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

Ethiopian Field Epidemiology and Laboratory Training Program (EFELTP)

Compiled Body of Works in Field Epidemiology

By

Ghidey G/libanos

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

February 2011
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Approval by Examining Board

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Chairman, School Graduate Committee	
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Advisor	
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Examiner	
_____	_____
Examiner	

Acknowledgment

During my stay of two years time in the University, both in the class room and Resident environment, different organizations/ institutions and individuals have made their contributions for the success of my work. Among these CDC is well appreciated for financing the program to be established and continued in a smooth manner and sharing theoretical as well as practical knowledge made through its well experienced staff.

I would like to express my grateful thanks to Drs. Richard Luce and Adamu Addissie for their continuous teaching, advice and guidance in achieving a fruitfull work. My gratitude also goes to all instructors of the AAU, School of public health, for the efforts invested in transferring their knowledge that enabled me to gain a practical knowledge in this field of study. I also recognize the supportive staff of AAU, School of Public Health for their sincer cooperation in the success of my achievement.

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List of Abbreviations

AAU	Addis Ababa University
AFP	Acute Flaccid paralysis
AWD	Acute Watery Diarrhea
BCG	Bacillus Calmette Guerin
CDC	Center for Diseases prevention and control
CFR	Case Fatality Rate
DRMFSS	Disaster Response Management and Food Security Sector
EFY	Ethiopian Fiscal Year
EHNRI	Ethiopian Health and Nutrition Research Institute
EIS	Epidemic Intelligence Services
EOS	Enhanced Outreach Strategy
EPHI	Ethiopian Public Health Institute
EPI	Extended Program on Immunization
FELTP	Field Epidemiology and Laboratory Training Program
FMoH	Federal Ministry of Health
H1N1	Pandemic Influenza A
IDSR	Integrated Diseases Surveillance and Response
IFHP	Integrated Family Health Program
IgM	Immunoglobulin M
MoH	Ministry of Health
NA	Not Available
NGO	Non Governmental Organization
NNT	Neonatal Tetanus

NS	Nutrition Survey
OPD /IPD	Outpatients Department/Inpatients Department
OPV	Oral Polio Vaccine
ORHB	Oromia Regional Health Bureau
ORWRB	Oromia Region Water Resource Bureau
OTP	Out Patients Therapeutic Program
PA	Pyrrolizidine alkaloid
PHC	Primary Health Care
PHEM	Public Health Emergency Management
PMI	President's Malaria Initiative
RA	Rapid Assessment
REST	Relief Society of Tigray
RHD	Regional Health Bureau
RRT	Rapid Response Team
RUTF	Ready to Use Therapeutic Food
SAM	Severe Acute Malnutrition
SARS	Severe Acute Respiratory Syndrome
SC	Stabilization Center
SF	Supplementary Food
SPH	School of Public Health
SSA	Sub Saharan Africa
TEPHINET	Training on Epidemiology and Public Health Intervention Network
TRHB	Tigray Regional Health Bureau
ULD	Unidentified Liver Disease

USA	United States of America
WASH	Water Sanitation and Hygiene
WHO	World Health Organization
WHO/AFRO	World Health Organization Regional Office for Africa
ZHD	Zonal Health Department

Preface

Field Epidemiology as a body of knowledge is the first of its kind in our country. It is designed in a way to build the capacity of trainees, especially on field assignments with hands on skills through spending seventy five percent of the time doing practical works, which in this regard is learning things by doing where our country is deficient in such a trend of teaching and learning processes in many fields of public health studies. As a discipline on human health, over a two year stay with various field attachments in different places of the country, it has capacitated my knowledge in practicing various activities which are presented in this compiled body of works as follows:-

Outbreak/Epidemic Investigations entitled as unidentified liver disease that occurred since 2002 until this time and the new influenza (H1N1) in 2010 were carried out in Tigray and Oromya regions respectively. A surveillance activity was mainly employed in the liver disease situation both in the fields and residency area that was on analysis of data and interpretation of findings with conclusions and recommendations required for the future. A field trip to affected districts of Oromya region with a team was conducted in November 2010 which has done such activities as interviewing sick people, record reviews of health facilities and doing laboratory samples for etiological investigations.

Surveillance Data Analysis Report based on a secondary data obtained from Federal HIV/AIDS prevention and control office and notably focusing on voluntary counseling and testing for a period of three years (2006- 2009) was analysed and interpreted during March 2009. Recommendations have also been pointed out from the findings focussing on the most affected groups of the population.

Evaluation of Surveillance System and Health Profile Description Report have been undertaken in Tigray regional state in November 2010 based on a planned trip to the area. Both activities were carried out using checklists prepared for this purpose. Project proposal for surveillance evaluation was developed by the team of trainees of field epidemiology, which then is reviewed and approved by a Resident advisor and academic coordinator. Interviewing health officials and professionals at different levels of the health system, record reviews and observations were employed within the health systems of selected sites for surveillance system evaluation on two selected diseases (Malaria and Measles) and administering a

checklist for description of health profile including other sectors like Education and Water offices were also undertaken concurrently in one of the visited districts.

Abstracts for Scientific Presentation on unidentified liver disease (ULD) and H1N1 have been submitted to and accepted at scientific conferences in TEPHINET (Training on Epidemiology and Public Health Intervention Network), and Ethiopian Medical Association which were held in Cape Town, South Africa and Addis Ababa, Ethiopia in December and February 2011 respectively.

Disaster related Situations Known as Humanitarian Emergency Needs Assessment collaborated by DRMFSS (Disaster Response Management and Food Security Sector) were among the activities which have been carried out using checklists for administering questions, review of records and observations in drought affected zones and districts of Oromya and Amhara regions in the years 2009 and 2010 respectively. At the end of the visit action plans were developed by the team of the assessing group and the regional sector bureaus for six months prospected based on the findings of the intervention areas prioritized by the team.

Protocol/Proposal for Epidemiologic Research Project as a component of the Field Epidemiology and Laboratory Training Program was developed and was supposed to be conducted in August – December 2010. The proposal was continued under the advice and guidance of academicians in the AAU, School of public health. The topic of my study was on Salmonella carrier status of Food handlers in Mekele City, Tigray, Ethiopia. The project proposal was developed following the scientific format of AAU reviewed, commented and approved by the respective advisors for obtaining a clearance from Ethical Review board.

Apart from what have been stated above other Additional Output Reports were also undertaken. These include Analysis of Measles outbreak in two districts (Welkait and Tsegede) of Tigray region which occurred in August-October 2010 based on a secondary data obtained from Tigray Regional Health Bureau. Analysis of a five year (2005- 2009) surveillance data on Measles was also employed from a data base of the World Health Organization country office upon a request and approval made by Federal Ministry of Health and particularly Public Health Emergency Management (PHEM) Core Procees. A proposal on antimicrobial resistance, prescription patterns and relations was again among the works supposed to be conducted in three regional Hospitals is additionally included in this compiled body of works.

Chapter I – Outbreak/Epidemic Investigations

1.1 Unidentified liver disease in districts of North-Western Zone, Tigray, Ethiopia, 2002-2010

Ghidey Gebrelibanos, Zayeda Beyene, Yohanes G/hawaria[2], Richard Luce[2]

Abstract

Background

A liver disease of unknown etiology which is characterized by epigastric pain, fever, jaundice, nasal bleeding, peripheral edema and abdominal swelling progressing to ascites with high morbidity and mortality reported among humans in six district*s* of the North-Western Zone of Tigray, Ethiopia since April 2002- 2010. This surveillance data analysis and outbreak/epidemic investigation was thus, aimed at describing the magnitude of unidentified liver disease by person, place and time for recommending possible preventive and control intervention strategies to the disease.

Methods

Study is conducted in North-Western Zone, Tigray region, Ethiopia. A line list was collected and case register log books of the districts were reviewed. Case definition was set based on the symptoms and signs of the disease to identify cases. Surveillance secondary data of all six districts of the Zone prepared in a line list was reviewed, entered and analyzed in Microsoft Excel.

Results

A total of 736 cases and 247 deaths were reported from April 2002 to June 2010, with an attack rate of 0.1% and case fatality rate of 33.5%. The median age of cases was 18 years which ranged between 1 and 81 years old. Age group of 5-14 accounted 32.7% (241/736). Sixty percent of total cases and 63% of deaths were males. Out of a total of 124 kebeles in these six districts 39 (31%) reported cases of unidentified liver disease to date.

Conclusion and Recommendation

Majority of cases affected by the disease were in the age group of 5-14, and with a higher proportion of male cases. Further research has to be employed in the area. Documents on how well cases were managed should be sought at all relevant health facilities to evaluate the the previous management of cases inorder to recommend better future case management approaches.

Key words: ULD, PAs, Ageratum, North-Western Zone

Background

A Liver disease of unknown etiological origin with significant morbidity and mortality was first reported in the village of Tsaeda-Emba, Kelakil kebele, Tahtay Koraro district of Tigray region in 2001/2002 (1).

But reports of regional health bureau and other partners show there were a number of cases reported before 2001.The outbreak in Medebay Zana which is adjacent district was also reportedly recognized in April 2005 with the first case from Tirkakia village, Kiberto kebele. Similar type of outbreak was reported from Asgede Tsimbla district. Recently as of October 2009 similar type of outbreak was reported from other three additional districts *i.e.,* Laelay Adiabo, Tahtay Adiabo and Tselemti district. Yet there is no reported case from sheraro and shire Endaselassie districts of North-Western Zone (2).

The disease in human that is commonly seen in districts of North-Western zone is manifested as epigastric pain, abdominal pain, nasal bleeding, peripheral edema and abdominal swelling progressing to ascites in some patients. It has a high mortality rate in some affected persons particularly in children, dying within weeks or months of first developing symptoms while other patients have lived for over six years with the disease. The disease also affects livestock such as chickens, sheep, goats and cattle, of which goats are reported to be the most affected animals. Reported symptoms in animals were almost similar to that of human cases, that include enlarged abdomen, depression, nasal bleeding, unusual screaming (goats), and blotting(1).

North-Western Zone is a mixed farming area with both crop production and livestock rearing activities. Agriculture activities are entirely dependent on the summer (*Kiremti)* rains from June to September. Major agricultural crops in Kibrito locality are millet, *teff*, sesame, sorghum, maize, and goadeya (leqwa). Animal products consumed are milk, meat, egg, honey, and chicken and the most abundant noxious weed found in the affected village is *Ageratum Species locally called Hagay fetewe*. It is found distributed widely in surrounding houses, drinking water sources, agricultural and grazing fields (1).The source of water for most inhabitants is mainly on stream/river though at times open dug well at households and well fitted by a hand pump are used by the community (2).

Although other possible causative factors for the health problem cannot be entirely excluded, pyrrolizidine alkaloid (PA) toxicity of the liver, possibly from contamination of *Ageratum* weed, is

suspected as the etiological agent (a working hypothesis) besides other risk factors contributing to the development of the disease in North-Western Zone of Tigray (1).
Pyrolizidine alkaloid-containing plants are widely distributed in many geographical regions in the world. It has been reported that about 3% of the world flowering plants contain toxic pyrolozidine Alkaloids (3).

Many pyrolizidine alkaloids are highly toxic and there have been almost 400 PAs identified in over 6,000 plants within numerous plant families to date. Most toxicity seems to result from three main families of plants: *Boraginaceae*, *Compositae*, and *Leguminosae* (3). Multiple PAs have been found to possess a wide variety of adverse effects that can range in severity, depending on the agent and the dose of the exposure (4). The dose and duration of exposure to heliotrine required to produce liver damage in humans has been previously estimated as 4–10 mg/kg per day for 3–7 weeks. WHO has indicated that the lowest intake causing disease may be 1 mg total PAs per day for a 70 kg adult , and German regulations for herbal remedies establish a maximum oral intake of 1 microgram per day(5).

Plants containing PAs are likely to grow as weeds among staple food crops and pastures, especially following drought, and consumption of such crops can cause large scale outbreaks of toxic disease in both man and farm animals(6).

Consumption of contaminated grain or the use of PA-containing plants as herbal medicines, beverages, or food by man, or grazing on contaminated pastures by animals, may cause acute or chronic disease. Although all age groups are affected, children are particularly vulnerable to the effects of PAs (6).

The classical symptoms and signs of human PA toxicosis are abdominal pain and rapidly developing ascites. Lassitude, anorexia, nausea, vomiting, diarrhea, edema, emaciation, hepatomegaly, splenomegaly, and mild jaundice also occur. The condition may present as an acute toxicity but is more often the late manifestation of hepatic failure or circulatory obstruction resulting from chronic pathological changes which have been developing in the liver over previous weeks or months due to a low level intake of the alkaloids(7).

Livestock are poisoned by grazing on plants containing pyrolizidine alkaloids, causing livestock loss due to liver and pulmonary lesions. It is now well recognized that a large variety of animal species are susceptible to pyrolizidine alkaloid toxicity (3).

The first recorded example of human disease caused by PA-containing plants was that reported in 1920 in South Africa where multiple cases of cirrhosis occurred following consumption of bread from flour contaminated mainly with the plant Senecio burchellii (7).

Thus this surveillance data analysis and Epidemic investigation is aimed at describing the distribution of unidentified liver disease by person, place and time inorder to recommend possible curative and preventive intervention strategies for the disease.

Methodology

Study area, period and population

Is in North-Western Zone of Tigray region, the capital of which is Known as, Shire and located at about 300 Km far away from the regional capital, Mekele. The Zone has an estimated total population of 737,509 and composed of eight districts. Between 2002 and June 2010 six districts reported cases of unidentified liver disease.

Type of Analysis:

Descriptive epidemiology was used to describe the magnitude of the Epidemic.

Data collection, entry and analysis:

A secondary ULD Surveillance data for all six districts of the Zone was obtained from a line list prepared by the regional health bureau and some were collected by field epidemiology residents from some health facilities. Data were reviewed, entered and analyzed in Microsoft Excel.

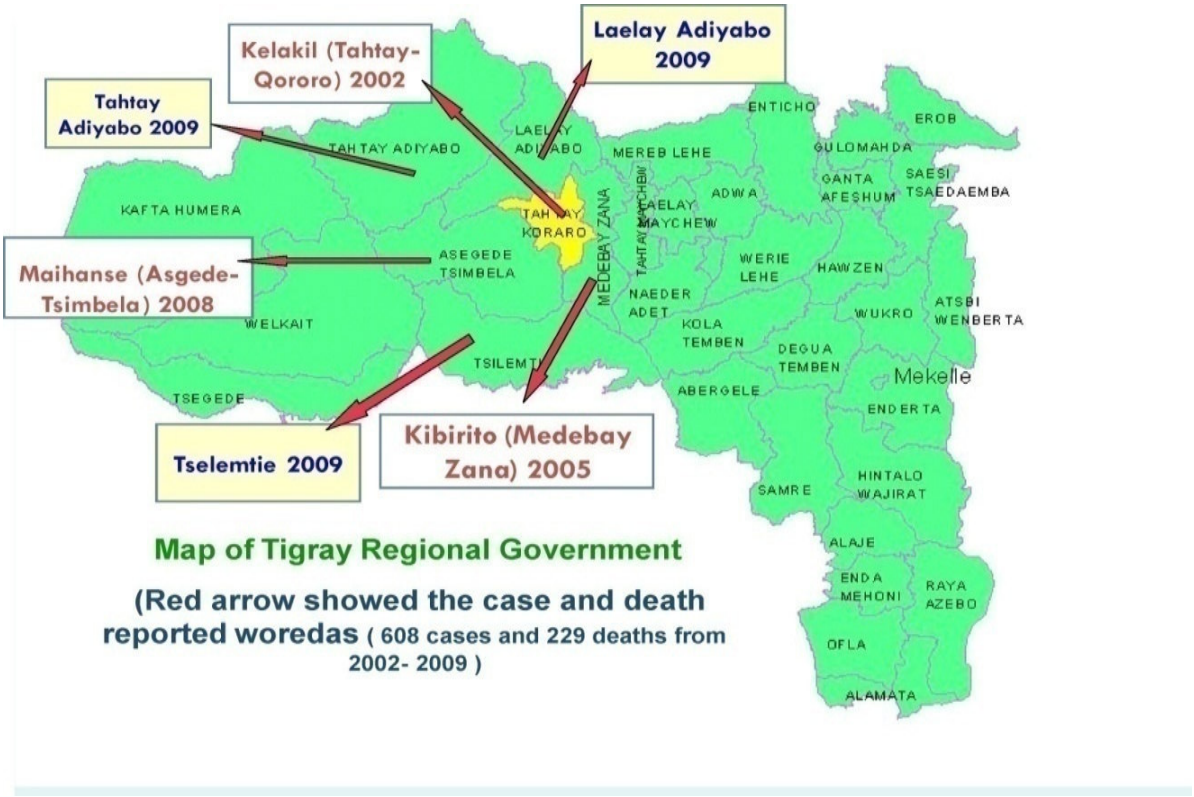

Fig. 1.1.1 Map showing cases of ULD reporting districts of NorthWestern Zone, Tigray, Ethiopia.

Definition of Cases

Cases were defined on the manifestations of symptoms and signs, which they showed over time based on the experiences of some cases that came across the problem some time in the past during the Epidemic situation. Case definition was developed by CDC, WHO and the Regional health bureau. It was designed in a way to capture cases of unidentified liver disease from the community upto Hospital level with the following operational definitions as stated below:-

Operational Case definitions of unidentified liver disease (ULD):

1. **Suspected case** is developed for use in the community when the patient first comes into contact with a Community Health Agent (CHA) or a health extension worker.

- **suspected case** is defined as a person with abdominal distention **AND** either a household member sick with similar symptoms **OR** abdominal cramps/pain for at least two weeks

2. **Possible case** is developed for use in the health center when the patient is being evaluated by a nurse or health officer

- **Possible case** a possible case is defined as a person who meets the suspected case definition **AND** has hepatomegally or splenomegaly.

3. **Probable case** is intended for use in the hospital

- **A probable case** is defined as a person who meets the possible case definition **AND** has a serum alkaline phosphatase (ALP) greater than or equal to twice the upper limit of normal

Result

Descriptive Epidemiology

As of a report indicated by Tigray regional health bureau (unpublished report of a project proposal by planning and coordinating committee on ULD), the first case of unidentified liver disease was in April 2002 from North-Western Zone, Tahtay koraro district, Kelakl Kebele, Emba Tsihdi village. Until June 2010 a total number of 736 patients were reported from 6 districts of North-Western Zone of the region with attack rate of 0.1% (736/674,091). Among these 476 were under clinical follow up in health facilities of the districts and a referral Hospital (Shire Hospital); 247 are died (case fatality rate 33.5%) and 13 of the cases with unknown status.There are a total of 124 kebeles in these six districts and 31% (39) of them reported cases of unidentified liver disease to date.

Table 1.1.1 shows list of districts reporting unidentified liver disease (ULD) cases and number of kebeles affected within each district

S.No	District	Total Number of Kebeles in the district	Number of affected Kebeles in the district	Percent
1	Asged-Tsimbla	27	15	55.6%
2	Medebay-Zana	20	11	55%
3	Laeay-Adiabo	22	7	31.8%
4	Tahetay-Koraro	14	2	14.3%
5	Tahetay-Adiabo	18	2	11.1%
6	Tselemti	23	2	8.7%
	Total	124	39	31.5%

The median age of cases is 18 years old which ranged between 1 and 81 years of age. Age group of 5-14 accounted 32.7% (241/736) followed by ≥ 45 years which comprised 24% (176/736) of the cases. Sixty percent of total cases and 63% of deaths were males.

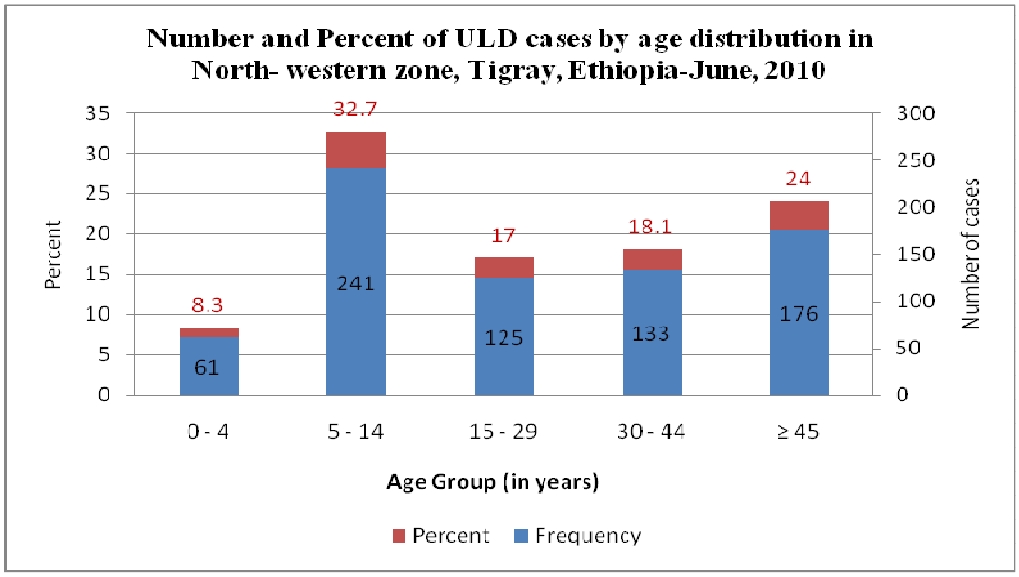

Fig. 1.1.2 depicts number of ULD cases by their age category in North-western zone of Tigray, June 2010

Even though it is difficult to figure out the symptoms and signs of cases of unidentified liver disease in either absolute number/percentage computation, the common manifestations of cases include epigastric pain, abdominal cramp, fever, jaundice (yellow discoloration of the eyes), nasal bleeding, peripheral edema, and abdominal swelling progressing to ascites and death.

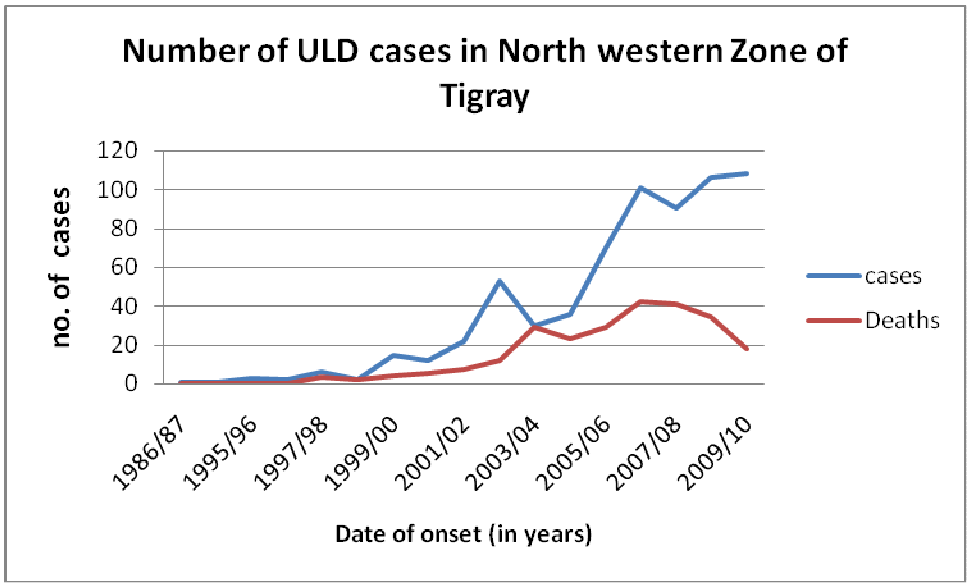

Figure1.1.3 shows number of ULD cases and deaths in years since the detection of outbreak

The number of reported unidentified liver disease (ULD) cases by their date of onset as depicted above is sourced from governmen health facilities and a nongovernmental organization found in the respective zone known as the oasis foundation in which cases were followed by this organization from the outset of the epidemic. And as displayed in the figure, the number of cases was in an increasing fashion since 1986/87. But the number of deaths decreased between the years 2007 and 2008. Here it is to be noted that the number of cases in this figure is less than the total number (420/736) and this indicates that the remaining number of cases has not had their date of onset shown in the registry.

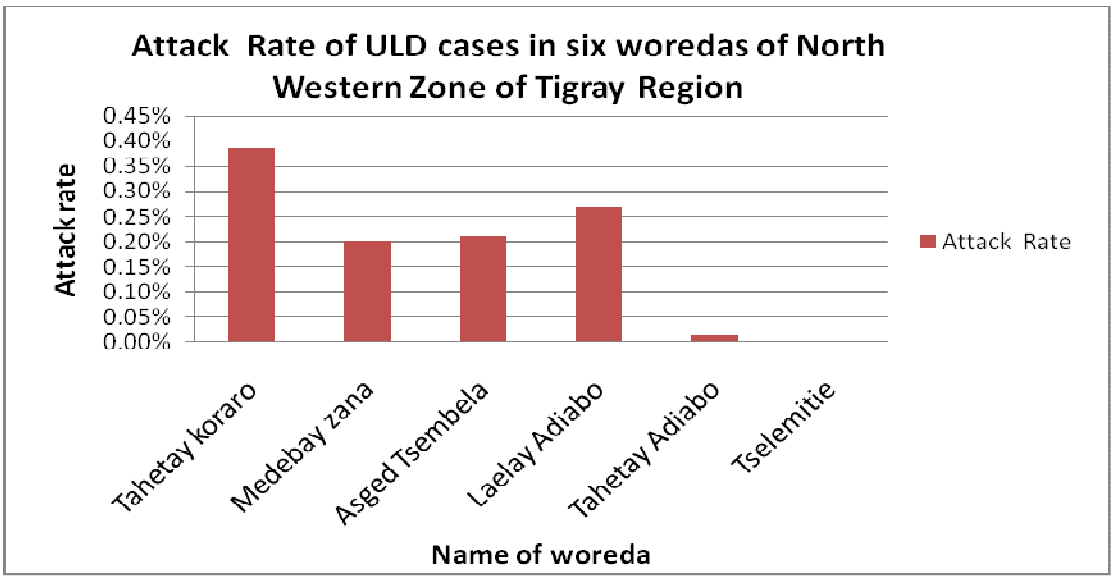

Figure 1.1.4 shows distribution of attack rate of ULD cases in 6 districts of North-Western Zone of Tigray

From the above figure two districts of high attack rate were Tahtay koraro (a district that reported the first ULD case) with attack rate of 0.39% and Laelay Adiabo reported 0.29%. This analysis was done since the beginning of the cases until June, 2010 but reporting of cases still continued even afterwards.

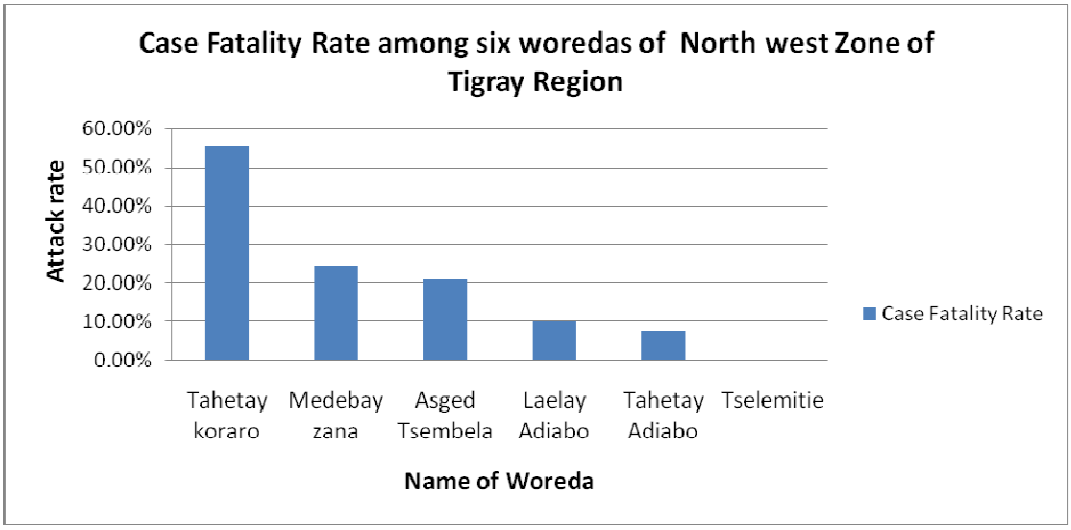

Figure 1.1.5 shows distribution of case fatality rate of unidentified liver disease (ULD) cases by reporting sites in North-Western Zone of Tigray

Over all case fatality rate of ULD cases is 33.6%.Tahtay koraro had highest fatality rate of 55.7% followed by Medebay Zana which accounted 24.6%.

Actions Taken:

Training on surveillance and priority diseases in general, for health workers selected by a representative of the regional health Bureau from all eight districts (Health Centers, Hospital and Health Post) of the zone, was provided by a resident of Field Epidemiology and Surveillnce expert of the region. The training was suited to unidentified liver disease which emphasized on active detection and reporting of cases by the case definition set for ULD to the immediate higher level using an appropriate format.

Community awareness and mobilization were the primary inputs that have been undertaken, by investigating partners (Ministries of Health, Agriculture, CDC, WHO, FAO, Universities of Addis Ababa and Mekele and others) and the local government, as the thought of the community for the cause of the disease was believed to be that of magic acts or an evil-eye (which locally is known as "DEFTERA").

Besides, treatment and other medical care given to the cases include vitamins, spironolactone, antibiotics, and paracentesis at various levels of the health facilities (notably, Health centers and Hospitals). Soya, barley, and sugar were also given as nutrition supplements (unpublished report of a project proposal by planning and coordinating committee on ULD). Psychological support was rendered for those who had lost their family members (by health professionals) so as not to have a feeling of stigmatization and non belonginginess to the respective community.

Discussion

Unidentified liver disease is yet a disease with unknown etiology but different investigations are going on by national planning and coordinating committee composed of different stakeholders and international partners including CDC. The reported health problem might possibly have resulted from prolonged PA exposure; this could be justified by the detection of pyrrolyzidine alkaloid (PA) in some grain samples (*tela*, millet, and *teff*) collected from affected villages. The most abundant noxious weed found in the affected village: *Ageratum Sp*. (locally known as *Hagay-fetewe*) containing PA. It was found distributed widely in the surroundings nearby community residences, drinking water sources and Agricultural grazing fields. This unidentified liver disease is about eight year's old disease (since its past document found in the line list of the Regional Health Bureau) in the Ethiopian history that started in Tahtay koraro

district and then continued to other borders of the district. There was also a report of similar outbreak in 1974- 1976 and 1920 in Afghanistan and South Africa respectively.

Actions taken might have brought in an increased health seeking behaviour of the community and might have changed the community's thoughts for the cause of the health problem to be of non magic acts. The management of cases both medically and nutritionally might also contributed in a decline of dying cases than they were ever done before.

The number of cases reported from health facilities increased from time to time. This increase in the number of cases might indicate either a true increase or the sensitivity of a surveillance system in picking up of cases (that might remain unreported) after an increase in the awareness of the health staff and other community health agents. Only 31.5% of the kebeles in those 6 districts reported ULD cases. Males were more affected and age group of 5 to 14 years accounted a greater proportion which is similar to other countries that experienced a situation like the one in North- western Zone of Tigray.

Tahtay koraro and laelay Adiabo districts were with high attack rate on the reported cases of unidentified liver disease. With regard to case fatality rates Tahtay Koraro and Medabay Zana took the greatest share. Over all case fatality rate (33.5%) for this unidentified liver disease is relatively high with a similar outbreak that happened in Afghanistan in 2001which had a 25% CFR.
Classification of cases by their symptoms and signs was observed as a limitation in this analysis.

Conclusion and Recommendation

Generally it can be concluded that the majority of cases affected by the disease were observed in the age group of 5-14 years, and with a higher proportion of male cases. Case fatality rate was higher when compared with the case in Afghanistan which encountered a similar health problem. Investigations need to be continued to determine the etiology of liver disease (which is referred to as unidentified until this time) and other hypotheses also be looked apart from PAs caused by Ageratum. Documents on how well cases were managed should be sought at all relevant health facilities to evaluate the previous management of cases inorder to recommend better future case management approaches. Reasons for increased case fatality rate must also be searched and possible solutions put in reducing the number of fatal cases.

Acknowledgment

The Authors would like to thank a surveillance focal person (assigned by the Regional Health Bureau of Tigray) for unidentified liver disease Ato Yohanes G/hawaria for providing the required information on ULD and highlighting on the situation during the start of the work. We also recognize the health professionals working in different health facilities, administrative bodies of the zone, districts and Kebeles for their cooperation in various activities.

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1.2 Outbreak of Pandemic Influenza A (H1N1) — Illu Aba Bora Zone, Oromia, Ethiopia, November 2010

Ghidey G/Libanos[1],Beyene Kidu[1], Workenesh Ayele[2], Tamene Abdissa[3], Woubayehu Kassa[2], Ketema Belda[4], Zegeye H/mariam[1], Almaz Abebe[2], Daddi Jima[2], Richard Luce[5], Adamu Addissie[6]

Abstract

Background: In November 2010 an outbreak of acute influenza-like illness was reported among inmates housed in a prison near Gore town, Illu Aba Bora zone in Oromia region. The outbreak quickly spread to the wider community. A team from EHNRI was dispatched to verify the existence of outbreak, determine the etiology and assist in control and prevention activities.

Methods: Patient registers were reviewed from the health facilities to gather clinical and epidemiological information about suspected cases. Throat swabs from acutely ill patients with influenza-like illness were obtained from 22 individuals at 4 sites in different districts within Illu Aba Bora zone (Alle, Chora, Bedelle and Didesa). The selected sites were Gore prison (N=5), Abdella clinic (N=9), Bedelle health center (N=4) and Denbi health center (N=4). Specimens were stored and transported under refrigerated conditions until laboratory testing was conducted. Quantitative data were entered and analyzed using Microsoft office-excel and the qualitative data were narrated.

Results: From 28 October to 5 November 2010, 86 patients (79 prisoners from Gore prison camp and 7 residents of Gore town) presented with acute influenza-like illness at Gore health center. Patients' ages ranged from 2-56 years, with a median of 28 years. All reported fever and cough. The attack rate among prisoners was 53% (79 out of 150 prisoners). No deaths were recorded. Sixteen of 22 (73%) individuals sampled were positive for pandemic influenza A (H1N1) 2009 virus; none were positive for seasonal influenza viruses.

Conclusion: A laboratory-confirmed outbreak of pandemic influenza A (H1N1) 2009 was identified in 4 districts of Illu Aba Bora zone in Oromia Region; however, neither the source of introduction nor the index case could be identified. The outbreak demonstrated the difficulty in reporting an immediately notifiable disease that cannot be distinguished from any other acute respiratory illness based on clinical features alone. Laboratory-based surveillance for any influenza-like illness or severe acute respiratory illness (ILI/SARI surveillance) is necessary to conclusively determine etiology in outbreaks of respiratory disease.

Key words: pandemic influenza A (H1N1) 2009, influenza-like illness outbreak, Illu Aba Bora zone, Oromia regional state, Ethiopia

Background

Influenza is an acute and highly contagious viral disease of the respiratory tract characterized by fever and respiratory tract symptoms (cough, coryza, and sore throat), headache, myalgia, and prostration. Occasionally nausea, diarrhea and vomiting may occur**.** Influenza virus infection occurs after transfer of respiratory secretions from an infected individual to a person who is immunological susceptible. But people may also become infected through touching inert objects having influenza viruses on the surface (fomite transmission), and then touching their mouth or nose (1).

Influenza virus shedding begins the day prior to symptom onset and often persists for five to seven days or longer in children, especially in young infants (2). Peak viremia occurs during the first two to three days of illness. If symptoms persist for more than 7 days, the chances of communicability persist until resolution of illness. Laboratory confirmation of influenza virus infection can be done by isolation of viruses from throat, nasal and nasopharyngeal secretions or tracheal aspirate or washings (1).

Three types of influenza virus are recognized: A, B, and C. Influenza A and B can cause outbreaks of serious human illness whereas influenza C causes only mild disease (1). Influenza viruses are constantly undergoing evolution and epidemics occur whenever there are small changes in the viral genome which accrue over time resulting in the creation of new strains, a process known as antigenic 'drift'. The new influenza virus strains can evade the host immune system since the immunity gained from previous infections or after vaccination, may not afford significant protection against the newly emerged strains.

Influenza A virus can be found in many different vertebrate species and it is also the only one to cause pandemics. This occurs through a process of antigenic 'shift' where there is a sudden and dramatic re-assortment of viral genes producing a radically altered strain of influenza virus to which humans are totally susceptible. An influenza pandemic is characterized by an explosive global spread of influenza due to the circulation of a novel strain of influenza A virus in humans, with capacity for sustained and efficient human-to-human transmission resulting in a high number of cases and/or deaths. With the increase in global transport and communications, as well as urbanization and overcrowded conditions, epidemics due to new influenza viruses are likely to be established quickly around the world**.** Global pandemics have been reported since the middle Ages. The most well documented pandemics occurred in 1918 (H1N1, the Spanish flu), 1957 (H2N2, the Asian flu) and 1968 (H3N2, the Hong Kong flu) (3).

A novel influenza A (H1N1) virus containing genes from humans, swine and avian species and never before linked to human disease emerged among people in Mexico in late March and early April 2009.

The triple reassortant virus then spread with travelers worldwide, resulting in the first influenza pandemic of the 21st century (4, 5). The World Health Organization (WHO) first declared the pandemic in June 2009, when the virus had spread to most regions of the world at an alarming rate (6). The incubation period of the novel influenza A (H1N1) virus appeared to be approximately 2-3 days, but could range up to 7 days. The majority of illnesses caused by pandemic influenza A(H1N1)2009 virus as it subsequently became known, have been self-limited mild to moderate uncomplicated disease, however severe complications including fatal outcomes have been reported (7). As of August 1, 2010 more than 214 countries and overseas territories or communities had reported laboratory confirmed cases of pandemic influenza A (H1N1)2009 virus, including over 18,449 deaths worldwide (8). Unlike previous pandemic influenza viruses of the past century, pandemic influenza A(H1N1) 2009 virus had low virulence even though its transmissibility was still high (9)]. By August 2010 the World Health Organization (WHO) officially declared 2009 pandemic influenza A (H1N1)) to be over, and the start of the post-pandemic phase**.** By that time the virus was so widespread and had completely replaced seasonal influenza viruses in many parts of the globe. Thus it was no longer considered differently from other seasonal flu viruses. However it was recognized that it could still cause pockets of outbreaks, particularly in areas and communities where it had not previously spread (10).

In Ethiopia confirmed pandemic influenza A (H1N1) virus infection was first identified in June 2009, in Addis Ababa**.** The index cases were students returning after a period of study in the United States. In the months immediately following the identification of the index cases, most cases were associated with travel history to places where the virus was already known to be present. However gradually a number of cases were also noted in those without any travel history, indicating that the virus had spread and that local circulation was already taking place. This was the case for Addis Ababa and also in some regions**.** As on 30th October, 2010, three hundred fifty three (353) persons have been tested so far of which 36 are positive for pandemic influenza A (H1N1) 2009 virus (11).

Health officials of Illu Ababora zone were alerted of the unusual respiratory illness in mid October, 2010 following the occurrence of clustering of cases among all age groups in large segments of the population within a relatively short period, resulting in a sudden unusually high patient flow seeking medical care

within all health facilities of the area. This was coincided with pandemic influenza A (H1N1)2009 vaccination campaign conducted in Jimma town. All patients within the acute phase of infection reported with similar symptoms including: fever, coryza, cough, myalgia, and headache. In light of this there was suspicion among health officials that the illness might be due to pandemic influenza.

In 5 November 2010 an investigative team consisting of residents from the field epidemiology training program (AAU), the national influenza laboratory (EHNRI) and the Oromia regional laboratory branch in Jimma responded to a call from the Oromia regional health bureau, to verify the existence of outbreak, determine the etiology of the unusual acute respiratory illness of unknown origin and provide guidance in the control of the outbreak.

Methods

Investigation Sites

Illu-AbaBora zone is found in the Western part of Oromia region. Administratively it consists of 24 districts including two town administrations. The zonal capital is based at Metu town and is located at 600 km away from Addis Ababa. According to National 2007cencus projection the zone has an estimated total population of 1,476,125 million in 2010. The zone is bordered with Jimma zone in the East, Kelem Welega zone in the North West, West and Eeast welega zones in the North, and Gambele region and in the South.

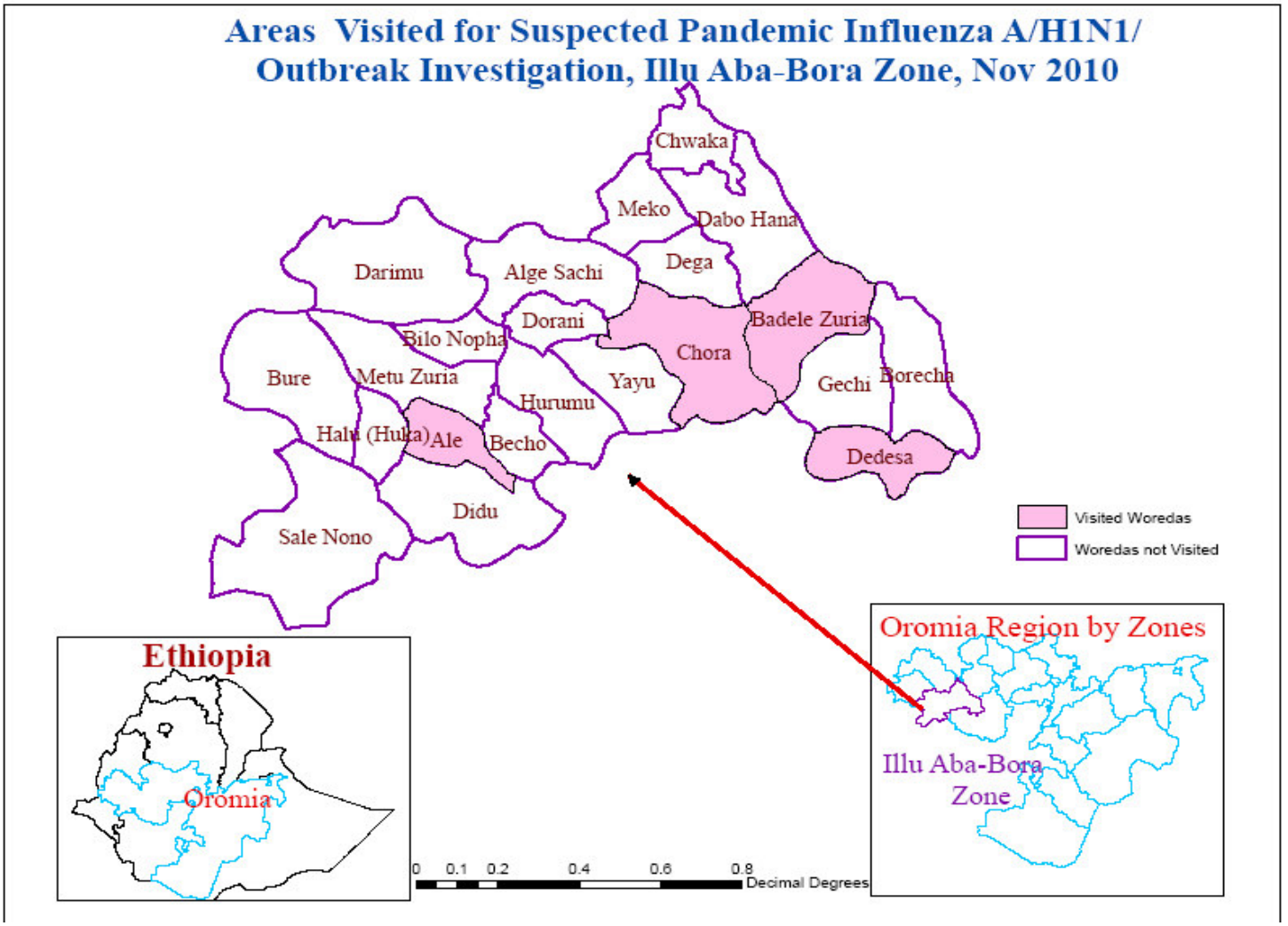

Fig.1.2.1 Map of H1N1 affected districts of Illu-AbaBora zone of Oromya Region, Ethiopia 2010

Investigation was conducted in the four districts from which cases were reported, including Ale, Chora, Bedele and Didesa districts of Illu Aba Bora zone.

Case Definitions:

For this investigation a suspected pandemic influenza A (H1N1)2009 case was defined as any person with influenza- like illness (ILI). A case of influenza- like illness in turn was defined as any resident of the four localities who had experienced a sudden onset of fever and cough and or sore throat in the absence of other known causes other than influenza. A confirmed case of pandemic influenza A(H1N1) 2009 was defined as a person with ILI and laboratory evidence of pandemic influenza A(H1N1) 2009 virus infection diagnosed by real time RT-PCR testing of a throat swab specimen.

Data Collection Methods:

- Regarding the overall situation of the outbreak, discussions were held with officials from the zonal health department and district health office heads as well as with surveillance focal persons assigned to the area.
- Patient registers were reviewed to collect information with regard to the clinical and epidemiological information of suspected cases. The list of suspected pandemic influenza A (H1N1)2009 cases from Gore prison and Gore town were obtained through review of the logbooks at Gore health center. Clinical diagnosis of the cases was verified by a physician from Metu hospital on 3 November 2010.
- From 7-8 November 2010, respiratory specimens were obtained from 22 influenza-like illness cases. Site of specimen collection included Gore prison camp (N=5), Bedele health center (N=4), Abdella clinic (N=9) and Denbi health center (N=4). Most of the cases were in the acute stage of infection. Nine of those sampled were individuals who had failed to improve after a course of antibiotic treatment.

