

SAINT PAULO’S HOSPITAL MILLENNIUM MEDICAL COLLEGE
(SPHMMC), DEPARTMENT OF PUBLIC HEALTH



ETHIOPIA FIELD EPIDEMIOLOGY TRAINING PROGRAM (EFETP)

COMPILED BODY OF WORKS IN FIELD EPIDEMIOLOGY

BY:

ASFAWOSSEN SOLOMON

SUBMITTED TO SAINT PAULO’S HOSPITAL MILLENNIUM MEDICAL
COLLEGE, DEPARTMENT OF PUBLIC HEALTH IN PARTIAL
FULFILLMENT FOR THE DEGREE OF MASTER OF PUBLIC HEALTH IN
FIELD EPIDEMIOLOGY

MARCH, 2018

ADDIS ABABA, ETHIOPIA

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FIELD EPIDEMIOLOGY

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SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE (SPHMMC)

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LETTER FOR DECLARATION (body of work with thesis)

I, the under signed, declared that this is my bona fide original work, has never been presented in this or any other University, and that all the resources and materials used for the body of work with thesis, have been fully acknowledged.

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Date: 26/03/2018

Place: Addis Ababa

Date of submission: 26/03/2018

This body of work with thesis has been submitted for examination with our approval as **Candidate's advisors.**

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_____ Name of FETP Coordinator	_____ Signature	_____ Date

**DEPARTMENT OF PUBLIC HEALTH GRADUATE STUDIES FINAL BODY OF
WORK WITH THESIS APPROVAL FORM**

As members of the Board of Examiners of the final body of work with thesis open defense, we certify that we have read and evaluated the body of work with thesis prepared by Asfawossen Solomon under the thesis entitled “Utilization of integrated management of neonatal and childhood illness algorithm and associated factors among health professionals assigned at under-five unit in governmental health centers in Addis Ababa, Ethiopia, 2017” and recommencement for the ***degree of Master of Public Health in Field Epidemiology***.

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List of Abbreviations and Acronyms

AWD-OB	Acute Watery Diarrhea - Outbreak
B. Sc.	Bachelor of Science
BCC	Behavioral Change Communication
BCG	Bacillus Calmette Guerin
CDC	Center for Disease Control and Prevention
CRS	Composite Reference Standard
CSA	Central Statistics Agency
DDT	Dichloro Diphenyl Tetrachloroethane
DPT	Diphtheria, Pertussis, and ,Tetanus
E.C	Ethiopian Calendar
EBS	Evidence Based Surveillance
EFETP	Ethiopian Field Epidemiology Training Program
EHNRI	Ethiopian Health and Nutrition Research Institute
EPHI	Ethiopian Public Health Institution
FHT	Family Health Team
Freq.	Frequency
GIS	Geographic Information System
Gov.	Government
GPI	Gender Parity Index
H.Cs	Health Centers
HDA	Health Development Army
HEW/Ps	Health Extension Workers/Programs
HF	Health Facility
HIT	Health Information Technology
HPDP	Health Promotion & Disease Prevention
HWs	Health Workers
IEC	Information, Education, Communication
IHR	International Health Regulation
ILIC	Integrated Land Information Center

MMWR	Morbidity and Mortality Weekly Report
MO	Medical Officer
MOH	Ministry of health
MUAC	Mid. Upper arm Circumference
NFP	Non-For profit Organization
NPV	Negative Predictive Value
Org.	Organization
OTP	Outpatient Therapeutic Program
PCR	Polymerase Chain Reaction
PGs	Post Graduates
PLW	Pregnant and Lactating Women
PLWHA/PLHIVA	People Living With HIV/AIDS
Pop.	Population
PPV	Positive Predictive Value
RMO	Resident Medical Officer
UHEWs	Urban Health Extension Workers
UNICEF	United Nations International Children's Fund
WDA	Woman Development Army

Executive summary

This body of works is the summary of all outputs produced, core competences accomplished and thesis during two years class & field residency in Field Epidemiology Training Program. These include outbreak investigations, surveillance data analysis, surveillance system evaluation, woreda health profile description, and conducted a research.

