

   blood/serum Y N U N/A

CSF Y N U N/A

9. Percent of health facilities that have the capacity to handle specimens until shipment
   Do you have the capacity to handle sputum, stool, blood/serum and CSF until shipment at this facility?
   Yes No Unknown Not applicable
10. Obs Observed presence of functional cold chain at health facility
    Yes No Unknown Not applicable
11. Percent of health facilities that have the capacity to ship specimens to a higher level lab
12. Obs Observed presence of transport media for stool at health facility
    Yes No Unknown Not applicable
13. Obs Observed presence of packing materials for shipment of specimens at health facility
    Yes No Unknown Not applicable

III. Data reporting ____

14. Percent of sites that have appropriate surveillance forms for that site at all times over the past 6 months
    Have you lacked appropriate surveillance forms at any time during the last 6 months?
    Yes No Unknown Not applicable
15. Percent of sites that reported accurately cases from the registry into the summary report to go to higher level
    Observed that the last monthly report agreed with the register for 4 diseases (1 for each targeted group [eradication; elimination; epidemic prone; major public health importance])
    a. Obs Measles Y N U N/A
    b. Obs Malaria Y N U N/A
    c. Obs SAM Y N U N/A
    d. Obs Tyhoid Y N U N/A
    e. Obs typhus Y N U N/A
16. Percent of sites that reported each reporting period to the next higher level during the past 3 months
    Number of reports in the last 3 months compared to expected number
    Obs Weekly: /12 times the number of sites
    Obs immediately: /-- times the number of sites
17. On time (use national deadlines)
    Obs Number of weekly reports submitted on time:-_____ /12 times the number of sites
    Obs Number of immediately reports submitted on time: ___/-- times the number of sites
18. Percent of HF that have means for reporting to next level by e-mail, telephone, fax or radio
    How do you report?
    a. Mail
    b. Fax
    c. Telephone
    d. Radio
    e. Electronic
    f. Other
19. Strengthening reporting
    How can reporting be improved?
    ____

____

IV. Data analysis

Percent of sites that:

20. Describe data by person (outbreaks, sentinel)
    Obs Observed description of data by age and sex
    Yes No Unknown Not applicable
21. Describe data by place
    Obs Observed description of data by place (locality, village, work site etc)
    Yes No Unknown Not applicable
22. Describe data by time
    Obs Observed description of data by time
    Yes No Unknown Not applicable
23. Perform trend analysis
    Obs Observed line graph of cases by time
    Yes No Unknown Not applicable
24. Have an action threshold for each priority disease
    Do you have an action threshold for any of the Country priority diseases?
    Yes No Unknown Not applicable
25. If yes, what is it (Ask for 2 priority diseases)? ________cases _____ % increase ______rate
26. Who is responsible for data analysis? ___________________________
27. How often do you analyze the collected data?
    a. Daily
    b. Weekly
    c. Every 2 weeks
    d. Monthly
    e. Quarterly
    f. As needed……..
28. Have appropriate denominators
    Obs Observed presence of demographic data at site (E.g. population <5 yr., population by village, total population)
    Yes No Unknown Not applicable

V. Epidemic preparedness

29. Percent of health facilities that have a standard case management protocol forepidemic prone diseases
    Obs Observed the existence of a written case management protocol for 1 epidemic prone diseaseYes No Unknown Not applicable

VI. Epidemic response

30. Percent of sites that implemented prevention and control measures based on local data for at least one epidemic prone disease
    Has the health facility implemented prevention and control measures based on local data for at least one epidemic prone disease?
    Yes No Unknown Not applicable
31. Percent of sites that achieved acceptable case fatality rates (e.g. 10% for Meningococcal CSM 1% for Cholera) during the most recent outbreak

Obs Observed that the health facility achieved an acceptable case fatality rate for most recent outbreak

Yes No Unknown Not applicable

VII. Feedback____

32. Percent of sites that have received a report or bulletin from a higher level during the past year on the data they have provided