Laboratory Procedure:

Throat swabs were collected from suspect cases using viral transport medium (Becton Dickinson).

Specimens were maintained under cold chain until laboratory analysis. RNA was extracted from respiratory specimens using a commercial RNA extraction kit (RNA Mini kit, QIAGEN). Five micro liters of extracted RNA from each patient was used in separate 20ul reaction mixtures (AgPath, Ambion) containing different influenza primers and probes (CDC Influenza Division, Atlanta, USA): influenza A,

influenza B and influenza A subtypes (seasonal A/H1, seasonal A/H3, swine influenza A and swine H1/ [2009 pandemic influenza A (H1N1)]. A control for amplification was also included (RNAse P). Amplification was carried out on an Applied Biosystems (AB) 7500 Fast real-time PCR system for a total of 45 cycles. Threshold for positivity was calculated for all positive specimens, including seasonal and swine influenza positive controls.

Data Entry and Analysis:

The qualitative data obtained from the health officials were narrated and the clinical, epidemiological and laboratory data were entered and analyzed using Micro-soft excel**.**

Results

General description of the Outbreak:

The zonal health officials in Illu Aba Bora zone recognized there was an unusual increase of acute influenza-like illness which began sometime in mid October 2010. According to the zonal surveillance focal person, four districts (Ale, Chora, Bedele and Dedesa) had reported an unusual increase in acute influenza-like illness within their catchment areas but none of the districts identified the index cases. Zonal health officials recognized that a campaign of pandemic influenza vaccination had been recently ongoing in the country but this vaccination had not been conducted in high risk groups in any of the districts of Illu Aba Bora zone.

In Ale district cases were reported from Gore town and Gore prison camp. The cases from Gore prison camp were seen at Gore health center on 28 October, 2010. The Ale district health office reported the event to Illu Aba Bora zonal health office on 1st November, 2010. In response, the zonal health office dispatched a team comprised of one physician from Metu hospital and the zonal surveillance focal person to the site for clinical and epidemiological investigation. The team investigated cases from Gore prison camp and Gore town who sought medical consultation at Gore health center from 28 October to 5 November 2010. The clinical investigation showed that 79 of the 150 prisoners and 7 individuals from Gore town had acute influenza-like illness. The clinical investigation also revealed that all patients within the acute phase of infection reported with similar symptoms including: fever, coryza, cough, myalgia, and headache. On the basis of the clinical finding the physician suspected the illness might be due to pandemic influenza and suggested laboratory investigation. Also in Ale district school absenteeism was reported from one primary school and one high school. Ninety-seven out of 208 (47%) and 24 out of 52 (46%) primary and secondary school students respectively were absent from school because of fever and acute respiratory symptoms.

Surveillance:

The case definition that was being used to identify suspected cases of pandemic influenza was the same case definition that was adopted at the very start of the pandemic. It included a reference to history of recent travel outside of Ethiopia to a location where pandemic influenza was already present, and also having had contact with a confirmed case of pandemic influenza within the past 7 days.

There was inadequate awareness about recent progress/developments concerning global pandemic influenza situation in general. In some cases there was not even the awareness that the virus had been detected in Ethiopia since June 2009.

The record review in four visited health facilities (one from each affected districts) revealed that individuals presenting with flu like symptoms were clinically diagnosed as influenza like illness, AFI, pneumonia, common cold and bronchitis during this period.

Cases were not registered in a separate outbreak registration or a line listing form and the case registration lacked important variables like date of onset of illness of a patient.
Active case search and case tracing was not in place in all the affected areas.

Epidemiological and clinical findings of suspected pandemic influenza A (H1N1)2009 virus cases in Gore town and Gore prison from records reviewed (N=86).

The age range of influenza-like illness/suspected pandemic influenza A (H1N1)2009 cases was from 2 through 56 years, with a median age of 28 years. All cases from Gore prison camp (N=79) were males. Of 7 cases from Gore town, 4 were females (57%). The clinical attack rate in Gore prison camp was 53% (79/150).

Fever and cough were two clinical symptoms which were present in all cases. Amongst prisoners at Gore prison camp other notable clinical signs included runny nose, sore throat and myalgia. None of the prisoners experienced any abdominal pain or diarrhea. In contrast the cases from Gore town (N=7) reported gastric disturbance in 2 individuals (29%) (Table1). All cases were mild and no death was reported.

Table1.2.1 Number of suspected pandemic influenza A (H1N1)2009 virus cases in Gore prison camp and Gore town reporting specific symptoms, November, 2010

Symptoms	Total Cases (N=86)	Frequency of cases, Gore Prison (N=79)	Frequency of cases, Gore town (N=7)
Fever	86	79 (100%)	7 (100%)
Cough	86	79 (100%)	7 (100%)
Runny nose	59	56 (71%)	3 (43%)
Myalgia	60	53 (67%)	7 (100%)
Sore throat	54	52 (66%)	2 (29%)
Headache	52	47 (59%)	5 (71%)
Back pain	42	40 (51%)	2 (29%)
Shortness of breath	47	45 (57%)	2 (29%)
Abdominal pain	1	0 (0)	1(14%)
Diarrhea	1	0 (0)	1(14%)

In Gore the surge in cases reporting to health facilities with symptoms of acute influenza-like illness peaked towards the end of October 2010. Disproportionately affected were individuals in the prison camp although there were some community cases which were also occuring simultaneously. However by the time that the investigative team arrived in Gore town (7 November 2010), the number of cases in the community was virtually nil (Fig.1.2.2).

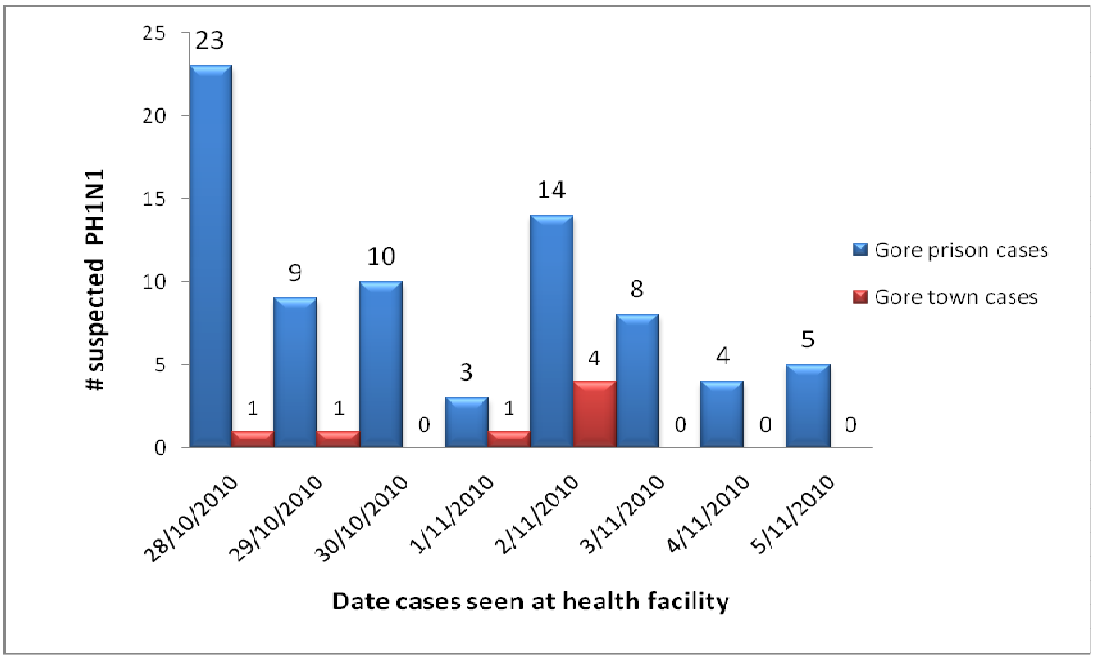

Fig1.2.2 Distribution of ILI/suspected pandemic influenza A (H1N1)2009 virus cases in Gore prison camp and Gore town by date seen at health facility, Illu Aba Bora zone, November, 2010

Note: In Fig1.2.2 the distribution of ILI symptoms is presented by the date that the patients were first seen at the health facility since data on date of onset of influenza-like illness symptoms was unavailable in patient registries.

The age group most affected in Gore (Ale district) tended to be young adults in the age range 26-33years (N=32) followed by those 18-25 years (N=29) and those 34-41 years (N=17). Together these 3 age categories accounted for 78 cases (91% of total cases present) (Fig.1.2.3).

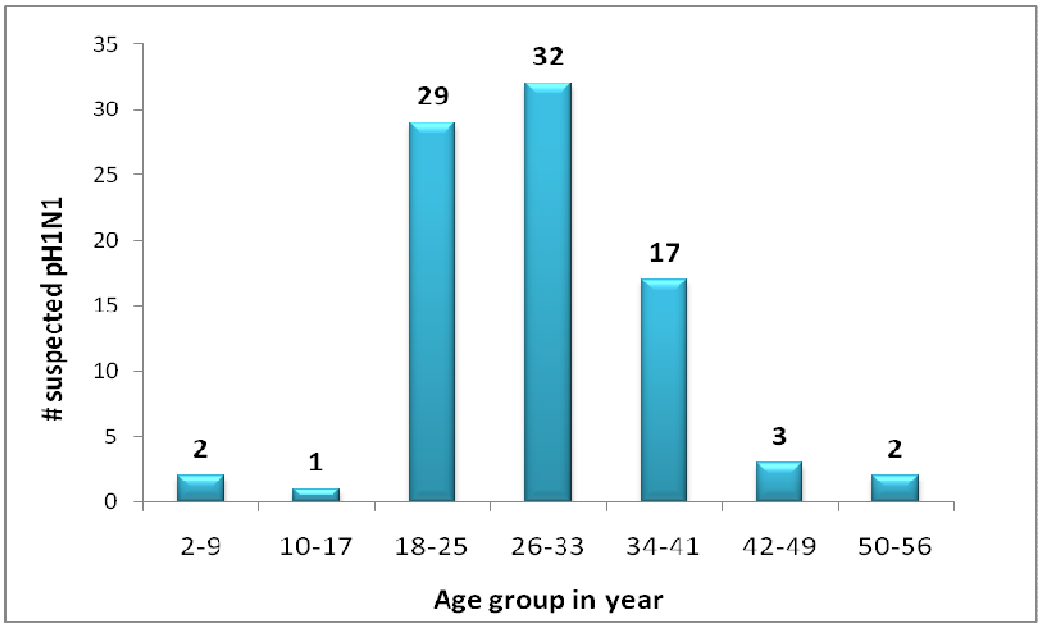

Fig.1.2.3 Distribution of suspected pandemic influenza A (H1N1)2009 virus cases by age group in Gore prison and Gore town, Illu Aba Bora zone, November, 2010

Epidemiological, clinical and laboratory investigation findings of suspected cases from the four localities:-

a) Epidemiological and clinical Findings:

Out of 22 individuals from whom a respiratory specimen was obtained there were 13 males and 9 females. Patients' ages ranged from 7-60 years, with a median age of 25 years.

The most commonly presenting clinical symptoms in those sampled were cough (100%), fever (82%), runny nose (77%), headache (68%) and sore throat (36%). The same five clinical symptoms were found to be the most commonly presenting ones in those individuals with confirmed pandemic influenza A (H1N1)2009 virus infection. None of the individuals with confirmed 2009pandemic influenza A (H1N1) virus infection suffered from nose bleeds, or a feeling of thirst or burning sensation (Table 1.2. 2). Out of the 22 individuals, 9 cases had received antibiotics and antipyretics but without clinical improvement. All cases were mild and no death was reported.

Table1.2.2 Number of suspected pandemic influenza A (H1N1)2009 virus cases sampled for laboratory investigation reporting specific symptoms, from four localities, Illu Aba Bora zone, November, 2010

Presenting Symptoms	Cases Sampled (N=22)	Cases Confirmed (N=16)
Cough	22(100%)	16 (100%)
Fever	18(82%)	14 (88%)
Runny nose	17(77%)	13(82%)
Headache	15(68%)	11(69%)
Sore throat	8(36%)	5(31 %)
Myalgia	3(14%)	3(19%)
Back pain	3(14%)	3(19%)
Anorexia	1(4.5%)	1(6.3%)
Nose bleeding	1(4.5%)	0 (0%)
Feeling thirsty	1(4.5%)	0 (0%)
Burning sensation	1(4.5%)	0 (0%)
Chest pain	1(4.5%)	1(6.3%)
Shortness of breath	2(9%)	2 (13 %)

b) Laboratory Findings:

Sixteen (73%) out of the 22 respiratory specimens were positive for influenza A virus and none were positive for influenza B. The influenza A-positive samples were sub-typed further; all were positive for pandemic influenza A (H1N1)2009 virus infection. No seasonal influenza viruses were present. One additional sample which was positive for influenza A remained below the threshold of positivity for general swine influenza A and also swine H1 viruses (pandemic influenza A(H1N1) 2009). It was classified as indeterminate. Specimen integrity was good in all cases as seen from amplification of RNase P gene from extracted samples, including from influenza-negative specimens.

The number of samples tested and those with positive pandemic influenza A (H1N1)2009 results from each of the 4 sites are displayed below (Fig.1.2.4).

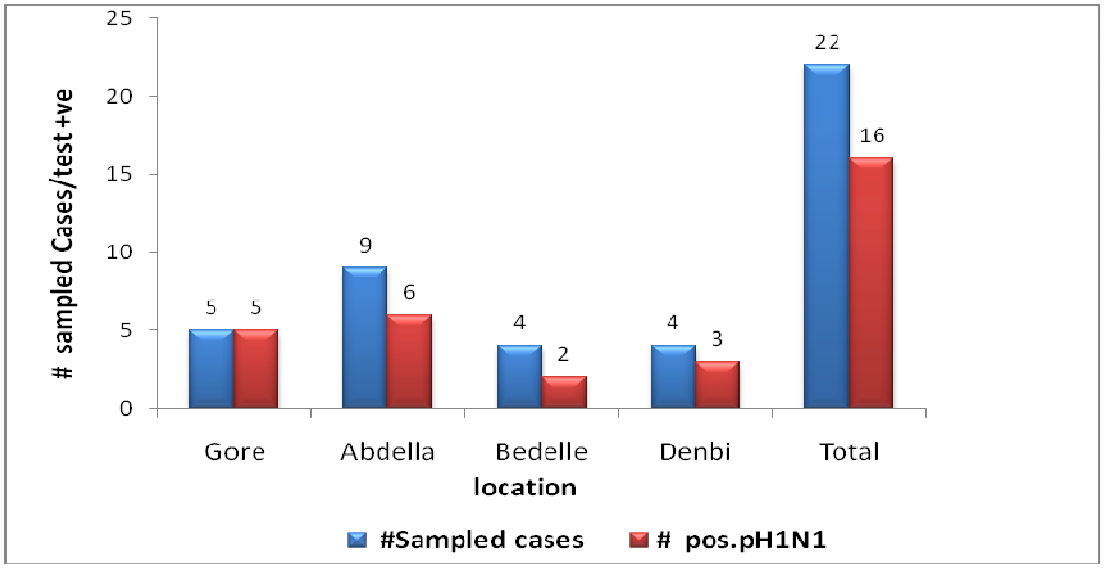

Fig.1.2.4 Number of cases sampled for lab test and confirmed pandemic influenza A (H1N1)2009 by location, Illu Aba Bora zone, 7-8 November, 2010

Note: Cases whose specimens were sampled for laboratory investigation in Gore were all from the prison camp. All the suspected cases sampled for laboratory investigation from Gore and Bedelle were individuals who had not shown improvement on antibiotics treatment and the remaining were cases who didn't start treatment. Of the 22 respiratory specimens collected over a 2-day period during the outbreak investigation, the majority were obtained within 1 week of the onset of flu-like symptoms whilst a few

samples were obtained from individuals who had manifested clinical symptoms for a longer duration (Fig. 1.2.5).

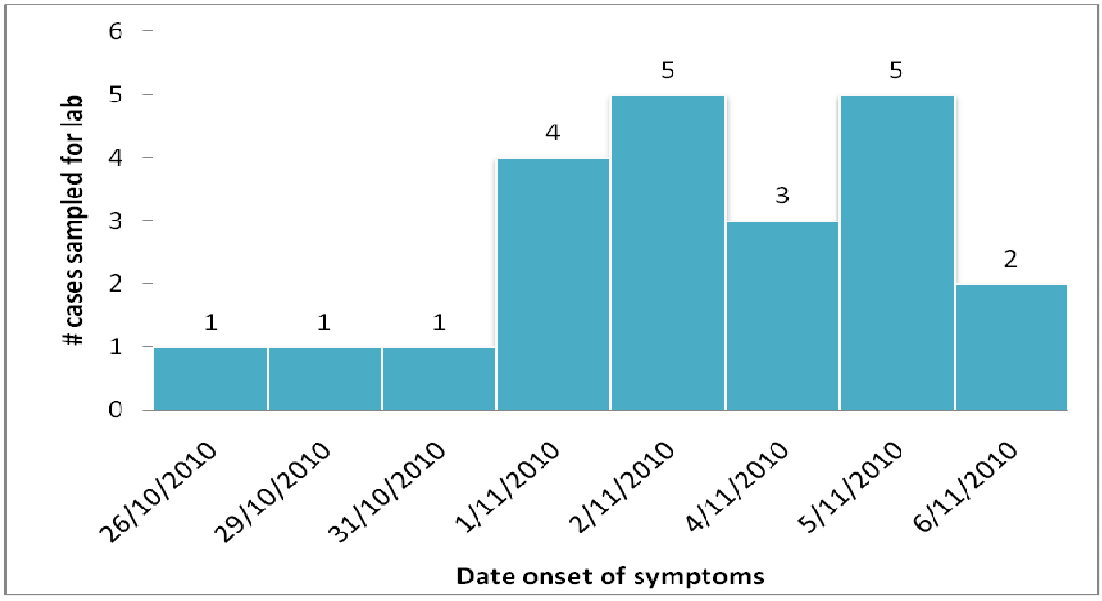

Fig. 1.2.5 Number of suspected pandemic influenza A (H1N1)2009 virus cases sampled for lab test by date of onset of symptoms from localities, Illu Aba Bora zone, 7-8 November, 2010(N=22)

The highest number of cases who were sampled were in the age range 16-33 years (N=14), out of which 11 (79%) were confirmed pandemic influenza A (H1N1)2009 cases. Only 5 of the sampled individuals were in an older age category and out of those ones, there were 3 confirmed pandemic influenza cases (60%) (Fig.1.2.5).

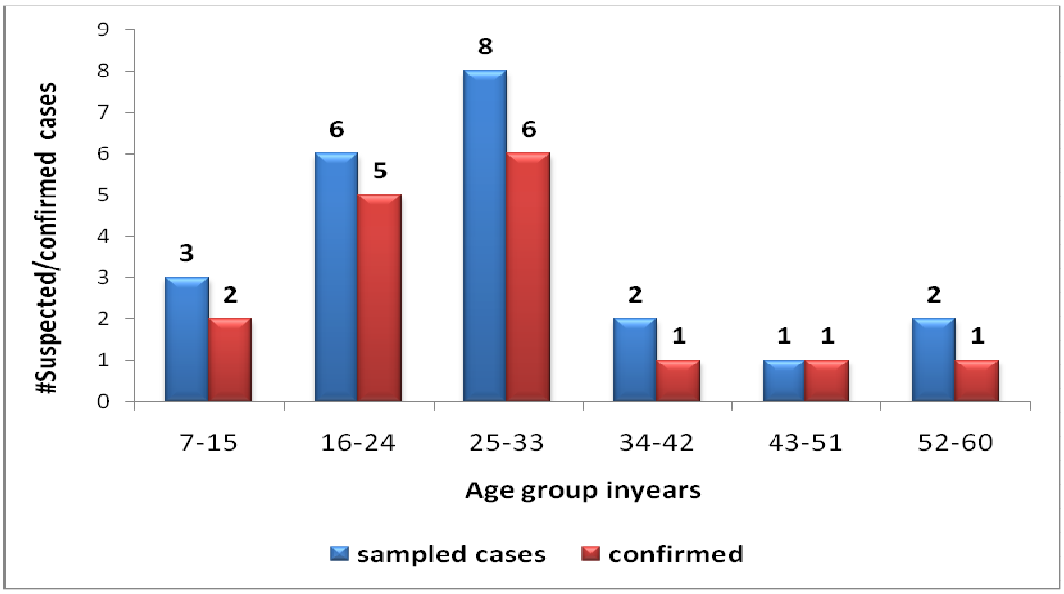

Fig.1.2.6 Age distribution of sampled and confirmed pandemic influenza A (H1N1)2009 virus cases from four localities (Gore, Abdella, Bedele, and Denbi), Illu Aba Bora zone, 7-8 November, 2010

Discussion

Confirmed pandemic influenza A (H1N1) 2009 virus was identified from all four sites (one site from each district). This may imply that pandemic influenza has made significant entry into these communities, making it likely that many individuals would have been exposed by now and perhaps also built some immunity against it.

In all four districts that reported suspected pandemic influenza A (H1N1)2009 index cases were not identified which resulted in of difficulty understanding of the introduction of the virus in the community. Though the unusual increase of influenza like illness was observed in some districts within Illu Aba Bora zone three weeks before the confirmation, there was a delay in reporting of the situation to the higher level which in turn resulted in a delay in response.

There was inadequate awareness among health officials and health providers about recent progress/developments concerning global pandemic influenza situation in general. This might be due to poor information dissemination or ignorance starting from federal level to grass root level.

All cases presenting flu-like symptoms were treated with anti-biotics and antipyretics. There was no antiviral drug available in any of the districts of Illuababora zone and no pandemic influenza (H1N1) 2009 vaccination of high risk group was conducted.

Age-specific frequency of cases was highest among young adults 16-33 years in confirmed cases and 18-33 in suspected cases, with the lowest frequency of cases among old age, a pattern that is consistent with reports from other countries.

The clinical cases attack rate at Gore prison camp was very high reached 52.6% (79/150) this might be contributed by factors such as environmental conditions of the premises and the contact rate between infectious and non infectious cases among the prisoners.

As observed from patient registries cases with flu-like symptoms were diagnosed as influenza like illness, in many cases, pneumonia, AFI, common cold and bronchitis which might underestimate the true incidence of pandemic influenza A (H1N1).

The case definition which they were using to identify suspected cases of pandemic influenza A (H1N1)2009 virus infection was the case definition adopted in the very start of the pandemic which encompasses travel history outside Ethiopia and contact history with confirmed cases within 7 days of onset of first symptoms as one defining criteria. But since no one in the affected communities had any record of recent travel outside the country, there was reluctance to report the outbreak of flu-like illness as possibly being pandemic influenza. In fact it is difficult to distinguish pandemic influenza (H1N1) virus infection from other respiratory illnesses via only clinical symptoms if not diagnosis is supported with laboratory. Even the current working case definition set by FMOH for the routine surveillance to detect suspected pandemic influenza A (H1N1) is more or less similar except the current case definition excludes travel history. So, the case definition should be very sensitive enough to detect the disease and needs some modification.

Measures taken:

- Clinical investigation of cases by physician only in Gore
- All cases were treated with antibiotics and antipyretics
- Respiratory specimens of suspected cases of pandemic influenza A (H1N1) were collected and tested
- Clarification was provided on the status of pandemic influenza A (H1N1) 2009 globally and in Ethiopia, besides updated case definition was provided to be used to detect suspected cases of pandemic influenza A (H1N1) 2009.
- Orientation was provided to health officials and healthcare providers in case registration during outbreak situation.
- Line listing forms were provided to Illuababora zonal health officials.

Conclusions

A laboratory-confirmed outbreak of pandemic influenza A (H1N1) 2009 was identified in 4 districts of Illu Aba Bora zone in Oromia Region; however, neither the source of introduction nor the index case could be identified. The outbreak demonstrated the difficulty in reporting an immediately notifiable disease that cannot be clinically distinguished from other acute respiratory illnesses. Laboratory-based surveillance for influenza-like illness or severe acute respiratory illness (ILI/SARI surveillance) is necessary to conclusively determine etiology in outbreaks of respiratory disease.

Though pandemic influenza A (H1N1) 2009 was confirmed in the four districts, there is no 100% confidence that the silence districts within the zone are really free of the disease. The findings of this investigation might not accurately represent the real magnitude of the outbreak within Illu AbaBora zone.

Recommendations

Increase awareness among health officials, healthcare providers and the wider community about new emerging respiratory diseases.

The case definition should be modified to the point it can be more sensitive to detect suspected cases of influenza like illness.

During outbreaks continuous enhanced surveillance should be in place.

Timely and appropriate communication or information dissemination system from higher to lower lever or vice versa should in place

Acknowledgment

The authors would like to thank Oromia Regional Health Bureau (RHB) and in particular health officials from Illu Aba Bora zone who accompanied the team on the outbreak investigation and rendered all their support. In addition we are also very grateful to CDC Influenza Division in Atlanta (USA) for providing us with all the diagnostic reagents and materials necessary for the laboratory investigation.

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Chapter II – Surveillance Data Analysis Report

2.1 Description of National HIV counseling and testing July 2006- June 2008

Ghidey G/libanos

Abstract

Background: HIV Counseling and Testing (HCT) is the key entry point to prevention, care, treatment and support services, where people learn whether they are infected, and are helped to understand the implications of their HIV status and make informed choices for the future. Analyzing this secondary data is aimed at describing the HIV situation for Ethiopia by person, time and place based on the data obtained on Voluntary HIV counseling and testing for the years 2006- 2008.

Methods: National data was found from Federal HIV/AIDS prevention and Control Office (HAPCO), entered and analysed using Microsoft Excel.

Results: over all 7,911,958 persons were counseled and tested for HIV in three years. For the years 2006 and 2008 females accounted 283,496 (50%) and 2,132,549 (47.05%) respectively. Total positive cases in 2006 through 2008 accounted 344,269 (4.35%). Female HIV positive cases were 44,645 (57.87%) and 95,498 (59.1%) for the first and the third year respectively. The percent of positive cases for the three years (2006, 2007 and 2008) showed incremental pattern as 22.4%, 30.6% and 46.9% respectively. Percent of cases tested positive by regional distribution was highest in Gambela (15.3%) followed by Addis Ababa (11.58%) and least in Somali (1.67%) followed by Tigray (1.76%).

Conclusion and Recommendation: The analysis concluded that gender sensitive (female targeted) strategies are among the top priority areas in the reduction of HIV positive cases.

Reports should contain important variables such as sex. Gender based intervention on HIV counseling and testing is mandatory and requires emphasis.

Key Words: National, Federal HAPCO, HIV/AIDS, HIV counselling and testing

Background

HIV is the greatest health crisis the world faces today. An increasing burden is being placed on women and children, who are experiencing growing rates of AIDS-related illness and death in many settings. Globally, about half of all adults living with HIV are women and 2.5 million children are living with the virus (1).

An estimated 33.2 million people worldwide were living with HIV in 2007; 2.5 million became newly infected with HIV; and 2.1 million lost their lives to AIDS. Sub-Saharan Africa (SSA) continues to be the region most affected by the AIDS epidemic. More than two out of three (68%) adults and nearly 90% of children infected with HIV live in this region, and more than three in four (76%) AIDS deaths in 2007 occurred in SSA (2).

Since the first evidence of HIV epidemic was detected in Ethiopia in 1984, AIDS has claimed the lives of millions and left behind an estimated 744,100 orphans. According to the national single point estimate, 1.3 million persons are estimated to be currently living with HIV in 2009.During the same time period, national HIV prevalence was estimated to be 2.2%, with urban and rural prevalence of 7.7% and 0.9% respectively (3).With a population estimated at nearly 80 million, Ethiopia is the second most populous country in Africa next to Nigeria. The HIV epidemic started in the mid-80s in Ethiopia. The first sera with HIV antibodies date back to 1984, and the first AIDS cases were diagnosed in 1986 in Addis Ababa, the Capital City (4).

HIV Counseling and Testing (HCT) is the key entry point to prevention, care, treatment and support services, where people learn whether they are infected, and are helped to understand the implications of their HIV status and make informed choices for the future. Currently, most people remain unaware of their HIV status due various reasons. However, with the development of affordable and effective medical care for people living with HIV, demand for testing is increasing rapidly, creating urgent need to increase access. The availability of HCT services in Ethiopia has been uneven, and even when available, uptake has been relatively low. Many people are reluctant to learn their HIV status when medical care for HIV-related illnesses and psychosocial support does not exist, and in the absence of community support and legal protection when they face discrimination and social marginalization (5).

HIV/AIDS counseling and testing (HCT) services vary according to Clients' needs**.** No single approach or service delivery model is suitable for all populations, or feasible in all settings. Choices and approaches depend on the needs, availability of resources and accessibility. Voluntary counseling and testing (VCT) is initiated by clients seeking to know their HIV status. HIV testing in the context of VCT is considered public or social testing and constitutes a prevention strategy. Provider-initiated HIV testing and counseling is voluntary a brief counseling or pre test education/information.HCT services can be provided through the following four models of delivery: **Integrated services-** services are provided in public, NGO and private health facility settings, as designated VCT units or under other programs such as OI and ARV drug management (5). It is also offered within the antenatal setting, STI clinics, PMTCT, pediatric services and family planning clinics (6, 7). **Stand-alone services-** services are provided at sites outside health facilities; sometimes linked with care and support services. **Outreach and mobile services-** services considered for special populations such as people in remote rural areas, pastoralists, refugees and prisoners. Outreach HCT can be provided in mobile vans or in other premises, such as kebeles, churches and schools. These services can be integrated with existing primary health care services. **Work place services** HCT services can be provided by trained practitioners in governmental agencies, NGO, and private sector institutions as part of comprehensive workplace HIV programs (5). Therefore, based on a three year secondary data on Voluntary HIV counseling and testing, description on the magnitude of HIV situation in Ethiopia was conducted with possible recommendations drawn.

Methodology

A national data is obtained from Federal HIV/AIDS prevention and control office (HAPCO) for the years 2006-2008 on HIV/AIDS voluntary counseling and testing services. Data is entered and analysed using Microsoft Excel.

Result

Over all 7,911,958 persons were counseled and tested for HIV in the three years. The proportion of sexes cannot be computed for all three years together as data is not available for 2007. But for the years 2006 and 2008 females accounted 283,496 (50%) and 2,132,549 (47.05%) respectively. Total positive cases in 2006 through 2008 accounted 344,269 (4.35%). For female HIV positive cases 44,645 (57.87%) and 95,498 (59.1%) is calculated in the years of which female reports were obtained.

An increase in the number of counseled and tested cases is observed in the three years. It is noticed that 564,351 (7.1%) in 2006, 2,815,101 (35.6%) in 2007 and 4,532,506 (57.3%) in 2008. The percent of positive cases for the three years (2006, 2007 and 2008) was in incremental pattern as 22.4%, 30.6%, and 46.9% respectively.

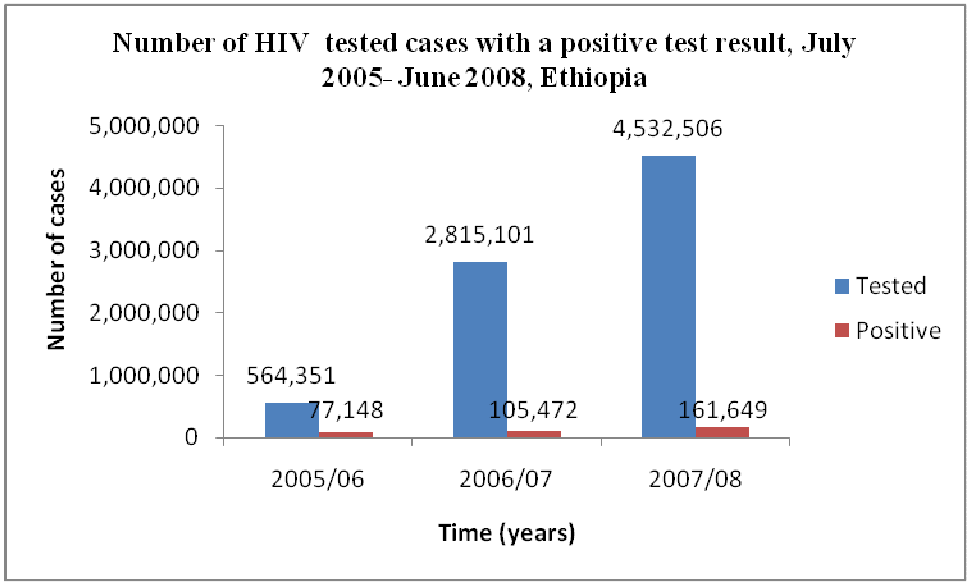

Fig.2.1 This distribution of cases denotes persons counseled and tested for HIV and their corresponding positive test results nationally in July 2005- June 2008

In all the three years, data is collected from 11 reporting sites of the country, where nine of these are regional states and two city Administrations (Addis Ababa and Dire-Dawa). The variables common to all the three years on reported cases computed from annual reports of Federal HIV/AIDS prevention and control office (HAPCO) included the number of cases counseled and tested, their test results and

reportinig sites only, with a lack of other important variables such as age of cases who attended voluntary counseling and testing services on HIV.

Table 2.1 Number of cases counseled and tested on Voluntary HIV counseling and testing services with a test result positive July 2005- June 2008

Region	Total tested	Total Positive
Tigray	2013343	35511
Afar	132919	3756
Amhara	1888014	103669
Oromia	1711734	71102
Somali	102651	1724
Benishangul-Gumuz	57817	2572
Gambela	12811	1961
SNNPR	1131511	31606
Harari	46552	3618
Addis Ababa	698781	80922
Diredawa	115825	7828
Total	7,911,958	344,269

In the years between July, 2005 and June, 2008 the proportion of cases that were tested positive by regional distribution was highest in Gambela 1,961 (15.3%) followed by Addis Ababa 80,922 (11.58%) and least in Somali 1,724 (1.67%) followed by Tigray 35,511 (1.76%).

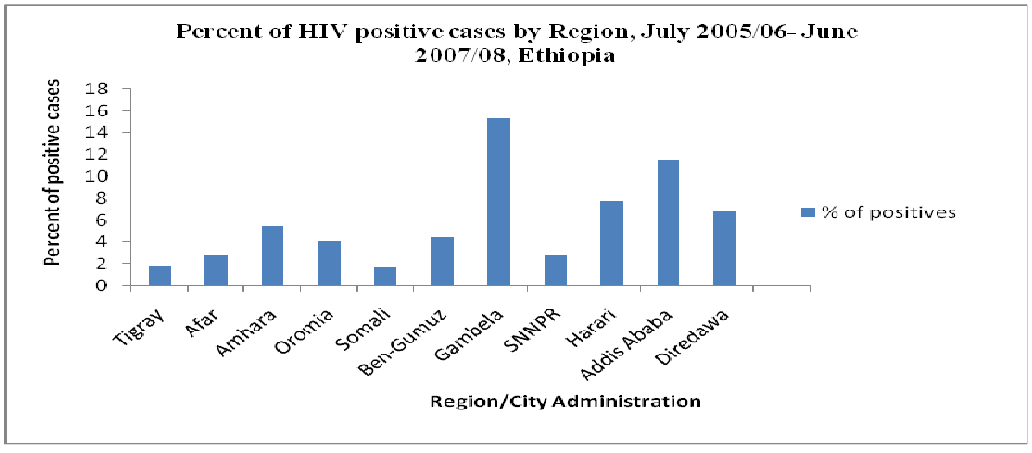

Fig. 2.2: Shows proportion of cases that were tested positive for HIV on a visit to voluntary counseling and testing services between July 2005 and June 2008, Ethiopia

Discussion

The number of HIV counseled and tested persons in both sexes particularly in year 2006 showed an even distribution of cases which might be resulted from service expansion as in PMTCT, STI clinics, family planning services and so on that might increased women's awareness in participation for knowing their HIV status. In the majority of HIV positive individuals especially, during the years for which female reported cases were obtained, females are more affected unlike males, which might be attributed to their vulnerability to acquire HIV infection for biological, economic and social factors.

Counseled and tested cases showed a trend of increase across a period of the three years (2006- 2008) which might be contributed to expansion of services by using different service delivery modalities which could result a changed behavior towards seeking for getting counseled and tested on HIV.

The results on cases that were tested also showed an increase in the proportion of persons who obtained a positive test result across the same time period (2006- 2008) which might be attributed to people's understanding in knowing their status on HIV might contribute to the prevention of HIV infection in themselves, their partners, their children and the community at large. The introduction of a freely delivered antiretroviral treatments for sustaining life might also posed people to get tested hoping these antiretroviral drugs prolong their lives in cases test results are found to be positive.

Failing to record the age and other important variables of attendees might have contributed to an obscuring of vital information and made comparison using different variables not to be utilized for analysis.

HIV positive cases with a higher proportion computed for Addis Ababa might be attributed to urbanization and accessibility of services for HIV counseling and testing. An explanation for the proportion of HIV positive cases that were highest in Gambella might be beyond the scope of this analysis.

Conclusion

The analysis of this three year secondary data concluded that gender sensitive (female targeted) strategies are among the top priority areas in the reduction of HIV positive cases both at local and national levels.

Recommendation

It is obvious that decision making in both technical and managerial/administrative aspects is primarily based on the availability and utilization of a properly recorded, analysed and interpreted data. Therefore it is strongly recommended that data/Information which is of primary importance for analysis, priority setting and decision making purposes must be kept and provided to those who need to use it.

Gender based intervention on HIV counseling and testing is mandatory and requires emphasis. This could be better expressed if present together with other factors attributable to acquiring HIV infection such as age and socio-economic conditions.

Reports should always, as much as possible, be consistent especially with respect to the most important variables so as to maintain the minimum required quality in the process of compilation, analysis, interpretation and utilization of the data for important public health action.

It is highly recommended to conduct a study for the increase in the proportion of HIV positive cases of Gambella and a decrease of proportion in Somali and Tigray Regions. Absence of classification by age category is identified as a limitation the most important deficiency in analyzing this secondary data which made the description not to be complete.

Acknowledgments

I would like to thank Dr Afewerk, Ato Feleke and Eleni (Federal HIV/AIDS prevention and control office) for their cooperation in getting the data available during that time. I would also express my grateful thanks to Drs. Richard Luce (Resident Advisor) and Adamu Addisie (Academic coordinator) for their guidance and academic advice.

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Chapter III – Evaluation of Surveillance System

3.1 Evaluation of Epidemiological Diseases Surveillance System, Tigray, Ethiopia 2010

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Background

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data about a health-related event for use in public health action to reduce morbidity and mortality and to improve health (1) and it is essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know".(2) Public health surveillance is an essential component of evidence-based decision making practices. (3) It includes case detection and registration, case confirmation, data reporting, data analysis, outbreak investigation, response and preparedness activities, feedback, and communication. (4)

A public health surveillance system is dependent on a clear case definition for the health-related event under surveillance. The case definition of a health-related event can include clinical manifestations, laboratory results, epidemiologic information and/or specified behaviors, as well as levels of certainty (e.g., confirmed/definite, probable/presumptive, or possible/suspected). The use of a standard case definition increases the specificity of reporting and improves the comparability of the health-related event reported from different sources of data, including geographic areas. (5)

Effective Communicable diseases control relies on effective surveillance and response system that promote better coordination and integration of surveillance function. In Africa, where infectious diseases continue to be a major health problem, many of the national surveillance systems ensure neither timely detection nor an effective response to them (6).

To address this issue, in 1998 the World Health Organization Regional Office for Africa approved the Integrated Disease Surveillance and Response (IDSR) strategy for strengthening infectious disease surveillance and response capacity among its 46 Member States and requested that Member States conduct assessments of their IDSR systems, the findings of which would act as a baseline for reform plans (7).

Integrated disease Surveillance and response is aimed to assist health workers to detect and respond to diseases of epidemic potential, of public health importance and those targeted for eradication and

elimination. The information collected through this strategy will help district health teams to respond quickly to outbreaks, set priorities, plan interventions, and mobilize and allocate resources. The Integrated Disease Surveillance and Response strategy links community, health facility, district, regional and national levels with the overall objective of providing epidemiological evidence for use in making decisions and implementing public health interventions for the control and prevention of communicable diseases. (7)

Surveillance is essential for the early detection of emerging (new) or re-emerging (resurgent) infectious diseases. In the absence of surveillance, disease may spread unrecognized by those responsible for health care or public health agencies. By the time the outbreak is recognized, it may be too late for intervention measures. Continuous monitoring is essential for detecting the 'early signals' of outbreak of any epidemic of a new or resurgent disease. For disease surveillance to prevent emerging epidemics, the time taken for effective action should be short. (4)

In 1996, as part of the response to the growing public health problem with communicable diseases, Ethiopia introduced an integrated disease surveillance and response (IDSR) strategy focusing on 17 priority diseases. Ethiopia adopted the world health organization's IDSR strategy in 1998, and in October 1999, the ministry of Health (MOH) of Ethiopia and its development partners assessed the country's surveillance system and used the results to adapt a five-year national plan. (8)

Since 2009 Ethiopia has introduced a new approach i.e. the public health emergency management (PHEM) to guide the prevention and control of any public health emergency problems within the country. Public health surveillance is part and parcel of the public health emergency management that helps to provide advance information of an incoming threat in order to facilitate the adoption of measures to reduce its potential health impact. Currently, the Federal ministry of health identified 20 diseases and health events to be reported immediately (Acute Flaccid Paralysis (AFP), Anthrax, Avian Human Influenza, Cholera, Dracunculiasis, Measles Neonatal Tetanus (NNT), Pandemic Influenza A (H1N1), Rabies, Small pox, Severe Acute Respiratory Syndrome (SARS), Viral Hemorrhagic Fever, Yellow Fever) and Weekly (Dysentery, Malaria, Meningitis, Relapsing Fever, Typhoid Fever, Typhus, Malnutrition) at national level. (9)

Information flow in Public Health Surveillance System:

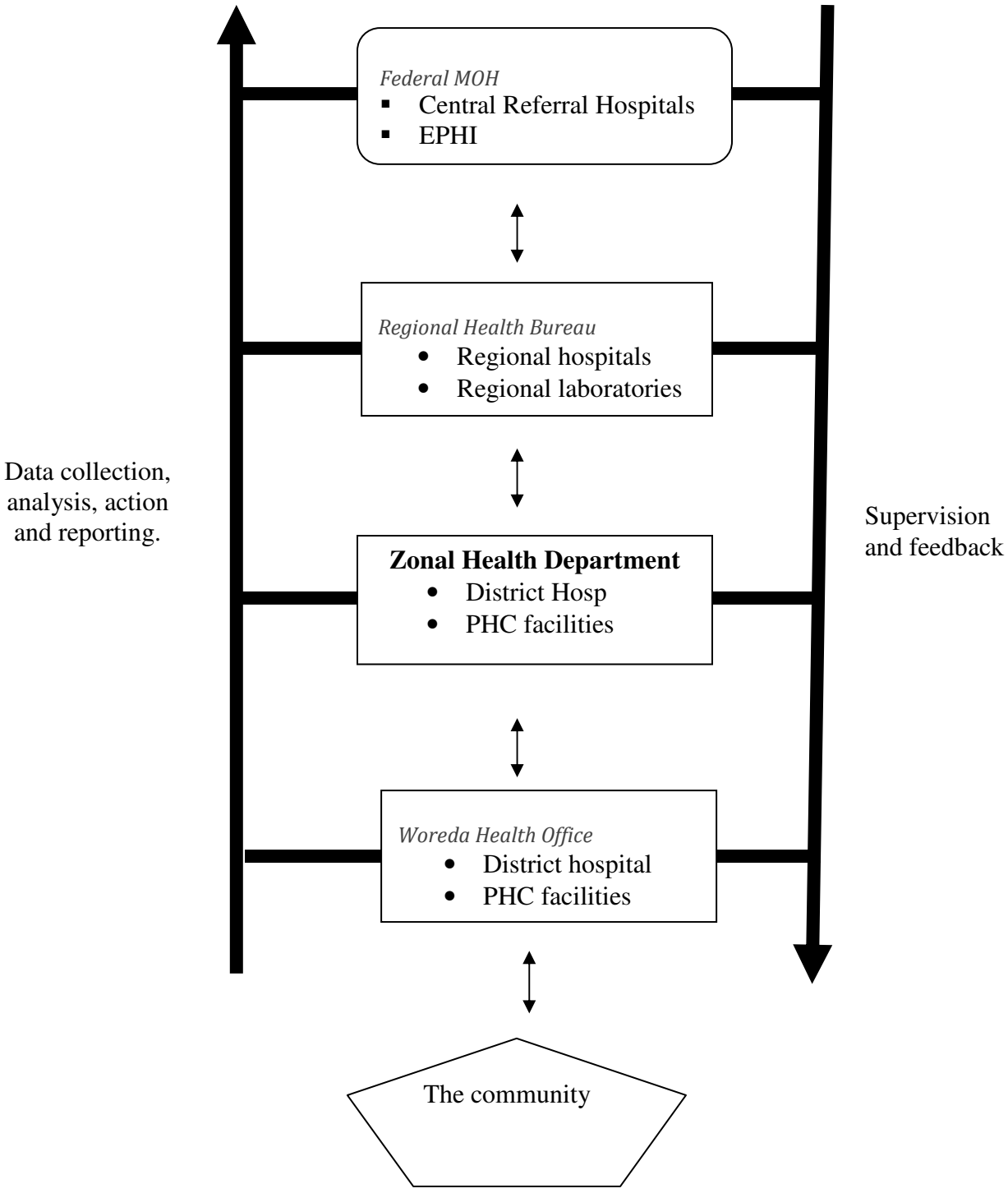

Fig. 3.1 Data and information flow in IDSR indicating varying cycles at various levels (**Source**: Federal Democratic Republic of Ethiopia, National Technical Guideline, Integrated Disease Surveillance and Response, 2002)

The purpose of evaluating public health surveillance systems is to ensure that problems of public health importance are being monitored efficiently and effectively. Public health surveillance systems should be evaluated periodically, and the evaluation should include recommendations for improving quality, efficiency, and usefulness. Evaluation of a public health surveillance system focuses on how well the system operates to meet its purpose and objectives.