The first chapter contains outbreak investigations of acute watery diarrhea in Gulele sub city, Addis Ababa, Ethiopia, in May 2017. For the outbreak case control study was conducted. The study result revealed eating salad, outside at gathering and raw meat and using common latrine were found as risk factors of disease contraction.

Regarding surveillance data analysis, four years typhus HMIS report/data of Gulele Sub City from 2012-2015 were taken retrospectively and descriptive analysis by person, place and time was performed. HMIS report is used to make the 4 years data uniform because the surveillance data was incomplete & couldn't be described by place & person. Trend revealed the overall prevalence rate of typhus fever in the Sub City was almost increasing from 2011/12-2014/15 and the increment was by far high in 2014/15 (22.1 per.1000pop. per year). Among the woredas of Gulele Sub City, wereda 5 showed high prevalence in all years except in 2012/13. Generally Wereda 8 and wereda 3 are the least prevalent weredas in Gulele Sub City, A.A, Ethiopia.

A surveillance system evaluation was also conducted in Gulele sub city, in February 2017 in five of the ten woredas of the sub city for one of public health important diseases, typhoid fever which is weekly reportable and one of the twenty communicable diseases under surveillance which had a significant magnitude from the weekly surveillance reports of Gulele sub city. The study finding revealed trend analysis were not being done by health centers, therefore the system was not sensitive & useful to detect outbreak, to estimate magnitude of the morbidity and mortality of the disease and to take action and decision making. In Gulele sub city the system was not satisfactory and there was also report discrepancy with the laboratory document in typhoid fever. But the system was confirmed by the respondents as it was simple and flexible by all assessed sites.

Woreda 9 health profile description of Gulele sub city, Addis Ababa was conducted in May 2016. It includes description of three years data (2013-2015). The objective of the assessment

was to describe the woreda health system and the health status of the population, provide broad overview of the social, economic, demographic and geographic determinants of health, to identify priority public health problems of the woreda and produce a baseline health profile document for possible intervention programs on the identified health problems and further studies. Overall in the three years, Acute Upper Respiratory Infection, Other or unspecified infectious & parasitic diseases and Diarrhea were the leading causes of Morbidity in the Woreda respectively.

A research was conducted on utilization of integrated management of neonatal and childhood illness (IMNCI) algorithm and associated factors among health professionals assigned at under-five unit in governmental health centers in Addis Ababa, Ethiopia, 2017. The study revealed that the proportion of IMNCI implementation by health workers in the study setting was (57%). In this study 75.7% of health workers respond who have attended IMNCI training as compared to WHO recommendation (60% of facility health workers). The study also identified lack of training and negative attitude of health workers had significant association towards low implementation of IMNCI strategy

.

CHAPTER-I Outbreak Investigation

1.1 Acute Watery Diarrhea Outbreak Investigation in Gulele sub-city, Addis Ababa city administration, May, 2017

Abstract

Introduction: Cholera is a diarrhoeal disease caused by a bacterial infection of the intestine. The bacterium is *Vibrio cholerae*, which can either be of type O1 or O139(1). It can infect both children and adults. It is one of the key indicators of social development and remains a challenge to countries where access to safe drinking water and adequate sanitation cannot be guaranteed.

Objective: The purpose of this case control study is to describe epidemiology, environmental investigation and determine the factor(s) associated with Acute Watery Diarrhea in Gulele sub city, Addis Ababa in June 2016.

Methods: Case-control study design was conducted in five woredas under St. Peter Cholera treatment center, Gulele sub city and the data collection period was from July 1 through September 3, 2016. Case-patients were identified from the Cholera treatment center and controls were selected randomly from the community. A control was any person who lived in the corresponding woredas who did not present any of the Acute Watery Diarrhea symptoms until the date of the interview. Sample size was set to 1:2 ratio of cases to controls in order to identify least odds ratio of 3.33 (for a risk factor on which intervention would have a significant impact), 23.9% prevalence of exposure among controls, with an alpha risk of 5% and 80% power. Multivariable binary logistic regression analysis was performed.