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

    Obs Observed at least 1 report or bulletin at the health facility from a higher level during the past year on the data they have provided

    Yes No Unknown Not applicable

33. Percent of health facilities that conducted at least semi-annual meetings with community members to discuss results of surveillance or investigation data

    How many meetings has this health facility conducted with the community members in the past six months? ________________

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

    Yes No Unknown Not applicable

VIII. Supervision:____

34. Percent of individuals supervised in the past 6 months

    How many times have you been supervised in the last 6 months?_________

    Obs Observed supervision report or any evidence of supervision in last 6 months

    Yes No Unknown Not applicable

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

    Obs Observed supervision report or any evidence for appropriate review of surveillance practices

    Yes No Unknown Not applicable

IX. Training ____

36. Percent of health personnel trained in disease surveillance and epidemic management

    Have you been trained in disease surveillance and epidemic management?

    Yes No Unknown Not applicable

37. If yes, specify when, where, how long, by whom?______________________________

    ____

X. Resources____

Percent of sites that have:

38. Logistics
    a. Electricity
    b. Bicycles
    c. Motor cycles
    d. Vehicles
39. Data management
    a. Stationery
    b. Calculator
    c. Computer

d. Software
e. Printer
f. Statistical package

40. Communications
    a. Telephone service
    b. Fax
    c. Radio call
    d. Computers that have modems
41. Information education and communication materials
    a. Posters
    b. Megaphone
    c. Flipcharts or Image box
    d. VCR and TV set
    e. Generator
    f. Screen
    g. Projector (Movie)
    h. Other:
42. Hygiene and sanitation materials
    a. Spray pump
    b. Disinfectant
43. Protection materials (list) ________________________________ ______ ________
    ____
    ____

XI. Satisfaction with surveillance system

44. Satisfaction with the surveillance system
    Are you satisfied with the surveillance system?
    Yes   No   Unknown   Not applicable
45. If no, how can the surveillance system be improved? ____________________________
    ____
46. Opportunities for integration
    What opportunities are there for integration of surveillance activities and functions (core activities, training, supervision, guidelines, resources etc.)
    ____
    ____
    ____

Annex 6: Health Post Level Surveillance System Evaluation Questionnaire, Dawro Zone, 2013

Identifiers

Assessment team | Type of health facility

Date | District
Interviewer | Region/province
Respondent | Country
Name of health facility | Surveillance system

---

1. Percent of health facilities with national surveillance manual
   Is there a national manual for surveillance at this site?
   Obs Observe national surveillance manual:
   Yes No Unknown Not applicable

I. Case detection and registration ________________________________

2. Percent of health facilities that have a clinical register
   Obs Observed the existence of a clinical register
   Yes No Unknown Not applicable
3. Percent of health facilities that correctly register cases
   Obs Observed the correct filling of the clinical register during the previous 30 days
   Yes No Unknown Not applicable
4. Percent of health facilities that have standardized case definitions for the country's priority diseases
   Do you have a standard case definition for: (each priority disease) AWD, AFP, SAM, Typhoid, typhus measles, malaria?
   Yes No Unknown Not applicable

5. Obs Observed the standard case definition for: (each priority disease)
   Yes No Unknown Not applicable
6. Percent of health facilities that use standardized case definitions for the country's priority diseases
   Obs Observed the respondent correctly diagnosing one of the country's priority diseases using a standard case definition
   Yes No Unknown Not applicable
   (Select one of the priority diseases in the facility's clinical register and ask how they diagnosed it — interviewer should have the standard case definition from MOH)

II. Data reporting ____

7. Percent of sites that have appropriate surveillance forms for that site at all times over the past 6 months
   Have you lacked appropriate surveillance forms at any time during the last 6 months?
   Yes No Unknown Not applicable
8. Percent of sites that reported accurately cases from the registry into the summary report to go to higher level

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

a. Obs Measles Y N U N/A
b. Obs Malaria Y N U N/A
c. Obs AFP (polio) Y N U N/A
d. Obs AWD Y N U N/A