This evaluation will be conducted with the purpose of describing the state of communicable disease surveillance in the region indicating how well the system is working to meet its purpose and objectives.

General objective

Evaluation of Epidemiological Diseases Surveillance System in Selected Districts in Tigray regional state, 2010

Specific objectives

- Assess the surveillance core functions with regard to case detection and registration, confirmation, reporting, data analysis, epidemic preparedness and response, and feedback on selected priority diseases in the selected districts,
- Assess the status of surveillance support functions in relation to standards and guidelines, training, supervision, communication, and resources
- Review attributes of surveillance system with regard to timeliness, completeness, usefulness, data quality, simplicity, and acceptability

Methods

Study area:

This surveillance system evaluation was conducted in Tigray Regional State. The region is located in the northern part of Ethiopia. According to the projection from the national 2007 census the region has an estimated population of 4.6 million people in the year 2009/10. Administratively the region is divided into 7 zones and 46 districts. The region comprises of 12 governmental Hospitals, 200 Health centers and 529 health posts. (10).

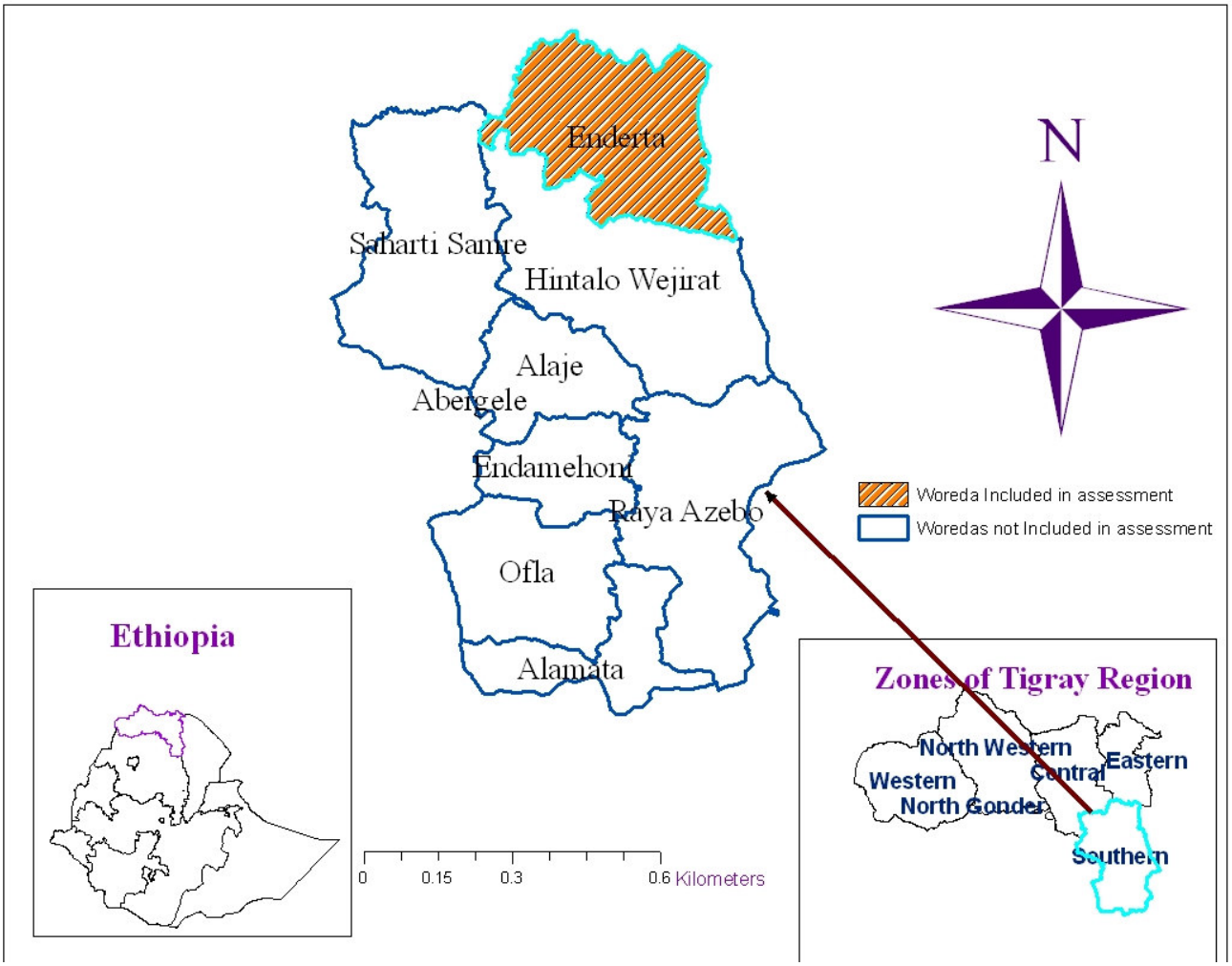

Fig. 3.2 Map showing a Zone where Surveillance is conducted, Tigray, Ethiopia 2010

Study period: the evaluation was carried out from November 20 through 28/2010.

Study population: The study population of this evaluation included governmental health facilities (two health centers and a health post) performing surveillance activities, health offices of South Eastern and Mekele City administration and the regional health bureau.

Sampling procedure: The evaluation was accomplished at the regional Health Bureau, district health offices, health centers and a health post. One zone; named South Eastern and one City health office named Mekele which are surrounding the regional capital were conveniently selected. The reason for selecting of these study sites on convenience basis is because of time and resource constraints. A District health office, one health center and one health post from South Eastern zone, one city health office and two health centers from Mekele administration were included in the evaluation. Both the health offices and three health facilities were selected randomly.

Data collection:
The evaluation comprised one weekly (malaria) and one immediately (measles) reportable diseases under surveillance.

It has examined the performance of the **core activities** (case detection and registration, confirmation, reporting, data analysis/interpretation, epidemic preparedness, and response, feedback), **supportive functions** (standards and guidelines, training, supervision, communication, resources, coordination), and **attributes** (Timeliness, completeness, usefulness, reliability/data quality, simplicity, and acceptability) of a surveillance system.

The assessment tool for the core activities and support functions of surveillance system is adapted from the assessment protocol for national communicable diseases surveillance system, and epidemic preparedness and response, which was developed by the World Health Organization-Regional Office for Africa (WHO/AFRO) and for the attributes of surveillance system is based on an established framework developed by the Centers for Disease Control and Prevention (CDC), Atlanta, USA. These tools were reviewed and modified accordingly to suit the local context.
Data were gathered through sets of semi-structured questionnaires that cover record review, interviews and certain observations at facility, district and regional health levels.

A semi-structured questionnaire was administered to surveillance focal persons at health facility, district/city health offices, and the regional health bureau.

Records reviewed:

Facility Patient registers, investigation forms, and standard case definitions, Copies of weekly reports of the previous one month period

District immediately and Weekly surveillance reports, case investigation forms and outbreak reports submitted by health facilities in the previous one month period

Region immediately and Weekly surveillance reports submitted by all districts in the region in the previous one month period

Observations made:

data management and organization, routine data analysis, use of case based weekly report forms, availability of case investigation forms, availability of surveillance guideline, logbook

Interviews conducted:

Interview was made with surveillance focal persons and health workers at various levels of the health system (facility, district, and region):

Data entry and analysis performed:

Data entry and analysis was done by the principal investigators i.e. FELTP residents. Data collected from interview, observation and record reviews was analysed manually. Then it was summarized and frequency distribution tables constructed. Tables were stratified according to the surveillance levels, and the findings were arranged through descriptive statistical measurements (frequency and percentage).

Ethical consideration:

Before conducting the present evaluation, verbal consent was obtained from the regional health bureau, District /city health offices and health facilities. Permission for conducting the interview was obtained from the respondents' respective supervisors and the respondents as well.

Definition of terms:

Completeness of reporting- Completeness in surveillance can have varying dimensions and may include the following: Completeness of reporting sites, completeness of case reporting and completeness of surveillance data.

Timeliness of reporting- Proportion of all expected reports in a reporting system received by a given due date.

Usefullness of the system- ability of the surveillance system to meet the objective (s) for which it is designed.

Simplicity of the system- Simplicity refers to the structure of the system and the ease of implementation.

Acceptability of the system- Is a reflection of the willingness of surveillance staff to implement the system, and the end users of the data to accept and use the data generated by the system.

Reliability/data quality- the degree to which the results obtained by a measurement/ procedure can be replicated.

Validity- An expression of the degree to which the surveillance data measure the true incidence of cases in the population.

Results

Case-detection and Registration:

In order to detect cases of priority diseases, health workers and community require adequate training on clinical diagnosis; be equipped with appropriate case definitions and there should be a means to capture information from any source.

Among 3 health centers that were visited during the assessment all of them have surveillance focal person but only four (66.7%) have documented plan for objectives of surveillance system activities. Regional health bureau and Mekele city health office try to capture community sourced information at occasional times, conversely Enderta health office and all health centers used to get information at all times.

This was mainly through health extension workers, community health workers and volunteers (locally called "Abo-Selasa").The mechanism being practiced was using a locally organized government structures at community level that means community volunteers get involved in all health activities including disease surveillance in thirty households assigned to them by the local government of the village. And regional health bureau, all districts, and health facilities have case definition for malaria and measles which was posted in Adult outpatients and under five year's departments. Data validation was done in regional health bureau and two districts. This was done mainly through telephone calls especially on reports which may seem to be doubtful in correctness.

Case Confirmation and Data reporting:

Regional health bureau, districts and all health facilities have capacity to transport specimen for malaria and measles case confirmation; Except Regional health bureau that claimed shortage of malaria RDTs all others are equipped with malaria diagnostic reagents but none of the districts and health facilities perform external quality assurance for malaria, and the health workers even do not have the knowledge about when, where and how may samples to send for quality assurance.

In all the responding institutions there was no malaria outbreak in last year but there was measles outbreak in Mekele, Welkait, and Tsegede districts.

Only regional health bureau is using E-mail to report to federal level but districts and health facilities are using hard copies and telephone calls to report to the next higher levels. Regional health bureau, district health offices, and health facilities sent and received reports to and from their immediate levels. During the assessment of a three months report, all of them have sent and received 12 times (based on a weekly reporting form for malaria), and all reported cases for measles on a case based reporting form (for regional health bureau and Mekele health office). All respondents had standard weekly, case based; line listing and epidemic reporting forms in the last three months period.

Data Analysis and outbreak investigation:

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health. The assessing group found that regional health bureau has clearly defined epidemic threshold for measles. However, Health facilities and districts neither analyze their data nor have standard, clear, and defined threshold for both malaria and measles. One thing observed during the visit was a posted chart displayed on the wall showing top ten diseases in Semha health center.

Measles outbreak of welkait and Tsegede was investigated by regional health bureau but Mekele health office did not investigate same type of outbreak that occurred in its catchment. No reported malaria or measles outbreaks in those visited health centers and a health post but there was a confirmed relapsing fever outbreak in Mekele health center. Here, only intervention is employed without doing any outbreak investigation.

Epidemic Preparedness and response:

All responded to have a rapid response team which is not functionally active as needed but which turns to be active (reactivated) after the occurrence of an epidemic. None of them have epidemic preparedness plan and budget line for epidemic response.

Nevertheless, they have emergency stocks of drugs and supplies for malaria and measles, of which its inadequacy is not indicated by any of the participants. Even though the assessment focused on measles and malaria, Mekele health center had reported cases of Relapsing fever and encountered with a shortage of drugs (doxycicllline) for case treatment and prophylaxis.

Cross border communications during outbreaks is practiced with the surrounding facilities, districts, and regions. Yet districts and health facilities do not practice notification of epidemics within 30 minutes to their next levels. Conversely the regional health bureau notifies outbreaks/ epidemics in a period of two hours to its higher level.

Feed back:

Receiving and giving feedback is not practiced at regional and district levels. On the other hand, two health centers (66.7%) witnessed for a feedback that is received from immediate higher levels. Yet, none of them could offer any formal written feedbacks apart from verbal means of obtaining it.

Assessment of support functions of surveillance system:-

Supervision:

The regional health bureau was not supervised by a higher authority and it did not conduct any planned supervision to districts and health facilities in the past one year. Mekele health office planned a periodic supervision but didn't implement accordingly, where as Enderta district planned and conducted, even though, it was without supervisory checklist.

Only one health center expressed that it was supervised two times in the past one year by the district health office but no document could be found on what the gaps were and how it was supported based on the findings of the supervision conducted. Unfortunately two of the health centers selected for this assessment were from Mekele city where, there are no health posts to be supervised within their catchment.

Standards, guidelines, and training:

The assessment found that the regional health bureau, districts, and health centers had national epidemiological disease surveillance guidelines and only two (33.3%) of the health centers had standard case management protocol and guideline for investigation of malaria and measles.

Surveillance focal persons for the regional health bureau, all districts and two of the health centers were trained in surveillance and basic epidemiology. A focal person working in one (Semha) health center did not get any formal training but is performing surveillance activities based on simple orientations given by a colleague. Proportion of health workers working in health facilities who are trained with surveillance and basic epidemiology ranges from 5% to 42%.

Table 3.1 Shows resources indicated in each visited health centers during the assessment

No	Type of resources	Name of health center						
		Semeha H.C	Mekele H.C	Quiha H.C	Mekele H.O	Endereta H.O	Regional health bureau	%
1	Electricity	2	1	1	1	1	1	82%
2	Motor cycle	2	2	2	2	1	2	17%
3	Vehicle	2	2	2	2	1	2	17%
4	Adequate Stationery	1	1	1	1	1	1	100%
5	Calculator	1	2	1	1	1	1	82%
6	Computer	2	2	2	2	1	1	33.3%
7	Printer	2	2	2	2	1	1	33.3%
8	Telephone service	1	1	1	1	1	1	100%
9	Fax	2	2	2	2	2	2	0%
10	Radio call	2	2	2	2	2	1	17%
11	Posters	1	1	1	1	1	1	100%
12	Megaphone	2	2	2	1	1	2	33.3%
13	Flipcharts or image box	2	1	2	1	1	1	66.7%
14	Generator	2	2	2	2	2	1	17%

NB. Present - 1 Absent – 2

The above table shows all (3) health centers have no access to motor cycle, vehicle, computer, printer, fax, Radio call, megaphone, and generator for emergency situation. One of the health centers (Semha) has no access to electricity.

Assessment of surveillance attributes:-

Timeliness:

All interviewed respondents expressed that reports are sent and received on time. Nonetheless, except for the regional health bureau, the assessing team did not find any mechanism on how reports are being monitored for timely arrival. Thus it was difficult to calculate the timeliness for each institution or

facility. The means which was in use by each institution was a simple verbal response based on a look at the weekly reports produced as per the scheduled time, but which did not tell anything about the time when the report is received.

Completeness:

Regional health bureau, districts, and all health facilities sent reports 100% completely as it was looked at the last 3 months reports. But completeness in terms of all variables that should be filled in the reporting format was not as set by the standard (see table below).

Table 3.2 Proportion of Malaria reports among different health Institutions

S.no.	Institution	% Malaria reports received last one month	%Malaria reports received with no missing of information	%total expected surveillance reports reported to next level	%malaria reports sent with no missing of information
1	Regional health bureau	93.2%	93.2%	100%	100%
2	Endereta health office	86.7	100	100%	100%
3	Mekele health office	N/A	N/A	100%	100%
4	Semeha health center	N/A	N/A	100%	100%
5	Mekele health center	N/A	N/A	100%	0%
6	Kuha health center	N/A	N/A	100%	100%

Usefulness:

Surveillance data (information) is used for planning, implementing, and evaluating public health interventions and programs. Though the assessment team couldn't find evidence for utilization of the data, the regional health bureau and Mekele health office verbally explained on utilizing surveillance data for planning, priority setting, and intervention purposes, conversely, Enderta and all visited health centers did not use their malaria and measles data for their own consumption apart from just reporting it to immediate next level authority.

Simplicity:

In terms of simplicity of case definition and data collection for malaria and measles all interviewed respondents during the assessment thought that measles and malaria case definition is simple to understand including community case definition but surveillance focal person in Mekele health center answered that case definition for malaria is very long and not simple to understand. Data Analysis is a problem (remaining impractical) at all levels, and even the meaning of which was not well understood especially in the health facilities.

Acceptability:

Acceptability is largely subjective attribute that encompasses the willingness of persons on whom the system depends to provide accurate, consistent, complete, and timely data. Six surveillance focal persons were assessed by the team and five replied that they are interested in working with the surveillance unit and assured its acceptability by other staff (health workers) in the facility. But one (health center) focal person gave a response that the system is not accepted as do other activities in the facility (HIV/AIDS) and he personally was not satisfied being a focal person for the less attention given to surveillance.

Reliability/data quality:

The degree to which the results obtained by a measurement/ procedure can be replicated. The team was not able to compare the data among the districts and health facilities upon observation because there were two different ways of reporting in the two visited districts. Here, one district did not compile reports of health facilities rather sent it directly to the regional health bureau; on the contrary, the other district compiles the reports of health facilities and transfers it to the region. For health facilities the team counted and compared the reported malaria and measles cases with case registration and laboratory registration log books for the previous one month. Fortunately there was no reported measles case in all visited health centers (see table 2).

Table 3.3.table shows number of malaria cases registered and reported to district/city health office

Name of Health center					
Semha H.center		Mekele H.center		Kuha H.center	
No. of malaria cases in Register	No. of malaria cases in Facility reports	No. of malaria cases in Register	No. of malaria cases in Facility reports	No. of malaria cases in Register	No. of malaria cases in Facility reports
1	1	9	9	3	2
1	1	17	17	5	4
1	1	4	10	0	0
4	4	5	16	1	1

As shown in table 3.3 above the registered and reported cases of malaria in Semha health center is comparable and consistent in the assessed four weeks time. As opposed to this, in Quiha and Mekele health centers (which are near to the regional health bureau and Mekele city health office) the inconsistency and mismatch in the same time period is not as expected. Here Mekele health center has shown a difference of 6(150%) and 11(220%) malaria cases in third and fourth weeks respectively. Similarly, Quiha health center gave a difference of -1(-33.3%) and -1(-20%) malaria cases in the first and second weeks respectively.

Discussion

Even though all interviewed institutions/facilities have surveillance focal person, many of them fail to have a clearly stated, documented objectives which should have been reflected in either the general plan and/or as a separate for the unit so that it guides on appropriate public health actions. A good opportunity in the region was that, there is a means of capturing information from the community through locally set government structures called “Abo-Selasa which is a remarkable way in the region for all health services and surveillance activities through which the health system reaches the community.

With regard to capacity of collection and transportation of specimen for malaria and measles it is not a problem in the assessed institutions/health facilities. But all did not perform external quality assurance for malaria thus; currently it is difficult to evaluate the status of laboratories of those health facilities.

Unless data is analyzed, it is unable to get evidence based information for important public health action. None of the visited institutions/health facilities analyze their data by person, place, and time. Yet they did

not use the surveillance data for any public health action. Epidemic preparedness and response and outbreak investigation was not a common practice in the region.

Giving feedback and conducting supervision are the ways to motivate staff, ensure whether staff is doing the right way, and identify the gaps of the institution so as to guide for a better performance. Here as assessed, all visited institutions/health facilities were not supervised regularly and did not supervise the others as planned and no feedback mechanism was seen that helps in the support to monitor activities and motivate staff.

Even though few of the visited health centers did not have case management protocol guideline, all institutions/health facilities had Public Health Emergency Management guideline which needs to be of use by all respective institutions and employees working with in these organizational settings.

Reliability is among the attributes that was assessed in all visited health facilities. In one of the health centers there were cases of malaria that have been registered but not all reported (under reporting) and in another health center the opposite holds true (over reporting). Generally all cases were not found on the reviewed registrations that were assessed as they should be appearing.

Conclusions

The study concludes that data analysis, planned supervision using a supervisory checklist and exchange of feedbacks is partially or not practiced at all levels of the health system. External quality assurance for malaria was not being implemented and even not known by some institutions/health facilities and focal persons /practitioners within these settings. Capturing information from the community in collaboration with the local government in a village was a good asset noticed in all surveyed participants.

Recommendation

The goal of enhancing notifiable disease reporting at each level of the health care system is to produce a system that values information for its role in guiding decision making. Therefore the following are recommended based on the findings:

- All health facilities and health institutions need to have clearly stated and documented objectives in their annual plan.
- Health facilities should send specimen for all applicable diseases for external quality assurance based on the standard to the reference laboratory.

- Unless data is analyzed its use for public health activities will be very limited. Therefore, data should be analyzed in reference to person, place, and time so that it can be utilized for planning, priority setting and intervention functions. Thus, emphasis must be given by all levels for critical monitoring and support.
- There are opportunities at the regional level for epidemic preparedness and response like, presence of Rapid Response Team, cross border communication and to some extent emergency drug stocks and epidemic preparedness plan (drugs, reagents, medical supplies, budget and other resources), however, this needs to be strengthened, continuous and based on a scientific prediction methods.
- As there is no supervision and feed back at any level of the health system, there is a difficulty in assessing the status of the health facilities and institutions and to know how the system is operating according to the desired standard. Therefore, supervision and feedback should be in place on a regular, continuous, and supportive manner.
- Surveillance activities are considered to be solely the responsibility of a focal person assigned to this task, and this especially is worse at health facility level. Therefore we recommend other health workers also need to be trained in basic surveillance and epidemiology that is focused on competency based, practical and applied situation.
- A log book should be available at each level (with some variables such as name of health facility and/district, date and time of arrival of reports, epidemiological week number, reports sent /received etc..), so that monitoring for timeline**ss** and completene**ss** of reports can be implemented in line with the standard procedure.
- Surveillance focal persons should re-write (receive reports) of all cases registered in different departments/units (adult and child outpatient and inpatient, emergency attendees etc…) of the health facility, to avoid over and under reporting of cases.
- Evaluation of disease surveillance system should be done regularly so as to motivate staff performance and improve the system.

Limitations of the Assessment:

The assessment on this evaluation has some limitations. As indicated in the methods section, the institutions and facilities included in the survey were selected based on convenience sampling and the sample size was too small for the findings to be representative.

Few questions (**Simplicity** and **Reliability**) presented in the attributes section of the survey were more subjective and therefore, difficult to be assessed on the basis of people's trust alone.

Going directly to the respective respondents without making a pre-test on the questionnaires had some limitations, observed during interview and work-up of the analysis.

Acknowledgment

The investigators recognize the contribution of the Regional health bureau, district health offices and health facilities surveyed. Again we would like to express our grateful thanks to the coordinator of a field epidemiology program, Dr. Zegeye Hailemariam for his unreserved effort in facilitating the evaluation to be carried out on time. Our gratitude also goes to Drs. Adamu Addisie (academic coordinator of field epidemiology program) and Richard Luce (resident advisor of field epidemiology program) for a review on the proposal made for this assessment. Last but not least we give our thanks to Ethiopian Public Health Association for financing this evaluation to come to an end with all the required objectives met.

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Chapter IV – Health Profile Description Report

4.1 District Health Profile Enderta District, Tigray Region, Ethiopia 2010

Ghidey G/libanos[1], Zayeda Beyene[1], Beyene Kidu[1]

Introduction

The Ethiopian field epidemiology and laboratory Training residents assigned to Tigray regional state have prepared health profile of Enderta district which contains relevant basic information for each of the district program. The purpose of preparing this district profile is to have a comprehensive document which can be used by District Health Management Teams and international and national stakeholders as a ready reference. Data collection instruments were developed by a team of Field Epidemiology Residents assigned to the respective region. Data were collected, tabulated and analysed by the same group of interviewers.

Health profile assessment of Enderta district of the year 2010

District Background:

Enderta district is found at South Eastern zone of Tigray. The capital of the district is based at Quiha town and located at 12 km East of Mekelle, the regional capital. The district is bordered with Abiala, a district of the Afar regional state in the East, Degua temben in the west, Wukro kilte awila-elo and Atsibi-wemberta in the south and Hintalo Wajirat and Samre seharti in the North.

Administratively the district is divided in to 17 kebeles and was inhabited by 123,063 population in the year 2010.

The estimated population growth rate is 2.5% per annum. Primary health service coverage accounts 85%.

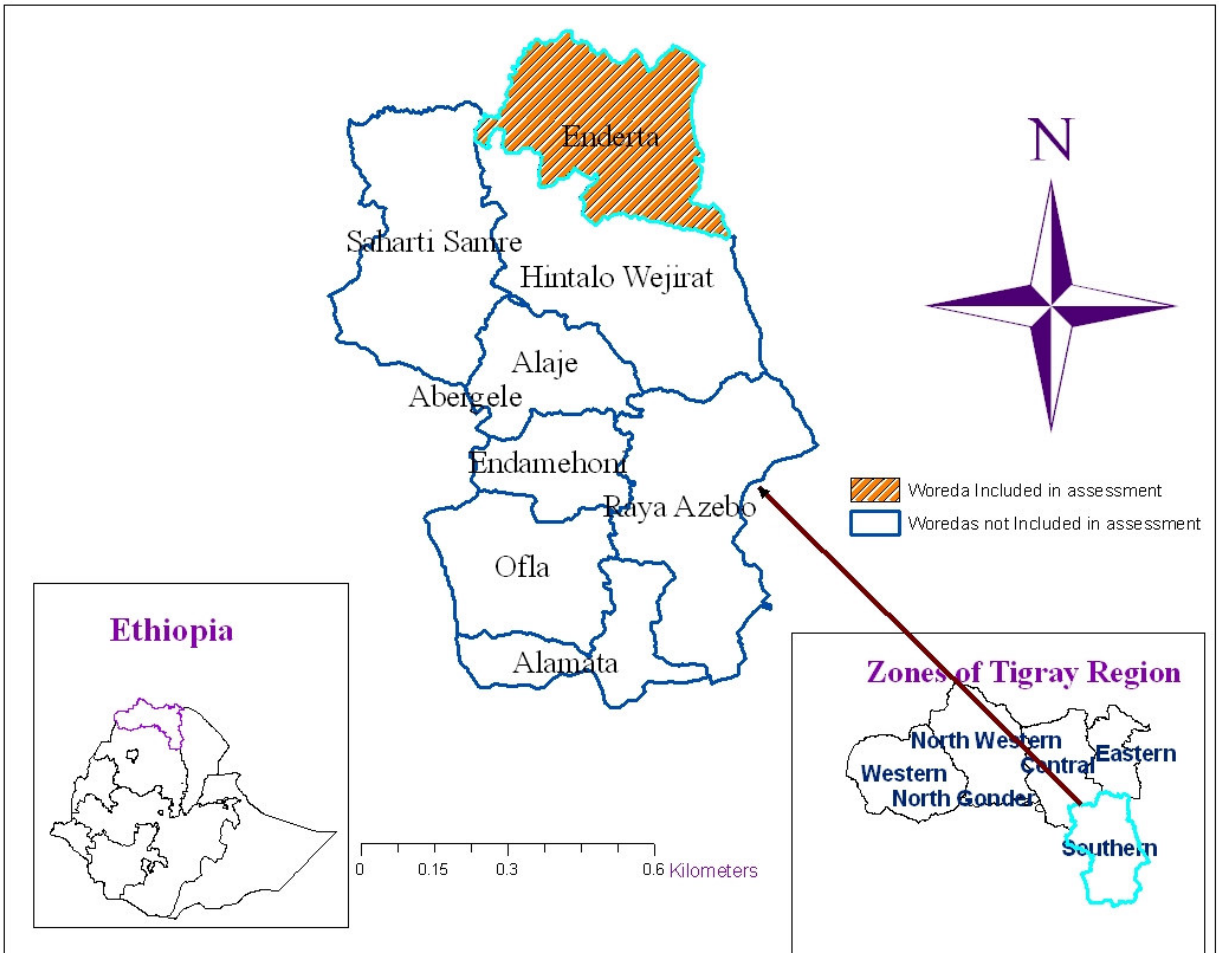

Fig. 4.1 Map showing a Zone, where Surveillance is conducted, Tigray, Ethiopia 2010

Objective

To assess and describe health related issues about health status, health indicators and to identify problems for priority setting.

Methodology

- Available data in Endrta health office was reviewed including of health institutions.
- Health profile of the regional health bureau was assessed
- Concerned health office heads, experts, health professionals of multi-disciplinary nature and experts of other sectoral offices (Education and Water) were interviewed
- Observation of charts posted on the walls of the office for a list on top causes of morbidity, organizational structure (organogram) and others were evaluated.

District Health System (DHS):

A District Health System includes the interrelated elements in the district that contribute to health in homes, educational institutions, workplaces, public places and communities, as well as in the physical and psychosocial environment. A District Health System based on Primary Health Care (PHC) is a self-contained segment of the national health system. It includes all the relevant health care activities in the area, whether governmental or otherwise.

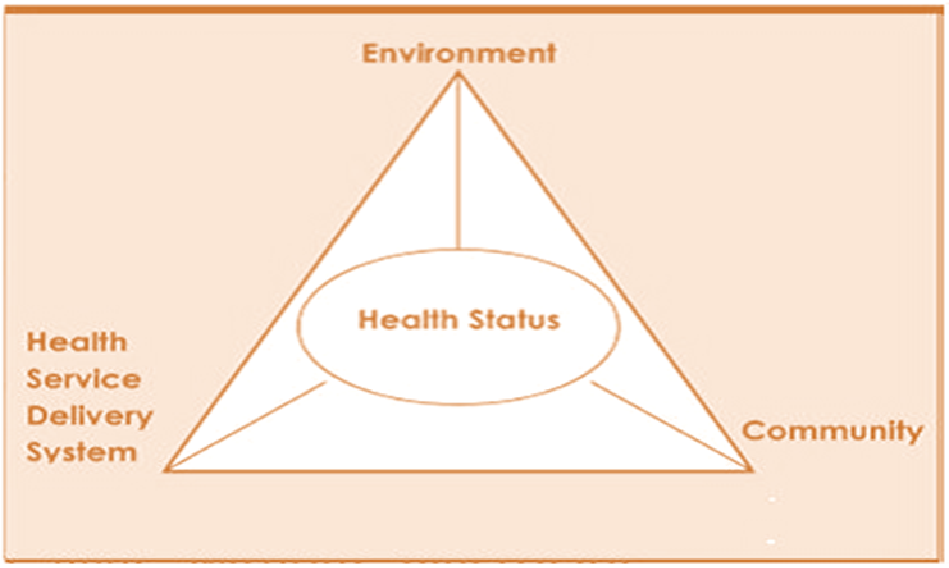

Fig. 4.2 Interdependence of elements operating in a district health system

It includes self care and all health care personnel and facilities, whether governmental or non-governmental, up to and including the hospital at the first referral level and the appropriate support services (laboratory, diagnostic and logistic support). As the decentralized part of the national health system, the District Health System represents a manageable unit, which can integrate health programs by allowing top-down and bottom-up planning and is capable of coordinating government and private sector efforts.

Following are the three main criteria for defining a District Health System unit:

- A clearly defined area with local administration and representation of different sectors;
- An area which can serve as a unit for decentralized intersectoral planning of health care; and
- A network of health facilities with referral support.

The district is the basic administrative unit. The presence of district managers and supervisors led by the District health office head (DHOH) offers the opportunity to function as an effective team with support from the representatives of other sectors, Non-Government Organizations (NGOs), private sector as well as the community. In any health system, there are three important elements that are highly interdependent, namely: the community, the health service delivery system and the environment where the first two elements operate. Figure 1 above illustrates the interdependence of these elements.

Environment:

This, for example, could be the context in which the health service delivery system operates. The contextual environment could be the political system, health-care policies and development policies. It could also include the socio-economic status or the physical environment, e.g. climatic conditions. All these elements have a bearing on the health status of the individual and the community, as well as the functioning of the health service delivery system.

Health Service Delivery System:

This depicts how health facilities are distributed in the community, which could also have a bearing on coverage. Similarly, health services could be viewed in terms of their affordability and responsiveness to equity which contribute to the health status of the community.

Community:

The characteristics of the society, such as culture, gender, beliefs and health-seeking behavior, together with the environment and health service delivery system, determine the health status. It is worth mentioning that information included in district health profiles takes into account the broader perspective of district health system.

Result

Table 4.1 Demographic information of Enderta district, Tigray, Ethiopia 2010

Demographic data	Number/Percentage/Rate
Total population • Female • Male	123,063 61,178 61,885
Annual population growth rate	2.5%
Average household size	4.4
Total households	27,969
Children <1 year	4,366
Children < 3 years	8.36%(10,288)
Children < 5 years	14.6%(17,967)
<15 years	43.7%(53,779)
Women in child bearing(15-49 years)	23.5% (28,920)
Pregnant women	3.8%(4,676)
Non-pregnant women	19.7% (24,243)

As shown in the table above about 50% of population in Enderta district is composed of females.

Table 4.2 District population by kebele of Enderta district, Tigray, Ethiopia 2010

Kebele	Total population
Arato	9,864
Chelekot	5,811
Dergajen	10,211
May-alem	5,208
Meseret	8,752
Maygenet	5,100
Maytsedo	7,489
May-anbesa	6,501
Bebri	7,716
Didba	7,421
Felegemayat	4,656
Felegeselam	6,652
Shibta	10,455
Lemlem	8,489
Mahibere-genet	7,134
Mariamdehan	5,871
Mesebo	5,733
Total	123,063

As depicted in the table above the population distribution by kebele ranges from 3.8% in Felegemayat to 8.5% in Shibta. The average population distribution accounts about 5.9%.

Table 4.3 Malarious Kebeles of Enderta district, Tigray Ethiopia, 2010

S.no	Kebele	Population
1	Chelekot	5,811
2	May-alem	5,208
3	Meseret	8,752
4	Maygenet	5,100
5	Didba	7,421
6	Felegemayat	4,656
7	Lemlem	8,489
8	Mahibere genet	7,134
9	Mariamdehan	5,871
	Total	58,442

Here 47.5% of the total district population lives in areas where malaria is endemic and out of this 8% belongs to Felegemayat and 15% to Meseret.

District health system:

The district health department is headed by a district health office head who is the manager of the district health system. It consists of four case teams located in the health office running various programs and activities. All are accountable to the head of the district health office. Various Health centers are located within the district and these again are run by a head (director) of the Health center who manages three case teams under his/her management. Some of the case teams have sub units that are directly accountable to them as in the organogram shown below.

Organizational structure of district health office

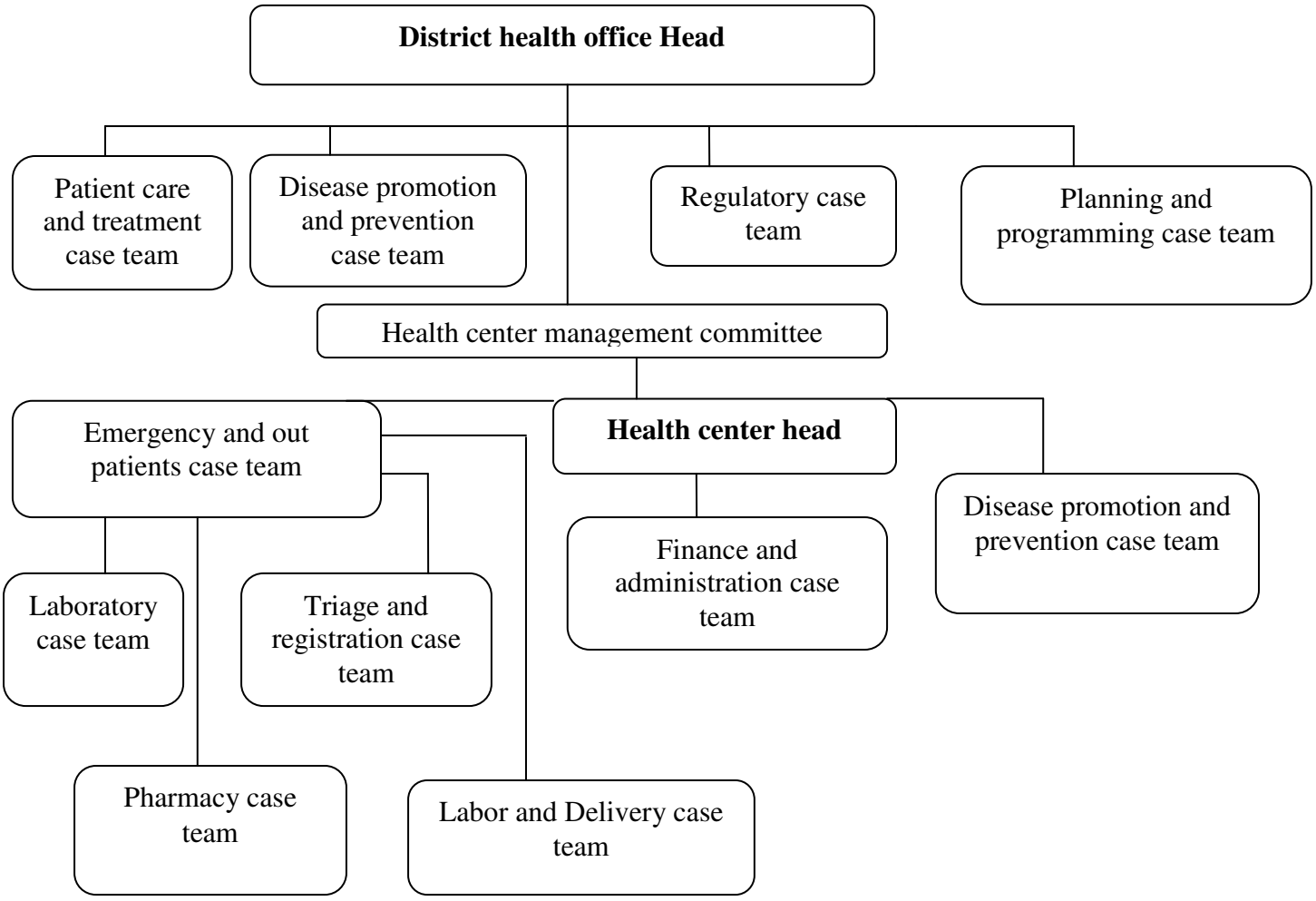

Fig. 4.3 Organizational structure of Enderta district health office (Source: District Disease promotion and prevention team)

Table 4.4.The number of health facilities in Endreta district, Tigray, Ethiopia 2010

Type of health facility	Number		
	Gov	Private	NGO
Hospital	0	0	0
Health center	6	0	0
Clinic	0	0	0
Health post	13	0	0
Pharmacy	0	0	0
Drug shop	0	0	0
Rural drug vendor	0	1	0

From the above table we can understand that except for a rural drug vendor which is owned by a private sector none of the health facilities (Health Center and health post) is owned by private or non-governmental organizations. At the same time the district also has no Hospital owned by either government, private or non-governmental organizations within its catchment.

Table 4.5.Human resource of Enderta district, Tigray, Ethiopia 2010

Profession	Number
Midwife nurse	2
Clinical nurse	31
Lab technician/technologist	4
Pharmacy technician/pharmacist	4
Health officer	7
Environmental technician/officer	4
Health extension workers	36
CHAs	384
Data clerk/manager	1

The human resource distribution of Enderta district is composed of multi disciplinary professionals as shown in table 4.5 which ranges from 3.8% for mid wife nurses to 59.6% for clinical nurses working in health centers (excluding Health extension workers, Community Health Agents and data clerks/managers) found within the district setting.

Table 4.6 Health staff to population ratio of Enderta district, Tigray, Ethiopia 2010

Doctor to population	0:123,063
Health officer to population	1:20,511
Nurse to population	1:4558
Health extension workers to population	1:3418

From table 4.6 it can be understood that the health extension workers to population ratio looks to be somewhat satisfactory when compared to other professionals and especially for a Medical Doctor whereby none is present in such a huge number of population.

Table 4.7 Health institutions to population ratio of Enderta district, Tigray, Ethiopia

Hospital to population	0:123,063
Health center to population	1:20,510
Health post to population	1:9466.4

As to the standard set in the four tiers system by Federal Ministry of Health for the Ethiopian context, one health post provides services to about 5000 people within its catchment. Here as it is seen in Table 4.7 the population served by a health post is almost twice which, in such circumstances, may be against the standard.

Maternal and child health performance in Enderta district, Tigray, Ethiopia 2010 is indicated in the following tables as follows:

Table 4.8.1 Childhood immunization

No HF	Static	Outreach	Live births	BCG		Surviving infants	Measles		Penta3		Fully immunized	
				Ach	%		Ach	%	Ach	%	Ach	%
19	6	10	4678	4086	87.3	4366	3050	69.8	4026	92	2775	63.5

* Ach = achievem

Table 4.8.1 shows a drop in the proportion of children vaccinated against the target diseases for immunization between vaccines that are given in earlier ages (BCG) and those given in later ages (measles) and fully immunized eligibles. A decline of 6.3% is shown between measles and fully immunized children alone. The drop in percentage between BCG and Measles also accounted about 17.5%. It is also observed that children did not get BCG vaccine at birth when compared to the coverage achieved by penta-valent3 vaccination that is given later than BCG vaccine.

Table 4.8.2 Matenal health

Description	Number/percent
Antenatal care coverage by skilled health personnel's	24
Antenatal care coverage by HEWs	33
Proportion of deliveries attended by skilled health personnel's	4
Deliveries attended by HEWs	202
Postnatal care coverage by skilled health personnel's	12
Postnatal care coverage by HEWs	34
Family planning • Contraceptive acceptance rate	79.5
TT2 pregnant	46
TT2 non-pregnant	77

From Table 4.8.2 above it can be seen that delivery services conducted at a health facility (health centers) are considered to be low (4%).

Table 4.9 Top ten causes of outpatient's morbidity in Enderta district, Tigray, Ethiopia 2010

Rank	Disease	Case	%
1	URTI	316	13
2	Diarrheal diseases	289	12
3	Conjunctivitis	269	11
4	Intestinal parasitosis	227	10
5	Other abdominal diseases	192	8
6	Common cold	164	7
7	Malaria	140	6
8	Gastritis	107	5
9	Skin diseases	95	4
10	Other skin diseases	76	3
	Total	1,875	

Table 4.10 Sanitation and drinking water availability and coverage in Enderta district, Tigray, Ethiopia 2010

Description	Number/percent
Number of households with latrine	19,941
Number of households without latrine	3,900
Latrine coverage	88%
Number of kebeles accessed to safe water supply	14
Number of kebeles not accessed to safe water supply	03
Safe water supply coverage	79.8%

Table 4.11 Malaria prevention and control performance of Enderta district, Tigray, Ethiopia 2010

Description	Number/percent
Total number of households with at least two ITNs	100%
Total number of kebeles covered with residual insecticide chemical spray	9
Total number of unit structures sprayed with residual insecticide chemical spray	17,160
Number of people living in sprayed houses	44,924

Total number of people living in malaria endemic area accounted 58,442 (see table 4.3) and out of these 77% (44,924) live in residual insecticide sprayed houses.

Table 4.12 HIV/AIDS services in Enderta district, Tigray, Ethiopia 2010

Description	Number
Total number of health facilities	19
Total number of health facilities providing VCT service	6HCs and 7HPs
Total number of health facilities providing PMTCT service	6HCs
Total number of health facilities providing ART	0
Number of persons tested for HIV	34,536
Persons tested +ve	245
Number of PLWHA ever enrolled for ART	0
Number of PLWHA ever started on ART	0
Number of PLWHA ever currently on ART	0
Pregnant women tested for HIV	963
Pregnant women tested +ve	15
Number of HIV positive women receiving ARV prophylaxis	0
Number of HIV positive babies receiving ARV prophylaxis	0

From table 4.12 it was observed that 0.71% (245) of HIV positive people did not get anti-retroviral therapy (ART) in the health centers of this district, as no services are yet provided in any of the facilities.

Table 4.13 Tuberculosis patient's performance in Enderta district, Tigray, Ethiopia 2010

Description	Number/percent/rate
Number of patients registered	132
Case detection rate	78.6
Treatment success rate	15(no)
Treatment completion rate	102(no)
Cure rate	15(no)
Defaulter rate	1
Died	3
Failure	0

Socio-economic indicators of Enderta district are depicted in the following tables:

Table 4.14.1 Infrastructure:

Type and number of health facilities in Enderta district, Tigray, Ethiopia 2010

Health facility/office	Number of health facilities with infrastructure						Remark
	Road		Electricity		Telephone		
	Yes	No	Yes	No	Yes	No	
Health center	6	0	5	0	6	0	
Health post	13	0	3	10	13		
Health office	1	0	1	0	1	0	

Table 4.14.2 Education:

Type and number of schools and number of teachers in Enderta district, Tigray, Ethiopia 2010

Type of school	Number of schools	Number of teachers
Primary	65	786
Secondary	1	12
Tertiary	0	0
Vocational	0	0
Nursing school	0	0

Table 4.14.3 Development and implementing partners collaborating with health sector in Enderta district, Tigray, Ethiopia 2010

International	Local
UNICEF	REST
Save the children	Catholic Church
FAO	Ethiopian Red Cross Society

Table 4.14.4 Health budget allocation of Enderta district, Tigray, Ethiopia 2010

Item	Amount in birr
Overall district health sector budget	2,498,699.47
Recurrent budget	
Salary	1,585,048.02
Malaria prevention and control	41,771
EPI	Information not obtained
HIV/AIDS prevention and control	Information not obtained
TB/Leprosy	Information not obtained
Hygiene and sanitation	Information not obtained
Malnutrition	Information not obtained
Drug supply	125,000
Any administration	
Capital budget	518,250

The respondents noted that the allocation of budget for all government sectors existing in a district is made by the local administration (government). As shown in table 4.14.4, we could observe that only 6.3%, of the total recurrent budget allocated to the health services by the local government, is spent for drug supply consumption.

Priorities identified/ Recommendations

After administering the questionnaire prepared for the assessment of this health profile document, identification of priorities in analysing the results is merely based on the findings collected during the period of data collection which is recommended as follows:-

- Maternal and child health services are among the most essential components of a health delivery system especially, in developing countries like Ethiopia. Attending delivery at health facilities by skilled attendants from the total eligibles of pregnant women was low compared to 2008 which was 7.1% of total eligible pregnants.
- Vaccinating children at the right age and especially with the vaccines given in earlier ages (BCG) did not follow the regular time schedule for immunization. Therefore, awaring the community should be well instituted at all levels.
- Health care services such as provision of therapy on anti retroviral to HIV positive patients within the vicinity of their surrounding is among the very important health aspects. It is therefore, recommended that patients should get services in a nearby health facility for better contribution in prevention and control activities.
- Budget allocated for drug consumption is very low as evaluated from the findings and one of the priority areas for our assessment.

Acknowledgment

We would kindly express our gratitude to all staff of Enderta district health office for their sincere cooperation in providing the required data for our assessment of the profile. We also thank Dr. Zegeye H/mariam for facilitating the assessment to be accomplished very soon. Again we thank Dr. Adamu Addisie (Academic coordinator of Field Epidemiology Training Program) for he shared us the checklist for use in the work of this profile assessment which gave us a guide on how to be carried out. Dr. Richard Luce (Resident Advisor of Field Epidemiology Training Program) is given many thanks for his technical advice on the works of the document. Ethiopian public health association is also given grateful thanks in financing, logistics and over all facilitating of the field assignments.

Chapter V – Abstracts for Scientific Presentation

5.1. Unidentified liver disease in districts of North-Western Zone, Tigray, Ethiopia, 2002-2010

Ghidey G/Libanos[1], Zayeda Beyene[1], Yohanes G/hawaria[2], Richard Luce[2]

Abstract

Background

A liver disease of unknown etiology which is characterized by epigastric pain, fever, jaundice, nasal bleeding, peripheral edema and abdominal swelling progressing to ascites with high morbidity and mortality reported among humans in six district*s* of the North-Western Zone of Tigray, Ethiopia since April 2002- 2010. This surveillance data analysis and outbreak/epidemic investigation was thus, aimed at describing the magnitude of unidentified liver disease by person, place and time for recommending possible preventive and control intervention strategies to the disease.

Methods

Study is conducted in North-Western Zone, Tigray region, Ethiopia. A line list was collected and case register log books of the districts were reviewed. Case definition was set based on the symptoms and signs of the disease to identify cases. Surveillance secondary data of all six districts of the Zone prepared in a line list was reviewed, entered and analyzed in Microsoft Excel.

Results

A total of 736 cases and 247 deaths were reported from April 2002 to June 2010, with an attack rate of 0.1% and case fatality rate of 33.5%. The median age of cases was 18 years which ranged between 1 and 81 years old. Age group of 5-14 accounted 32.7% (241/736). Sixty percent of total cases and 63% of deaths were males. Out of a total of 124 kebeles in these six districts 39 (31%) reported cases of unidentified liver disease to date.

Conclusion and Recommendation

Majority of cases affected by the disease were in the age group of 5-14, and with a higher proportion of male cases. Further research has to be employed in the area. Documents on how well cases were managed should be sought at all relevant health facilities to evaluate the the previous management of cases inorder to recommend better future case management approaches.

Key words: ULD, PAs, Ageratum, North-Western Zone

5.2. Outbreak of Pandemic Influenza A (H1N1) — Illu Aba Bora Zone, Oromia, Ethiopia, November 2010

Ghidey G/Libanos[1], Beyene Kidu[1]

Abstract

Background: In November 2010 an outbreak of acute influenza-like illness was reported among inmates housed in a prison near Gore town, Illu Aba Bora zone in Oromia region. The outbreak quickly spread to the wider community. A team from EHNRI was dispatched to verify the existence of outbreak, determine the etiology and assist in control and prevention activities.

Methods: Patient registers were reviewed from the health facilities to gather clinical and epidemiological information about suspected cases. Throat swabs from acutely ill patients with influenza-like illness were obtained from 22 individuals at 4 sites in different districts within Illu Aba Bora zone (Alle, Chora, Bedelle and Didesa). The selected sites were Gore prison (N=5), Abdella clinic (N=9), Bedelle health center (N=4) and Denbi health center (N=4). Specimens were stored and transported under refrigerated conditions until laboratory testing was conducted. Quantitative data were entered and analyzed using Microsoft office-excel and the qualitative data were narrated.

Results: From 28 October to 5 November 2010, 86 patients (79 prisoners from Gore prison camp and 7 residents of Gore town) presented with acute influenza-like illness at Gore health center. Patients' ages ranged from 2-56 years, with a median of 28 years. All reported fever and cough. The attack rate among prisoners was 53% (79 out of 150 prisoners). No deaths were recorded. Sixteen of 22 (73%) individuals sampled were positive for pandemic influenza A (H1N1) 2009 virus; none were positive for seasonal influenza viruses.

Conclusion: A laboratory-confirmed outbreak of pandemic influenza A (H1N1) 2009 was identified in 4 districts of Illu Aba Bora zone in Oromia Region; however, neither the source of introduction nor the index case could be identified. The outbreak demonstrated the difficulty in reporting an immediately notifiable disease that cannot be distinguished from any other acute respiratory illness based on clinical features alone. Laboratory-based surveillance for any influenza-like illness or severe acute respiratory illness (ILI/SARI surveillance) is necessary to conclusively determine etiology in outbreaks of respiratory disease.

Key words: pandemic influenza A (H1N1) 2009, influenza-like illness outbreak, Illu Aba Bora zone, Oromia regional state, Ethiopia

Chapter VI – Narrative Summary of Disaster Situation Visited

6.1 Meher Non-Food (Health, Nutrition and WASH) Emergency Needs Assessment in Oromia

Background

Oromia National Regional State is one of the 9 Administrative regions of Ethiopia with a total population of 29,362, 377 (2002EC Population projection). Administratively the region is divided in to 18 zones which further subdivided in to 303 districts, 12 Administrative Towns and 6,500 PA Kebeles. The potential health service coverage of the region is currently estimated to be about 84%. In 2002 EFY, the EPI coverage of Penta3, Measles and BCG accounts for 70%, 69% and 72% respectively. The region has experienced various health emergencies like drought, diarrheal diseases, floods and other epidemic prone diseases, which affected the health of the population for many years. In order to respond for public health emergencies, non-food emergency needs assessment has been conducted from 23 November to 14 December 2009.

This report summarizes the non-food (Health, Nutrition & WASH) emergency needs assessment in the Highlands of Bale, West Arsi, Arsi and East Shoa zones of Oromia region.

Table 6.1.1 Background information of the zones:

Zones	Total population	No of Districts	Health Facilities			Potential Health service coverage
			Hospitals	Health centers	Health Posts	
Bale	1,422,483	20	2	20	273	75%
West Arsi	2,112,193	13	2	30	187	80%
Arsi	2,767,537	25	1	41	392	96%
East Shoa	1,393,037	13	1	20	301	85%

Table 6.1.2 Background information of the visited zones

Zone	EPI Coverage, 2009			
	BCG	Pentavalent3	OPV3	Measles
Bale	87.6%	91.6%	91%	82.4%
W/Arsi	101%	97%	97%	85%
Arsi	96%	91.4%	89.5%	84.3%
E/Shoa	78%	92%	92%	81%

Table 6.1.3 EPI Coverage of the visited districts, Oromya, Ethiopia, 2009

Zone	Woreda	EPI Coverage (%)		
		BCG	Pentavalent3	Measles
Bale	Agarfa	88	104.7	103.6
	Gasera	91	85	77
West Arsi	Arsi negele	77	62	51
	Shashemene Rural	90	89	72
	Wondo	NA	NA	NA
	Shala	95	118	80
	Siraro	72	88	77
Arsi	Dodota	86	81	73
	Merti	79	69	60
East Shoa	Fentale	64	67	59
	Boset	84	91	82
	Dugda	92	97	80
	Adame Tulu	82	81	58

Objectives

The main objectives of the Meher non-food emergency (health, nutrition and WASH) needs assessments are:

- To determine the occurrence and extent of public health emergencies in the zones and Districts
- To identify districts affected by malnutrition
- Identify affected districts by epidemic prone diseases like malaria, AWD, measles, dysentery and relapsing fever
- Determine number of people needing humanitarian assistance of non-food sectors
- To identify gaps and Assess the capacity of Districts in preparedness & response plan
- To suggest action points for epidemic preparedness and response

Methodology

- After being briefed by the zonal administrator, the health & nutrition cluster visited the zonal health department for additional briefing. The general health and nutrition situations in the districts (major epidemic prone diseases and Districts affected by malnutrition) were explained by the zonal experts and were prioritized for field visits.
- Data was collected through key informant interviews and discussions using checklists. The key informants were health workers at regional, zonal and woreda health offices mainly those working under PHEM and MCH units. In addition secondary data was collected from monthly and annual zonal/woreda reports through field visit to those districts affected by epidemic prone diseases and malnutrition.
- Finally the data was analyzed manually using chart and tables.

Summary of Assessment Findings

The areas of assignment for the non-food team (health, nutrition and WASH) are Highlands of Bale, West Arsi, Arsi and East Shoa zones of Oromia region. After briefing, the team visited zonal and selected woreda health offices in these four zones.

Public Health Emergencies/Epidemics:

Oromia Region has experienced various health emergencies like diarrheal diseases, floods and other public health emergencies, which affected the health of the population for many years. In order to

respond for public health emergencies, non-food emergency needs assessment has been conducted from 23 November to 14 December 2009.

In 2009, Acute Watery diarrhea (AWD) outbreak has affected many zones of the region. In response to this, the Regional Health Bureau (RHB) has developed epidemic preparedness and response plan of action. In addition, PHEM task force has been established at all levels. However, the capacity of the RHB in terms of trained human resource on PHEM components, operational cost, drugs and medical supplies, and transportation are limited to respond to an epidemic. Moreover, the RHB has adequate laboratory, services, diagnostic supplies, and reagents in 2 regional laboratories located in Adama and Nekemite Towns. These regional laboratories are capable of performing AWD, Meningitis and gram negative bacterial culture and other laboratory services.

When we observe public health emergencies situation of the assessed zones; Arsi, West Arsi and East Shoa zones have been affected by Acute Watery diarrhea (AWD) out break; however, there was no outbreak in Bale zone. Like the regional level task forces have been established at zonal level to respond to public health emergencies/epidemics (PHEM), however, lack of operational cost, inadequate drugs and medical supplies, lack of diagnostic supplies at zonal level (e.g. culture media, transport media for AWD and Meningitis) and inadequate training on PHEM components for health professionals were the main challenges in immediate response to an epidemic. Among the 4 visited zones, East Shoa has the capacity to do all laboratory investigations regarding epidemic prone diseases as one of the regional laboratories is located in this zone.

After zonal briefing, the team assessed selected districts based on the repeated occurrence of an outbreak and malnutrition situation. In all visited Districts, Rapid Response Team (RRT) has been established but only functional during outbreak. Budget was not allocated for emergency/epidemic preparedness and response at woreda level. In addition, visited districts were not having adequate stock of drugs & medical supplies for major epidemic prone diseases like malaria, AWD, measles, dysentery and relapsing fever.
Data on major epidemic prone diseases have been collected from selected districts of the 4 respective Zones, but for ease of analysis and to keep on evidence based data from the main source it is made to be limited to the Districts that were visited by the team. As depicted in table 6.1.4 below, the data for AWD and malaria diseases represent cases of the past 3 months (01 August 2009 – 31 October 2009).

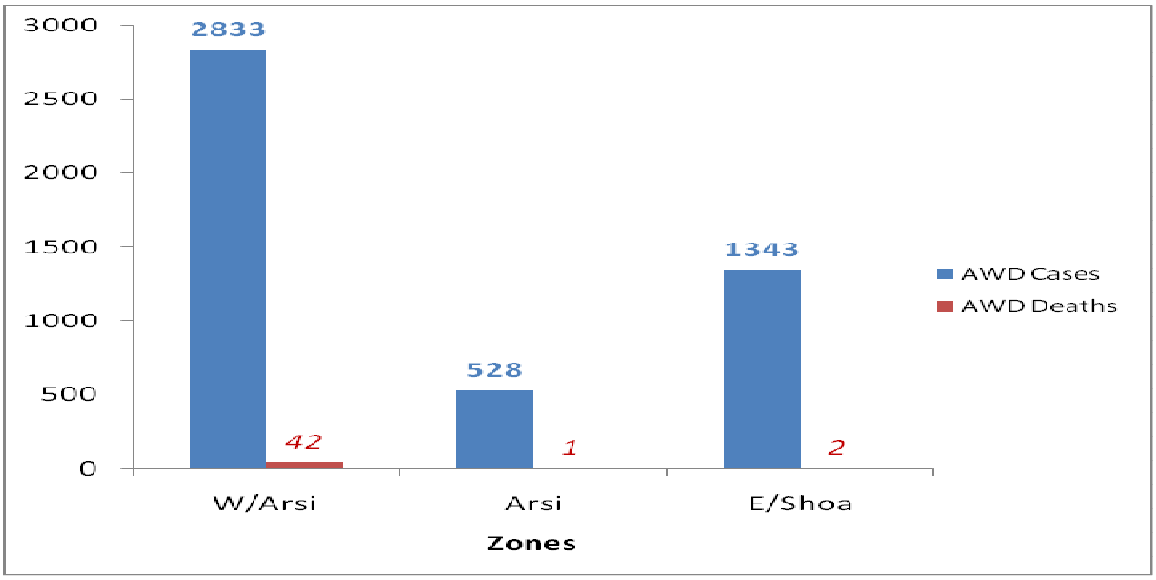

Fig.6.1.1 Total Acute Watery diarrhoea cases and Deaths in visited zones, April - Nov 2009

W/Arsi Zone

Among the 4 zones, West Arsi has been the most affected by AWD outbreak during the year 2009. According to the west Arsi zonal health department report (ZHD), a total of 2,808 AWD cases and 39 deaths with CFR of 1.4% have been reported during the epidemic period.

Malaria is also major problem in all visited zones, however, there was no malaria epidemic in the year 2009 even if high number of malaria cases were reported.

In West Arsi malaria is a major problem, the assessment team has visited all the 5 districts (Shashmen, Arsi negele, Wondo, Shala and Siraro) with high malaria incidence. The numbers of malaria cases were high in October 2009 compared to the previous months. For example, in Wondo woreda, there were 789 malaria cases in October 2009 while 406 and 454 in August and September 2009 respectively.

Arsi zone

During 2009, 4 districts of Arsi zone (Merti, Jeju, Guna, Robe and Zewaydugda) have been affected with AWD outbreak. Among these districts the most affected Merti woreda has been visited by the team. The index case in Merti woreda was reported on 22 June 2009 and according to the woreda health office

report a total of 401 AWD cases and 4 deaths With CFR of 1% has been reported from 22 June – 13 October 2009.

Malaria is also endemic in most districts of Arsi zone, 20 districts out of 25 are malaria endemic, however, according to the past 3 months data, malaria cases were seen in 16 districts. Based on this data, the most affected districts were Zewaydugda, Jeju, Merti and Dodota.

Among the visited zones and districts, measles epidemic was reported only from Seru woreda of Arsi zone.

Table 6.1.4 Trend of Malaria and AWD cases in visited districts, August - October 2009

Zone	Woreda	Total popula	Malaria cases			AWD cases		
			August	September	October	August	September	October
Bale	Agarfa	78,821	0	0	0	0	0	0
	Gasera	104,593	1	2	1	0	0	0
West Arsi	Arsi negele	284,637	160	166	273	393	156	26
	Shashemene Rural	254,763	31	78	49	238	86	16
	Wondo	63,837	406	454	789	19	1	0
	Shala	163,239	348	630	1454	10	1	0
	Siraro	183,600	70	85	97	0	0	0
Arsi	Dodota	68,169	39	51	118	0	0	0
	Merti	87,834	315	178	163	20	96	6
East Shoa	Fentale	72,587	679	308	364	0	0	0
	Boset	176,891	7	27	458	91	71	13
	Dugda	153,073	14	24	180	0	0	0
	Adame Tulu	146,086	579	829	2418	43	27	0

Malnutrition

W/Arsi zone

Malnutrition is one of the main problems in all 4 Zones but with marked rise in the number of cases of Severe Acute Malnutrition (SAM) in 5 districts of West Arsi zone. The team has visited all the five districts namely Shashemene, Arsi negele, Wondo, Shala and Siraro. According, to the data collected for 5 months (June-October 2009) a total of 21,168 SAM cases have been reported.

Among the five districts, Shashemene and Arsi negele are the most affected districts. For example in the previous five months trend (June – October 2009) the number of Severe Acute Malnutrition (SAM) cases were 9,290 and 6,497 in Shashamene and Arsi-Negele districts respectively. In response to malnutrition, the zone has 150 Out Patient Therapeutic Programs (OTPs) and 6 Stabilization Centers (SCs).

Table 6.1.5 Malnutrition status in visited districts, June - October 2009

Zone	Woreda	No of OTPs	No of SCs	Total Sever Acute Malnutrition Cases				
				June	July	August	September	October
Bale	Agarfa	22	1	67	67	90	104	199
	Gasera	20	1	152	24	0	0	101
West Arsi	Arsi negele	43	2	1698	1204	1357	987	1251
	Shashemene Rural	27	2	1885	2071	1864	1730	1740
	Wondo genet	NA	NA	NA	NA	NA	NA	NA
	Shala	30	2	125	500	374	298	316
	Siraro	18	0	1099	777	787	739	366
Arsi	Dodota	1	0	NA	NA	NA	NA	47
	Merti	18	1	NA	NA	NA	NA	4
East Shoa	Boset	23	0	0	10	13	203	407

Bale zone:

In the highlands of Bale zone, 5 districts among 9 districts were affected by malnutrition. The team visited two districts in these highland areas (Agarfa & Gasera). In these Districts there were 44 OTPs & 2 SCs. In both districts the numbers of children affected by malnutrition are high in October 2009 compared to the previous months.

Regarding Therapeutic supplies, Agarfa Woreda has enough supply as the program is supported by an NGO (Concern), however, according to the Woreda health office, the project will phase-out after 2 months and there will be a gap unless planned to address the problem in the coming months. In Gasera Woreda, currently supplies like F75, folic acid, antibiotics are not enough and also needs assistance in the coming months.

Arsi zone:

Malnutrition is one of the main problems in Arsi zone. According to the zonal health department, 4 districts (Merti, Dodota, Golelcha and Seru) are affected by malnutrition and they are EOS districts. However, 6 districts have reported malnutrition cases in October 2009. It was difficult to assess and compare the malnutrition status of the zone before October 2009 as there was no report on the number of cases and therapeutic feeding programs.

The assessment team visited two districts of Merti & Dodota among the 4 EOS targeted districts. Like the zonal health department report, both districts didn't have any malnutrition report before October 2009. According to the October 2009.report, there were 18 OTPs and 1 SC in Merti woreda and only 1 OTP in Dodota woreda. There were 47 SAM cases in Dodota and 4 SAM cases in Merti woreda during October 2009. However, based on the malnutrition screening program during EOS, there were 158 SAM cases in Merti woreda. Regarding Therapeutic supplies, both woreda have enough therapeutic supply except folic acid, antibiotics and albendazole.

Interruption of the OTP, shortage of routine drugs like folic acid and antibiotics, financial scarcity and shortage of transportation are the main challenges in responding to malnutrition. For example, 4 OTPS in Shala woreda of West Arsi zone were closed due to lack of operational cost and transportation. During the assessment there were inadequate recording and reporting on OTPs and SCs. Besides, it was difficult to find regular report on the number of SAM cases particularly in East Shoa. Therefore, these problems need to be addressed urgently through coordinated activity between ZHD and partners.

Humanitarian Intervention Organizations

During the interview at zonal and woreda levels, humanitarian intervention organization currently working on health and supporting during emergency situations were identified. All visited zones and Districts have indicated that their health priorities for potential humanitarian intervention were: Malnutrition, Malaria and WASH as indicated in the table below.

Table 6.1.6 Developmental partners working in collaboration with nutrition, public health and other activities related to health, by zone

Zone	Organization	Main activity	Health priorities for potential humanitarian intervention
West Arsi	- ESHE - Rift Valley Women & Child development - World Vision - PMI	- MCH (Family health) - MCH (Reproductive health) - Malnutrition - Training of HEWs - Indoor residual spray	- Malnutrition - Malaria - EPI - WASH
Bale	- Concern World Wide - Save The Children USA - IFHP - CCM - Merlin	- Nutrition - De-worming (primary school) - MCH - EPI - Clean delivery - Training - Nutrition	- Malnutrition - Malaria - EPI - WASH
Arsi	- PMI	- Indoor residual spray	- Malnutrition - Malaria - WASH
East Shoa	- FHI - World Vision	- MCH - Nutrition - MCH	- Malnutrition - Malaria - EPI - WASH - HIV

Recommendations

Based on the assessment findings, the following action points were suggested in order to respond for public health emergencies/epidemics:

- Detailed epidemic preparedness and response action plan on major epidemic prone diseases has to be developed at regional, zonal and woreda levels
- Capacity building at all levels (allocation of adequate human resource for public health emergency and training on public health emergency components

- Allocation and early release of budget for public heath emergencies (availability of emergency fund at zonal and level)
- Ensure adequate drugs and medical supplies to mitigate PHEM situations and the regional health bureau, zones and districts should have contingency stalk for emergency.
- Regular budget allocation at woreda level for PHEM activities
- Public health emergency task force and rapid response team have to be permanently functional (meeting regularly and evaluate current situations)
- Re-establishment of OTPs and SCs, and regular supportive supervision in order to follow the management of SAM cases according to national guidelines
- Data management has to be improved at all levels (regular recording and reporting as well as data quality and self assessment)
- Emphasis should be given to safe and adequate water supply; hygiene and environmental sanitation in order to prevent and control repeated occurrence of AWD.

Conclusion

Based on the assessments; gaps, challenges, and strengths were identified in order to take corrective measures. Accordingly, epidemic prone diseases and malnutrition are among the causes of major public health problems with in the visited zones and districts. The information obtained from the assessment is a clue in forecasting the uncertainty of epidemics. Timely and prompt use of data and reports has a significant input in making correct decisions and fostering better performance and achievements in the foreseeable future before public health disasters take place.

6.2 Belg Needs Assessment on Health and Nutrition in Amhara Regional State, July 2010

Executive Summary

A total of 17 districts were assessed from 4 zones (N/Wollo, S/Wollo, Oromia and N/Shewa) for health and nutrition emergencies. Upper respiratory tract infection, intestinal parasites, malaria, diarrhea and gastritis are the top five cause of morbidity in the assessed districts.

Disease of Epidemics assessment from Sept 2009-May 2010 indicated 357 AWD cases and 4 deaths (CFR=1.12%), 46,167 malaria cases and 53 measles cases and 1 death (CFR = 1.9%) were reported. IDSR timeliness reporting rate was found low, only 17.6 %(3) of districts have IDSR timeliness rate of ≥80% for the last six months. Two districts (Bati and Kelela) have reported 108 hysteria cases as unusual event. Risk factors for epidemic assessment revealed that most of the districts (15) are at risk of AWD and malaria epidemic.

As to disease prevention and control, 9 districts (52.94%) have measles coverage less than 80%, 7(41.17%) districts Pentavalent less than 80% and ITN coverage for 5(29.41%) districts was less than 80%.

Concerning emergency drugs and supplies, of the assessed districts, 15(88.24%) have no stock of drugs for AWD, 11(64.71%) for malaria, 15(88.24%) for meningitis, 9(52.94%) for measles. It was also reported, absence of stock for RL (64.71%), ORS (70.59%), Syringes and gloves (85.35%). It was reported that 11-15 districts have guidelines for AWD, malaria, Measles for meningitis.

Only four districts (23.53%) have reported less than 2 health officers. Otherwise, all the assessed districts have nurses greater than 5, laboratory technicians and more than 10 health extension workers. As to trained manpower, all have trained health workers on PHEM and IDSR. However, some districts reported untrained ones on EPI (11.76%), malaria (29.41%) and nutrition (5.88%).

Nutrition assessment result revealed that except Kelela in S/Wollo and MojanWodara in N/Shewa, all have nutrition program. In these districts, there are 277 TFP sites (265 OTPs & 12 Stabilization Center) which reported 4153 new SAM cases from Jan-May, 2010. Meket and Habro districts reported the

highest number of (36%) new SAM cases. Bati and Argoba districts have no SC; as a result they are referring complicated SAM cases to Dessie hospital and Kombolcha health center respectively.

The assessment team faced challenges of time constraint, unavailability of complete data, and absence of PHEM/nutrition focal persons during assessment.

Finally the team has summarized estimated beneficiaries of 410,970 people for AWD, 4224 for measles outbreak management, 19,531 for meningitis and 423,752 for malaria. This estimation is based on expected risk for each specific diseases and gabs of coverage in water supply, ITN, and immunization of the assessed districts.

So, it is recommended that support of emergency drugs and supplies, capacity building for health workers on PHEM, allocation of budget of EPRP, improving communication and reporting. In addition, strengthening of TFP through regular monitoring and supportive supervision, establishment of SC and provision of routine drugs are some of the recommendations for nutrition.

Background

Amhara region is one of the 9 regional states that comprise 18,765,416 people with mean annual growth rate of 1.8%. Amhara is one of the regions that have been affected by AWD, meningitis and measles outbreaks in the year 2009 and 2010. The recent data review indicated that there were 3534 AWD cases and 48 deaths with 1.35% CFR in the year 2009, July to October. A total of 81 meningitis cases and 18 deaths with 22.22% CFR have been reported in July 2009.

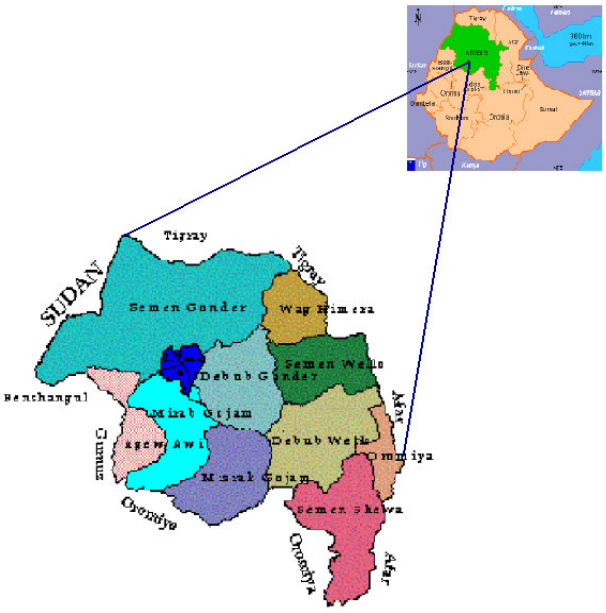

Fig 6.2.1 Map of Amhara Regional State

In addition, malaria is the major public health problems of the region. About 80% of the land and 75% of the population is at risk of malaria. The annual number of malaria cases reported from all health facilities ranges from 1 to 1.2 million cases.

In the region, risk factors for emergency prone diseases such as AWD, malaria, measles and meningitis are still persistent

General Objective

The overall objective of the assessment is to contribute in ensuring appropriate and effective humanitarian planning and responses, which will lead to reducing morbidity, mortality and acute malnutrition in the most vulnerable areas of Amhara Region.

Specific Objectives

1. To assess the type, magnitude, and likelihood occurrence of different public health emergencies in the most vulnerable (selected) districts
2. To assess the existing capacity of the health system in managing public health emergencies
3. To develop preparedness plans based on the findings obtained

Methods

This health and nutrition emergency needs assessment has been conducted as part of the 2010 Belg assessment in selected hotspots districts of South Wello and North Wollo of the Amhara region, using the following major data collection methods:

- In-depth Discussion with zonal level DPP committee, and non health sectors such as water resources, education and food security coordination and disaster prevention offices and with zonal and woreda level health officials.
- Review of secondary data against standard national checklists and observation of selected sites.

Summary of Assessment Findings

Section A. Health:

Health Profile: Population: - Seventeen districts were selected and assessed for health and nutrition needs from 4 zones of the Region. The total population in these districts is 2,114,970 of which 1,059,600 are males, 1,055,370 females and 285,521 constitute under five years old children. Meket (11.4%) followed by kallu (10.8%) has the highest population from all the assessed wereds. Argoba (1.7%) is the least in population size (See table 1 for name of districts and zones).

Morbidity and Mortality:

The top five causes of the morbidity are upper respiratory tract infection, intestinal parasitosis, malaria, diarrhea, and Gastritis. However data were not available for causes of mortality.

Only 17.6 %(3) of districts have IDSR timeliness rate of ≥80% for last six months. However 71 %(12) of them analyzed at least malaria data to see the trend of the disease. The major constraints in information management were; delayed reporting due to lack of transportation and communication facilities, shortage of computer, and shortage of trained man power and attrition of health workers.

Epidemic Diseases, Sept 2009-May 2010:

Acute watery diarrhea (AWD)- Three hundred fifty seven cases and 4 deaths (CFR=1.12%) were occurred during this period. 41% and 23% of districts reported AWD in September and October 2009 respectively. No cases were reported from all districts from November 2009-May 2010.

Malaria- A total of 46,167 cases were reported from the assessed districts and the attack rate is 2.2% with the highest rate in JileTimuga(12.6%) followed by Kalu (6.03%) .The peak month for the summarized cases found to be October 2009. No cases were reported from Mojana wodara during Sept 2009-May 2010.

Meningitis- Only one case was reported from JileTimuga woreda in Oromia zone in March 2010.

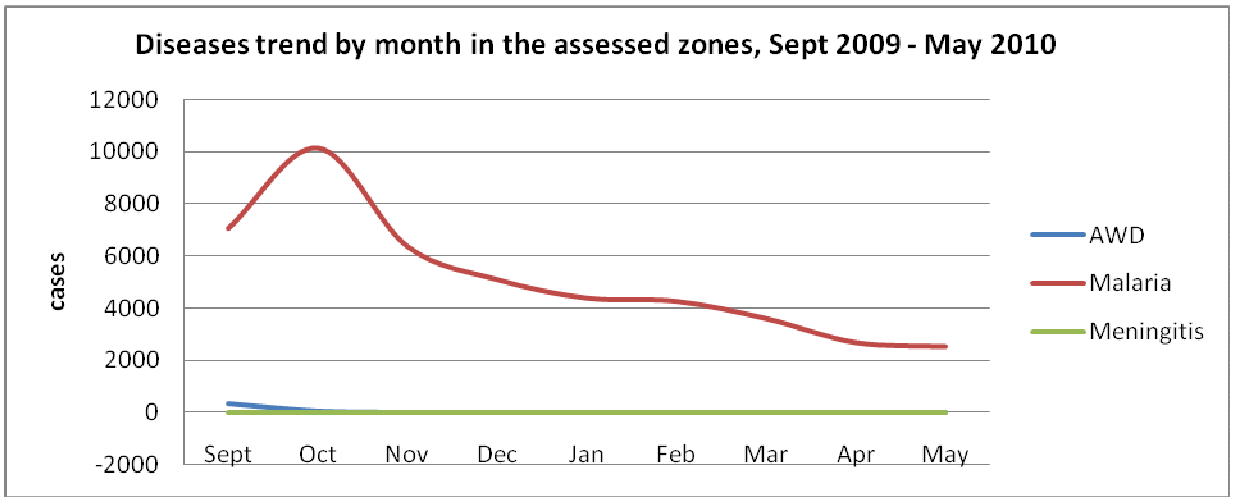

Fig 6.2.2 Acute Watery Diarrhea, measles and meningitis trend by month in assessed districts, Amhara, July 2010

Measles: A total of 53 cases and 1 death (CFR = 1.9%) of measles were also reported from 71% (12) of the assessed districts in four zones. More cases have been reported from Eferata Gidem in N/Shewa (13), Mekit (10) and Kalu (10) from N/Wollo zone. The death was from Mekit.

Unusual event disease occurrence: Hysteria was reported from Bati town (68 cases) and Kelela (40 cases).

Disease prevention and control:

It was found that of the total assessed 17 districts, 9 (52.94%) have measles coverage less than 80%, 7((41.17%) and Pentavalent less than 80%. In addition, five districts reported ITNs coverage less than 80%, from which the list coverage was reported from Ankober (32%) in N/Shewa.

Water supply and latrine coverage:

From the total 15 districts that accessed information, 7(46.67%) districts are providing improved water sources for more than 60% of the population and though information on treated water consumption could not be accessed from 9 districts, 7(41.18%) districts were reported provision of treated water for more than 60% of the population.

Low latrine coverage reported from four districts, Jile Timuga (18%),Argoba(21%), Bati Zuria(31%) and Mekit (36%) and the rest reported above 66%. In most districts (9) , information was not available on latrine utilization (8 districts reported based on their assumption).

Emergency drugs and supplies:

Of the total assessed districts, 88.24% have no stock of drugs for AWD, 64.71% for malaria, 88.24% for meningitis, 52.94% for measles. It was also reported, absence of stock for RL (64.71%), ORS (70.59%), Syringes and gloves (85.35%). Even, the available reported drugs and supplies are not adequate for the coming 6 months.

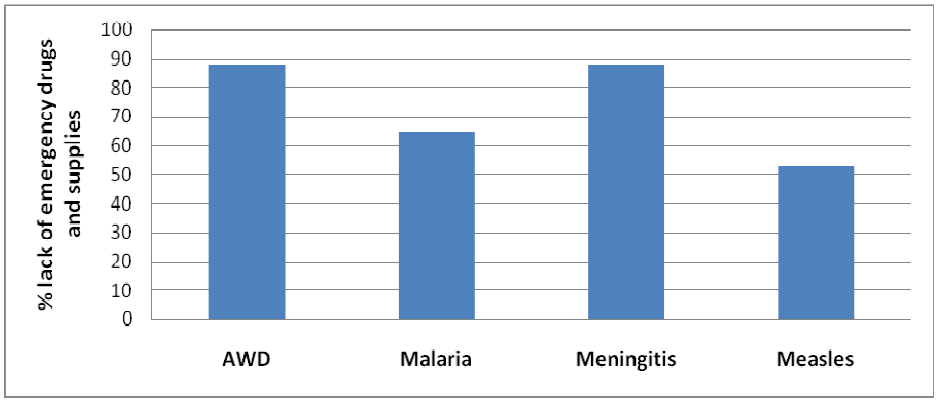

Fig.6.2.3 Emergency drugs and supplies by diseases, July 2010

In addition, stock supplies vary from zone to zone. Apart from Oromia zone, all assessed zones and RHB reported that they don't have meningitis vaccine in their stock, but all don't have oily CAF. RHB and all the assessed zones have coartem (43200 strips). 700 tabs Doxycycline are available in RHB and N/Shewa. A total of 5448 bags of ringer lactate and 17057 sachets of ORS were also available at Regional and Zonal level. Laboratory supplies (RDT for malaria and meningitis) are not available at all levels. Only S/Wollo reported that it has one CTC for AWD in the stock. The available stock reported by RHB and Zones is for the whole zones and districts in the region.

Guidelines for case management:

A total of 15 (88.24%) districts have guidelines for AWD and Measles, 13(76.4%) for malaria and 11(64.71%) for meningitis.

Human resource: Only four districts (23.53%) have reported less than 2 health officers. Otherwise, all the assessed districts have nurses greater than 5, one laboratory technician and more than 10 health extension workers. As to trained manpower, all have trained health workers on PHEM and IDSR. However, some districts reported untrained ones on EPI (11.76%), malaria (29.41%) and nutrition (5.88%).

Coordination forum and EPRP: Almost 13 (77.50%) districts have coordination forum and EPRP. But all are not active this time and have no budget for response.

Coordination and PHEM

Coordination: At regional level, there is functional multisectoral health and nutrition emergency coordination forum on monthly basis for RHB, NGOs and UN agencies. However, the forum lacks representatives from water, education and agriculture governmental sectors. All the assessed zones have multisectoral coordination forum for the health when there is emergency. Participants are from government, NGOs in N/Wollo and South Wollo.

PHEM: Except N/Shewa zone, the rest have developed multi disease EPRP. But all of them don't have PHE preparedness and response fund. Including regional health bureau, all the assessed zones have dedicated PHEM unit/team. However, they need seven (4 RHB/PHEM, 2 Oromia and 1 S/Wollo)

additional pubic health emergency officers. With respect to trainings provided for PHEM members, all team members from both regional and zones trained on PHEM, IDSR and outbreak management of major epidemic prone diseases. Only regional and N/Shewa zone PHEM members have trained on EPRP preparation.

Challenges mentioned including absence of budget for monitoring and supportive supervision, shortage of computers, lack of communication means like phone, internet connection, CDMA, high staff turnover and lack of training for staff.

Major areas of supports they need from both Federal and health partners are financial support, emergency drugs and medical supplies, logistics like motorcycle, technical support and capacity building on data management and EPRP.

Risk factors **/** epidemic diseases

Malaria- Among all the assessed 17 districts, 76.5% are located below 2000m, 82.4% are malaria endemic, 88.23% have malaria breeding sites, and 58.82% have interrupted rivers and 88.24%(15 districts) have unprotected irrigation.

Meningitis**-** 58.82% of the assessed districts responded as they are located in the meningitis belt, however most of the districts didn't know whether they are in the meningitis belt or not., 11.8% reported meningitis epidemic in the last three years and only one woreda (Kelela in S/Wollo zone) reported a total of 25869(74.5%) people vaccinated in July 2009.

Acute Watery Diarrhea (AWD)- 82.4% of assessed districts have history and reported AWD epidemic in 2007/2008 and 2008/2009 from July to October.

Health care financing and health partners:

Health care financing: In all assessed districts, HIV/AIDS, TB/leprosy, EPI, delivery, ANC, and FP services are provided to the community free of charge. A waiver/exemption system is also available for poorest of the poor. Selection of users and decision is carried out by committee consisting kebele leaders and community representatives. All services in the health centres (OPD, Inpatient, drugs, operation and referral) are provided freely.

Partners working in Health: In all assessed werdas there is at least one partner/NGO is working in health. Some of the major programs which health partners participate are HIV/AIDS, WASH, and nutrition (Table 5).

Section B: Nutrition:

Nutrition assessment result revealed that except Kelela in S/Wollo and MojanWodara in N/Shewa, all have nutrition program. In these districts, there are 277 TFP sites (265 OTPs & 12 SCs) which reported 4153 new SAM cases from Jan-May, 2010. Meket and Habro districts reported the highest number of (36%) new SAM cases. There is also lack of routine medicine such as Amoxicillin and Mebendazole/Albendazole in Bati woreda. Bati and Argoba districts have no SC; as a result they are referring complicated SAM cases to Dessie hospital and Kombolcha health center respectively. It was also seen more cases were coming to TFP sites in March and April.

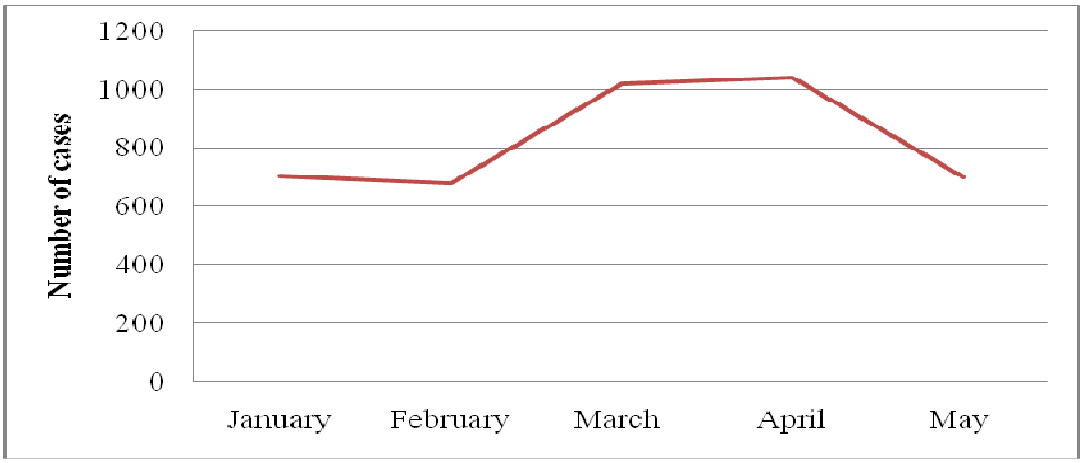

Fig. 6.2.4 SAM cases admission trend by month in all assessed districts, Jan-May 2010

TFP Sites, Jan- May, 2010:

In all assessed districts having nutrition program, a total of 341 TFP sites are expected to report every month, but on average 257 (75.3%) TFP sites were reporting (see table 6). Low attention is the reason given for low reporting rate performance in some districts.

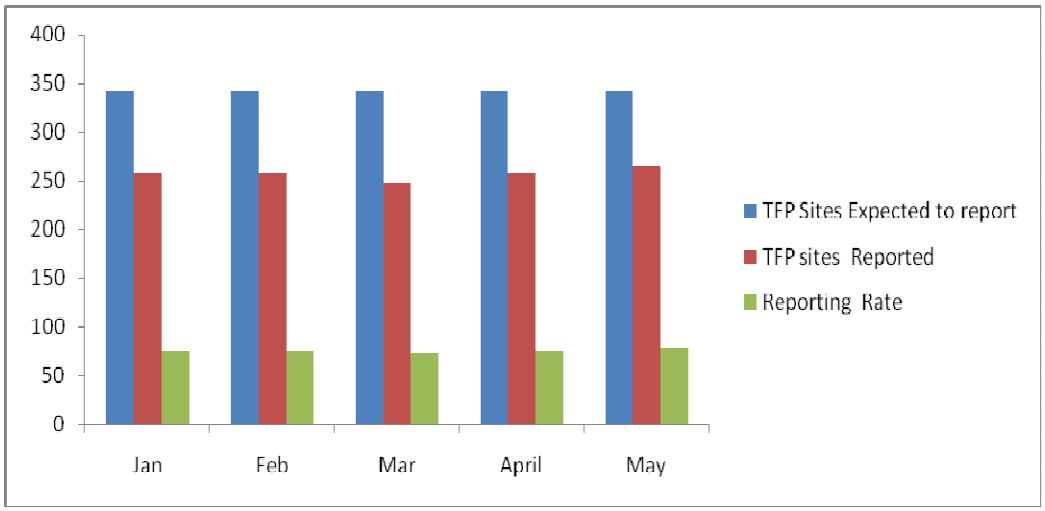

Fig. 6.2.5 TFP sites expected to report, sites reported and report rate trend, July 2010

Estimated beneficiaries:

Estimation of beneficiaries is calculated based on disease specific attack rate and standard risk percent for populations, coverage's of ITN and water. Total estimated beneficiaries are attached in the annex part

Limitation of the assessment

- Time constraint to visit each district/woreda
- Data unavailability in some districts/districts
- Absence of focal persons in some districts
- The questionnaire is limited to collect complete information (stock, risk factor, nutrition)

Recommendations

Based on the findings of this assessment, the team would like to recommend the following points:

For Health:

- Stocks of essential drugs and medical supplies for emergency needs should be secured both at woreda and zonal level
- Capacity building for health workers on PHEM, such as in preparedness planning, in forecasting emergencies, malaria monitoring chart and estimating supply needs

- Allocate budget for emergency preparedness and response to the assessed districts
- Improve multisectoral information communication and reporting with in different levels of health structure.

For Nutrition

- It is necessary to strengthen all OTP sites through regular and consistent supportive supervision
- Link moderate cases, discharged cases to SFP and strengthen enhanced outreach strategy (EOS)
- Promote partners to work on nutrition program in the assessed districts (especially in Sayint Ajiabr the program in the district is just phased out)
- Refreshment training for health workers and HEWs on nutrition
- Establishment of Stabilization center (Argoba and Bati districts)

Chapter VII – Protocol/Proposal for Epidemiologic Research Project

7.1 Salmonellae Carrier Status of food handlers in Mekelle, Tigray, Ethiopia, 2010

Summary

Introduction: Food borne diseases continue to be a major public health problem. A 2006 statistics for food-borne illness in various industrialized countries showed that up to 60% of cases may be caused by poor food handling techniques, and by contaminated food served in food service establishments. The annual incidence of typhoid is estimated to be about 17 million cases worldwide. In developed countries *Salmonella* is recognized as a major food-borne human pathogen. In developing countries however no valid data are available in the majority of cases. In Ethiopia, as in other developing countries, it is difficult to evaluate the burden of salmonellosis because of the limited scope of studies and lack of coordinated epidemiological surveillance systems. In addition, under-reporting of cases and the presence of other diseases considered to be of high priority may have overshadowed the problem of salmonellosis. This study thus is expected to help service providers, health planners and other stake holders in establishing mechanisms on assessing potential risks of salmonella transmission on food handlers in Mekele city

Objectives: To determine the prevalence of typhoid fever and assess risk factors among food handlers in Mekele, Tigray, Ethiopia.