9. Percent of sites that reported each reporting period to the next higher level during the past 3 months
   Number of reports in the last 3 months compared to expected number
   Obs Weekly: /12 times the number of sites
   Obs immediately: /-- times the number of sites
10. On time (use national deadlines)
    Obs Number of weekly reports submitted on time:-_____ /12 times the number of sites
    Obs Number of immediately reports submitted on time: ___/-- times the number of sites
11. Percent of HF that have means for reporting to next level by e-mail, telephone, fax or radio
    How do you report?
    a. Mail
    b. Fax
    c. Telephone
    d. Radio
    e. Electronic
    f. Other
12. Strengthening reporting
    How can reporting be improved?
    ____
    ____
    ____

III. Data analysis____

Percent of sites that:

13. Describe data by person (outbreaks, sentinel)
    Obs Observed description of data by age and sex
    Yes No Unknown Not applicable
14. Describe data by place
    Obs Observed description of data by place (locality, village, work site etc)
    Yes No Unknown Not applicable
15. Describe data by time
    Obs Observed description of data by time
    Yes No Unknown Not applicable
16. Perform trend analysis
    Obs Observed line graph of cases by time
    Yes No Unknown Not applicable

IV. Epidemic response____

17. Percent of sites that implemented prevention and control measures based on local data for at least one epidemic prone disease

Has the health facility implemented prevention and control measures based on local data for at least one epidemic prone disease?

Yes No Unknown Not applicable

V. Feedback____

18. Percent of sites that have received a report or bulletin from a higher level during the past year on the data they have provided

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

    Obs Observed at least 1 report or bulletin at the health facility from a higher level during the past year on the data they have provided

    Yes No Unknown Not applicable

19. Percent of health facilities that conducted at least semi-annual meetings with community members to discuss results of surveillance or investigation data

    How many meetings has this health facility conducted with the community members in the past six months? ________________

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

    Yes No Unknown Not applicable

VI. Supervision:____

20. Percent of individuals supervised in the past 6 months

    How many times have you been supervised in the last 6 months?_________

    Obs Observed supervision report or any evidence of supervision in last 6 months

    Yes No Unknown Not applicable

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

    Obs Observed supervision report or any evidence for appropriate review of surveillance practices

    Yes No Unknown Not applicable

VII. Training ____

22. Percent of health personnel trained in disease surveillance and epidemic management

    Have you been trained in disease surveillance and epidemic management?

    Yes No Unknown Not applicable

23. If yes, specify when, where, how long, by whom?_______________________________

    ____

VIII. Resources____

Percent of sites that have:

24. Logistics
    a. Electricity
    b. Bicycles
    c. Motor cycles
    d. Vehicles
25. Data management
    a. Stationery
    b. Calculator
    c. Computer

d. Software
e. Printer
f. Statistical package

26. Communications
    a. Telephone service
    b. Fax
    c. Radio call
    d. Computers that have modems
27. Information education and communication materials
    a. Posters
    b. Megaphone
    c. Flipcharts or Image box
    d. VCR and TV set
    e. Generator
    f. Screen
    g. Projector (Movie)
    h. Other:
28. Hygiene and sanitation materials
    a. Spray pump
    b. Disinfectant
29. Protection materials (list) ________________________________ ______ ________
____
____

IX. Satisfaction with surveillance system

30. Satisfaction with the surveillance system
    Are you satisfied with the surveillance system?
    Yes No Unknown Not applicable
31. If no, how can the surveillance system be improved? ____________________________
    ____
32. Opportunities for integration
    What opportunities are there for integration of surveillance activities and functions (core activities, training, supervision, guidelines, resources etc.)
    ____
    ____
    ____