Methods: Cross- sectional study will be employed among food handlers working in different food establishment services in Mekele City.

Work plan and budget The work plan in implementing the study is started since July 2010 for writing a proposal and will extend to December 2010 as a peroid of report writing and submission of the research project. The planned budget needed to conduct the research is 78,328.86 Ethiopian Birr.

Key words: Typhoid fever, Salmonellae, Food handlers, Food establishments

Back ground

Food borne disease is an increasing health and economic burden the world over. Centralization and globalization of food supply, increasing microbial resistance to antibiotics and growth of susceptible immune suppressed subpopulations are the main behavioral, environmental and biological factors responsible for the change (1, 2). Food borne diseases continue to be a major public health problem. A 2006 statistics for food-borne illness in various industrialized countries showed that up to 60% of cases may be caused by poor food handling techniques, and by contaminated food served in food service establishments. In developed countries *Salmonella* is recognized as a major food-borne human pathogen (3).

The annual incidence of typhoid is estimated to be about 17 million cases worldwide. Typhoid is responsible for collective food poisoning with approximately 65% of cases in France (4) and 95% in the United States of America (5). No valid data are available for most developing countries, but there is reason to believe that they have similar problems (3). In Ethiopia, as in other developing countries, it is difficult to evaluate the burden of salmonellosis because of the limited scope of studies and lack of coordinated epidemiological surveillance systems. In addition, under-reporting of cases and the presence of other diseases considered to be of high priority may have overshadowed the problem of salmonellosis (6).

Statement of the Problem

Typhoid fever (enteric fever) is an endemic disease and has become a major public health problem in developing countries with an estimated annual incidence of 540 per 100,000 populations. In sub-Saharan Africa typhoid is still a substantial public health problem (6, 7).Asymptomatic excretion of Salmonella typhoi in stools for greater than 1 year following an episode of acute typhoid fever occurs in approximately 3% of adults (8). Since food handlers in eating establishments cater to larger number of people, they are epidemiologically more important than domestic food handlers in spreading of food borne diseases (9, 10).

Accordingly, food-handlers with poor personal hygiene working in food-serving establishments could be potential sources of many intestinal infections (11). Food-handlers who harbor and excrete

intestinal salmonellosis may contaminate foods from their faeces via their fingers, then to food processing, and finally to healthy individuals (12).

Rationale and outcome of the Study

Because of the importance of chronic typhoidal Salmonellae carrier food handlers in the chain of infection, screening for Salmonellae among food handlers is important though this practice has been deemed not cost efficient by WHO(13-15). To the investigator's best knowledge there is no study conducted so far on the prevalence of salmonella typhi in any area of Tigray Region. Based on the report of Tigray Regional Health Bureau a total of 7165 cases of typhoid were reported from 2006-2010. Out of total reported cases 1044 were from Mekelle City health office for three years (2008-2010) alone. This implies Mekelle City contributes a considerable proportion of cases in the burden of Salmonellosis with underreports considered.

Thus, findings of this study will help service providers, health planners and other stake holders in establishing mechanisms on assessing potential risks of salmonella transmission.on food handlers in Mekele city. The study also attempts to answer the carrier status of *salmonellae* and personal hygiene conditions of food handlers in Mekele City. It may also suggest the inclusion of Salmonellae screening in the regular clinic check-up, treating and educating those found to be infected so as to strengthen the prevention and control of food borne infections among food handlers and the community.

Literature Review

Over view of Typhoid Fever

Typhoid fever is a bacterial disease, caused by *Salmonella typhi (16)*. *Salmonella typhi* is Gram-negative bacteria, which are motile. They are intestinal pathogens, which comprise of a species *Salmonella typhi*, which causes an enteric fever known as typhoid fever. In contrast to other *Salmonella* serotypes, the etiologic agents of Typhoid fever have no known hosts other than humans (9, 10). The disease was initially called *typhoid fever* because of its clinical similarity to typhus. However, in the early 1800s, typhoid fever was clearly defined pathologically as a unique illness on the basis of its association with enlarged Payer's patches and mesenteric lymph nodes. In 1869, given the anatomic site of infection, the term *enteric fever* was proposed as an alternative designation to distinguish typhoid fever from typhus. However, to this day, the two designations are used interchangeably. The incubation period for *S.* Typhi averages 10–14 days but ranges from 3 to 21 days, with the duration likely reflecting the inoculum size and the host's health and immune status (17).

Clinical Picture

Early symptoms include progressive onset of fever, headache, abdominal discomfort, loss of appetite, constipation followed by diarrhea, dry cough, malaise and rash along with relative bradycardia (18, 19).

Transmission

The transmission of typhoid in less-industrialized countries may be due to contaminated food or water. Even after recovery from typhoid, a small number of individuals (called carriers) continue to carry the bacteria. These people can be a source of infection for others. Transmission is more likely to occur via food contaminated by carriers handling food (7).

Typhoid fever in Patients at various Health Facilities, Outbreaks and food establishments

A study employed in Jakarta, Indonesia in 1019 fever patients they identified 9% *Salmonella typhi* and 3% *Salmonella paratyphi* A infections. Paratyphoid fever among cases was independently associated with consumption of food from street vendors. Independent risk factors for typhoid fever using the community control group were mostly related to the household, i.e, to recent typhoid fever in the household, no use of soap for hand washing, sharing food from the same plate, and no toilet in the

household. Also, typhoid fever was associated with young age in years. In comparison with fever controls, risk factors for typhoid fever were use of ice cubes and female sex (20).

In a Study conducted in India eight patients with Gallstones were detected to be typhoid carriers on the basis of Vi serology. The mean age of typhoid carriers was 49 years (range 25–65 yr). Six of the eight carriers were female. Two patients gave a past history of documented typhoid fever. In two of them, Widal test was suggestive of carrier state. Typhoid carriers more often belonged to a lower socioeconomic stratum (five of eight patients). Among the 37 (who had ultrasonographic evidence of gallbladder calculi and were designated as cases) cases, six (16%) were detected to be typhoid carriers in contrast to two patients (2.5%) among the 80 controls. The difference between the two groups was statistically significant (21).

In an outbreak which has occurred in Jerusalem of the 770 persons who participated in three events on 3 consecutive days (17th, 18th and 19th August 2004) at a banqueting hall 124 were interviewed (66 from the first event, 37 from the second and 21 from the third). Of these, 75 persons reported having symptoms. Stool samples of personnel (n=10) were tested from nine workers who were asymptomatic and one who reported acute gastrointestinal symptoms. Two out of ten samples were Salmonella enteric culture-positive. One was from the worker who reported acute symptoms; he became sick on the second day and did not attend work on the third day of the outbreak. The other positive sample was from an asymptomatic worker (22).

A study in India has shown that, a total of 24 food establishments with 236 enlisted food handlers were visited. Out of these 214 were examined. Out of these 28 (12.9%) food handlers were suffering from intestinal parasitic infestation. Out of 28, 12 (42.81%) were contributed by Entamoeba histolytica, followed by 8 (28.6%) cases of Ascaris lumbricoides. Evidence of Giardia lamblia infestation was found in 5 (17.8%), T. solium in 2 (7.2%) and Strongyloidosis in 1 (3.6%) of food handlers. Of 214 cases, one person (0.47%) was found to have S. typhi in the stool sample. In the food handler who yielded growth of S. typhi from his stool sample, Vi-Reaction showed 1:20 serum dilution. The main deficiencies in personal hygiene were poorly kept nails improper working clothes, lack of footwear, irregular bathing & not brushing teeth (9, 10).

In Japan a study was performed to determine the incidence and features of *Salmonella* among food handlers compared with serovars from symptomatic patients in the same period in Kyushu, Japan. *Salmonella* serovars were isolated from 106 (0.032%) of 331,644 fecal samples from food handlers; *S. enterica* subspecies *enterica* serovar Infantis (*S.* serovar Infantis) was the dominant serovar, followed by *S.* serovar Corvallis and *S.* serovar Enteritidis. This study provides information on these serovars, and demonstrates the need for further education on food hygiene, including methods of sanitary handling of chicken eggs and chicken meat, which are possible infectious sources of *S.* serovar Infantis, *S.* serovar Corvallis and *S.* serovar Enteritidis. From November 1999 to May 2000, fecal samples (331,644) were collected from food handlers working in food factories, hotels, restaurants, supermarkets or companies that provide food services for offices, factories, hospitals, schools, daycare centers and other facilities, in eight pre-modified Rappaport broth for 18 h at 37°C, then streaked for isolation on differential plating media, using *Salmonella-Shigella* agar plates, and incubated for 24 h at 37°C (20).

Salmonella were isolated from 106 (0.032%) of the 331,644 fecal samples from the food handlers, The monthly numbers of isolates of *Salmonella* from food handlers were as follows: 23 (0.066%) from 34,838 samples in November 1999; nine (0.020%) from 44,669 samples in December; six (0.014%) from 41,900 samples in January 2000; five (0.012%) from 43,513 samples in February; nine (0.020%) from 44,604 samples in March; 14 (0.024%) from 59,459 samples in April; and 40 (0.064%) from 62,661 samples in May. The dominant serovar among 16 serovars and two untypable isolates from the food handlers was *S.* serovar Infantis, followed by *S.* serovar Corvallis and *S.* serovar Enteritidis.

In a study which is carried out in Spain, there were 1,106 hospitalizations for typhoid and paratyphoid fever during the study period. The annual hospitalization rate was 0.31 cases per 100,000 population. The mortality and case fatality rates were 0.003 per 100,000 population and 0.9%, respectively. The average length of hospitalization was 10.19 days. These hospitalizations impose an annual direct cost of €334,000 (23).

A laboratory finding of patients in a study done in Singapore showed S- typhi was isolated from 46 (85%) patients, of which 15 were with positive stool cultures. In 3 of the patients, non-typhoidal *Salmonellae* was isolated from stool and in one child, both *S typhi* and non-typhoidal *Salmonella* were

isolated from the stool. Carriage of non-typhoidal *Salmonellae* does occur and concomitant disease or other infections or antibiotic therapy can cause excretion of these organisms in the faeces (24)

In a Study done in Chile, rectal swabs were obtained from 78, and stool samples from 77, of the 81 domestic food handlers for cases; 2 food handlers were positive for S. typhi, including the mother of one case and the cook (female) of another. Swabs were also obtained from 81, and stools from 71 food handlers of controls. One of these food handlers was positive for S. typhi; this was the mother of a control child whose own children were negative for S. typhi but who prepared flavoured ices that she sold to neighbourhood children, including the case matched with her child. The ages of these food handlers were 34, 37 and 55 years; none of them had a history of typhoid fever, but two had a history of biliary colic and one was known to have gallstones.Seven additional food handlers had stool cultures positive for other enteropathogens, including S. paratyphi B other salmonellae (25) and Shigella (26).

In a study that is carried out in Omdurman area of Sudan a total of 60 bacterial strains and 18 intestinal parasites were isolated from 259 food handlers examined. The main pathogens isolated were *Staphylococcus aureus* from nasal swabs, *Salmonella typhi*, *Shigella boydii*, *Gardia lamblia,* and *Entamoeba histolytica/dispar* from stools. Of the total food handlers examined, 71.8%, 20.5%, 3.8%, 2.6%, and 1.3% tested positive for *S. aureus*, *G. lamblia*, *S. typhi*, *E. histolytica,* and *S. boydii*, respectively. Among the food handlers groups, storekeepers had the highest number of carriers with pathogenic bacteria and intestinal parasites (41.0%), followed by restaurant workers and bakers (24.4% each), butchers (5.1%), milk distributors and fruit/vegetable sellers (2.6% each) (18).

A multi-national population based cohort study in Nigeria, has shown that a total of 622 cases were identified for an annual incidence of 1.02 per 100,000 population. The incidence of typhoidal (serotypes Typhi and Paratyphi) and non-typhoidal (other serotypes) disease was 0.21 and 0.81 per 100,000/year. There was major regional and moderate seasonal and year to year variability with an increased incidence observed in the latter years of the study related principally to increasing rates of non-typhoidal salmonella bacteremias. Advancing age and male gender were significant risk factors for acquiring non-typhoidal salmonella bacteremia. In contrast, typhoidal salmonella bacteremia showed a decreasing incidence with advancing age and no gender-related excess risk (27).

A study done in Egypt shows that out of 500 children, 91 (18.2%) children have typhoid bacilli in their urine or stool. Stool carrier represent 82.4% (75 children) while 17.6% (16 children) were urinary carrier. Inspite of higher prevalence at age group > 12 years (41.3% in stool carriers and 37.5% in urinary carriers) there is insignificant difference in carrier state between different age groups. There were 57 males (62.6%) and 34 females (37.3%). Males had significantly higher carrier rates than females. As regards to water supply percentage of urinary and stool carriers were more in cases using water pump and general source of water supply than cases using tap water (28).

In a study done in Nigeria Lagos, Salmonella species were isolated from 17% of the stool samples obtained from the food handlers. The organisms isolated from the stool from food handlers were *S. typhi* (6.8%), *S. enteritidis* (5.3), *S. choleraesuis* (2.9%)*, S. paratyphi* A (1.5%) and *S. arizona* (0.5%) (29).

A study employed in Ghana among food vendors showed, typhoidal Salmonellae were isolated from six people, giving a carriage rate of 2.3%. Three of the Salmonellae isolated were S. typhi, and they had significant Widal agglutinin titres of l/160 and 1/320 for 0 and H antigens, respectively. The other three were non-typhoidal Salmonellae. The three had S. typhi and the other three had titres of 1/80 or less for both 0 and H antigens, respectively. (30).

A study conducted in Bahir-Dar, Ethiopia among 384 food handlers, showed that one hundred fifty eight (41.1%) food handlers had intestinal parasites and 6 (1.6%) were found positive for *S. typhi*. Twenty-five (6.5%) food handlers were suffering from diarrhoea. Nine species of intestinal parasites, 2 protozoa (*E. histolytica/*dispar 12.76% and *G. lamblia* 7. 0%*)* and 7 helminthes (*A. lumbricoides,* 11.7%*, Hookworm,* 8.1%, *S. stercoralis,* 2.86%*, S. mansoni,* 1.8%*, Taenia species,* 1.3%*, H. nana,* 0.5% and *T. trichiuria,* 0.5%) were detected (31).

Widal agglutination test:

As various studies stated, the Widal test has been used very extensively in the serodiagnosis of typhoid fever and, in developing countries, remains the only practical test available. Many studies (32-35), however, have produced data which have serious doubts on the value of the Widal test. Classically, a fourfold rise of antibody in paired sera is considered diagnostic of typhoid fever (36).

General Objective

To determine the prevalence of chronic typhoidal salmonellae and assess risk factors among food handlers in Mekele, Tigray, Ethiopia.

Specific Objectives

- To identify the etiology of typhoidal salmonellae among food handlers in both serology and stool culture
- To identify asymptomatic carriers of *salmonella typhi* among food handlers
- To assess possible risk factors for typhoidal salmonellae among food handlers

Methodology

Study area and period:

This study will be conducted in Tigray Regional State, Mekelle City, located 776 km North of Addis Ababa. The study will involve food handlers' interviews of 62 Hotels, 41 Restaurants, and 17 Cafeterias at two selected health centers in Mekelle City. The population of Tigray regional state is estimated at 4.6 million people in the year 2009/10. The health facilities in the region consist of 12 Hospitals, 46 Health centers, and 529 Health posts (all governmental), of these three hospitals and six health centers are located in Mekele.

According to the 2007 census projection the population of Mekelle City was estimated at 232,119 of which, an estimated 1385 food handlers are working in different food establishments as of a data obtained from Bureau of Trade and industry of the Region. Water supply and latrine coverage of the City are estimated 78% and 76% respectively. The study will be conducted from November 01/2010-December 30/2010.

Study design:

A cross- sectional survey will be carried out. It will employ a quantitative data collection method to collect data from randomly selected food handlers working in different food establishment services. The quantitative research approach is considered to be appropriate for this study because it allows a formal and systematic approach to collect information on food handlers' knowledge, attitude and practices on hygienic conditions and assessing risk factors to the problem in question.

Study population:

The source population includes food handlers working in restaurants, cafeterias and snack houses found in Mekelle City. The health centers are named as Kasech, Semen and Mekele Health Centers. Food handlers recruited to participate in the study are supposed to come to the respective two selected health centers through environmental health workers working in these facilities and environmental health experts of the city health office in cooperation with the management of the selected establishments.

Inclusion Criteria:

Food handlers who are selected for the study will be included, regardless of their duration of stay in the work/ establishment

Food handlers of Establishments (Cafeteria, Restaurant and Snack houses) having legal acceptance by bureau of trade and industry

Both male and female will be included

Exclusion Criteria:

Food handlers of recently opened establishments which were not enrolled in the sampling frame

Sample Size

The total sample size is determined using single population proportion formula as follows:

$$n = \frac{Z^2 P(1-P)}{e^2},$$

Where,

- n is the sample size,
- Z^2 is the abscissa of the normal curve that cuts off an area at the tails (1– equals the desired confidence level, e.g., 95%),
- e is the desired level of precision,
- p is the estimated proportion of an attribute that is present in the population. Here for a single population proportion (prevalence) it is estimated as 50%, as the prevalence in a study conducted at Bahr Dar is low (1.6%).
- $Z = 1.96$ at $\alpha = 0.05$
- e is level of precision

$$n = \frac{(1.96)^2 \times 0.5(1-0.5)}{(0.5)^2} = 384$$

However, the total population of food handlers is small (1385). Therefore, population correction factor is used to further minimize the sample, i.e.

$$n = \frac{N}{1+Nd^2}, \text{ which gives } 310$$

Sampling technique:

First list of food and drink establishments with a total population of food handlers will be prepared in collaboration with Regional Trade and Industry Bureau. Then, the total sample is distributed among food establishments using a proportional allocation method. Simple random sampling will be used to select study subjects from each establishment. The study is targeted to include all the available food and drink establishments (Restaurants, Cafeterias and Hotels) found in Mekelle City.

Data collection procedures and tools:

Interviews will be administered to each food handler using a structured questionnaire before blood and stool specimens are collected for examination in selected Health Centers. Blood will be tested in the Health Centers, and stools will be analysed in the Regional Laboratory after they get collected in the Health Centers. The interview will be carried out upon a written consent of all food handlers who agreed to be tested.

A structured questionnaire will be developed in English for use by data collectors (Health workers of the selected Health centers) that will be recruited for this study. The variables in the questionnaire will be adapted from previous studies, consultation with advisors, peer discussions and other sources.

Laboratory Data:

Sample collection and transport

The methods of diagnosis in this study will be both serology and stool culture.Venous blood will be collected from each selected food handler aseptically with a trained health worker. Serum for the widal procedure will be separated after clot formation from 2-3 ml sample.

Stool specimen will also be collected from each food handler in a clean stool cup by medical laboratory technicians/technologists and transported following an appropriate transport media to the Microbiology laboratory at Mekele Regional Laboratory with in an hour of collection.

Widal slide agglutination test:

The Widal test will be performed with standardized kits. Serum samples of patients will be screened with a slide agglutination test which measures agglutinating antibodies against the lipopolysaccharide ‘O’ and protein flagellar ‘H’ antigens of *S. typhi* and Para typhi and Examine the serum–antigen

mixture macroscopically for agglutination within 1 minute in a good light following the procedure(37,38).

Culture and identification:

For isolation of *S. typhi*, stool samples will be enriched in Selenit F broth for 18 hours prior to inoculating into the plates of Salmonella-Shigella agar (Oxoid, UK). After 24 hours of incubation at 37 ^{o}C, *S. typhi will* be identified following the standard procedures (39).

Data quality control:

Findings and experiences from the pre-test will be utilized in modifying and reshaping the research data collection tools. Continuous supervision will be carried out through out data collection period both by supervisors from the Health Centers and the principal investigator to monitor and keep the data quality maintained. Questionnaires will be collected and checked for completeness and accuracy from data collectors by supervisors from the health centers and regional laboratory including laboratory results and the quality in the regional laboratory will be more managed by a technical advisor working in this section. Finally the result will be submitted to the principal investigator. The capacity of the regional laboratory was assessed before the development of the proposal and confirmed that it is capable of performing stool culture and has staff competent in conducting the procedures.

Data processing and analysis:

The data obtained through interview will be collected by health professionals of the selected health centres recruited in this study. After data collection, each questionnaire will be checked for completeness. The data collected from each study participant will be entered, cleaned and analyzed using Epi-info version 5.3.1 and SPSS version 15.00 computer soft ware packages. Descriptive statistics such as means, percentages and tables will be employed to summarize and present the findings including findings obtained from the laboratory.

Dependent Variables

- Presence of *salmonella typhi*
- Carrier status of *Slmonella typhi*

Independent variables

- Age
- Religion
- Educational status
- Occupation
- Income
- Personal hygiene
- Recent treatment

Operational definitions:

Cater- Provide or serve foods and drinks by a food handler in places, (food establishments registered by Bureau of Trade and Industry) where customers are served with different food and drink items.

Carrier for Salmonellae - Any person (food handler in this context) with no signs and symptoms of a disease (typhoid) but harbouring a disease causing micro-organism (salmonella typhi or paratyphi) inside his/her body confirmed by laboratory tests, and is capable of transmitting it to others.

Food handler - Any person who is engaged in preparing and/or serving of any foods and drinks for customers being in a legally accepted (registered in Trade and Industry Bureau) food establishment.

Food Establishment- is a Restaurant, Hotel or a Snack house which provides food and drink services to various users from different places.

Ethical consideration:

Ethical clearance will be taken from the Research Ethics Committee of the School of Public Health (SPH) and Institutional Review Board (IRB) of the Faculty of Medicine (FOM), Addis Ababa University (AAU). Official permission will be secured from Regional Health Bureau (RHB) and Mekelle City Health Office. Respondents will be informed about the objective and purpose of the study and a written consent will be obtained from each respondent before the interview. They will also be informed about their rights of not participating in the study at any time. Confidentiality and anonymity of the information will be kept in secrete. In case a subject's test result is positive for *salmonellae* by either serology or stool culture he/she will have the right to know the result in any way convenient to them. Besides, a complete course of treatments will also be given free of charge following the routine prescription policy of the health facility.

Dissemination of findings:

The final report of the study will be submitted to the School of Public Health, Faculty of medicine, Addis Ababa University. The result of the study will also be disseminated to EPHA, Tigray Regional Health Bureau, Mekelle City Health Office and other relevant organizations. Efforts will also be made to publish the findings in one of the reputed journals and presented in any of the scientific conferences which will be held at both national and international junctures.

Table 7.1 Work Plan on Salmonella typhi carrier status of food handlers by monthly breakdown

Ser.No	Activities	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
1	Proposal writing								
2	Submission of first draft								
3	Identifying the food establishments and food handlers								
4	Securing Ethical clearance and letter of support								
5	Pre-testing of tools (questionnaires)								
6	Finalizing of tools								
7	Data collection								
8	Analysis & Interpretation								
9	Report writing and submission								

Table 7.2 Budget breakdown on Salmonella typhi carrier status of food handlers

Ser. No.	Title	Qualification	Rate/item unit price	Duration of work/quantity	Total in Birr	Remark
	Personnel costs					
1	Two Nurses	Diploma	100	45X2 persons	9000	
2	Two Med. Laboratory Technologistss for culture in regional laboratory	Diploma	100	45X2 persons	9000	
	Two Med Lab Techs on health center	Diploma	100	45X2 persons	9000	
3	Laboratory Technical Advisor	Senior Med.Lab.Technologist	180	30	5400	
4	One Principal Investigator		180	60	10800	
5	One Assistance in the Laboratory in regional laboratory	certificate	50	45X1 persons	2250	
	Environmental health officer	Diploma/BSc	100	45	4500	
6	Training for data collectors	(Nurses, Med.Lab.Techs)	180	1 X5 persons	900	
	Transport					
7	For principal investigator		Air ticket		1250	double trip
8	For taxi to transport samples to Lab		10 birr	45X2person	450	
	Reagents and supplies					
	widal antisera O and H		82	50	4100	
11	Kligler Iron Agar 500 gram		910	2	1820	
16	Lysin iron Agar 500gm		929	1	929	
17	Muller Hinton Agar		732	1	732	
18	Nutrient broth 500gm		643	2	1286	
20	Selenit broth Base 500gm		366	1	366	
21	SS Agar modified)		645	2	1290	
21	Si. citrate Agar 500 gm		761	1	761	
22	Urea 40% 10x5ml		338	2	676	
23	Urea Agar Base 500gm		800	1	800	

26	Dextrose Agar 500 gm		149	1	149	
27	Stool cup (standard cupped)		6	350	2100	
	Agar medium for motility		800	1	800	
28	Kovac's reagent 1x100 ml		450	2	900	
	Cotton swab				100	
31	Anti. sensitivity discs (packet each)		262	7	1834	7 types of drugs
32	**Stationery materials**				2500	
	Ciprofloxacin,50% expected pos		20	155	3100	
Total Amount					**76,793**	
2% contingency					**1535.86**	
Grand Total					**78,328.86**	

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Chapter VIII – Other Additional Output Reports

8.1. Measles Outbreak—Welkait and Tsegede districts, Tigray, Ethiopia, August - October, 2010

Abstract

Background: Measles is a highly infectious viral disease that causes high morbidity and mortality in many developing countries. In Africa and Asia more than 20 million measles cases are reported annually. Ethiopia introduced measles vaccination as part of the expanded program on immunization (EPI) in 1980; however, measles outbreaks continue to occur frequently in the country. This Measles outbreak data analysis was aimed at describing the magnitude of the outbreak by person, place and time

Methods: A secondary data of Measles Outbreak of Welkait and Tsegede districts was obtained from the regional health bureau. Data was entered and analyzed using micro soft Excel.

Results: The first case was reported from Welkait district with onset of rash on August 24, 2010. There were 169 suspected measles cases reported from both Welkait and Tsegede districts. Majority of the cases (55%) were from Welkait district. Of the 169 cases 56.2% were male, 10.7% infants and 44.4% under five years. The median age of cases from Welkait and Tsegede districts was 8.5 and 5 years respectively. The case fatality rate was 5.3% (9/169). Majority of the cases (60.4%) had no history of measles vaccination and 22.4% of the cases reported at least one dose of measles vaccination. Out of 9 serum samples taken from both districts for laboratory confirmation 100% were positive for IgM.

Conclusion: Laboratory confirmed measles outbreak was identified in Welkait and Tsegede districts with an overall high case fatality (5.3%). Majority (60.4%) of cases had no history of measles vaccination besides a greater proportion (89.3%) of the cases was individuals above 1 year of age.

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Key words: Measles outbreaks, Welkait and Tsegede, Tigray, Ethiopia

Introduction

Measles is a highly infectious viral disease caused by a Morbillivirus and for which humans are the only reservoirs. It includes prodromal symptoms of fever, malaise, cough, coryza (runny nose), and conjunctivitis. Within 2 - 4 days of the prodromal symptoms, a rash made up of large, blotchy red spots (maculo-papular rash) appears behind the ears and on the face. The rash spreads to the trunk and extremities and typically lasts 3-7 days. Individuals with measles are infectious 4 days before through 4 days after rash onset. Incubation period is about 10 to 12 days with a range of 7-18 days. Transmission is by respiratory droplets or direct contact. When the measles virus is introduced into a non-immune population, nearly 100% of individuals will become infected and develop a clinical illness. In areas with tropical climate, most cases of measles occur during the dry season and in areas with temperate climate the peak is during the late winter and early spring. (1)

Unimmunized children under five years of age, and especially infants, are at highest risk for measles and its complications, including death. Common complications include severe diarrhea, Pneumonia, inflammation of the middle ear and Encephalitis. Complicated measles is likely in poorly nourished children, especially those who do not receive sufficient vitamin A, who live in crowded conditions, and whose immune systems have been weakened by HIV/AIDS or other diseases. Measles is a major cause of blindness among children in Africa and other areas of the world with endemic measles. (2)

Although a vaccine has been available since 1959 (3), measles remains an important cause of morbidity and mortality in children, particularly in developing countries where more than 95% of measles-associated deaths occur. (4-6)

Natural measles infection tends to induce higher antibody levels than does measles vaccination. Depending upon the titer of passively acquired maternal antibodies, young infants are usually protected against measles for several months. Maternal antibody protection decays by six to nine months of age, leaving infants increasingly susceptible to measles. (7)

Measles is prevented by immunization with measles vaccine. To reduce the risk of infection in hospitals, all children between the ages of six and nine months who have not received measles vaccine and who are admitted to a hospital should be immunized against measles. If the children's parents do not know whether they have received measles vaccine, the child should still be immunized. If a child

has received measles vaccine before nine months of age, a second dose should be administered at nine months or as soon as possible after nine months. (2)

In 1980, Ethiopia introduced measles vaccination as part of the Expanded Program on Immunization (EPI). One dose of measles vaccine is recommended at 9 months of age. In view of the disease burden, the Ministry of Health (MOH) of the Federal Democratic Republic of Ethiopia in collaboration with the Regional Health Bureaus (RHBs) and partners started implementing the accelerated measles control strategy in 1998. Measles control Strategies for sustained measles morbidity and mortality reductions in Ethiopia include, Strong routine immunization of > 90% of children aged 9 to 11 months; Provide a second opportunity for measles vaccination; Case-based measles surveillance and improved case management. (8)

Detection of an outbreak relies on the ability of the responsible authority to recognize an increase in measles cases significantly above the number normally expected. This recognition is simpler if a routine surveillance system collects either summary or case-based information on clinical and confirmed cases of measles. In the absence of an effective surveillance system it may be difficult to detect small or limited outbreaks. (9)The objective of this secondary Measles outbreak data analysis thus, was to describe the magnitude of the outbreak by person, place and time.

Methods

Outbreak location:

Measles outbreak was reported from Welkait and Tsegede districts from August-October, 2010. The districts are located in Western zone of Tigray region and are neighbors to each other. Besides, these districts share borders with districts in North Gondar of Amhara region. Welkait and Tsegede districts had a population of 150,764 and 112,013 in the year 2010 respectively. Measles vaccination coverage of welkait and Tsegede districts was 66.9% and 80.7% respectively in the year 2010.

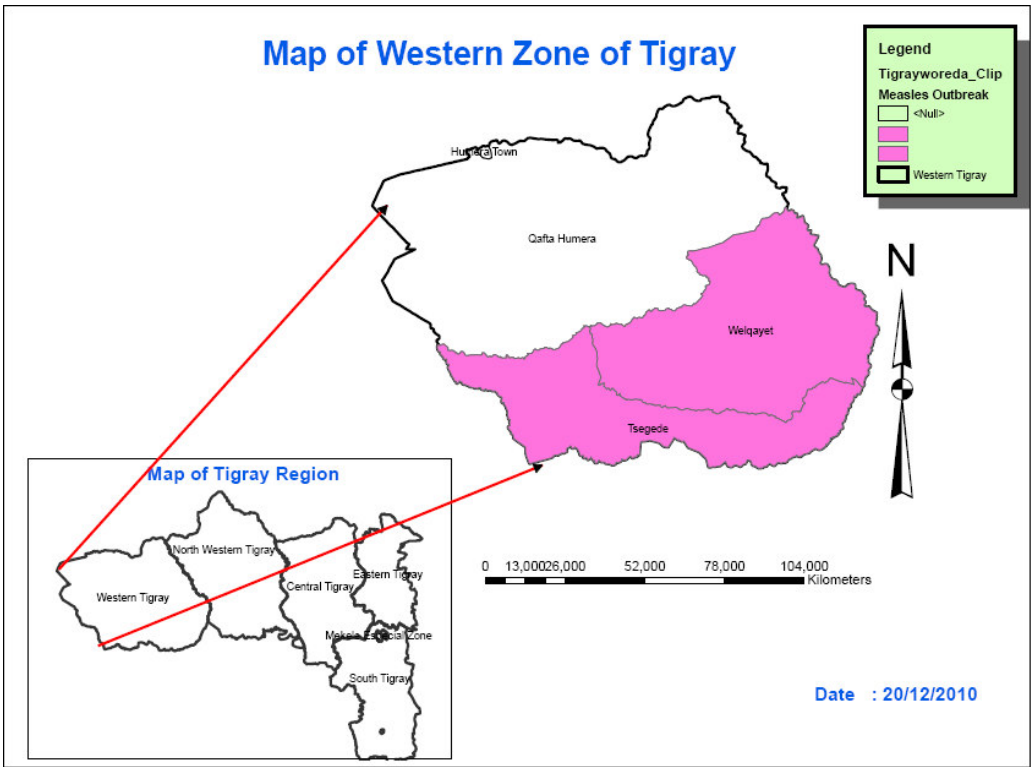

Fig. 8.1.1 Map showing Measles affected districts of western zone of Tigray regional state

Analysis type: Descriptive epidemiology was used to describe the magnitude of the outbreak in the two districts.

Data collection, entry and analysis:

A secondary Measles outbreak data of the two districts (Welkait and Tsegede) was obtained from Tigray regional health bureau, Public Health Emergency Management case team. Data was entered and analysed using micro soft Excel.

Case definition:

Suspected measles case: A person who presented with rash with fever and cough, runny nose or conjunctivitis or if a clinician suspects measles

Confirmed measles case: A person who presented with Rash with fever and cough, runny nose or conjunctivitis and positive for IgM from central laboratory

Result

During the outbreak a total of 169 Measles cases were reported from Welkait and Tsegede districts. About 55% (93/169) of cases were reported from Welkait district (Fig 2). Among 169 cases 56.2% were male, 10.7% infants and 44.6% children 1-5 years. Age range of cases was from 3 months to 50 years in both districts, with median age of 5 years for Welkait and 8.5 years for Tsegede. One hundred and two (60.4%) of cases were not vaccinated for measles vaccine at all and 28(22.4%) cases had at least one dose of measles vaccination. The overall case fatality rate was 5.3 %(9/169).

Among 50 kebeles in both districts about 19 kebeles reported measles cases. The first measles case (index case) was reported from Welkait district, Adi gaba Kebele whose farming area was in Ambagala, a bordering Kebele of North Gondar of Amhara region, and the date of onset of rash was on 24/08/2010 and it was reported by the community. Nine blood serum samples were collected from both districts of different Kebeles and sent to central laboratory and all were positive for Measles IgM.

The epidemic curve below showed that the outbreak duration was from 24/08/2010 through 20/10/2010. There were two peaks in the beginning of September and beginning of October. There were also days with zero report.

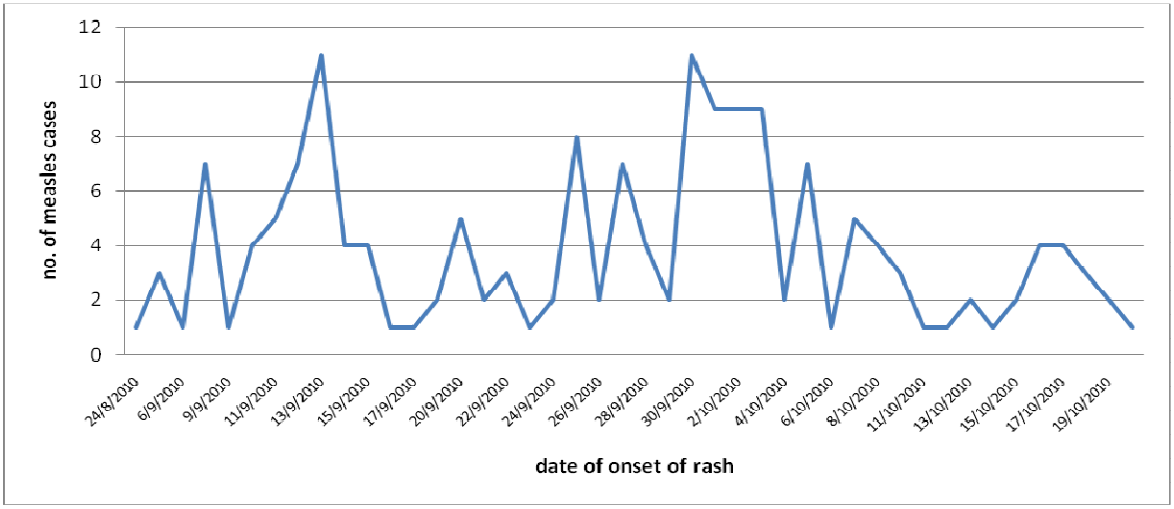

Figure 8.1.2 Epidemic curve of measles cases in Welkait and Tsegede districts, Western zone, Tigray region, late August-mid October, 2010

Majority (60%) of the cases were reported from Adigaba and Awra kebeles, the kebeles shared borders by six other kebeles within the district.

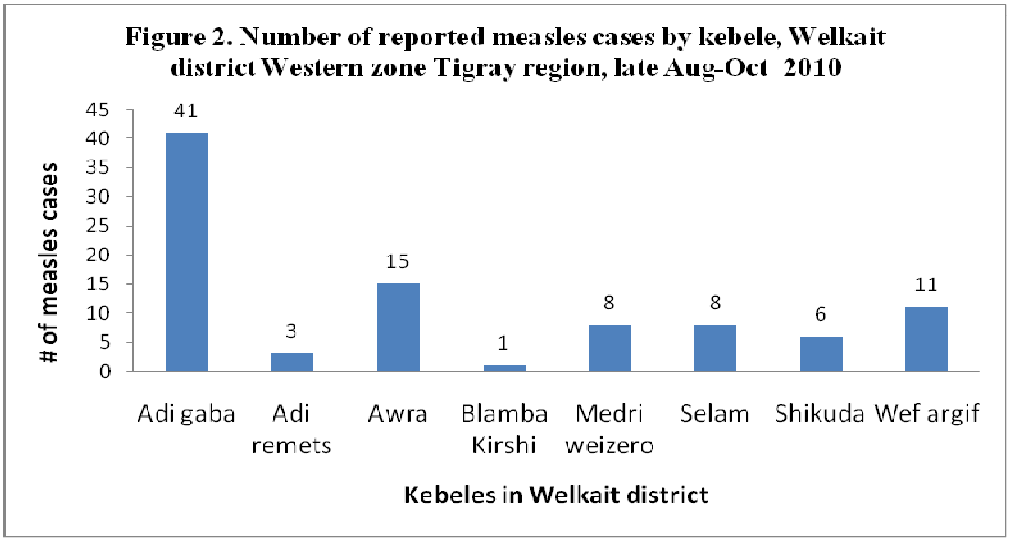

Fig.8.1.3 Measles reported cases of Welkait district, Tigray, Ethiopia 2010

About 49% of the cases in Tsegede district were reported from two kebeles namely; Hinta Bela and Dara and the rest from 9 kebeles (Fig 3).

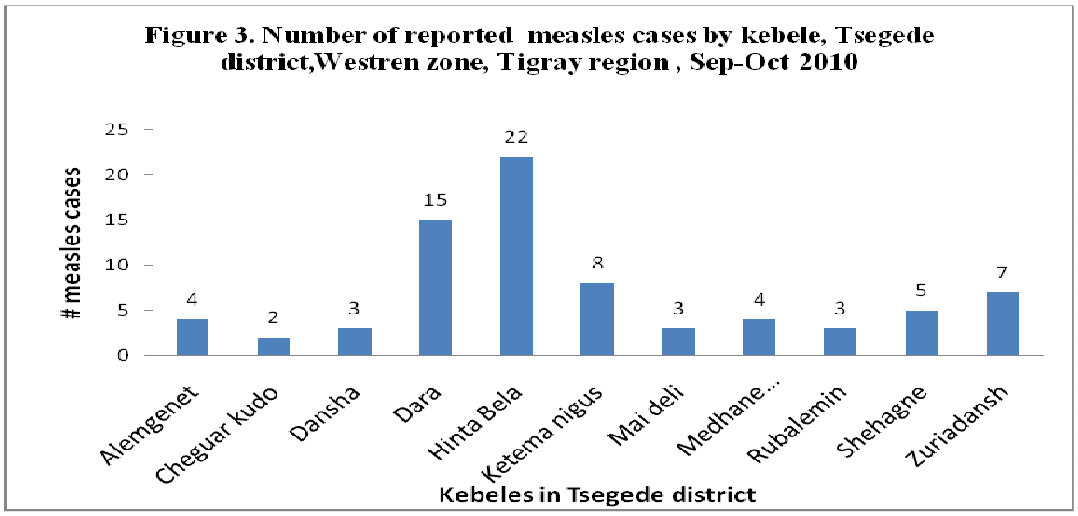

Fig. 8.1.4 Measles reported cases of Tsegede district, Tigray, Ethiopia 2010

Majority (102/169) of the cases had no history of measles vaccination, 28 cases had one dose of measles vaccine, 10 cases two doses of measles vaccine and 29 cases with measles vaccination of unknown status. Of the unvaccinated cases majority were between the ages of 1 and 5 years and greater than 5 years of age (table1).

Table 8.1.1 Age and vaccination status of measles cases in Welkait and Tsegede districts, Western zone, Tigray region, October 2010

Age	Vaccination status of cases				Total
	unvaccinated	One valid dose of measles vaccine	two valid dose of measles vaccine	unknown status	
<1 year	18(100%)	0	0	0	**18**
1-5 years	29(42.3%)	22(32.8%)	9(13.4%)	7(10.5 %)	**67**
>5 years	55(65.5%)	6(7.1%)	1(1.2%)	22(26.2%)	**84**
Total	**102**	**28**	**10**	**29**	**169**

Discussion

Laboratory confirmed measles outbreak was identified in the two districts namely: Welkait and Tsegede. In both districts majority of the cases were clustered to few kebeles and the outbreak affected all age groups. Majority (60.4 %) of the cases were those who had not previous history of measles vaccination which shows low measles vaccination coverage in the previous years in the districts. But there were also cases who had received two doses of measles vaccination which in turn brings a question about the vaccine efficacy.

Among the diseased individuals almost half (84/169) of whom were people above 5 years of age which indicates that there were a number of accumulated susceptible individuals in the community which can be a risk factor for the likelihood of future outbreaks.

The overall case fatality in the two districts was higher than the national measles case fatality rate which was 4% in 2007(National guideline for measles guideline and outbreak Investigation, FMOH 2007). The high cases fatality might be due to a delay in seeking medical care or else poor case management.

The outbreak in the two districts lasted longer duration which can result in high transmission of the disease in the community.

Conclusion

Laboratory confirmed measles outbreaks were identified in Welkait and Tsegede districts with an overall high case fatality (5.3%) rate. Among the total cases majority (60.4%) had no history of measles vaccination besides majority (151/169) of the cases were people above 1 year old. In both districts cases were highly clustered to few kebeles.

Recommendations

Routine immunization should be strengthened to the point that measles outbreak is minimized and the interval between outbreaks prolonged. Moreover, measles supplementary immunization and catch up campaigns are also indispensable to increase herd immunity in the communities. Studies on cold chain, EPI coverage and awareness of the community towards immunization are mandatory.

Acknowledgement

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We would also like to thank Dr. Richard Luce, EFELTP resident advisor for his review and comments on the abstract upon its submission to Epidemic Intelligence Services (EIS).

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8.2 Description of National Measles Surveillance, Ethiopia, 2005– 2009

Ghidey Ghebrelibanos[1], Belay Bezabih[1]

Abstarct

Background: Measles is a vaccine preventable disease which causes significant morbidity and mortality among children worldwide especially in developing countries like Ethiopia. The aim of this study was to assess the measles trend in the country, describe measles epidemiologically and identify locations where occurrence of cases is high for providing further investigation of causes.

Methods: A Descriptive study was undertaken on the national measles surveillance data of 2005-2009 from November to December 2010 in Addis Ababa, Ethiopia. The data base has many field names(variables) but we analyzed selectively such as age, sex, date of onset of illness, reporting zone and province(Regional state), date of sample collection, sent to and received by the national laboratory, number of vaccine doses, type of reporting form, final classification of cases and presence of outbreaks. Then descriptive statistical analysis was made using Epi Info Version 3.5.1 and Microsoft Excel.

Results: A total of 17,521 cases and 127 deaths (CFR=0.71%) were reported in the years 2005 -2009. 50.7 % (8894) were from rural setting and 25.4 % (4460) not identified as rural-urban.51.9% were males, 0.34% with sex not reported and the median age was 4 years old. The age group 1-4 years constituted 41.7 % (7323) of the total suspected and 34.4 % (1032) of the confirmed cases by laboratory measles IgM antibody. 17.1% (3000) of laboratory confirmed cases were reported during 2005-2009 in which Oromia regional state accounted first with a proportion of 40.5%(1216) although the highest attack rate(12%)observed in Hareri region.The national measles vaccine coverage reached to 72.2% in 2008 but five regions were under 55%. The highest number of cases and incidence [5771(7.6 per 100,000 population)] was reported in year 2008. 6.4% (1120) cases get two or more vaccine doses, 31.3% (5490) get one dose, 26.9%(4718) not vaccinated and 35.3%(6192) with unknown vaccination status. Forty six (45.1%) zones reported measles outbreaks from 2005-2009. Except Tigray, Harar and Dire Dawa all regions reported cases of an outbreak.

Conclusion: Generally there was a trend of increased cases in January, February and March. The national vaccination coverage showed progress year to year though the vaccination coverage of five regions was still fewer than 55%.The age group 1-4 years was the most affected by measles and 62.2% of the cases were not vaccinated for measles or with unknown vaccination status. Oromia regional sate constituted most of the suspected and laboratory confirmed measles cases, however the highest attack rate was observed in Hareri region. Outbreaks which occurred in four zones were responsible for the

highest peaks of the national epidemic curve of the five years period. Therefore, regions should be strengthened for the improvement of measles vaccination coverage. The surveillance activities need improvement in early detection of cases, for the completeness of variables and specificity of reporting suspected measles cases especially during outbreaks. The seasonality of disease transmission or occurrence of outbreaks could indicate when to conduct SIAs and needs further investigation and research to find out causes of outbreaks for the identified locations.

Key words: Measles, national surveillance, Vaccination coverage, Ethiopia

Back ground

Measles is a highly infectious viral disease caused by a Morbillivirus and for which humans are the only reservoirs. In a non-immune person exposed to measles virus, after an incubation period of about 10 to 12 days (range 7-18 days), prodromal symptoms of fever, malaise, cough, coryza (runny nose), and conjunctivitis appear. Within 2 - 4 days of the prodromal symptoms, maculo-papular rash appears behind the ears and on the face. The rash spreads to the trunk and extremities and typically lasts 3-7 days(1). Most persons recover from measles without complications. Some complications are associated with measles due to transient suppression of cellular immunity, which is a characteristic feature of the disease. Frequent complications in children less than five years of age include otitis media (5% -15%) and pneumonia (5% -10%) (2). Transmission is primarily person-to-person via aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons. Individuals with measles are infectious 4 days before through 4 days after rash onset (1).

Despite the existence of a safe, effective, and inexpensive vaccine, measles is still not being controlled in many parts of the world. However the use of measles vaccine over the last 30 years has reduced global measles morbidity and mortality by 74 and 85%, respectively, compared with the pre-vaccine era(3).The World Health Organization (WHO) estimates that almost one million measles-related deaths occur each year, the majority (85%) in Africa and Asia(4,5).

Measles is widely known in Ethiopia and it has many names in various ethnic languages, e.g., Kufign, Ankelis or Shifto. In 1980 Ethiopia introduced measles vaccination as part of the Expanded Programme on Immunization (EPI) (6). A single dose of measles vaccine is recommended at 9 months of age (7, 8).

Several developed and developing countries follow a strategy that differs in timing and in the number of doses delivered either through routine immunization or supplemental mass immunization campaigns(9).In determining the age for vaccination, countries must balance the consequences of an older age (lack of protection in the early months of life) and a younger age (reduced effectiveness). In many countries, where morbidity and mortality due to measles are uncommon in infants, choose an older age for vaccination (e.g., age 12 or 15 months). In other countries, where a high number of deaths due to measles occur in children aged <9 months, a younger age for vaccination has been advocated (10, 11).

However, during supplemental immunization campaigns, a single dose of measles is given, irrespective of the immunization and disease history status, to all children in the target age group (12).

A study conducted in Ethiopia showed also that campaign vaccination elevated immunity in the target ages by between 30% and 50% according to age group, or an average of around 40% (13).

Measles surveillance has been established in Ethiopia. According to the National PHEM guide line, every suspected measles case should be detected, reported using the cases based form and undergo laboratory investigation (or the first five cases in the situation of outbreaks) and during an outbreak all cases must be entered on a line listing, investigated and reported to next higher level (6,14).

Ethiopia has experienced numerous measles outbreaks and increasing morbidity. As a vaccine preventable disease, measles surveillance data analysis is critical to guide intervention and vaccination activities.

So the aim of the study was to assess the measles trend in the country, describe measles epidemiologically and identify locations where occurrence of cases is high for providing further investigation of causes.

Methods and Materials

Study area, population and period:

Ethiopia is administratively sub-divided into nine regional states and two city administrations and according to the third Population and Housing Census in the 1997 with a total population of 73,918,505 the annual growth rate was 2.6%. 50.5%(37,296,657) were males, 45.0% of the population was under age 15 years old, 51.9 % was in the age group of 15-64 years and the proportion of population aged 65 years was 3.2 % (15). This national measles surveillance data was analyzed between November and December 2010 in Addis Ababa, Ethiopia.

Design and data collection:

A Descriptive study was undertaken on the national measles surveillance secondary data of 2005-2009. A concept note has been developed by the principal investigators to find the data and reviewed by the school of public health of Addis Ababa University. Then the EHNRI/PHEM approved the request of a five year national measles data base to carry out this study. The data base has many field names (variables) but it was analyzed selectively on such field names as: age, sex, date of onset of illness, reporting zone and province(Regional state), date of sample collection, sent to and received by the national laboratory, number of vaccine doses, type of reporting form, final classification of cases and presence of outbreaks.

Case definition:

We used the national Public Health Emergency Management and measles guideline for the case definitions and the final classification of cases by the laboratory as it was kept in the data base (6,16, 17). According to the Federal ministry of health of Ethiopia-Public health emergency management (PHEM), measles is one of the immediately reportable diseases under surveillance. Suspected cases and deaths of fever with rash illness filled on a case-based reporting form with serum sample collected are sent and tested for IgM antibody at Central (EHNRI) virology laboratory. Line listing is also used during an outbreak for reporting of cases.

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

Confirmed case: A suspected case with laboratory confirmation (positive IgM antibody) or epidemiologically linked to confirmed cases during an epidemic.

All suspected cases of measles are finally classified based on the adequacy of the blood specimen collected, and sample taken or not in to the following categories;

Laboratory confirmed: A suspected measles case that is investigated, including the collection of an adequate blood specimen (5ml), and has serological confirmation of recent measles virus infection (IgM positive).

Epidemiologically linked: A suspected measles case that has not had a blood specimen taken for serologic confirmation, but is linked to a laboratory confirmed case (definitive serologic evidence of recent measles virus infection). Linked is interpreted as being in the same geographic area (place) during the infectious period (time) of a laboratory-confirmed case (person), i.e., in the same district within 30 days.

Discarded**:** A suspected measles case that has been completely investigated, including the collection of adequate blood specimen (5ml), but lacks serologic evidence of recent measles virus infection (i.e., IgM negative).

Clinical / Compatible: A suspected measles case that has not had a blood specimen taken for serologic confirmation and cannot be epidemiologically linked to a laboratory-confirmed case.

Statistical analysis: Descriptive statistical analysis was employed using Epi Info Version 3.5.1 and Microsoft Excel.

Ethical issue: This work will be realized based on the Ethical clearance of public health emergency management /EHNRI

Results

According to the national measles surveillance data which include case based and line listing; a total of 17,521 cases and 127 deaths were reported throughout the country during 2005 -2009. Of the total suspected cases about 50.7 % (8894) were from rural setting, 23.7 % (4167) from urban and 25.4 % (4460) not identified as rural-urban.

About 51.9% were males, 0.34% with sex not reported. The median age was 4 years which ranged between < 1 and 79 years old.

The national measles vaccine coverage increased from 42 % in 2002 to 72.2% in 2008. Conversely an increased number of reported cases was also observed from 2005 to 2008 (Figure 1).In the five years of reporting period, only 6.4% (1120) cases get two or more measles vaccine doses, 31.3% (5490) get one dose, 26.9% (4718) not vaccinated and 35.3%(6192) with unknown vaccination status.

It was observed that the cumulative number of suspected cases for five years continuously increased between December and January.

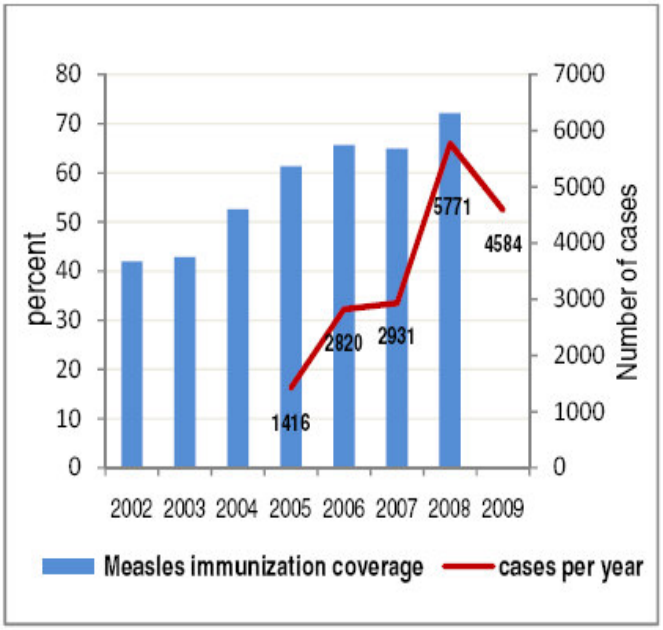

Figure 1: Measles cases and immunization coverage 2005-2009, Ethiopia

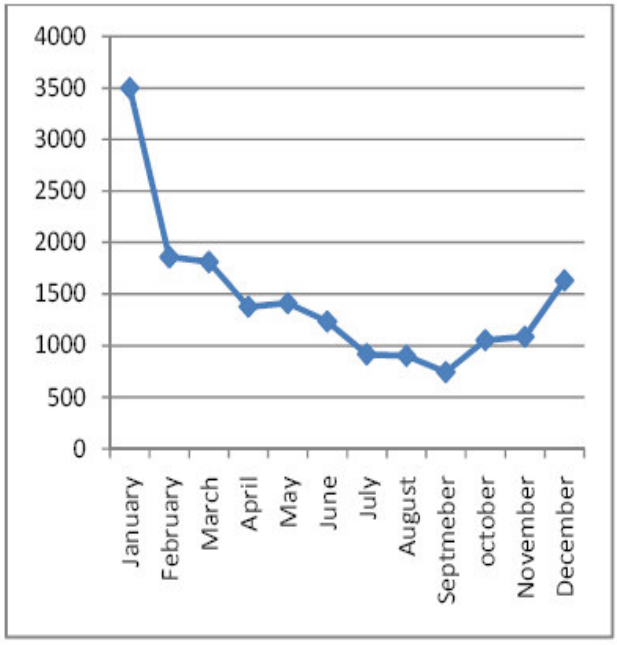

Figure 2: Trend of measles cases by month of onset from 2005-2009, Ethiopia

N.B. Vaccination coverage of five regions was below 55% in 2008, frequency of vaccination coverage for regions from 2002-2008 is presented in the annex section of table 8.2.4

The highest number of cases and incidence [5771(7.6 per 100,000 population)] was reported in year 2008 (table 8.2.1).

Table 8.2.1 Distribution of cases per 100,000 population per year, 2005-2009, Ethiopia

Year	Population	Cases	Cases per 100,000 pop.
2005	54867674	1415	2.57
2006	56294233	2820	5.00
2007	73918505	2931	3.96
2008	75840386	5771	7.60
2009	77812236	4584	5.89

In each month of the five year period a minimum of 50 suspected cases were reported to the central level. As it is shown in the epidemic curve, the highest peak was from January to February 2008 and 2009.

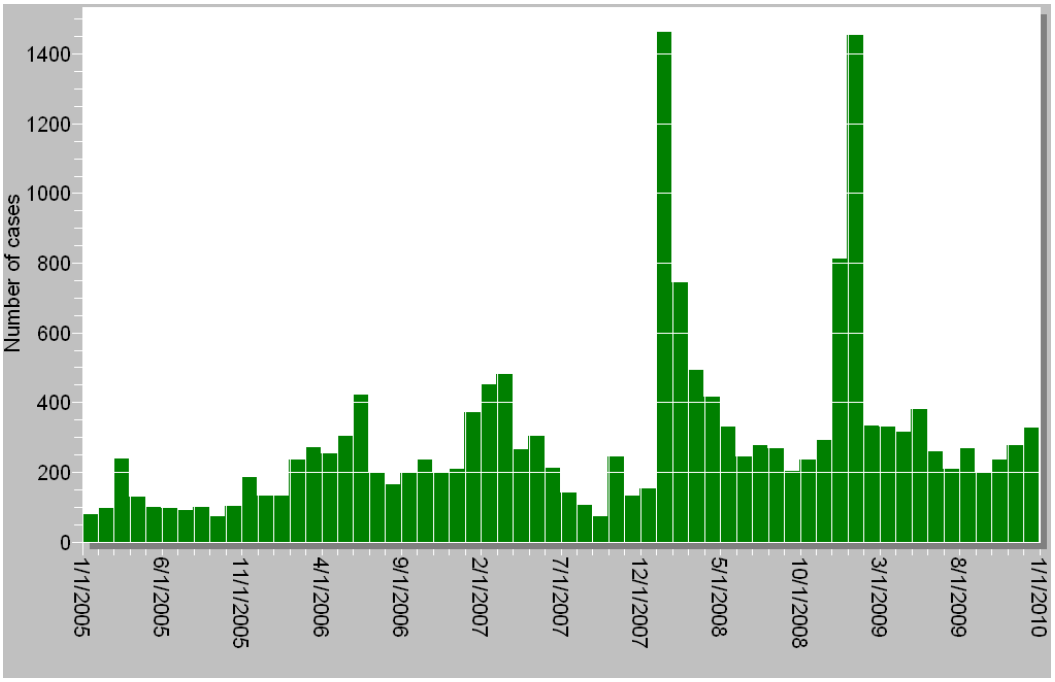

Figure 8.2.2 Epi-curve of suspected measles cases by date of onset, 2005-2009, Ethiopia

Through filtration of the data base for these specific months which showed the highest peaks in the epidemic curve (Figure 3) Guji, west Arsi, West Haraghe and Sidama zones reported high number of cases using line listing form in which an outbreak indicated by their respective Epi-curves.

The outbreak in Guji started on14/1/2008 and the highest peak was on 21/1/2009 and then continued to 5/2/2008. As it is evidenced by the Epi-curve at least 40 cases per day were reported even after the highest peak. A total of 1606 suspected cases were reported during the two months of an outbreak. 94.7% (1520) cases were under 15 years old,45.6% (733) unvaccinated, 43.7%(702) get one dose, 1.1%(18) 2 doses,9.5%(153) unknown measles vaccination status.

In west Arsi, a total of 954 cases were reported in January 3-31, 2009. During this period 99.6% of the cases reported using a line list form. Measles vaccination status was not known in 99.6% (951) of the cases and only one case was vaccinated for first dose. Sex was evenly distributed (50%) and no death was listed in the data base.

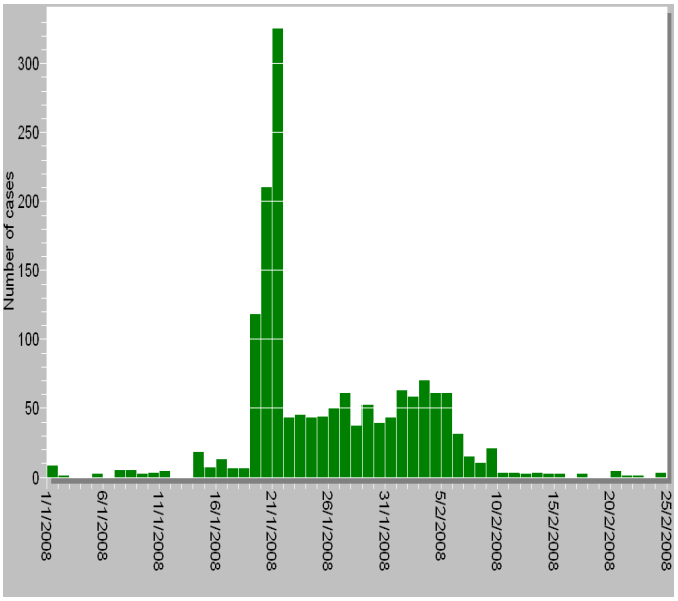

Fig. 8.2.3 Epicurve of measles outbreak by date of onset Guji Oromia, Ethiopia, Jan-Feb 2008

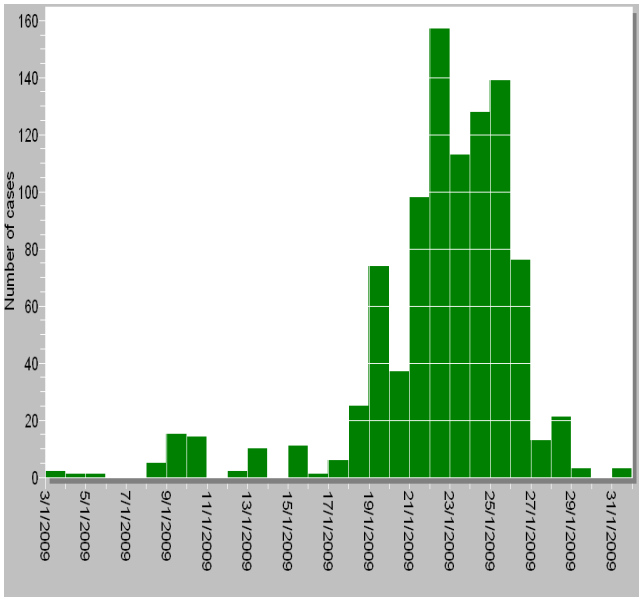

Fig.8.2.4 Epicurve of measles outbreak by date of onset in west Arsi, Oromia, January 2009

In West Hararghe an outbreak occurred in February 2007 (Figure 8.2.6) and two other outbreaks from March to April and December 2008. 237 cases were reported in December 2008 which was higher than the cases occurred in previous three outbreaks (Feb 2007, and March-April 2008). 54.7% (135) cases were females, 89.1% (220) were under the age of 15 years and only 17 cases have got one dose of measles vaccine.

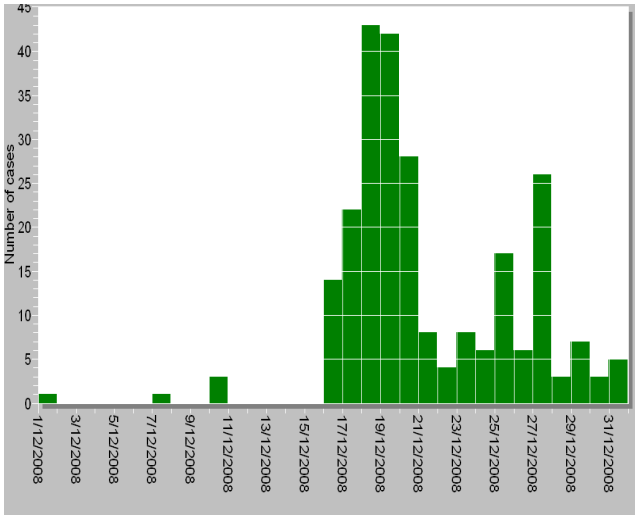

Fig.8.2.5 Epi-curve of Measles outbreak in West Hararghe, Oromia, Ethiopia, Dec 2008

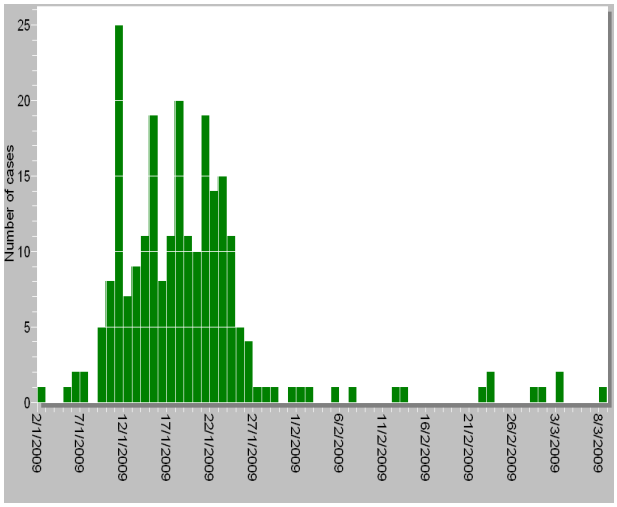

Fig.8.2.6 Epicurve of measles outbreak by date of onset in Sidama, SNNPR, Ethiopia, January 2009

In Jan 2009 there was also an outbreak in Sidama zone with 236 reported suspected cases. 50.4% (119) were females, 55.1% (130) unvaccinated, 35 % (92) with vaccination history (one and more doses) and 5.9% (14) with unknown vaccination status and one death.Fourteen cases from Guji, 4 from West Arsi, 6 from West Haraghe and 21 from Sidama zones were confirmed for measles IgM antibody collected during the occurrence of increased number of cases as depicted in the respective Epi-curves shown above.

During 2005-2009 period, the age group 1-4 years old constitute 41.7 % (7323) of the total suspected and 34.4%(1032) of the confirmed cases by laboratory measles IgM antibody. 9.3% (1632) of the suspected and 6.5% (197) of the laboratory confirmed were under 1 year.

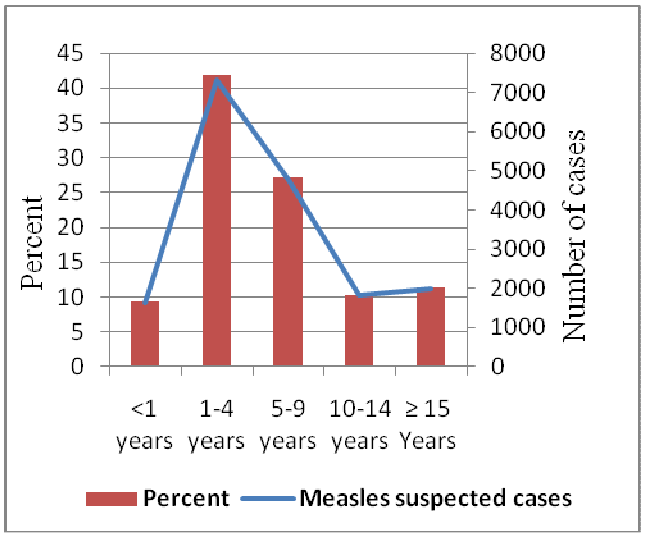

Fig. 8.2.7 Distribution of Measles suspected cases by age category 2005-2009, Ethiopia

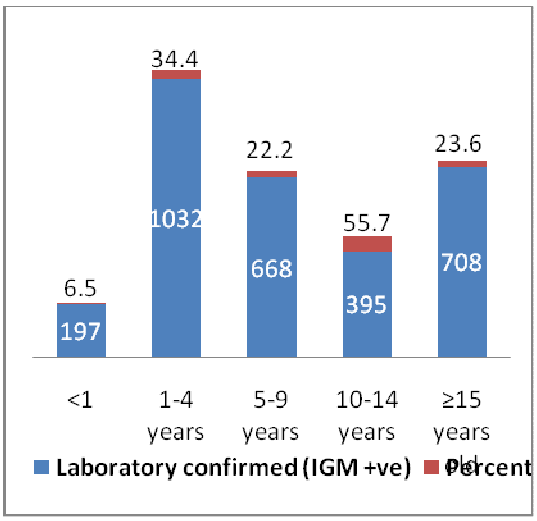

Fig 8.2.8 distribution of Measles laboratory confirmed cases by age category 2005-2009, Ethiopia

A total of 11841 serum samples were collected and sent to the national laboratory(EHNRI).The highest annual proportion of samples collected was 67.3%(3087) in 2009 followed by 86.4%(1224) in 2005.

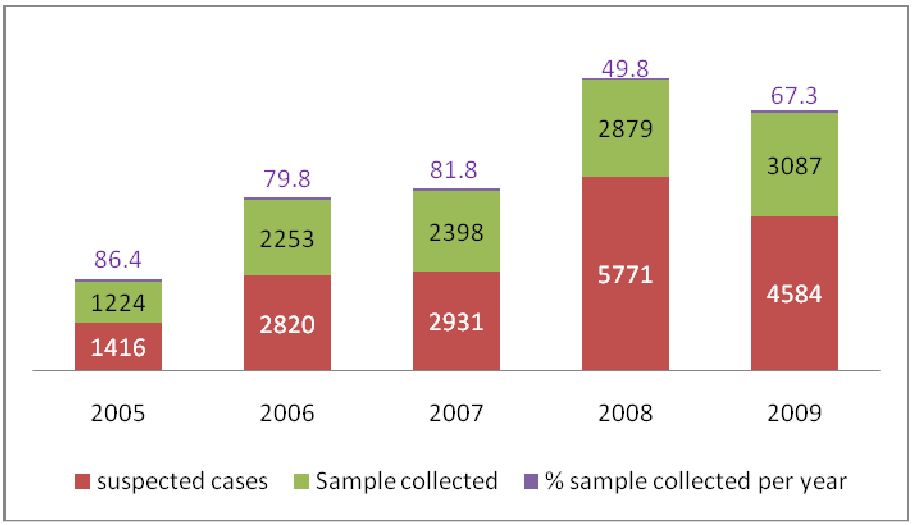

Fig.8.2.9 Frequency of samples collected and total suspected cases per year, 2005-2009, Ethiopia

The highest [31.1% (913)] confirmed cases of measles IgM antibody was reported in 2007 and the least [9.7% (447)] was in 2005 (table 2). 50.9 % (1524) of measles IgM confirmed cases were males during 2005-2009.

Table 8.2.10 Frequency of measles cases by final classification from 2005-2009, Ethiopia

Year	Confirmed (IGM +ve)	Discarded (IGM - ve)	Epi linked	Clinical / compatible	Total cases	% IgM positive
2005	200	159	73	983	1415	14.1
2006	821	549	81	1369	2820	29.1
2007	913	533	53	1432	2931	31.1
2008	619	2892	63	2197	5771	10.7
2009	447	1527	679	1931	4584	9.7
Total	3000	5660	949	7912	17521	17.1

From all regional states, Oromia ranked first by notifying 44.8 % (7861) of the national total suspected cases during the five years period. Somali and SNNP regional states detected the highest [48.8% (153)] and lowest [12.4% (356)] proportion of confirmed IgM positive of their own total suspected cases respectively. But from total national confirmed IgM positive cases still Oromia regional state accounted first with a proportion of 40.5%(1216) (table 8.2.3).

Table 8.2.3 Distribution of measles cases by region and final classification, 2005-2009, Ethiopia

Province of Residence	Confirmed (IgM +ve) No (%)	Discarded (IgM -ve) No (%)	Epi linked No (%)	Clinical / Compatible No (%)	Total suspected cases No (%)
Tigray	102(14.4)	0	49(6.9)	554(78.5)	705(4.0)
Addis Ababa	298(24.2)	43(3.5)	98(7.9)	788(64.2)	1227(7.0)
Afar	157(31.9)	197(40.0)	24(4.8)	114(23.17)	492(2.8)
Amhara	526(17.2)	778(25.4)	196(6.4)	1557(50.9)	3057(17.4)
Ben-Gumuz	48(16.7)	96(33.4)	29(10.10)	114(39.7)	287(1.6)
Dire Dawa	27(45)	0	1(1.6)	32(53.3)	60(.3)
Gambella	28(19.4)	105(72.9)	2(1.3)	9(6.2)	144(.8)
Hareri	89(17.1)	0	24(4.6)	406(78.2)	519(2.9)
Oromia	1216(15.4)	3654(46.4)	348(4.4)	2643(33.6)	7861(44.8)
SNNPR	356(12.4)	719(25.17)	167(5.8)	1614(56.5)	2856(16.3)
Somali	153(48.8)	68(21.7)	11(3.5)	81(25.8)	313(1.7)
Total	3000(17.1)	5660(32.3)	949(5.4)	7912(45.1)	17521(100)

All regions/city administrations and 102 zones in the country reported cases in each year and at least in one year respectively. In all five years period the attack rate for measles sustained more than 2% in Harari region (figure 8.2.11).

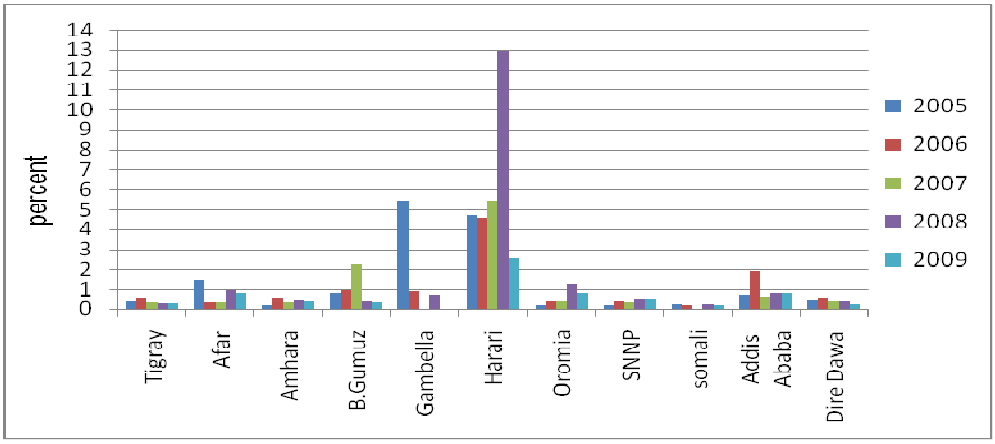

Fig 8.2.11 Measles attack rate by regional state from 2005-2009, Ethiopia

From all regions the highest attack rate (12.9%) observed in Harari in 2008 and in Gambella (5.4%) in 2009. Except in 2006 in all four years, Oromia reported the highest number of cases and 44.8% (7861) of the total cases reported in the country (Table 8.2.4, figure 8.2.11).

From 102 zones reported during 2005-2009, a total of 17521 cases were notified. Guji zone constituted the highest [1724 (9.8%)] number of cases, followed by west Arsi 1423(8.1%), West Hararge 823(4.7%), Sidama 791(4.5%) and North Gondar 725(4.1%).In 2006 23.5% (24) of zones had zero report of measles cases followed by 16.7 % (17) in 2005, but in 2009 all 102 zone reported suspected measles cases.

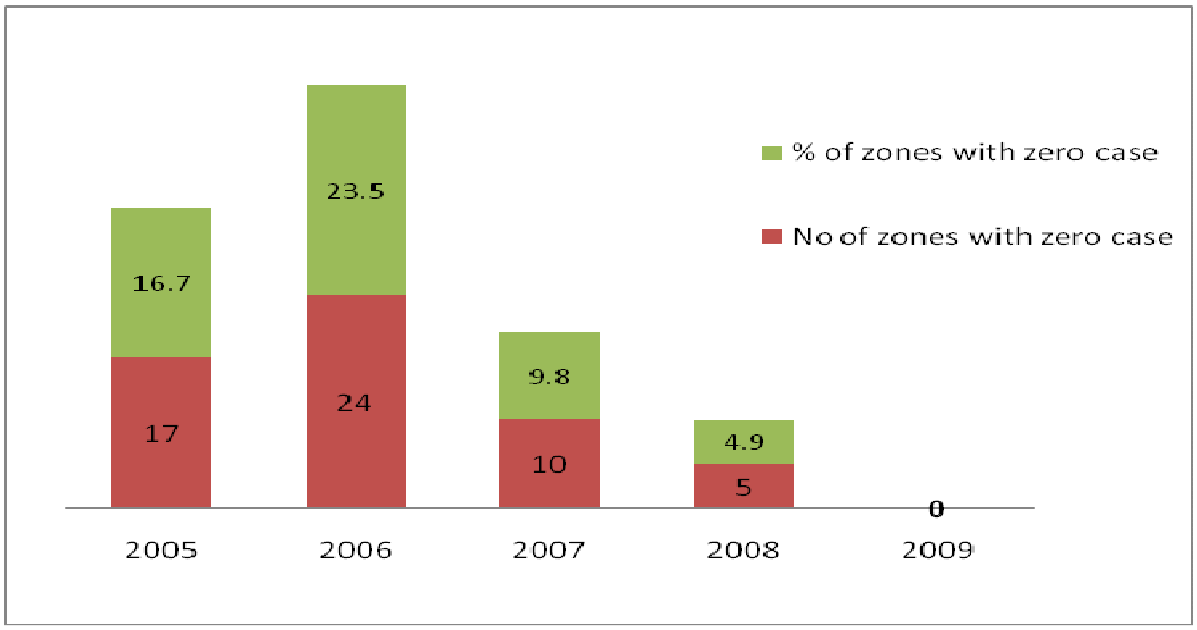

Fig 8.2.12 Frequency of zones with zero report of measles cases from 2005-2009, Ethiopia

From the total of 17522 registered cases 11842(67.6%) were reported using case based forms and 5680(32.4) were using line listing. 64.1% (3643) of the reports using the line listing were from Oromia region. Tigray, Harari and Dire Dawa had zereo report of line listing based data (Table 6 in annex).Fourty six (45.1%) zones reported measles outbreaks from 2005-2009, from which Guji 1593(28.2%), West Arsi 1100(19.4%), West Haraghe 512(9%), Sidama 320 (5.7%) and North Gondar 260(4.6%).Except Tigray, Harar and Dire Dawa all regions reported cases of an outbreak

at least in 2 years from 2005-2009. Amhara, Oromia and SSNPR reported an outbreak in all four years except in 2005 (Table 8.2.4).

Table 8.2.4 Report of cases on outbreaks by region from 2005-2009, Ethiopia

Region	2005	2006	2007	2008	2009
Addis Ababa	0	17	0	4	22
Afar	62	0	18	68	49
Amhara	0	308	166	213	91
Ben-Gumuz	0	14	82	0	0
Gambella	86	8	0	11	0
Harar	0	0	0	0	0
Oromia	0	124	188	2286	1055
SNNPR	0	73	79	257	310
Somali	11	5	0	52	0
Tigray	0	0	0	0	0
National	159	549	533	2891	1527

From 16 zones, 126 deaths were reported during 2005-2009 the highest reported was from Gujji, 23 cases (18.2%) followed by West Harerghe 21(16.6%) and from zone 2 of Afar region 14(11.1%).The overall case fatality in five consecutive years of the country was 0.72%.

Discussion

Measles Immunization coverage in Ethiopia showed a progress from 42% in 2002 to 72.2% in 2008. It was also indicated that the Federal Ministry of Health conducted measles supplemental immunization activities (SIAs) starting from 1998. Moreover, recently the African regional goal of >90% measles immunization national level coverage and >80% in all districts was adopted by the Federal Ministry of Health of Ethiopia (14).

Nonetheless, notification of measles cases increased year to year in the four consecutive years with only a decline in year 2009. It was also depicted by the Epi-curve that Ethiopia experienced outbreaks in 2008 and 2009 of January to February (Figure 8.2.3 & 8.2.4-7). This could probably be improvement of measles surveillance activities such as notification of any suspected case of measles. In Oromia region for example, 3654 (46.4%) of the reported suspected cases were classified as discarded from 2005-2009 which might indicate an increase in awareness for notifying suspected cases of measles making the surveillance become sensitive. As it was evidenced, among the total cases 26.9% (4718) were vaccinated and 35.3% (6192) with unknown vaccination status; low immunization coverage and inadequate vaccine efficacy could be the main contributing factors for the occurrence of outbreaks and increment of measles cases in the country. The seasonality trend of the disease or Increase in the number of cases from December to February could not be explained within the scope of this work.

The two highest peaks of the Epi-curve (Figure 8.2.3) in January 2008 and 2009 were due to the outbreaks in Guji, West-Arsi and Sidama zones. As it was shown in Figures 8.2.4-7 in Guji, West Hararghe, West Arsi and Sidama zones an outbreak was occurred in a consecutive days with confirmation of laboratory measles IgM antibody in 30 days or less.

The most affected group by age was observed from 1-4 years throughout the five years period. This could be the immaturity of immune system in this age group and it is also documented that in developing countries the most vulnerable children are between the ages of 9 months and 5 years (18).

Though an increased number of suspected measles cases notified in 2008 and 2009, the laboratory confirmed cases (10.7% & 9.1% respectively) were much lower than the rest three years. This could be due to the occurrence of outbreaks in 2008 and 2009, which minimized the number of serum samples to be collected, i.e., no more serum sample collection after five laboratory confirmed cases during an outbreak.

The incidence of suspected measles cases in all five years was more than 2 cases per 100,000 populations which kept Ethiopia as high burden of measles compared to other African countries[19]. The cumulative case fatality rate in five years was low and figured to be 0.71%. This might be due to under reporting of deaths and weak surveillance activities to detect a case early which is a common situation like other causes of deaths in the country or it could also be due to improved case management in health facilities.

Regions such as Oromia, Amhara, SNNPR, and Tigray had low performance or proportion of detection of confirmed IgM positive cases. This might be attributed to an increase in notifying of suspected cases probably because of the occurrence of outbreaks in each year which might in turn resulted in a decrease on the Numerator. However except Ben-Gumuz and Harari all other regions and city administrations had good performance.

The highest attack rate (12.9%) in Harari and Gambela (5.4%) could be beyond the csope for its explantion in this study; however the probable hypothesis might be assumed to be low cold chain management quality or presence of many susceptible groups in the community.

In three regions (Tigray, Hareri and Dire Dawa) there were no cases of measles reported by a line list form (outbreak) as opposed to other regions. The case in Tigray could be explained by its consistent and higher vaccination coverage (above 74%), better from other regions. But the absence of outbreak in Hareri and Dire Dawa in five years period couldn't be explained so far.

Primary indictors for the performance of measles surveillance[6] such as (i) a greater than 80 % of reported measles cases with a blood specimen collected within 30 days of rash onset excluding epidemiologically linked cases from the denominator, (ii) a target of >80% of districts that have

reported at least one case of measles (or >1 reported case per 100,000 population) with a blood specimen per year, (iii) Annualized rate of investigation (with blood specimens) of suspected measles cases or > 1 case investigated with blood specimen per 100,000 populations per year were tried to be assessed. The first mentioned indicator could not be computed as there was a difficulty in the database for it consisted no district to see the second indicator, but when we observed by zone; in 2009 102(100%) zones reported at least one measles case , 83.3% in 2005, 74.5% in 2006, 88.2% in 2007 and 93.1% in 2008. But the target set on the third indicator was met and found to be above 1(4.5 per 100000, i.e. 3511 blood samples in2009) for all four years except in 2005 which was 0.65 per 100,000 population (only 359 blood samples collected/year).

From the supplemental performance indicators of measles surveillance the target which indicate a 90% or more arrival of samples to the national laboratory in a good condition (i.e., adequate volume, no leakage, not desiccated) was found to be 99.9%(11829).17.12 %(3000) of measles cases were laboratory confirmed (Table 2) which was above the target set by the FMOH of Ethiopia and WHO[6,] i.e., < 10%.

Conclusion

A total of 17,521 suspected and 3000 (17.1%) laboratory (IgM antibody) confirmed measles cases were notified at central level in the years 2005 through 2009.The overall case fatality rate was 0.71% for the same periods. Generally there was a trend in increment of cases in the months of January, February and March. The national vaccination coverage showed progress year to year though the vaccination coverage of five regions was still fewer than 55%.Four zones (Guji, West Arsi, West Hararghe, and Sidama) were identified as places which were responsible for the highest peaks in the national epidemic curve of the five years period because of the occurrence of outbreaks.

The age group 1-4 years was the most affected by measles from all other age categories and 62.2% of the cases were not vaccinated for measles or with unknown status of vaccination. Oromia regional sate constituted most of the suspected and laboratory confirmed measles cases, however the highest attack rate was observed in Hareri region. Tigray, Dire Dawa, and Hareri regions had no report of cases of an outbreak in all the five years period.

Recommendations

The FMOH and other partners should collaborate and strengthen regions for improvement of measles vaccination coverage. The seasonality of disease transmission or occurrence of outbreaks could indicate when to conduct SIAs and needs further investigation and research. The surveillance activities need improvement in early detection of cases, for the completeness of variables and specificity of reporting suspected measles cases especially during outbreaks. Improvement in the database management for ease of analysis is of value. Instances in such a respect could be; including names of health facilities and avoiding inconsistencies with filling of districts' names. Further investigation or research is better conducted to find out causes for outbreaks of the identified geographic locations.

Acknowledgment

We express our thanks to Dr Richard Luce (Resident Advisor of Field Epidemiology) for his comments on the concept note in the pre-analysis phase which led us to look forward in writing this work. We also acknowledge the FMoH (PHEM) and WHO country office for providing the data base.

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8.3 Antimicrobial Resistance and antimicrobial prescription pattern and relations in Ethiopian regional Hospitals, 2010

Ghidey G/libanos, Belay Bezabih, Mer'Awi Aragaw

Summary

Introduction: Despite the enormous advances in health care in the last half-century, infectious diseases still account for 25% of deaths world wide and 45% of deaths in low income countries. Antimicrobial use is the most important factor and key driver responsible for increased antimicrobial resistance.

Geographical variation in antimicrobial resistance was shown by different studies which is an indication of the importance of the numerous and interrelated factors driving the problem. So, to better understand national, regional and local trends of antimicrobial resistance, it is important to critically assess national data on antibiotic consumption.

This study is therefore, useful to support and guide, on the disadvantages of empirical treatment, for clinicians and dispensaries by increasing their awareness in using the drugs so wisely. Thus, it brings antimicrobial resistance to a low degree at all levels and in all settings of the country and could also contribute in minimizing the shortage of drugs essential for patient management. The study will be conducted in three regional referral Hospitals: Mekele, Bahr Dar and Hawassa in out patient and in patient units of the Hospitals.

Objectives: The over all objective is to describe the Epidemiology of antibiotic resistance and antibiotic prescription pattern and their relations among three regional Hospitals in Ethiopia.

Methods: A cross-sectional study design will be employed and resistance data will also be reviewed back to complete information and describe the data well for the intended objective.

Work plan and budget: The work plan in implementing the study is started since November 2010 for writing a proposal and will extend to January 2010 as a peroid of report writing and submission of the research project. The planned budget needed to conduct the research is **47,258.40** Ethiopian Birr.

Key words: Antimicrobial resistance, Prescription pattern and relations, Hospitals

Background

Although many patients, especially in sub-Saharan Africa, continue to die as a result of inadequate access to antimicrobials, an emerging problem globally is the widespread indiscriminate use of antimicrobials, especially antibacterial agents. Antimicrobial reistance costs money, livelihoods and lives and threatens to undermine the effectiveness of health delivery programs. It has recently been described as a threat to global stability and national security (1) Despite the enormous advances in health care in the last half-century, infectious diseases still account for 25% of deaths world wide and 45% of deaths in low income countries (2).

According to the CDC, at least 70% of the pathogenic microorganisms responsible for about two million nosocomial infections occurring annually in the U.S are resistant to at least one antibiotic. About 90, 000 persons die in the U.S each year from these infections (3). Excess mortality rate due to antimicrobial resistant strains was also shown in different studies (4).

Antimicrobial use is the most important factor and key driver responsible for increased antimicrobial resistance (5). However, poverty and inadequate resources, natural calamities, human population growth, user-related factors, health care related factors, health service provision centers, policy and regulatory issues and use of antimicrobial drugs in veterinary are responsible risk factors for antimicrobial resistance in developing countries(6).

Origin and Mechanisms of Drug Resistance

Resistance may be inherent or acquired (7). Anaerobic bacteria, Enterococcus species are inherently resistant to aminoglycosides (8), Acquired resistance can be developed by mutation or gene transfer. Gene transfer can occur through transformation, transduction and conjugation. Mutation may occur in the gene encoding target protein, transport protein, protein for drug activation or promoter or regulatory gene affecting expression of the target transport protein or an inactivating enzyme(9).

The well known mechanisms of drug resistance are; a) Inactivation of the drug: very common, forexample, production of beta-lactamaseby staphylococci. The enzyme which is plasmin coded destroys the betalactam ring responsible for the antibacterial activity of penicillins. B) Altered cell

wall permeability: So that the drug is unable to enter the organism (for example, tetracycline resistance in pseudomonasaeruginosa. C) Modification of the active site of the drug: modification of the enzyme or substrate with which the antimicrobial agentreacts enables the organism to function normally despite the presence of the drug, for example, Trimethoprim resistance where the bacterium acquires a plasmid or transposon coding for an enzyme with which the drug cannot interact (10).

Epidemiologic studies have also repeatedly demonstrated the influence of antimicrobial use on the emergence, persistence, and transmission of antimicrobial resistant bacteria (11). In two studies (12, 13) a close association between the use of fluoroquinolones and the increase in the incidence of multi drug resistanct E.coli was observed. Other different studies also showed the correlation/association between antimicrobial drug use antimicrobial resistance(e.g. S. pneumonia resistance to penicillin use) in Europe (14-17).

A study in Finland demonstrated that Erythromycin resistance among group A streptococci decreased from 16.5- 8.6% over a four-year period during a nationwide program relying on national guidelines to limit the use of Erythromycin (18). Other studies in the united states show that decreased use of antibiotics for prophylaxis and treatment correlated with decreasing rates of colonization with resistant organisms (19).

Geographical variation in antimicrobial resistance was also shown by different studies which is an indication of the importance of the numerous and interrelated factors driving the problem (20, 21). So, to better understand national, regional and local trends of antimicrobial resistance, it is important to critically assess national data on antibiotic consumption (22).

The drug administration and control authority (DACA) organized an antimicrobial resistance (ARM) stakeholders' meeting on March 2, 206, at Hilton Hotel in Addis Ababa in collaboration with RPM plus/ MSH and indicated that ARM is a growing problem in Ethiopia (23). Several studies were also conducted and indicated the prevalence of antimicrobial resistance for different bacterial isolates in different localities. To see some of them; A study in Gondar College of Medical Sciences Teaching and Referral Hospital that > 68% of isolates were resistant to two or

more antimicrobials (24). In a study done at Gondar Health center, only 7.7 % of them were sensitive to cotrimoxazole, 87.5% were multi drug resistant, and one strain was resistant to as many as 8 antibiotics, including ceftiaxone (25). In a study conducted in Jimma Hospital during 1997/98, 25 (41%) of the 61 Staphylococcus aureus nosocomial infection isolates were found methicillin-resistant (26). It was also indicated the prevalence of multi drug resistance tuberculosis (MDR-TB) which is about 1.2% in new cases and 3.5-12% in re-treatment cases of pulmonary tuberculosis (PTB) (27, 28).