Annex 7: Laboratory Level Surveillance system Assessment tool

General information		
Name of the laboratory		
Address of the laboratory:	Telephone_______ Fax_______ e-mail__________	
Level of the Laboratory :	Community Health Facility District Regional National	
Affiliation of the Laboratory :	Public/Private /Academic /Religious Institution / NGO	
Name of head of Laboratory		
Building Facilities and utility services		
Is the laboratory in a free-standing building or part of larger structure?		
How many rooms with bench space are there in the laboratory Does the Laboratory have the following services available? Electricity/Running water		
Is there a back-up power source in case of power failure (E.g. emergency generator)?	Yes / No	
If yes, what systems are protected?		
Refrigerators/freezers	Yes No	
Computers	Yes No	
Other(specify)	Yes No	
What types of communications systems are available?		
Post	Yes No	
Telephone	Yes No	
Fax	Yes No	
Satellite phone	Yes No	
E-mail (no. computers)	Yes No	
Internet (no. computer)	Yes No	

Laboratory staff		
1. Medical Laboratory Professioal Number a. MSc, b. Bsc c. Dipoma		
2. Assistants (not doing tests)		
3. Clerical/Cleaner		
Has training been conducted for the laboratory staff on		
AWD		
Malaria		
Other epidemic prone diseases (briefly describe)		
If yes when was the last training been conducted for your laboratory staff?		

Reagents

Where you are getting your reagents?	From a commercial supplier
	From another laboratory
	Supplied by Regional/Zonal/District/health office
Was there shortage of reagents in the last six month which are used for identifying diseases	Yes/No
If Yes What Are the most important reasons?	Lack of funds Lack of information Unprioritizing others(specify)
/What type of water is used for preparation of media and reagents?	
Deionizer Distilled Distilled Tap water	Yes No Yes No Yes No

Tests performed at the laboratory

Disease	Specimen type	Assay Performed	Yes	No	Number/ Month
Meningitis	CSF	a. Cell count b. Latex agglutination c. Gram stain d. Culture e. Identification tests f. A-M susceptibility			
Watery diarrhea (cholera)	Faeces	Microscopy of wet preparation Culture-TCBS Culture-Alk. Peptone Stereotyping			
Malaria	Blood	Thick/Thin film microscopy			
Measles	Serum Throat swab, conjunctival swab	IgM by EIA Other serological test Virus isolation			
Yellow fever	Blood, postmortem liver	IgM Virus isolation			
suspect typhoid or brucellosis	Blood, faeces serum	Culture Identification tests A-M susceptibility Serological tests (Widal, brucella agglutinins)			
Hepatitis	Serum	Anti-HAV IgM Anti-HbsAg Anti-HCV IgM			
Viral haemorrhagic fevers (any)	Serum Serum, other tissue specimens	IgM Virus detection			

Acute flaccid paralysis	Faeces	Virus isolation Virus typing			

Specimen collection, labeling and handling

Do request forms contain ALL of the following patient information: Specimen source, date and time of collection, type of test requested?	Yes No
Are specimens that are received labeled with the patient's name and Unique identifiers?	Yes No
Does the laboratory have a logbook/electronic record of all specimens Sent for diagnostic testing?	Yes No
Are specimens discarded after testing, or are they stored?	Discarded Stored
Does you laboratory refer bacteriology isolates or serum samples to A reference laboratory?	Yes No
If yes, reason for referral (all)	
Confirmation Identification of unknown organism Test not performed on site	Yes No Yes No Yes No
Number of sample referred in the last six month?	
Types of transport media used (all that apply)	
Trans-isolate Cary and Blair Viral transport medium	Yes No Yes No Yes No
Other (describe):	

Reporting procedures

Are records kept of the number and type of tests performed and results?	Yes No
Does the laboratory have a list of diseases that are supposed to be reported to the Ministry of Health?	Yes No
Does the lab staff know what diseases should be reported?	Yes No
Does the lab provide regular reports of patients with notifiable diseases to any of the following Ministry of Health offices/institutions?	
District Health Office State Health Office	Yes / No / NA Yes / No/ NA