A study in a teaching hospital in Gondar, North-West Ethiopia showed seventy percent of the study subjects had received one or more anti-microbials. Most exposure was in surgical ward (84%) followed by pediatric (82%).

Orthopedic (78%), medical (72%), gynecologic (58%) and obstetric (20%) wards. The antimicrobials most frequently prescribed were penicillin G (25%), followed by chloramphenicol and Ampicillin (29). Other two studies in Ethiopia were also carried out to assess rational drug use and prescription patterns and indicated in a minimal drugs/encounter percentage (<2.5%) and other important points (30, 31).

However, studies in this issue are limited and we did not get any that showed about antibiotic prescription or usage trends, patterns and its relation with antibiotic resistance in Ethiopia. So this study may give some important views on the condition of antimicrobial resistance and antibiotic use in the country.

Rationale of the Study

The study is useful to support and guide, on the disadvantages of empirical treatment, for clinicians and dispensaries by increasing their awareness in using the drugs so wisely. Thus, it brings antimicrobial resistance to a low degree at all levels and in all settings of the country and could also contribute in minimizing the shortage of drugs essential for patient management.

General Objective

The over all objective is to describe the Epidemiology of antibiotic resistance and antibiotic prescription pattern and their relations among three regional Hospitals in Ethiopia.

Specific Objectives

To assess antimicrobial prescription frequencies and resistance patterns

To determine the quantity of antibiotics prescribed for the diagnosed disease in each Hospital

To compare type and frequency of Antibiotic prescription in Hospitals and in different units within a Hospital

To identify multi drug resistant pathogens and see the relation of resistance and prescription rate

Methods and Materials

Study area, period and population

The study will be conducted in three regional referral Hospitals: Mekele, Bahr Dar and Hawassa between January 01and 10/ 2010 in out patient and in patient units of the Hospitals.

Study Design:

A cross-sectional study design will be employed and resistance data will also be reviewed back to complete information and describe the data well for the intended objective.

Sample Size and Sampling Technique:

All patients received antibiotic treatment during the study period will be included in the study. A five year antimicrobial resistance data will also be reviewed from regional health laboratories which are found in the regions of each respective Hospital.

Data Collection:

A structured questionnaire will be used to collect information like type and number of antibiotic prescriptions, suspected diagnosis, microbiological findings, socio-demographic and Hospital details.

Statistical analysis:

Data will be entered into a computer, cleaned and analysed using Epi-info software package version 3.3.2 to see the relation of antimicrobial use and resistance rate and other relevant results.

Ethical Consideration:

Ethical clearance will be obtained from the Research Ethics Committee of the School of Public Health (SPH) and Institutional Review Board (IRB) of the Faculty of Medicine (FOM), Addis Ababa University (AAU). Official permission will be secured from Regional Health Bureaus (RHBs) of the three Regional Hospitals. Respondents will be informed about the objective of the study and a verbal consent will be obtained from each respondent before the interview.

8.3.1 Work Plan on Antimicrobial Resistance and antimicrobial prescription pattern and relations by monthly breakdown

Ser. No	Activity	Time	Responsible	Remark
1	Research proposal write-up First draft	Nov 30- Dec 17/2009	Investigators	
2	Review, Finalyse and submission of proposal	Dec 18-23/2009	Investigators And advisors	
3	Approval and funding	Dec 24-30/2009	EPHA	
4	Data collection	January 01-05/2010	Investigators And data collectors	
5	Analysis	January 06-15/2010	Investigators	
6	Finalizing Document	January 16-23/2010	Investigators And advisors	
7	Dissemination and power point presentation to respective bodies	January 24-30/2010	Investigators	

8.3.2 Budget breakdown on Antimicrobial Resistance and antimicrobial prescription pattern and relations

Ser No.	Budget category	Unit cost	Multiplying factor	Total cost	remark
1	Personnel	Daily wage	No of staff x d		
2	Principal investigators	180.00	180x3x20	10,800.00	
3	Data collectors in outpatients, ward and laboratory units	100	(100x14x5d) 3 sites	21,000.00	
4	Training for data collectors	20	(100x14) 3 sites	4,200.00	
5	Refreshment (tea break) for training		(20x14) 3 sites	840.00	
6	Transportation		1500x3 sites	4,500.00	
7	Paper trim (for printing)		30 packs of 450/400 pcsx100	3000	
8	Questionnaire Photocopy		1x200.00	200.00	
9	Writing pen		72 pcs x 2.00	144.00	
11	Pencil		72 pcs x 1.00	72.00	
12	Eraser		36 pcs x 3.00	108.00	
13	Sharpener		36 pcs x 4.00	144.00	
14	Contingency 5%			2250.4	
	Total cost			47,258.4	

Dummy Tables

Table 8.3.3 Total number of patients received antibiotics by Age and sex, January 1-10/2010

Ser. No	Age Group	Sex		Total
		Male	Female	
1	0-5			
2	6-14			
3	15-55			
4	> 56			

Table 8.3.4 Distribution of total number of patients received antibiotics, Number of prescribed Antibiotics and Clinicians/ Prescribers in the three Hospitals, January 1-10/2010

Ser. No	Name of Hospital	Number of Antibiotics Prescribed	Number of clinicians/ prescribers
1			
2			
3			

Table 8.3.5 Trend of antibiotics prescriptions in different Hospital units between January 01& 10/2010

Ser. No	Hospital Unit	Days of data collection in the Month of January									
		1	2	3	4	5	6	7	8	9	10
1	Surgical										
2	Medical										
3	Gyn/Obs										
4	Pediatrics										
5	Adult OPD										
6	Child OPD										
	Total										

Table 8.3.6 Distribution of prescription percent and Resistance rate (in RHL) for selected Antibiotics

Ser. No	Antibiotic	Prescription %	Resistance % (in RHL)	Correlation
1				
2				
3				
4				
5				

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Annexes

Annex1.1 Line list of cases of influenza like illness whose specimens taken and tested

S. no	Name	District/kebele	Age	Sex	symptoms onset date	Date specimen collected	treatment given	Out come	Test result	C/C
1	Sherif Kedir	Gore prison	25	M	1/11/2010	7/11/2010	Anti-biotic and antipyretics	Not improved	pos.pH1N1	cough, fever ,runny nose, headache
2	Arjefo Ayana	Gore prison	29	M	2/11/2010	7/11/2010	Anti-biotic and antipyretics	Not improved	pos.pH1N1	cough, myalgia, runny nose, sore throat
3	Begidu Regassa	Gore prison	24	M	2/11/2010	7/11/2010	Anti-biotic and antipyretics	Not improved	pos.pH1N1	cough, runny nose, fever, headache
4	Shifa Kelifa	Gore prison	20	M	29/10/2010	7/11/2010	Anti-biotic and antipyretics	Not improved	pos.pH1N1	cough, back pain ,fever , runny nose
5	Tamiru Taye	Gore prison	32	M	2/11/2010	7/11/2010	Anti-biotic and antipyretic	Not improved	pos.pH1N1	cough, fever, headache, myalgia, runny nose
6	Nuredin Yadeta	Abdella	25	M	6/11/2010	8/11/2010	No	NA	pos.pH1N1	fever, cough, shortness of breath, sore throat
7	Mustofa Mohammed	Abdella	55	M	1/11/2010	8/11/2010	No	NA	Not detected	cough, sore throat, headache, runny nose
8	Bedria Fedia	Abdella	60	F	4/11/2010	8/11/2010	No	NA	pos.pH1N1	fever, headache, back pain, cough
9	Mekiya Kedir	Abdella	45	F	1/11/2010	8/11/2010	No	NA	pos.pH1N1	cough, sore throat, fever, headache
10	Halima Mohammed	Abdella	15	F	4/11/2010	8/11/2010	No	NA	pos.pH1N1	cough, sore throat, fever, headache, runny nose
11	Zeytuna Hassen	Abdella	16	F	5/11/2010	8/11/2010	No	NA	Not detected	fever, cough, sore throat ,runny nose
12	Taju Jemal	Abdella	32	M	6/11/2010	8/11/2010	No	NA	pos.pH1N1	cough, fever, runny nose, headache
13	Amira Ali	Abdella	7	F	4/11/2010	8/11/2010	No	NA	pos.pH1N1	fever, cough, runny nose
14	Birke Frisa	Abdella	35	F	5/11/2010	8/11/2010	No	NA	Indeterminate	cough, fever, sore throat, headache
15	Mohammed Yilma	Bedelle	28	M	2/11/2010	8/11/2010	Anti-biotic and antipyretic	Not improved	Not detected	dry cough, headache, nose bleeding, burning sensation, thirsty
16	Mitike Anegagregn	Bedelle	17	F	1/11/2010	8/11/2010	Anti-biotic and antipyretics	Not improved	pos.pH1N1	shortness of breath, headache, chest pain, back pain, fever, cough, runny nose
17	Wakjira	Bedelle	42	M	31/10/2010	8/11/2010	Anti-	Not	pos.pH1N	cough, fever,

	Diressa						biotic and antipyretic	improved	1	headache, runny nose
18	Guday Gemede	Bedelle	25	F	26/10/2010	8/11/2010	Anti-biotic and antipyretics	Not improved	Not detected	cough, fever, runny nose
19	Rijalu Ambarago	Denbi	18	M	2/11/2010	8/11/2010	No	NA	pos.pH1N1	fever, headache, anorexia ,cough, runny nose
20	Yusuf Bonenja	Denbi	18	M	5/11/2010	8/11/2010	No	NA	pos.pH1N1	cough, fever, runny nose , headache
21	Sedenur Mohammed	Denbi	30	M	5/11/2010	8/11/2010		NA	pos.pH1N1	cough, runny nose, sore throat, myalgia
22	Semira Alkadir	Denbi	9	F	5/11/2010	8/11/2010	No	NA	Not detected	Fever, headache, runny nose. Cough

Annex 1.2 Line lists of suspected cases of pandemic influenza A (H1N1) Gore prison and Gore town of Ale district, Illu Ababora zone from record review, Nov 2010

S.no	Name of patient	sex	age	date seen at health facility	C/C	Treatment given
1	Abde Tariku	M	21	28/10/2010	Fever, Dry cough, Runny nose, sore throat, Headache	anti biotic and antipyretics
2	Abdi Hussen	M	30	2/11/2010	Fever, sore throat, Headache, Shortness of breath	anti biotic and antipyretics
3	Abdi Tariku	M	26	30/10/2010	Fever, Dry cough, sore throat, Backache, Shortness of breath	anti biotic and antipyretics
4	Abdirahman Kedri	M	20	28/10/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
5	Abdisa Jeka	M	30	28/10/2010	Fever, cough, Runny nose, sore throat, Headache	anti biotic and antipyretics
6	Abdulnur Faris	M	22	2/11/2010	Fever, Cough, Runny nose, sore throat, Headache, Backache	anti biotic and antipyretics
7	Abebe Tariku	M	23	29/10/2010	Fever, Dry cough, Runny nose	anti biotic and antipyretics
8	Abebe Tariku	M	28	5/11/2010	Fever, Dry cough, Runny nose, sore throat	anti biotic and antipyretics
9	Adamu Terefe	M	35	28/10/2010	Fever, Dry cough, Shortness of breath	anti biotic and antipyretics
10	Afewerki Ayiza	M	27	30/10/2010	Fever, Dry cough, Runny nose, sore throat	anti biotic and antipyretics
11	Ahmed Aumer	M	43	28/10/2010	Fever, Dry cough, Runny nose	anti biotic and antipyretics
12	Alemayehu Dano	M	32	5/11/2010	Fever, cough, Headache, Backache, Shortness of breath	anti biotic and antipyretics
13	Alemu Ferisa	M	37	3/11/2010	Fever, Dry cough, Headache, Backache, Shortness of breath	anti biotic and antipyretics
14	Amsalu Degaga	M	27	28/10/2010	Fever, Dry cough, Runny nose	anti biotic and antipyretics
15	Anbadio Qono	M	25	28/10/010	Fever, cough, Shortness of breath	anti biotic and antipyretics
16	Asinake Firsa	M	2	5/11/2010	Fever, Dry cough, Backache	anti biotic and antipyretics
17	Banja Gebeyehu	M	39	28/10/2010	Fever, Dry cough, Shortness of breath	anti biotic and antipyretics
18	Befikadu Bonso	M	28	3/11/2010	Fever, Dry cough, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
19	Begdu Regasa	M	23	2/11/2010	Fever, Dry cough, Runny nose, sore throat	anti biotic and antipyretics
20	Belachew Muluneh	M	33	2/11/2010	Fever, Dry cough ,Backache, Shortness of breath	anti biotic and antipyretics
21	Belayneh Dejene	M	19	29/10/2010	Fever, Dry cough, Runny nose, Headache, Backache, Shortness of breath	anti biotic and antipyretics
22	Biritu Teka	M	27	2/11/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
23	Demelash Desalegn	M	39	30/10/2010	Fever, Dry cough, Runny nose, Shortness of breath	anti biotic and antipyretics
24	Dereje Andalo	M	35	3/11/2010	Fever, Dry cough, Runny nose, sore throat, Headache	anti biotic and antipyretics
25	Desalegn Alemayo	M	38	28/10/2010	Fever, Dry cough, sore throat, Headache, Backache	anti biotic and antipyretics

26	Dinnare Kidene	M	29	29/10/2010	Fever, Dry cough, Runny nose, Shortness of breath	anti biotic and antipyretics
27	Diriba Firsa	M	20	30/10/2010	Fever, Dry cough, Headache, Backache	anti biotic and antipyretics
28	Docco Tumee	M	33	5/11/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
29	Eshetu Endale	M	31	4/11/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
30	Eshetu Feyera	M	28	3/11/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
31	Eshetu Kedir	M	38	29/10/2010	Fever, Dry cough, Runny nose	anti biotic and antipyretics
32	Girma Irkisa	M	36	3/11/2010	Fever, dry cough, runny nose, headache, backache, shortness of breath	anti biotic and antipyretics
33	Habtamu Degaga	M	32	4/11/2010	Fever, Dry cough, Runny nose, Shortness of breath	anti biotic and antipyretics
34	Habtamu Bekele	M	29	28/10/2010	Fever, Dry cough, Backache	anti biotic and antipyretics
35	Habtamu Kamir	M	27	5/11/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache ,Shortness of breath	anti biotic and antipyretics
36	Habtamu Tadele	M	20	30/10/2010	Fever, Dry cough, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
37	Hujulu Hukiri	M	36	1/11/2010	Fever, Dry cough, Runny nose, Headache, Backache, Shortness of breath	anti biotic and antipyretics
38	Itana Jifar	M	30	28/10/2010	Fever, Dry cough, Runny nose, sore throat, Backache, Shortness of breath	anti biotic and antipyretics
39	Jiwar Bekele	M	19	28/10/2010	Fever, Dry cough ,Runny nose, sore throat, Headache, Shortness of breath	anti biotic and antipyretics
40	Kedir Melese	M	25	5/11/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache	anti biotic and antipyretics
41	Ketema Kesito	M	40	28/10/2010	Fever, Dry cough, Headache, Backache, Shortness of breath	anti biotic and antipyretics
42	Kifle Endeg	M	39	2/11/2010	Fever, Dry cough, Runny nose	anti biotic and antipyretics
43	Mahari Kasaye	M	33	1/11/2010	Fever, Dry cough, Runny nose, sore throat, Shortness of breath	anti biotic and antipyretics
44	Mehamed Mustofa	M	43	29/10/201	Fever, Dry cough, Runny nose, sore throat, Headache	anti biotic and antipyretics
45	Melaku Meshesha	M	36	28/10/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
46	Melaku Truneh	M	18	28/10/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
47	Melkamu Gezayi	M	29	5/11/2010	Fever, Dry cough, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
48	Mengesha Asnake	M	56	28/10/2010	Fever, Dry cough, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
49	Mitku Aschenaki	M	30	29/10/2010	Fever, Dry cough, Runny nose, Backache, Shortness of breath	anti biotic and antipyretics
50	Nasir Faris	M	18	30/10/2010	Fever, Dry cough, Runny nose, Backache, Shortness of breath	anti biotic and antipyretics
51	Nuredin Abdu	M	23	30/10/2010	Fever, Dry cough	anti biotic and antipyretics
52	Nuredin Hussen	M	24	28/10/2010	Fever, Dry cough, Runny nose, sore throat,	anti biotic and antipyretics
53	Reshid Jemal	M	22	30/10/2010	Fever, Dry cough, Runny nose	anti biotic and

						antipyretics
54	Reta Lema	M	41	2/11/2010	Fever, Dry cough, Headache, Backache, Shortness of breath	anti biotic and antipyretics
55	Reta Merdasa	M	25	28/10/2010	Fever, Dry cough, Runny nose, sore throat	anti biotic and antipyretics
56	Seifu Jebril	M	34	29/10/2010	Fever, Dry cough, Headache, Backache, Shortness of breath	anti biotic and antipyretics
57	Shemsu Husen	M	38	1/11/2010	Fever, Dry cough, Runny nose, sore throat, Shortness of breath	anti biotic and antipyretics
58	Shibru Dibaba	M	31	30/10/2010	Fever, Dry cough, Runny nose, sore throat, Shortness of breath	anti biotic and antipyretics
59	Shifa Kelifa	M	25	29/10/2010	Fever, Dry cough, Runny nose, sore throat, Backache, Shortness of breath	anti biotic and antipyretics
60	Shiferaw Taye	M	32	2/11/2010	Fever, Dry cough, Runny nose, sore throat, Backache, Shortness of breath	anti biotic and antipyretics
61	Sintayehu Aslemaki	M	19	28/10/2010	Fever, Dry cough, Runny nose, sore throat, Headache	anti biotic and antipyretics
62	Sintayehu Belay	M	21	28/10/2010	Fever, Dry cough, Runny nose, sore throat, Headache	anti biotic and antipyretics
63	Sintayo Asico	M	20	5/11/2010	Fever, Dry cough, Runny nose, sore throat, Headache	anti biotic and antipyretics
64	Sintayo Belay	M	18	3/11/2010	Fever, Dry cough, Runny nose, Headache, Backache, Shortness of breath	anti biotic and antipyretics
65	Tagel Asefa	M	19	3/11/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
66	Tajudin Mohamed	M	48	28/10/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
67	Tamru Taye	M	32	2/11/2010	Fever, Dry cough, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
68	Tamru Tesema	M	29	4/11/2010	Fever, Dry cough, Runny nose	anti biotic and antipyretics
69	Tariku Tadesse	M	30	29/10/2010	Fever, Dry cough, Runny nose, Headache, Backache	anti biotic and antipyretics
70	Tazik Gebeyo	M	24	29/10/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Shortness of breath	anti biotic and antipyretics
71	Tekalign G/michael	M	28	4/11/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Shortness of breath	anti biotic and antipyretics
72	Tekalign Getaneh	M	31	3/11/2010	Fever, Dry cough, Runny nose, sore throat	anti biotic and antipyretics
73	Teklu Tadese	M	22	2/11/2010	Fever, Dry cough, Runny nose, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
74	Tesfaye Debebe	M	27	1/11/2010	Fever, Dry cough, sore throat, Headache, Backache, Shortness of breath	anti biotic and antipyretics
75	Tezera Bekele	M	35	30/10/2010	Fever, Dry cough, Runny nose, sore throat, Shortness of breath	anti biotic and antipyretics
76	Tilahun Mengesha	M	23	28/10/2010	Fever, Dry cough, Runny nose, sore throat, Headache	anti biotic and antipyretics
77	Wondmu Sintayo	M	30	28/10/2010	Fever, Dry cough, Runny nose, sore throat, Headache	anti biotic and antipyretics
79	Zahir Isaa	M	30	28/10/2010	Fever, Dry cough, Runny nose,	anti biotic and antipyretics
80	Aliya Awel	F	20	2/11/2010	Sore throat, dry cough, headache,fever, back pain,myalgia,	anti biotics and antipyretics

81	Melesiya Awel	F	15	2/11/2010	Fever,dry cough, myalgia	anti biotics and antipyretics
82	Abdo Abrar	M	40	29/10/2010	Myalgia,fever, sore throat, cough,	anti biotics and antipyretics
83	Hasenat Abdu	F	5	1/11/2010	fever,headache,myalgia,cough, runny nose	anti biotics and antipyretics
84	Medina Aliyi	F	37	2/11/2010	Fever,headache,myalgia, runny nose,back pain, abdominal pain, diarrhea, cough	anti biotics and antipyretics
85	Getachew Tesfa	M	20	2/11/2010	headache, runny nose, fever,myalgia, dry cough	anti biotics and antipyretics
86	Sitotaw Melkamu	M	2	28/10/2010	fever, cough, myalgia	anti biotics and antipyretics

Annex 3.1 Questionnaire for Evaluation of surveillance system at Health facility level

General information

Hospital /Health center /Health post

District name _____

Health facility name_____

Name of interviewer_____Date_____

Name interviewee _____Profession/position _____

Telephone no. of interviewee (land line or cell phone) _____

Does your health facility have surveillance focal person?

□yes □ No □ not applicable

Is there any written documentation of the objectives of a surveillance system available? (**Observe**)

□yes □ No □ I do not know

Case-detection and Registration

Do you have any means / mechanism to capture information from the community / or other informal sources

□yes □ No □ I do not know

If yes, what type of means do you have?_____

Do you have standard case definitions for malaria and/or measles?

□yes □ No □ I do not know

If yes, are they posted (**Observe**)?

□yes □ No

Case Confirmation

Do you have the capacity to collect specimen for case confirmation of malaria and/or measles?

□yes □ No □ I do not know

Does your facility perform External quality assurance for malaria?

□yes □ No □ I do not know

Are laboratory diagnostic reagents for malaria present and maintained in your health facility?

□Yes □ No □ I do not know

Are supplies for malaria and/or measles specimen collection and transportation present and maintained in your health facility?

□Yes □ No □ I do not know

Proportion of malaria and/or measles out breaks that are laboratory confirmed within last year (**specify**)_____

Data Reporting

What type of communication facility do you use for reporting to next level?

□Hard copy report □Mail □ Fax □Radio □telephone □Other

Number of measles reports sent to district previous 3 months_____

Number of malaria reports sent to district previous 3 months_____ /12 reports

Did your health facility use case based reporting forms for measles in the past 1 year?

□yes □ sometimes □ No □I do not know

Proportion of outbreak of malaria and/or measles detected in previous 1 year that were notified to the next higher level within 30 minutes surpassing the epidemic threshold_____

Data Analysis

Do you do malaria and/or measles surveillance data analysis at your facility/organization level? (**Observe**)

Time □yes □ No □ I do not know

Place □yes □ No □ I do not know

Person □yes □ No □ I do not know

Does your health facility have clear and defined epidemic threshold values for malaria and/or measles?

□yes □ No □ I do not know

If yes, do you monitor? (**Observe**)

□yes □ No □ I do not know

Outbreak Investigation

Did you have any suspected malaria and/or measles outbreak in the last 1 year?

□yes □ No □ I do not know

If yes, how many suspected outbreaks did you have in the last year? _____

How many of the suspected outbreaks were investigated? _____

Did you look for any risk factor during investigation?

□yes □ No □ I do not know

Did you use the data for action?

□yes □ No □ I do not know

Epidemic Preparedness

Do you have any written report of epidemic preparedness plan? (**Observe**)

□yes □ No □ I do not know

Did your health facility experience shortage of drugs and supplies for the most recent malaria and/or measles outbreak within 3 months

□yes □ No □ not applicable

If yes, what was the shortage? _____

Are emergency stocks of drugs and supplies available?

□yes □ No □ I do not know

Do you have a budget line for epidemic response?

□yes □ No □ I do not know

Epidemic Response:

Does your facility/ organization have a rapid response team?

□yes □ No □ I do not know

Did your facility/ organization implement prevention activities based on local malaria and/or measles data? (**Observe**)

□yes □ No □ I do not know

How fast did you respond to epidemic reports in your locality?_____

Does your health facility have experience of cross-border communication during outbreaks?

□yes □ No □ not applicable

Feedback

Is there any feedback mechanism that is received from the district?

□yes □ No □ I do not know

How many written feedback reports did you receive from district during the last 1 year? (**Observe**) _____

Supervision

How many times have you been supervised in the last 1 year? (**Observe**) _____

How many supervisory visits were planned in the last 1 year? _____

How many supervisory visits have you made in the last 1 year? (**Observe**) _____

How many supervisory visits you made for each health posts? _____

Do you use supervisory check lists? (**Observe**)

□yes □ No

Standards and guidelines

Is there a national guideline for surveillance at your health facility?

□yes □ No □ I do not know

Does your health facility have standard case management protocol for malaria and/or measles?

□yes □ No □ I do not know

Does your laboratory unit have SOP's for collection, packaging, and referral of specimen's malaria and/or measles?

□yes □ No □ I do not know

Does your health facility have guidelines for investigation of malaria and/or measles outbreaks?

□yes □ No □ I do not know

Training

Did you get training in surveillance and basic epidemiology?

□yes □ No

If yes, when was the training?_____

What proportions of the health workers have surveillance training?_____

Resources

Are the following resources indicated in the table below available in your facility/organization? (Mark **X** where appropriate)

No	Type of resources	Present	Absent	Remarks
1	Electricity			
2	Motor cycle			
3	Vehicle			
4	Adequate Stationery			
5	Calculator			
6	Computer			
7	Printer			
8	Telephone service			
9	Fax			
10	Radio call			
11	Posters			
12	Megaphone			
13	Flipcharts or image box			
14	Generator			

Timeliness:

How many malaria weekly reports did you send to district during the last 3 months timely? _____

(Observe)

How many measles reports did you send to district immediately during the last 3 months? _____

(Observe)

Number of outbreaks initiated verification process within 30 minutes?_____

Completeness

How many malaria weekly reports did you send to the district within the last 3 months? (**Observe**)_____

How many immediately measles reports did you send to the district within the last 3 months? (**Observe**)_____

Does your health facility complete all the variables of the malaria and measles reporting formats? (**Observe**)

□yes □ No □do not know

Usefulness:

Do you use malaria and/or measles surveillance data /information for?

Planning □yes □ No □do not know

Priority setting □yes □ No □do not know

Interventions □yes □ No □do not know

Others (**Specify**) _____

Simplicity:

Do you think that the surveillance system is simple to understand?

Case definition □yes □ No □do not know

Data collection □yes □ No □do not know

Data analysis □yes □ No □do not know

If case definition is no, of which disease is difficult to understand the case definition_____

Acceptability:

Do you think that surveillance system is acceptable by health workers?

□ Yes □ No □not much

Are you satisfied working in the existing surveillance system?

□yes □ No

Reliability:

Do you think that surveillance reports with reported cases correspond (with an acceptable error margin) to the records in the register over the same time period?

□ Yes □ No □not sure

Reports of previous 1 month

Disease conditions	Number of cases recorded		Number of deaths recorded	
	Register review	Facility reports	Register review	Facility reports

Annex 3.2 Questionnaire for Evaluation of Surveillance System at District Level

General information:

District name _____

Name of interviewer_____Date_____

Name of interviewee _____Profession/position _____

Number of health facilities: Hospital___ Health center ___ Health post_____

Telephone no. of interviewee (land line or cell phone) _____

Is there any written documentation of the objectives of a surveillance system available? (**Observe**)

□yes □ No □ I do not know

Is there legal mechanism to enforce surveillance for priority diseases?

□Yes □ No □ I do not know

Case-detection and Registration:

Do you have any means / mechanism to capture information from the community / or other informal sources

□yes □ No □ I do not know

If yes, what type of means do you have?_____

Do you have standard case definition for malaria and/or measles? (**Observe**)

□yes □ No □ I do not know

Proportion of health facilities with Standard Case Definition for malaria and/or measles_____

Is data validation routinely done?

□Yes □ No □ I do not know

Case Confirmation

Are laboratory diagnostic reagents for malaria and /or measles present and maintained in your district?

□Yes □ No □ I do not know

Are there malaria and/or measles outbreaks that are lab confirmed in the last 1 year?

□yes □ No □ I do not know □ not applicable

Proportion of malaria and/or measles out breaks that are laboratory confirmed within last year _____

Are supplies for specimen collection and transportation present and maintained in your district?

□Yes □ No □ I do not know

Proportion of health facilities that have the capacity to transport specimens for malaria and/or measles to a higher level lab?_____

Do you have a documented list of referral laboratories for confirmation of malaria and/or measles?

□yes □ No □ I do not know

Proportion of health facilities performing external quality assurance for malaria_____

Data Reporting

What type of communication facility do you use for reporting to next level?

□Hard copy report □Radio □Telephone □Mail □ Fax □Other

Proportion of measles cases that were reported to regional level using case based reporting forms in the previous 1year_____

Proportion of malaria and measles epidemics detected in previous 1 year that were notified to the regional level within 1 hour surpassing the epidemic threshold_____

Number of reports received at district level in the last 3 months? (**Observe**)

For measles_____

For malaria:_____ /12 reports

Does your district have appropriate surveillance forms at any times during the past 3 months? (**Observe**)

Weekly report form □Yes □ No □I don't know

Case based report form □Yes □ No □I don't know

Line listing □Yes □ No □I don't know

Epidemic report form □Yes □ No □I don't know

Number of reports sent to region during the last 3 months (**Observe**)

For measles _____

For malaria_____ /12reports

Data Analysis

Do you analyze malaria and measles data at your district by (**observe**)

Time □yes □ No □ I do not know

Place □yes □ No □ I do not know

Person □yes □ No □ I do not know

Does your district have clear and defined epidemic threshold values for epidemic prone diseases?

□yes □ No □ I do not know

If yes, what is the threshold? _____

Outbreak Investigation

Did you have any suspected outbreak in the last year?

□yes □ No □ I do not know

How many of the suspected outbreaks were investigated?

_____

Did you look for any risk factor/s during investigation?

□yes □ No □ I do not know

Did you use the data for action?

□yes □ No □ I do not know

Epidemic Preparedness

Does the district have a rapid response team for epidemics?

□yes □ No □ I do not know

Proportion of health facilities with RRTs_____

Do you have any written report of epidemic preparedness plan? **(Observe)**

□yes □ No □ I do not know

Does your district have budget line for epidemic response?

□Yes □ No □ I do not know

Did your district experience shortage of drugs and supplies for the most recent malaria and/or measles outbreak within the last 1 year?

□yes □ No □ I do not know □Not applicable

If yes, what were the outbreaks and the shortage? _____

Proportion of districts that experienced shortage of drugs and supplies for the most recent outbreak with the previous 1 year _____

Are emergency stocks of drugs and supplies for malaria and/or measles available at district level?

□yes □ No □ I do not know

Does your district have a functional epidemic management committee? (**Observe**)

□yes □ No □ I do not know

Epidemic Response:

Did epidemic management committee evaluate its preparedness and response activities during the past 1 year (Observe written report to confirm)?

□Yes □ No □ I do not know

Did your district have experience of cross-border communication during outbreaks any time in the past?

□Yes □ No □ I do not know

Observe that district level responded within1 hour of notification of most recently reported outbreak in one year (from written reports with trend and intervention)

_____

Feedback:

Do you get a periodic feedback from the regional level?

□Yes □ No □ I do not know

How many written feedback reports did you receive from the region during the past 1 year? (**Observe**) _____

Do you give a periodic performance feedback to health facilities?

□Yes □ No □ I do not know

How many written feedback reports did you produce during the past 1 year? (**Observe**)_____

Supervision

Do you conduct a planned supervision to health facilities on a regular basis?

□Yes □ No □ I do not know

Proportion of supervisions conducted according to plan (how many were planned and how many implemented) _____/_____

Do you use supervisory check lists during supervision?

□Yes □ No □sometimes

Observe supervision report or any evidence of supervision in the previous 1 year

How many times have you been supervised in the previous 1 year?_____

Standards and guidelines

Is there a national surveillance manual/guideline at your district?

□yes □ No □ I do not know

What Proportion of health facilities is with standard guidelines for malaria and/or measles _____?

Does your district have standard case management protocol for malaria and/or measles?

□yes □ No □ I do not know

What Proportion of health facilities is with standard case management protocol for malaria and measles _____/_____?

Does your district surveillance unit have guidelines for investigation of outbreaks?

□yes □ No □ I do not know

What Proportion of health facilities is with guidelines for investigation of outbreaks_____?

Does your district laboratory unit have SOPs for collection, packaging, and referral of specimens of malaria and/or measles?

□yes □ No □ I do not know

Does your district use guidelines for infection control?

□Yes □ No □ I do not know

Training

Have you ever been trained in surveillance and basic epidemiology?

□yes □ No

What proportion of the health workers has surveillance training?_____

Does your district have surveillance training manuals at hand? (**Observe**)

□yes □ No

Does your district have surveillance training plan for this fiscal year?

□Yes □ No

Did you conduct the training according to the plan?

□Yes □ No

If no, what was the reason? _____

Resources

Are the following resources (indicated in the table below) available in your district? (Mark **X** where appropriate)

No	Type of resources	Present	Absent	Remarks
1	Electricity			
2	Motor cycle			
3	Vehicle			
4	Adequate Stationery			
5	Calculator			
6	Computer			
7	Printer			
8	Telephone service			
9	Fax			
10	Radio call			
11	Posters			
12	Megaphone			
13	Flipcharts or image box			
14	Generator			
15	Movie projector with screen			

Timeliness:

Proportion of health facilities submitted weekly malaria reports to the district on time in the previous 3 months_____

Proportion of expected immediately measles reports to the districts on time in the previous 3 months_____

Proportion of outbreaks notified to the regional level within 1 hour of detection since last year _____

Proportion of outbreaks with verification process initiated within 1 hour of detection_____

Completeness:

Proportion of total expected weekly malaria surveillance reports that were received within previous 3 months at district level regardless of timeliness(**observe**)_____

Proportion of malaria and/or measles reports received with no missing of the required information (variables) within previous 3 months at district level (**observe**) _____

Proportion of total expected surveillance reports that were reported to regional level within previous 3 months regardless of the timeliness of reporting (**observe**)_____

Proportion of reports sent with no missing of the required information (variables) within previous 3 months to regional level (**observe**) _____

Usefulness:

Do you use surveillance data /information for?

Planning,	□yes	□ No	□do not know
Priority setting	□yes	□ No	□do not know
Interventions	□yes	□ No	□do not know
Monitoring and evaluation of programs	□yes	□ No	□do not know

Observe for any sample that is planned for priority setting and intervention using the available data

□ Yes □ No □do not know

Simplicity:

Do you think that the surveillance system is simple to understand?

Case definition	□ Yes	□ No	□not much
Data collection	□ Yes	□ No	□not much
Data analysis	□ Yes	□ No	□not much

If the answer for case definition is no, of which disease is it_____

Disease conditions	Number of cases recorded		Number of deaths recorded	
	District reports	Regional report	District reports	Regional report

Acceptability:

Do you think that surveillance system is acceptable at district level?

□ Yes □ No □not much

Are you satisfied working in the existing surveillance system?

□yes □ No

Reliability

Do you think that surveillance reports with reported cases correspond (with an acceptable error margin) to the records in the register over the same time period?

□ Yes □ No □not sure

Weekly report accuracy (district to region)

Annex 3.3 Questionnaire for a Regional surveillance system

General information

Name of interviewer_____Date_____

Name of interviewee _____Profession/position _____

Number of health facilities: Gov.Hospital ____ Gov. H.center ____ Gov.Health post_____

Private Hospital ___ Private Clinic____

Telephone no. of interviewee (land line and/or cell phone) _____

Is there any written document of the objectives/plan of disease surveillance system in the region? (**Observe**)

□Yes □ No □ I do not know

Is there legal mechanism to enforce surveillance for priority diseases?

□Yes □ No □ I do not know

Case-detection and Registration

Does your region have any means / mechanism to capture information of unusual event from the community or other informal sources?

□Yes □ No □ I do not know

If yes, what type of means do you have?_____

Does your region have standard case definitions for malaria and/or measles? (**Observe**)

□Yes □ No □ I do not know

Proportion of districts with Standard Case Definition for malaria and/or measles_____

Is data validation routinely done?

□Yes □ No □ I do not know

Case Confirmation:

Are laboratory diagnostic reagents present and maintained in your region?

□Yes □ No □ I do not know

Are supplies for specimen collection and transportation present and maintained in your region?

□Yes □ No □ I do not know

Proportion of malaria and/or measles out breaks that are laboratory confirmed within last year (**specify**)_____

What proportion of health facilities (HF) Perform external quality assurance for malaria?_____

What proportions of health facilities have the capacity to transport specimens for malaria and/or measles to a higher level lab?_____

What proportions of health facilities have guidelines for specimen collection, handling, and transportation to the next level?_____

Data Reporting:

What type of communication facility do you use for reporting to central level?

□hard copy report □E-mail □ Fax □Radio □Electronic □Other

Proportion of measles cases that were reported to central level using case based reporting forms in the previous 1year_____

Proportion of malaria and measles epidemics detected in previous 1 year that were notified to the central level within 1 hour surpassing the epidemic threshold_____

Number of reports received at regional level in the previous 3 months

For measles_____/

For malaria:_____ /12 times reports

Did your region have appropriate surveillance forms any time during the past 3 months? (**Observe**)

Weekly report form	□Yes	□ No	□I don't know
Case based report form	□Yes	□ No	□I don't know
Line listing	□Yes	□ No	□I don't know
Epidemic report form	□Yes	□ No	□I don't know

Data Analysis

Does your region analyze malaria and measles surveillance data by (**Observe** for line graph?)

Time □Yes □ No □ I do not know

Place □Yes □ No □ I do not know

Person □Yes □ No □ I do not know

Does your region have clear and defined epidemic threshold values for malaria and measles?

□Yes □ No □ I do not know

If yes what is the threshold? _____

Outbreak Investigation

Did you have any suspected outbreak of malaria and/or measles in the past 1 year?

□Yes □ No □ I do not know

How many of the suspected outbreaks were investigated? _____

Number of outbreaks in which risk factors were looked for _____

Number of outbreaks in which findings were used for action _____

Epidemic Preparedness:

Does your region have Rapid Response Team (RRT)?

□Yes □ No □ I do not know

What Proportion of districts is with RRTs_____?

Do you have any written report of epidemic preparedness plan? (**Observe**)

□Yes □ No □ I do not know

Does the region have budget line for epidemic response?

□Yes □ No □ I do not know

Has the region had _____at all times in the past 1 year?

Emergency stocks of drugs	□Yes	□ No	□ I do not know
Vaccines	□Yes	□ No	□ I do not know
Supplies	□Yes	□ No	□ I do not know

Did your region experience shortage of drugs and supplies for the most recent outbreak/s within the previous 1 year?

□Yes □ No □ I do not know

If yes, what were the outbreak and the shortage? _____

Proportion of districts that experienced shortage of drugs and supplies for the most recent outbreak/s with the previous 1 year _____

Does your region have a functional epidemic management committee?

□Yes □ No □ I do not know

Epidemic Response:

Did epidemic management committee evaluate its preparedness and response activities during the past 1 year (Observe written report to confirm)?

□Yes □ No □ I do not know

Did your region experience cross-border communications during outbreak?

□Yes □ No □ I do not know

Observe that regional level responded within 2 hours of notification of most recently reported outbreak/s within a year (from written reports with trend and intervention)

□Yes □ No □ I do not know

Feedback:

Do you get a periodic performance feedback from central level?

□Yes □ No □ I do not know

How many written performance feedbacks reports did you receive from central level during the last 1 year? (**Observe**) _____

Do you give a periodic performance feedback to districts?

□Yes □ No □ I do not know

How many written performance feedback reports did you produce during the last 1 year? (**Observe**)_____

Supervision:

Do you conduct a planned supervision to your districts on a regular basis?

□Yes □ No □ I do not know

Proportion of supervisions conducted according to plan (how many was planned and how many was implemented) _____

Do you use supervisory check-lists during supervision?

□Yes □ No □sometimes

Observe supervision report or any evidence of supervision in the previous 1 year

How many times did have you been supervised in the previous 1 year?_____

Standards and guidelines

Does your region have surveillance standard guidelines?

□Yes □ No □ I do not know

What Proportion of districts is with standard guidelines for malaria and/or measles _____?

Does your region have guidelines for investigation of malaria and/or measles outbreaks?

□Yes □ No □ I do not know

What Proportion of districts is with guidelines for investigation of outbreaks_____?

Does your region have standard case management protocol for malaria and measles?

□Yes □ No □ I do not know

What Proportion of districts is with standard case management protocol malaria and measles _____?

Does your region use guidelines for infection control?

□Yes □ No □ I do not know

Does your region have SOPs for laboratory units (malaria and measles)?

□Yes □ No □ I do not know

What Proportion of districts is with SOP's? _____

Training:

Do you have training on disease surveillance /IDSR?

□Yes □ No

If yes, when was the training?_____

What proportions of health workers have surveillance training in the region currently?_____

Does your region have surveillance training plan for this fiscal year?

□Yes □ No

Did you conduct the training according to the plan?

□Yes □ No

If no, what was the reason? _____

Does your region have surveillance training manual?

□Yes □ No

Resources:

Are the following resources indicated in the table below available in your region? (Mark **X** where appropriate)

No	Type of resources	Present	Absent	Remarks
1	Electricity			
2	Motor cycle			
3	Vehicle			
4	Adequate Stationery			
5	Calculator			
6	Computer			
7	Printer			
8	Telephone service			
9	Fax			
10	Radio call			
11	Posters(malaria and measles)			
12	Megaphone			
13	Flipcharts or image box			
14	Generator			
15	Internet access			

Timeliness:

Proportion of districts submitted weekly malaria reports to the region on time in the previous 3 months_____

Proportion of expected immediately measles reports received on time from districts in the previous 3 months_____

Proportion of outbreaks notified to the central level within 1 hour of detection since last yea _____

Proportion of outbreaks with verification process initiated within 2 hour of detection_____

Completeness:

Proportion of total expected weekly malaria surveillance reports that were received within previous 3 months at regional level regardless of timeliness(**observe**)_____

Proportion of malaria and/or measles reports received with no missing of the required information (variables) within previous 3 months at regional level (**observe**) _____

Proportion of total expected surveillance reports that were reported to central level within previous 3 months regardless of the timeliness of reporting (**observe**)_____

Proportion of reports sent with no missing of the required information (variables) within previous 3 months to central level (**observe**) _____

Usefulness:

Do you use surveillance data /information for?

Planning □Yes □ No □I do not know

Priority setting □Yes □ No □I do not know

Intervention □Yes □ No □I do not know

Others (specify) _____

Observe for any sample that is planned for priority setting and intervention using the available data _____

If available what disease data useful was for (specify)_____

Simplicity:

Do you think that the surveillance system is simple to understand with regard to?

Case definition □ Yes □ No □Not much

Data collection □ Yes □ No □Not much

Data analysis □ Yes □ No □Not much

Acceptability

Do you think that surveillance system is acceptable at regional level?

□ Yes □ No □not much

Proportion of Users/Implementers Who thinks the surveillance system is acceptable_____

Reliability:

Do you think that surveillance reports with reported cases correspond (with an acceptable error margin) to the records in the register over the same time period (observe)

□ Yes □ No □not sure

Annex 3.4 Questionnaire for Evaluation of surveillance system at Health post level

General information

Hospital /Health center /Health post

District name _____

Health post name_____

Name of interviewer_____Date_____

Name of interviewee _____Profession/position _____

Telephone no. of interviewee (land line/cell phone) _____

Do you have training of surveillance system/IDSR?

□yes □ No

If yes, when was the training?_____

Is there a national manual/guideline of surveillance at your health facility?

□yes □ No □ I do not know

Case-detection and Registration:

Disease conditions	Number of cases recorded		Number of deaths recorded	
	Total District report	Region report	Total District report	Region report

Have you heard of notifiable diseases under surveillance?

□yes □ No □ I do not know

If yes, do you know no. of notifiable disease?

□yes □ No □ I do not know

How many are they? _____

What are they? (Name them) _____

Do you have any means / mechanism to capture information from the community / or other informal sources

□yes □ No □ I do not know

If yes, what type of means do you have?_____

Do you have standard case definitions for notifiable diseases available?

□yes □ No □ I do not know

Data Reporting:

What type of communication facility do you use for reporting to next level?

□Hard copy report □Mail □ Fax □Radio □telephone □Other

Outbreak Investigation:

Did you have any suspected outbreak in the last year?

□yes □ No □ I do not know

If your answer is yes, how many suspected outbreaks did you have in the last year? _____

Annex 6.2.1 List of assessed districts by their population size in 4 Zones, Amhara Region, July 2010

Zone	District name	Total population	Male	Female	Under 5	Above 5	Remark
North wello	Mekit	241833	121158.33	120674.67	32647.46	209185	
	Gidan	159532	79925.532	79606.468	21536.82	137995.18	
	Habru	203143	101774.64	101368.36	27424.31	175718.7	
	Gubalafto	155012	77661.012	77350.988	20926.62	134085.38	
South Wollo	Sayint Ajibar	155047	77678.547	77368.453	20931.35	134115.66	
	Kelela	144446	72367.446	72078.554	19500.21	124945.79	
	Kallu	229536	114997.54	114538.46	30987.36	198548.64	
	Werebau	105012	52611.012	52400.988	14176.62	90835.38	
	Argoba	37704	18889.704	18814.296	5090.04	32613.96	
Oromia	Batit Towen	38396	19236.396	19159.604	5183.46	33212.54	
	Bati Zuria	75792	37971.792	37820.208	10231.92	65560.08	
	Jile Timuga	77510	38832.51	38677.49	10463.85	67046.15	
North Shewa	Afrata Gidim	117505	58870.005	58634.995	15863.18	101641.83	
	Mojanawadira	75157	37653.657	37503.343	10146.2	65010.805	
	Ankober	80371	40265.871	40105.129	10850.09	69520.915	
	Qewat	110865	55543.365	55321.635	14966.78	95898.225	
	MenzGera	108109	54162.609	53946.391	14594.72	93514.285	
Total	17	2114970	1059600	1055370	285521	1829449	

Annex 6.2.2 Drugs and supplies stock needs estimation regional summary for assessed districts, Amhara Region, July 2010

Item		Stock at hand visited Zonal level	needs in assessed districts	Remark
Drugs , Laboratory and other supplies	ORS sachets	17057	27490.165	
	Ringer Lactate 1 liter	5448	5074.892	
	NG tub	0	422.93	
	Doxy cyclin 100 mg	700	2536.446	
	Erythromycin 250 mg	0	10148.784	
	Ciprofloxacilin	0	2536.446	
	Amoxacilin suspention	0	2536.446	
	Coartem	43200	929121	
	crystalin penecilin	0	15771.05	
	AC vacin	0	89431.836	
	RDT for malaria	0	54685	
	pastorex for meningite	0	400	
	AWD CTC kite	1	32	

Annex 6.2.3 Summary of Beneficiaries by disease type of intervention, Amhara Region, July 2010

No.	Disease Intervention	Activity	Estimated beneficiaries	Remark
1	AWD	Manage cases in CTCs	4397	
		Prevention o f AWD;	406573	
2	Measles	case Management/ Vit A and antibiotics/	4224	
3	Meningitis	immunize population at risk	14931	
		Case Management	4600	
4	Malaria	Treat cases	126709	
		ITN distribution	297043	
	N.B. Beneficiaries could overlap for different diseases			

Annex 6.2.4 Estimation of beneficiaries by disease interventions for 17 districts, Amhara Region, July 2010

Woreda	Intervention	Activities	Risk population	Attack rate	Estimated beneficiaries
Bati Zuria	AWD	manage cases	75793	0.20%	151.586
		prevention of AWD	To avoid resource duplication(WASH)		
	Measles	managing of cases by Vitamin supplementation and antibiotics	75793	0.20%	151.586
	Meningitis	prevention of Meninigits:	75793	0.70%	530.551

		immunization			
		Case MX	75793	0.20%	151
	Malaria	Treat cases	75792	2.90%	2197.968
		Distribute ITN	75792	31.00%	23495.52
Jile Timuga	AWD	Case Mx in CTC	77510	0.20%	155.02
		prevention of AWD	To avoid resource duplication(WASH)		
	Measles	managing of cases by Vitamin supplementation and antibiotics	77510	0.20%	155.02
	Meningitis	prevention of Meninigits: immunization	77510	0.70%	542
		Case MX	77510	0.20%	155
	Malaria	Case management	77510	12.60%	9766.26
		ITN	77510	25.00%	19377.5
Bati town	AWD	Case management	38396	0.20%	76.792
		prevention of AWD	To avoid resource duplication(WASH)		
	Measles	managing of cases Mx / Vit A and antibiotics/	38396	0.20%	76.792
	Meningitis	prevention of Meninigits: immunization	38396	1%	268.772
		Case MX	38396	0%	76.792
	Malaria	Treat cases	38396	1%	383.96
		ITN distribution	38396	0.20%	76.792
Kallu	AWD	manage cases	229536	0.20%	459.072
		Prevention of AWD	To avoid resource duplication(WASH)		
	Mealses	managing of cases Mx / Vit A	229536	0.20%	459.072

		and antibiotics			
	Meningitis	prevention of Meninigits: immunization	229536	0.70%	1606.752
		Case MX	229536	0.20%	459.072
	Malaria	manage cases	229536	6.00%	13772.16
		Distribute ITN	229536	20.00%	45907.2
Werebabu	AWD	Case Mx in CTC	105012	0.20%	210.024
		Prevention of AWD	To avoid resource duplication(WASH)		
	Mealses	managing of cases Mx / Vit A and antibiotics/	105012	0.20%	210.024
	Meningitis	prevention of Meninigits: immunization	105012	0.70%	735.084
		Case MX	105012	0.20%	210.024
	Malaria	manage cases	105012	0.30%	315.036
		ITN distribution	105012		
Kelela	AWD	Case MX	144446	0.20%	288.892
		prevention of AWD	To avoid resource duplication(WASH)		
	Measles	managing of cases Mx / Vit A and antibiotics/	144446	0.20%	288.892
	Meningitis	prevention of Meninigits: immunization	144446	0.70%	1011.122
		Case MX	144446	0.20%	288.892
	Malaria(Amhara Risk pon)	Treat cases	144446	1.00%	1444.46
		Distribute ITN	144446	27.00%	39000.42
Sayint Ajibar	AWD	Case MX	155047	0.20%	310.094
		Prevention of AWD	To avoid resource		

			duplication(WASH)		
	Measles	managing of cases Mx / Vit A and antibiotics/	155047	0.20%	310.094
	Meningitis	prevention of Meninigits: immunization	155047	1%	1085.329
		Case MX	155047	0%	310.094
	Malaria	Treat cases	155047	0%	310.094
		Distribute ITN	155047	27%	41862.69
Argoba	AWD	Manage cases in CTCs	37704	0.20%	75.408
		Prevention of AWD	To avoid resource duplication(WASH)		
	Mealses	managing cases such as ;vitamin A supplementation and antibiotics	37704	0.20%	75.408
	Meningitis out break	immunize population at risk	37704	0.70%	263.928
		Case MX	37704	0.20%	75.408
	Malaria	case management	37704	2%	754.08
		ITN distribution	37704	29%	10934.16
Meket	AWD	Manage cases in CTCs	241833	0.20%	483.666
		preventionof AWD;	241833	38.00%	91896.54
	Measles	managing of cases Mx / Vit A and antibiotics/	241833	0.20%	483.666
	Meningitis	immunize population at risk	241833	1%	1692.831
		Case MX	241833	0%	483.666
	Malaria	Treat cases	241833	0%	918.9654

		ITN distribution	woreda coverage is 100%		
Gubalafto	AWD	Manage cases in CTCs	155012	0.20%	483.666
		preventionof AWD;	155012	55.00%	85256.6
	Mealses	managing of cases Mx / Vit A and antibiotics/	155012	0.20%	310.024
	Meningitis	immunize population at risk	155012	1%	1116.724
		Case Mx	155012	0%	310.024
	Malaria	Case MX	155012	0%	72855.64
		ITN distribution	woreda coverage is 100%		
Gidan	AWD	Manage cases in CTCs	159532	0.20%	319.064
		preventionof AWD;	159532	34.00%	54240.88
	Mealses	case Mx / Vit A and antibiotics/	159532	0.20%	319.064
	Meninigitis	immunize population at risk	159532	1%	1595.32
		Case Mx	159532	0%	319.064
	Malaria	Treat cases	159532	0%	319.064
		ITN distribution	159532	28%	43871.3
Habru	AWD	Manage cases in CTCs	203143	0.20%	406.286
		AWD prevenion	203143	32.00%	65005.76
	Mealses	managing of cases Mx / Vit A and antibiotics/	203143	0.20%	406.286
	Meningitis out break	Immunization	203143	1%	1422.001
		Case MX	203143	0%	406.286
	Malaria	Case MX	203143	5%	10157.15

		ITN distribution	203143	20%	40628.6
Eferat Gidim	AWD	Case Mx in CTC	117505	0.20%	235.01
		prevention of AWD	117505	68.00%	79903.4
	Mealses	managing of cases Mx / Vit A and antibiotics/	117505	0.20%	235.01
	Meningitis	prevention of Meninigits: immunization	117505	0.70%	822
		Case MX	117505	0.20%	235
	Malaria	Treat cases	117505	10.00%	11750.5
		ITN distribution	117505	2.80%	3290.14
Mojanawadira	AWD	managing cases at CTC	75157	0.20%	150.314
		prevention of cases	To avoid resource		
	measles	case management	75157	0.20%	150.314
	Meningitis	Case MX	75157	0.20%	150.314
		mass vacination	75157	1%	526.099
Ankober	AWD	Case Mx at CTC	80371	0.20%	160.742
		prevention of AWD	To avoid resource duplication(WASH)		
	Mealses	managing of cases Mx / Vit A and antibiotics/	80371	0.20%	160.742
	Meningitis	prevention of Meninigits: immunization	80371	0.70%	562.597
		Case MX	80371	0.20%	160.742
	Malaria	Distribute ITN	80371		
		Treat cases	80371	8%	6429.68
MenzGera	AWD	Case Mx in CTC	108109	0.20%	216.218
		prevention of AWD	108109	28.00%	30270.52
	Mealses	managing of cases Mx / Vit A	108109	0.20%	216.218

		and antibiotics/			
	Meningitis	Case Mx	108109	0%	216.218
		mass vaccination of risk group	108109	1%	756.763
	Malaria	Treat cases	108109	0%	216.218
		ITN distribution	108109		
Qewat	AWD	Case Mx in CTC	110865	0.20%	221.73
		Prevention of AwD	To avoid resource duplication(WASH)		
	Mealses	managing of cases Mx / Vit A and antibiotics/	110865	0.20%	221.73
	Meningitis	prevention of Meninigits: immunization	110865	1%	776.055
		Case MX	110865	0%	221.73
	Malaria	Treat cases	110865	1%	1552.11
		ITN distribution	110865	20%	22173

Annex 6.2.5 partners working with district health offices during assessment period

Partners	Program				Districts
	Health	HIV/AIDS	WASH	Nutrition	
WV	√		√	√	Eferata Gidim, Habiru
EMERDA		√			Eferata Gidim
Concern				√	Argoba
SC UK	√		√	√	Kelela, Sayint, Mekit, Gubalafto, Gidan
Carter Center	√				Gubalafto, Argoba
Water Action			√		Worebabu, Argoba
Action Aid		√	√		Ankober
ORDA			√		Habiru, Worebabu
ADA	√				Worebabu
IFHP	√				Gubalafoto
Clinton foun		√			Habiru,
In-gender Health	√				Ankober, kelela
OXFAM			√		Ankober
RWASH			√		Ankober

Annex 6.2.6 TFP admissions trends and RR Jan-May 2010

Woreda	Jan- 2010		Feb 2010		Mar 2010		Apr 2010		May 2010	
	Adm	RR%	Adm	RR%	Adm	RR%	Adm	RR%	Adm	RR%
Bati Zuria	154	NA	116	NA	90	NA	NA	NA	No data	NA
Bati Town	48	100	20	100	34	100	8	100	0	100
Jile Tumuga	29	88	14	70.5	5	52.9	11	58.8	8	76.5
Efratana	4	25	13	18.7	13	62.5	7	62.5	27	93.7
Mojana	No TFP		-	-	-	-	-	-	-	
Ankober	12	62.5	17	31.2	0	25	5	37.5	12	43.7
Menze gera	16	35	50	60	4	25	11	25	10	30
Kewet	33	55.5	89	66.6	38	88.8	28	77.7	28	72
Kalu	57	82.3	51	85.3	42	76.4	73	85.3	45	85.3
Kelela	NoTFP	-	-	-	-	-	-	-	-	
Ankober	18	100	15	100	7	100	61	100	13	100
Werebabo	29	68.2	30	63.6	34	50	7	68.2	18	68.2
Saint Ajibar	95	100	63	100	107	100	10	100	12	100
Meket	62	100	28	100	266	63.8	347	100	180	78.7
Gidan	23	100	31	100	87	84.6	207	100	117	80.7
Habro	124	83.3	91	86.8	242	86.6	89	76.6	73	90
Gubalafto	0	100	46	NA	41	NA	175	100	155	100

Annex 7.1 Questionnaire on carrier status of Salmonella typhi on food handlers, Mekele, Tigray

Prevalence of Salmonella typhi among food handlers in Mekele town, Tigray, Ethiopia, 2010

7.1. Information sheet and interviewee's consent that certify the respondent understands and consent before the interview.

01. Town _____

02. Name of Health institution_____

03. Questionnaire Identification Number_____

7.1.1. Information sheet

Introduction: My name is _____ I came from Addis Ababa University, Medical faculty, School of Public Health. I would like to inform you that you and I would have a short discussion concerning this study. Before we go to our discussion, I will ask you to listen carefully to what I am going to read to you about the purpose and general condition of the study and tell me whether you agree or disagree to participate in this study. I am interviewing food handlers working in different food establishments about prevalence of Salmonella typhi among food handlers in Mekele City; you are selected to be one of the participants in the study.

The study will be conducted through interview and laboratory tests consisting of blood and stool examinations. The information you give us during the interview will be kept confidential and is going to be used only for study purposes. Concerning the laboratory tests you need to have about a half tea spoon of fresh stool collected by yourself and take it to a laboratory personnel working in this facility immediately after being collected. A small amount of blood will also be collected by a a health worker of this facility.

The required amount of blood will be drawn using a sterile syringe and needle from your anterior fore- arm without having any serious effects except a little pain. I additionally can reassure you that this test is not for any other purposes other than for typhoid fever. A code number will identify every participant and no names will be used. If a report of the result is published, only summarized information of the total group will appear. The interview is voluntary and you have the right to participate, or not to participate or to refuse at any time during the interview. Your refusal will not have any effect on your work, no punishment or loss of benefits.

However, your participation is important to fulfill the study objectives and design appropriate prevention and control measures for typhoid in Mekelle and other similar setups in the country.

Thank you!!

If the study subject agrees to participate in the study, complete consent note prepared for this purpose.

7.1.2. Written Consent:

I, the under signed, is given the information about the purposes and advantages of the study by the interviewer. No enforcement or pressure is imposed on me to be interviewed and tested. It is only upon my grant consent that I agree to participate in this study.

Participant's Signature _____

Date _____

Interviewer's signature certifying that participant is consented and signed to participate in the study.

Name---------- signature----------

Date----------month----------2010

Checked by supervisor

Name ----------signature---------- date ----------

Principal investigator's name: Ghidey G/libanos G/sellassie Tel. 0910713198/0914728656 e-mail gideylibanos@yahoo.com

Annex 7.2 Socio-Demographic Characteristics of Respondents

No	Questions	Coding classification	Skip
1	Address	1. Town _____ 2. Kebele _____ 3. Phone No. _____	
2	How old are you?	_____years	
3	Sex	1. Male 2. Female	
4	What is your religion?	1. Orthodox 2. Moslem 3. Protestant 4. Catholic 5.Others(specify)_____	
5	What is your current educational Status?	1. Illiterate 2. Primary 3. Secondary 4. Tertiary	
6	What is your current occupation type in the hotel, restaurant or cafeteria?	1.Waiter/waitress 2.Cook 3.Other(specify) _____	
7	What is your average monthly income?	_____Eth Birr/Month 88. I do not know 99. Refuse to answer	
8	What is your current marital status?	1. Married 2. Single 3. Widowed 4. Divorced 5. Other	

9	Do you have a child whom you Bring up?	1. Yes 2. No	
10	If your answer to Question No. 9 is Yes, How many Children do you have ?	_____	
11	How long have you been engaged in such a work?	1. _____ Days 2. _____ Weeks 3. _____ Months 4. _____ Years	
12	Have you attended a special type of training when you are employed?	1. Yes 2. No	
13	Did you see a medical check-up when you get first Employed?	1. Yes 2. No	
14	Has your Restaurant/Hotel /Cafeteria ever sent you to near by health facilities for routine medical check-up ?	1. Yes 2. No	
15	If yes, how often do you see a Clinic for medical Check-up?	1. Every Month 2. Every 3 Months 3. Every 6 Months 4. Every Year 5. Never	
16	If you often see a clinic, on a regular basis, do you have a follow up card?	1. Yes 2. No	

Annex 7.3 Knowledge, Attitude and Practice related to personal hygiene and health

17	Do you wash your hands before preparing or Serving food?	1. Yes 2. No	
18	If your answer to Q- No-17 is yes, what does your Washing practices include?	1. water only 2. water & soap 3. other (specify) _____	
19	Do you wash your hands after a visit to the toilet?	1. Yes 2. No	
20	If your answer to Q- No-19 is yes, what does your Washing practices include?	1. water only 2. water & soap 3. other (specify) _____	
21	Do you practice washing your body?	1. Yes 2. No	
22	If your answer to Q- No-20 is yes, what does your Washing practices include?	1. water only 2. water & soap 3. other (specify) _____	
23	If your answer to Q- No-20 is yes, how often/week do you wash your body?	1. daily 2. once/ week 3. twice/ week 4. ≥ three times/ week	
24	Do you have separate clothes/gown for work?	1. Yes 2. No	
25	If you have different separate clothes for work, How often/week do you change it?	1. once/ week 2. twice/ week 3. ≥ three times/ week	
26	If you have different separate clothes for work, Who washes your clothes?	1. Assigned workers 2. self and at work	

		3. self and at home 4. not washed at all	
27	Do you know what typhoid fever means?	1. Yes 2. No	
28	If your answer to Q No 28 is yes, is it transmitted from person to person?	1. Yes 2. No 3. I do not Know	
29	If your answer to Q No 29 is yes, do you Know how it is transmitted?	1. by food/ water 2. by breathing 3. by touching 4. sexual contact 5. other (specify) _____	
30	Have you ever been told any disease of typhoid by a medical professional before two weeks?	1. Yes 2. No	
31	Is there any sick person with typhoid in your house-hold two weeks?	1. Yes 2. No	

Annex 7.4 Knowledge, Attitude and Practice related to hygiene of feeding utensils and environment

32	Do you use separate washing compartment for cleaning feeding utensils?	1. Yes 2. No	
33	If your answer to Q- No-27 is yes, how many different washing compartment for cleaning feeding utensils do you use?	1. only one 2. two 3. ≥ three	
34	Does your establishment have a toilet facility?	1. Yes 2. No	
35	If your answer to Q- 34 is yes, what type of toilet facility does it have?	1. Simple pit latrine 2. VIP latrine 3. Pour flush water 4. Other (specify)	
36	Does your toilet facility have water supply?	1. Yes 2. No	
37	Are you involved in cleaning the toilet of your food establishment?	1. Yes 2. No	
38	If your answer to Q- No-37 is no, who cleans it?	1. has a cleaner/s 2. cleaned by users 3. not cleaned at all	
40	How could you express the cleanliness of the toilet in the establishment you work in?	1.Poor 2. Moderate 3. Good	

Dummy Tables

Annex 7.5 Socio-demographic characteristics of food handlers, Mekele, Tigray, Ethiopia, 2010

Ser. No.	Characteristics		Number	Percent	Total	
					Number	percent
1	Age	18-30				
		31-45				
		46-65				
		>65				
2	Sex	Male				
		Female				
3	Marital status	Single				
		Married				
		divorced				
		widowed				
4	Religion	Orthodox				
		Muslim				
		Protestant				
		other				
5	Education	Illiterate				
		Primary				
		Secondary				
		Tertiary				
6	Income	< 100				
		100- 200				
		200-300				
		300- 400				
		400-500				
		> 500				

Annex 7.6 Frequency of widal positivity for salmonella from food handlers and association of risk factors, Mekele, Tigray, Ethiopia 2010

		Widal test				
Ser. No.	Risk factors	Pos. (%)	Neg. (%)	OR	95 % CI	P value
1	Age (being young & old)					
	Religion					
	Income level					
	Certification In food preparation					
2	Routine medical check up					
	Establishment level					
3	Hand washing after toilet					
	Hand washing before food handling					
4	Soap use for hand washing					

Annex 7.7 Frequency of isolates of salmonella typhi/paratyphi on stool culture of food handlers and association of risk factors, Mekele, Tigray,Ethiopia 2010

		Yes (%)	No (%)	OR	95 % CI	P value
	Age (being young & old)					
	Religion					
	Income level					
	Certification In food preparation					
	Routine medical check up					
	Establishment level					
	Hand washing after toilet					
	Hand washing before food handling					
	Soap use for hand washing					
	toilet facilities in establishment					
	Water supply to a toilet facility					

Annex 7.8 Isolates of Salmonella typhi from Stool cultures and their corresponding widal tests, Mekele, Tigray, Ethiopia 2010

	Stool Culture			
Widal Test	Results	Positive	Negative	Total
	Positive			
	Negative			

Annex 8.1.1 Line list of Measles cases Tsegede district, Westren Zone, Tigray Region, Aug-Sep 2010

Ser. No	Kebelle	sex	Rash onset date	Age	No. of valid measles doses (0,1,2,99)	blood taken yes/no	results pos/Neg	outcome 1=alive 2=dead 99=unknown	comments
1	Dara	F	10/11/2010	1&6/12 year	0	No		1	Treatment given
2	Dara	F	9/13/2010	7 year	0	No		1	Treatment given
3	Dara	F	9/13/2010	5 year	0	No		1	Treatment given
4	Dara	M	9/13/2010	11 Month	0	No		1	Treatment given
5	Dara	M	9/15/2010	11 year	0	No		1	Treatment given
6	Dara	M	9/15/2010	3 year	0	No		1	Treatment given
7	Dara	F	10/15/2010	8 year	0	No		1	Treatment given
8	Dara	M	10/15/2010	2 year	0	No		1	Treatment given
9	Dara	F	10/16/2010	27 year	0	No		1	Treatment given
10	Dara	M	10/16/2010	22 year	0	No		1	Treatment given
11	Dara	M	10/16/2010	20 year	0	No		1	Treatment given
12	Dara	F	10/17/2010	25 year	0	No		2	Unknown
13	Dara	F	9/20/2010	11 year	0	No		2	Unknown
14	Dara	M	9/20/2010	28 year	0	No		2	Unknown
15	Dara	M	10/20/2010	12 year	0	No		1	Treatment given
16	Hinta Bela	M	9/21/2010	25 year	0	No		1	Treatment given
17	Hinta Bela	F	9/25/2010	1 year	0	No		1	Treatment given

18	Hinta Bela	F	9/25/2010	2 year	0	No		1	Treatment given
19	Hinta Bela	F	9/25/2010	23 year	0	No		1	Treatment given
20	Hinta Bela	M	9/25/2010	20 year	0	No		1	Treatment given
21	Hinta Bela	M	9/25/2010	18 year	0	No		1	Treatment given
22	Hinta Bela	M	9/25/2010	17 year	0	No		1	Treatment given
23	Hinta Bela	M	9/25/2010	2 year	0	No		1	Treatment given
24	Hinta Bela	F	9/27/2010	6 month	0	No		1	Treatment given
25	Hinta Bela	F	9/27/2010	25 year	0	No		1	Treatment given
26	Hinta Bela	F	9/27/2010	3 year	0	No		1	Treatment given
27	Hinta Bela	M	9/27/2010	6 month	0	No		1	Treatment given
28	Hinta Bela	F	9/30/2010	3&6/12 year	0	No		1	Treatment given
29	Hinta Bela	F	9/30/2010	6 month	0	No		1	Treatment given
30	Hinta Bela	M	9/30/2010	3 month	0	No		1	Treatment given
31	Hinta Bela	M	9/30/2010	21 year	0	No		1	Treatment given
32	Hinta Bela	M	9/30/2010	25 year	0	No		1	Treatment given
33	Hinta Bela	M	9/30/2010	6 year	0	No		1	Treatment given
34	Hinta Bela	M	9/30/2010	3&8/12 year	0	No		1	Treatment given
35	Hinta Bela	M	9/30/2010	2 year	0	No		1	Treatment given
36	Hinta Bela	M	9/30/2010	18 year	0	No		1	Treatment given
37	Hinta Bela	F	10/1/2010	8 year	1	No		1	Treatment given

38	Ketema nigus	F	10/1/2010	2 year	9	yes	1	1	Treatment given
39	Ketema nigus	F	10/1/2010	20 year	9	yes	1	1	Treatment given
40	Ketema nigus	F	10/1/2010	7 month	0	No		1	Treatment given
41	Ketema nigus	F	10/1/2010	11 Month	0	No		1	Treatment given
42	Ketema nigus	M	10/1/2010	4 month	0	No		1	Treatment given
43	Ketema nigus	M	10/1/2010	5 month	0	No		1	Treatment given
44	Ketema nigus	M	10/1/2010	6 month	0	No		1	Treatment given
45	Ketema nigus	F	10/2/2010	8 month	0	No		1	Treatment given
46	Cheguar kudo	F	10/2/2010	10 year	1	yes	1	1	Treatment given
47	Cheguar kudo	F	10/2/2010	2 year	0	No		1	Treatment given
48	Shehag ne	M	10/2/2010	10 year	0	No		1	Treatment given
49	Shehag ne	M	10/2/2010	17 year	0	No		1	Treatment given
50	Shehag ne	M	10/2/2010	7 year	0	No		1	Treatment given
51	Shehag ne	M	10/2/2010	16 year	0	No		1	Treatment given
52	Shehag ne	M	10/2/2010	2 year	0	No		1	Treatment given
53	Alemge net	F	10/3/2010	22 year	0	No		1	Treatment given
54	Alemge net	F	10/3/2010	20 year	0	No		1	Treatment given
55	Alemge net	F	10/3/2010	24 year	0	No		1	Treatment given
56	Alemge net	M	10/3/2010	1&8/12 year	0	No		1	Treatment given
57	Rubale min	M	10/3/2010	22 year	0	No		1	Treatment given

58	Rubalemin	M	10/3/2010	1&1/12 year	0	No		1	Treatment given
59	Rubalemin	M	10/3/2010	20 year	0	No		1	Treatment given
60	Zuriadansh	M	10/3/2010	25 year	0	No		1	Treatment given
61	Zuriadansh	M	10/4/2010	2 year	0	No		1	Treatment given
62	Zuriadansh	F	10/5/2010	20 year	0	No		1	Treatment given
63	Zuriadansh	F	10/5/2010	17 year	0	No		1	Treatment given
64	Zuriadansh	M	10/5/2010	26 year	0	No		1	Treatment given
65	Zuriadansh	M	10/7/2010	22 year	0	No		1	Treatment given
66	Zuriadansh	M	10/7/2010	22 year	0	No		1	Treatment given
67	Medhane alem	M	10/7/2010	9 year	0	No		1	Treatment given
68	Medhane alem	F	10/7/2010	12 year	0	No		1	Treatment given
69	Medhane alem	F	10/7/2010	13 year	0	No		1	Treatment given
70	Medhane alem	M	10/7/2010	20 year	0	No		1	Treatment given
71	Mai deli	F	10/8/2010	3 year	1	No		1	Treatment given
72	Mai deli	M	10/8/2010	2&6/12 year	1	No		1	Treatment given
73	Mai deli	M	10/8/2010	5 year	1	No		1	Treatment given
74	Dansha	F	10/10/2010	1 year	0	No		1	Treatment given
75	Dansha	F	10/10/2010	28 year	0	No		2	Unknown
76	Dansha	M	10/10/2010	2&6/12 year	0	yes	1	99	Treatment given

Annex 8.1.2 Line list of measles cases in Welkait district, Western zone, Tigray, Sep-Oct 2010

Ser. No	Kebelle	sex	date of rash onset	Age	No. of valid measles doses (0,1,2,99)	blood taken yes/no	results pos/Neg	out come 1=alive 2=dead 99=unknown	Comments
1	Awra	F	9/8/2010	50 year	99	Yes	1	1	Treatment given
2	Awra	F	9/8/2010	4 year	99	No		1	Treatment given
3	Awra	M	9/8/2010	1 year	99	No		1	Treatment given
4	Awra	M	9/9/2010	5 year	1	No		1	Treatment given
5	Awra	F	9/10/2010	6 year	99	No		1	Treatment given
6	Awra	F	9/12/2010	9 year	1	No		1	Treatment given
7	Awra	M	9/12/2010	4 year	1	Yes	1	1	Treatment given
8	Awra	M	9/12/2010	2&9/12 year	0	No		1	Treatment given
9	Awra	F	9/13/2010	2 year	99	No		1	Treatment given
10	Awra	F	9/26/2010	1 year	0	No		1	Treatment given
11	Awra	M	9/13/2010	20 year	99	No		1	Treatment given
12	Awra	M	9/20/2010	1&5/12 year	1	No		1	Treatment given
13	Awra	M	10/1/2010	13 year	1	No		1	Treatment given
14	Awra	M	9/30/2010	14 year	99	No		1	Treatment given
15	Awra	M	9/30/2010	3 year	99	No		1	Treatment given
16	Shikuda	F	9/20/2010	30 year	99	No		1	Treatment given

17	Shikuda	M	9/21/2010	28 year	99	Yes	1	1	Treatment given
18	Shikuda	M	9/20/2010	3 year	1	No		1	Treatment given
19	Shikuda	M	9/24/2010	7 year	99	No		1	Treatment given
20	Shikuda	M	9/25/2010	17 year	99	No		1	Treatment given
21	Shikuda	M	9/27/2010	1 year	2	No		1	Treatment given
22	Adi gaba	F	9/8/2010	7 month	0	No		1	Treatment given
23	Adi gaba	M	8/13/2010	28 year	99	No		1	Treatment given
24	Adi gaba	M	9/8/2010	1 year	1	No		1	Treatment given
25	Adi gaba	F	9/8/2010	9 year	0	No		1	Treatment given
26	Adi gaba	F	9/10/2010	9 year	99	No		1	Treatment given
27	Adi gaba	F	9/10/2010	1 &1/12 year	0	No		1	Treatment given
28	Adi gaba	F	9/6/2010	4 year	1	No		1	Treatment given
29	Adi gaba	M	9/12/2010	5 year	2	No		1	Treatment given
30	Adi gaba	M	9/12/2010	9 year	99	No		1	Treatment given
31	Adi gaba	M	9/13/2010	38 year	0	No		1	Treatment given
32	Adi gaba	M	9/13/2010	40 year	0	No		1	Treatment given
33	Adi gaba	F	9/10/2010	30 year	99	No		1	Treatment given
34	Adi gaba	F	9/14/2010	4 month	0	No		1	Treatment given
35	Adi gaba	M	9/13/2010	1 year	0	No		1	Treatment given

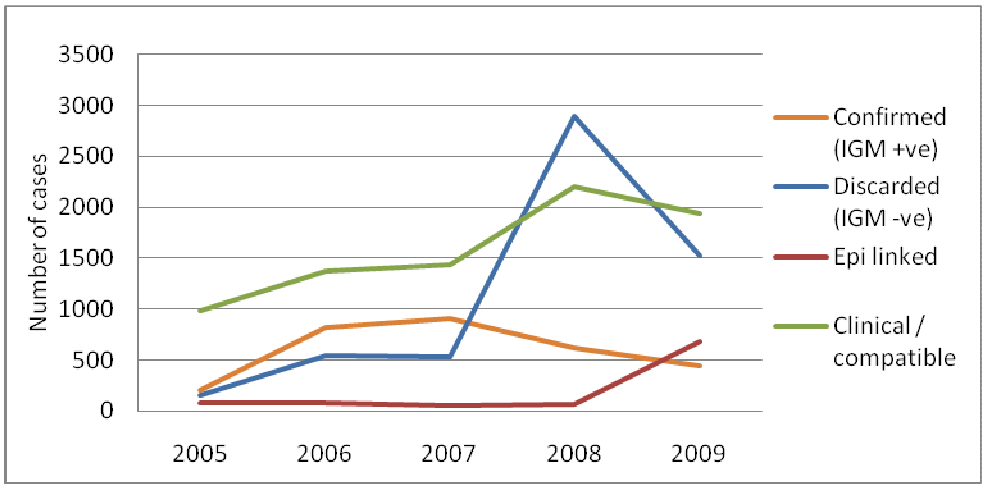
36	Adi gaba	M	9/13/2010	9 year	0	No		1	Treatment given
37	Adi gaba	F	9/13/2010	23 year	99	No		1	Treatment given
38	Adi gaba	M	9/14/2010	3 year	1	No		1	Treatment given
39	Adi gaba	M	9/14/2010	5 year	0	No		1	Treatment given
40	Adi gaba	F	9/13/2010	30 year	0	No		1	Treatment given
41	Adi gaba	F	9/11/2010	8 year	99	No		1	Treatment given
42	Adi gaba	F	9/11/2010	5 year	99	No		1	Treatment given
43	Adi gaba	M	9/11/2010	3 year	1	No		1	Treatment given
44	Adi gaba	F	9/12/2010	5 year	0	No		1	Treatment given
45	Adi gaba	F	9/12/2010	18 year	99	No		2	Unknown
46	Adi gaba	M	9/11/2010	7 month	0	No		2	Unknown
47	Adi gaba	F	9/11/2010	38 year	0	No		2	Unknown
48	Adi gaba	F	9/15/2010	4&8/12 year	1	Yes	1	1	Treatment given
49	Adi gaba	F	9/16/2010	3&4/12 year	1	Yes	1	1	Treatment given
50	Adi gaba	F	9/18/2010	3 year	0	No		2	Unknown
51	Adi gaba	M	9/23/2010	5 year	0	No		1	Treatment given
52	Adi gaba	M	9/18/2010	17 year	9	No		1	Treatment given
53	Adi gaba	M	9/26/2010	16 year	9	No		1	Treatment given
54	Adi gaba	M	9/14/2010	4 month	0	No		2	Unknown
55	Adi gaba	F	10/3/2010	16 year	9	No		1	Treatment given

56	Adi gaba	F	10/5/2010	16 year	0	No		1	Treatment given
57	Adi gaba	M	10/5/2010	19 year	9	No		1	Treatment given
58	Adi gaba	M	9/28/2010	17 year	0	No		1	Treatment given
59	Adi gaba	F	10/5/2010	14 year	0	No		1	Treatment given
60	Adi gaba	F	10/4/2010	24 year	0	No		1	Treatment given
61	Adi gaba	F	10/6/2010	10 year	1	No		1	Treatment given
62	Adi gaba	F	10/7/2010	13 year	0	No		99	Treatment given
63	Selam	M	9/27/2010	1 year	99	No		1	Treatment given
64	Selam	M	9/27/2010	4 &6/12 year	0	No		1	Treatment given
65	Selam	F	9/22/2010	5 year	1	No		1	Treatment given
66	Selam	M	9/22/2010	1 &6/12 year	1	No		1	Treatment given
67	Selam	M	9/15/2010	10 year	99	No		1	Treatment given
68	Selam	M	9/24/2010	1 &1/12 year	0	No		1	Treatment given
69	Selam	F	9/23/2010	12 year	99	No		1	Treatment given
70	Selam	M	9/22/2010	11 year	0	No		1	Treatment given
71	Wef argif	M	9/28/2010	20 year	0	No		1	Treatment given
72	Wef argif	F	9/29/2010	4 year	2	No		1	Treatment given
73	Wef argif	F	10/5/2010	2&3/12 year	2	No		1	Treatment given
74	Wef argif	M	9/28/2010	10 year	0	No		1	Treatment given

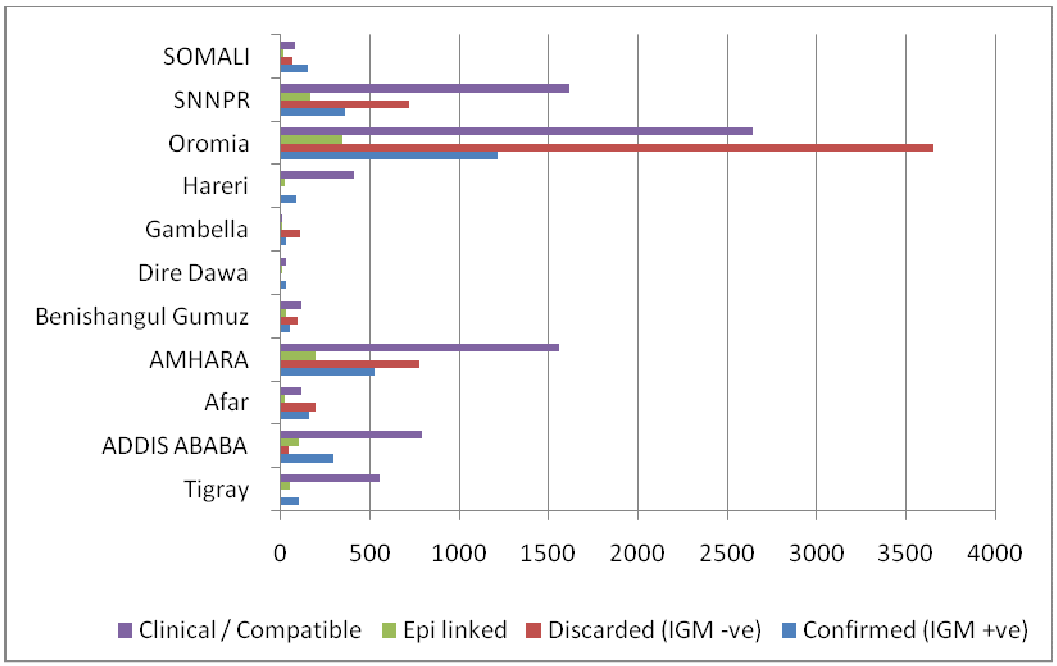
75	Wef argif	M	10/2/2010	1 &10/12 year	0	No		1	Treatment given
76	Wef argif	F	9/28/2010	20 year	0	No		1	Treatment given
77	Wef argif	M	9/29/2010	3 year	2	No		1	Treatment given
78	Wef argif	M	10/17/2010	4 year	2	No		1	Treatment given
79	Wef argif	M	10/14/2010	1&4/12	1	No		1	Treatment given
80	Wef argif	F	10/13/2010	2&3/12	1	No		1	Treatment given
81	Wef argif	M	10/13/2010	2 year	1	No		99	Treatment given
82	Adi remets	M	10/12/2010	2 year	1	No		1	Treatment given
83	Adi remets	M	10/7/2010	14 year	1	No		1	Treatment given
84	Adi remets	F	10/8/2010	8 months	0	No		1	Treatment given
85	Blamba Kirshi	M	10/6/2010	9 & 17/30 months	1	No		1	Treatment given
86	Medri weizero	M	10/18/2010	7 month	0	No		1	Treatment given
87	Medri weizero	M	10/17/2010	4 year	1	No		1	Treatment given
88	Medri weizero	M	10/17/2010	4 year	1	No		1	Treatment given
89	Medri weizero	F	10/17/2010	3 year	1	No		1	Treatment given
90	Medri weizero	F	10/18/2010	9 month	0	No		1	Treatment given
91	Medri weizero	M	10/18/2010	4 year	2	No		1	Treatment given
92	Medri weizero	F	10/19/2010	3year	2	No		1	Treatment given
93	Medri weizero	F	10/19/2010	6year	2	No		1	Treatment given

Annex 8.2.1 distribution of cases and attack rate (%) in regions from 2005-2009, Ethiopia

Region/Year	2005	2006	2007	2008	2009	Total
Tigray	121(.37)	188(.57)	159(.36)	111(.25)	127(.28)	706
Afar	153(1.4)	33(.29)	47(.33)	141(.97)	118(.8)	492
Amhara	235(.16)	817(.57)	581(.33)	721(.41)	703(.39)	3057
B.Gumuz	37(.78)	48(.98)	153(2.2)	25(.36)	24(.33)	287
DIRE DAWA	11(.42)	15(.56)	13(.37)	13(.37)	8(.22)	60
Gambella	103(5.46)	18(.91)	0	22(.68)	1(.03)	144
HARERI	63(4.68)	63(4.56)	100(5.45)	243(12.91)	50(2.59)	519
OROMIA	280(.14)	755(.38)	1134(.41)	3367(1.2)	2325(.81)	7861
SNNPR	191(.17)	416(.37)	542(.36)	803(.51)	904(.56)	2856
SOMALI	74(.22)	45(.13)	14(.031)	97(.21)	83(.17)	313
Addis Ababa	148(.37)	422(.57)	188(.36)	228(.25)	241(.28)	1227
Total	1416	2820	2931	5771	4584	17521



Annex 8.2.2 Trend of Measles case by final classification from 2005-2009, Ethiopia



Annex 8.2.3 Frequency of measles final classification by region, 2005-2009, Ethiopia

Annex 8.2.4 Measles vaccination coverage by regional states, 2005-2009, Ethiopia

Region	1995 (2002-2003)	1996 (2003-2004)	1997 (2004/2005)	1998 (2005-2006)	1999 (2006/2007)	2000 (2007/2008)
Tigray	83.52	73.73	83.2	83.9	80.76	78.9
Afar	22.79	24.69	N/A	19	29.65	50.4
Amhara	50.03	61.91	64.1	63.9	67.56	72.5
Oromiya	33.91	43.21	52.7	58.9	60.88	73.6
Somali	6.09	7.24	13.4	35.7	18.46	26.2
Ben-Gumuz	27.56	36.28	42.9	80	68.2	55.4
SNNPR	47.05	64.24	83.4	100.9	87.06	91.3
Gambella	36.53	N/A	16.5	68.9	39.72	42.3
Harari	62.98	59	67.8	70.3	59.88	75.5
Addis Ababa	65.32	70.7	69.2	40.9	38.54	39.8
Dire Dawa	58.55	39.37	46.1	49.7	51.22	48.7
National	42.91	52.61	61.3	65.6	64.9	72.2

Annex 8.2.5 Frequency of types of data by region, 2005-2009, Ethiopia

Province of Residence	Case based		Line listing	
	No	%	No	%
Addis Ababa	1184	10.0	43	0.8
Afar	296	2.5	196	3.5
Amhara	2266	19.1	791	13.9
Benishangul Gumuz	174	1.5	113	2.0
Dire Dawa	60	0.5	0	0
Gambella	39	0.3	105	1.8
Hareri	519	4.4	0	0
Oromiya	4218	35.6	3643	64.1
SNNPR	2135	18.0	721	12.7
Somali	245	2.1	68	1.2
Tigray	706	6.0	0	0
Total	11842	100	5680	100

Annex 8.2.6 Distribution of serum sample's result by region, 2005-2009, Ethiopia

Province of Residence (Regional state/city administration)	IgM positive No (%)	IgM negative No (%)	Indeterminate result No (%)	Sample not done No (%)
Addis Ababa	298 (9.9)	788 (10)	20 (7.3)	78 (11.9)
Afar	157 (5.2)	114 (1.4)	8 (2.9)	17 (2.6)
Amhara	526 (17.5)	1557 (19.7)	55 (20)	128 (19.5)
Ben-Gumuz	48 (1.6)	114 (1.4)	4 (1.5)	8 (1.2)
Dire Dawa	27 (0.9)	32 (0.4)	1 (0.4)	0
Gambella	28 (0.9)	9 (0.1)	2 (0.7)	0
Hareri	89 (3.0)	406 (5.1)	14 (5.1)	10 (1.5)
Oromia	1216 (40.5)	2642 (33.4)	90 (32.7)	270 (41.2)
SNNPR	355 (11.8)	161 (20.4)	57 (20.7)	109 (16.6)
Somali	153 (5.1)	81 (1)	8 (2.9)	3 (0.5)
Tigray	102 (3.4)	554 (7)	16 (5.8)	33 (5)
National	2999 (100)	7911 (100)	275 (100)	656(100)

Annex 8.3.1 Questionnaire on antimicrobial resistance and antimicrobial relations and prescription patterns in regional Hospitals, Ethiopia, 2010

1. Name of the Hospital _____ 2. Patient code Number _____

3. Age _____ 4. Sex _____

5. Address: Region _____

District _____ Kebele _____

6. Date patient received the antibiotic treatment _____

7. Name/ Type of Antibiotic the patient received:

7.1. _____ Dose _____ duration _____(PO/IM/IV)

7.2. _____ Dose _____ duration _____(PO/IM/IV)

7.3. _____ Dose _____ duration _____(PO/IM/IV)

8. Total Number of Antibiotics received in the current visit:

8.1 One 8.2 Two 8.3 Three

9. In which Hospital unit did the patient get the treatment?

9.1 Medical Ward 9.2 Surgical Ward 9.3 Gyn/Obs

9.4 Adult OPD 9.5 Child OPD 9.6 Pediatrics ward

10. Was there any microbiological finding for this particular patient?

10.1 Yes 10.2 No

11. If the answer for Question 10 is Yes, Specify _____

12. What were the symptoms for the diagnosed disease?

12.1 _____

12.3 _____

12.3 _____

13. What was the disease diagnosed for this patient?

Specify _____

14. What was the total number of prescriptions you made for this day? _____

15. What was the total number of patients seen today? _____

Thank You for completing this questionnaire

Ghidey G/libanos G/selassie

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1. Personal data

Name:	Ghidey G/libanos G/selassie
Sex:	Male
Date of birth:	July 29, 1971
Place of Birth:	Mekele, Ethiopia
Nationality:	Ethiopian
Civil status:	Married, a father of two
Religion:	Christian
Language	Tigrigna, Amharic, English

2. Education and Qualification:

BSc (Public Health): Gonder College of Health Sciences, Feb 2000
Pre-BSc: Diploma in Nursing, July 1994-June 1996
Master of Public Health in Field Epidemiology: AAU (Feb 2009-2011): Finalysing

3. Short Courses and Trainings (only major ones)

Training on Voluntary HIV Counseling and Testing (TOT)
Training on Prevention of Mother to Child Transmission of HIV (TOT)
Basic ART Training, Training on STIs, Home based care for HIV/AIDS (TOT)
Epi-info basic Training, Management of TB and Leprocy

4. Professional Assignments

July 1996 to date: Nurse, Health officer in different facilities, Woreda Health Offices and Regional Health Bureau

5. Additional skills

Basic computer skill (MS- Word, Excel, Access, power point)
Basic skills on EPI-info software
Proven skill on Oral, written communications

6. References

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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: Ghidey G/libanos G/selassie

Signature: _____

Place: AAU, Addis Ababa

Date of Submission: February, 14/2011

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

Name of advisor: _____

Signature: _____

Date: _____