National / MOH level	Yes / No/ NA Yes / No /NA
If reports are submitted, how frequently?	
Weekly Monthly Quarterly Other	Yes No Yes No Yes No Yes No
Quality control procedures and programs	
Does the laboratory use any system for internal quality control?	Yes No
Does the laboratory participate in any external quality assurance or proficiency schemes?	Yes No
Was there any general laboratory supervision conducted to this laboratory?	Yes No
If yes, how often in for the last one year?	one times/two times/ three and more
Does your laboratory have a system for regularly monitoring of quantities of reagents and materials so that there is warning if stocks become low?	Yes No

Annex 8: Informed consent form

Hello, my name is______________________. I am here on behalf of the researcher.
We would like to understand risk factors associated with measles outbreak in Hawassa City Administration. To get this information, we are caring out interviews households with child age less than five years. I will ask you to complete one short questionnaire about socio-demography, economic condition, and vaccination status about your child. The study is aimed to confirm whether children in Hawassa City immune against measles or not. This study done with blood test, so we need blood specimen from your child. The results of this research will help to improve the vaccination program. The interview takes 10 minute. What you tell me will be kept strictly confidential and will be kept securely and no one outside of this researcher will find out the answers that you give me. Your name and address or child's status never appears on this study separately. Participation is voluntary and you may withdraw from the session at any time or refuse to answer any questions that make uncomfortable. Participation in this study will not affect your personal or your child. If you have further questions about the study, you can contact Yeshitila Mogessie Kidanie 0912142413/0925266812 or e-mail yeshitilamogessie@yahoo.com.
Are you willing to take part in the interview? Yes ☐ No ☐
Thank you for your participation. We are very grateful for your cooperation.

Informed consent certified by

Interviewer name________________________ signature___________________

Date of interview__________________________

Result of interview:
1. Completed 2. Completed partially 3. Refused

THANK YOU!

Annex 9 : Questionnaires for Measles Specific Antibody (IgG) Study, Hawassa City, 2014

ID.____________

Patient Name____________________ Date of Data collection___________

Region________ Zone_______ Woreda______ Kebele _______ Got _______ Phone________

Location: Longitude: _________________ Latitude: _______________________

I. Socio-demographic Characteristics

S. No	Questions	Alternatives
101	Sex	1.Male 2.Female
102	Age	years________ Months________
103	Occupation for child mother	1. Farmer 2. House wife 3. Student 4. Unemployed 5. Daily laborer 6. Merchant 7. Government employee 8. NGO employee 9. Other (specify)_________
104	Occupation for child Father	1. Farmer 2. Student 3. Unemployed 4. Daily laborer 5. Merchant 6. Government employee 7. NGO employee 8. Other (specify)_________
105	Educational level For child Mather	1. Unable to read and Write 2. Read and write 3. Elementary 4. Secondary 5. Above secondary
106	Educational status for Child father	1. Unable to read and Write 2. Read and write 3. Elementary 4. Secondary 5. Above secondary
107	Marital status	1. Single 2. Married

		3. Divorced 4. Widowed
108	Family size	______________
109	Income level	1. Low 2. Medium 3.High
110	Ethnic group	1. Sidama 2.Amhara 3.Wolayita 4.Gedeo 5. Gurage 6.Oromo 7.Silti 8. Hadiya 9.Other
111	Religion	1.Orthodox 2.Protestant 3.Catholic 4. Muslim 5.Other

. Risk factors

201	Vaccination Status	1. vaccinated 2.Unvaccinated
201.1	If vaccinated number of doses received	____________________
201.2	Age at the time of first dose	_____________________
201.3	Age at the time of last dose	_____________________
202	Nutritional Status(MUAC)	_____________________
203	Did the child ever have measles infection?	1. yes 2.No
204	IgG Result	_____________________

Annex 10: Map of African Meningitis Belt

Annex 11: Declaration

I, the undersigned, declare that this is my original work and has never been presented by another person in this or any other University and that all the source materials and references used for this thesis have been duly acknowledged.

Name: Yeshitila Mogessie

Signature: ______________________________

Place: ______________________________

Date of Submission: ______________________________

The thesis has been submitted for examination with my approval as a university advisor.

Name of advisor:

Signature: ______________________________

Date: ______________________________