Result: Persons who ate Salad (AOR = 4.681, 95% CI = (1.741, 12.582)), outside at gathering, (AOR = 4.389, 95% CI = (1.204, 15.991)), raw meat (AOR = 4.295, 95% CI = (1.443, 12.784)) and using common latrine (AOR = 4.060, 95% CI = (1.424, 11.573)) were at a greater odds of having Acute Watery Diarrhea. Washing hands before eating (AOR = .068; 95% C.I = (.024, .189)) and house hold tap water for drinking (AOR = .310; 95% C.I = (.121, .793)) had significant protective association.

Conclusion & Recommendation: The source of the infection was multiple; it includes eating of salad, outside at gathering, raw meat and using common latrine. Washing hands before eating was significantly protective. Cases were not localized to any specific area rather it was disseminated to all woredas with different Attack rate and most of the rivers were positive for *Vibrio Cholera*.

It was recommended to prevent the further spread of this outbreak and ban on illegal slaughter and who was selling contaminated raw meat and community education on using cooked meat, how to treat salad and hand washing.

Introduction

Cholera is a diarrhoeal disease caused by a bacterial infection of the intestine. The bacterium is *Vibrio cholerae*, which can either be of type O1 or O139(1). It can infect both children and adults. It is one of the key indicators of social development and remains a challenge to countries where access to safe drinking water and adequate sanitation cannot be guaranteed(2).

Cholera is one of the oldest diseases affecting humans. It is caused by the gram-negative bacteria *Vibrio cholerae*. Six pandemics occurred between 1817 and 1923, which started from the Ganges delta and were caused by *Vibrio cholerae* O1, Classical biotype. The ongoing 7th pandemic is caused by *Vibrio cholerae* O1, El Tor biotype, which started in Indonesia in 1961, reached the Indian subcontinent in 1966 and then spread to the Middle East. It reached Africa in 1970 and extended rapidly throughout the continent, creating new endemic zones that had not seen cholera for over a century. It took another 20 years for the 7th pandemic to reach the Americas: the first cases were reported in Peru in 1991 and within one year the disease had spread throughout Latin America. A new strain appeared in 1992: *V. cholerae* O139 (Bengal). It is not known if this new strain will emerge as the 8th pandemic and replace *V.cholerae* O1 El Tor in Asia(3).

There are over 100 vibrio species known but only the “cholerae” species are responsible for cholera epidemics. About 20% of those who are infected develop acute, watery diarrhea – 10–20% of these individuals develop severe, watery diarrhea with vomiting. If these patients are not promptly and adequately treated, the loss of such large amounts of fluid and salts (more than 10–20 liters/day in severe forms) can lead to severe dehydration and death within hours. The case-fatality rate in untreated cases may reach 30–50%.Treatment is straightforward (basically rehydration) and, if applied appropriately, should keep the case-fatality rate below 1%. Cholera is usually transmitted through fecal contamination of water or food and remains an ever-present risk in many countries. New outbreaks can occur sporadically in any part of the world where water supply, sanitation, food safety, and hygiene are inadequate. As the incubation period of cholera is very short, (2 hours to 5 days) the number of cases can rise extremely quickly(2).

It is impossible to prevent cholera from being introduced into an area – but spread of the disease within an area can be prevented through early detection and confirmation of cases, followed by appropriate response. Because cholera can be an acute public health problem – with the potential

to cause many deaths, to spread quickly and eventually internationally, and to seriously affect travel and trade – a well-coordinated, timely, and effective response to outbreaks is paramount.

Response activities should always be followed by the planning and implementation of preparedness activities that will allow future cholera outbreaks to be dealt with more effectively.

A strong cholera preparedness plan and programme is the best preparation for outbreaks in countries at risk of cholera, whether or not they have yet been affected, or countries in which seasonal recurrence of the disease may be expected(4).

During the past three decades, intensive research has contributed substantially to our understanding of the epidemiology and clinical management of cholera.

It is known that vaccination, mass chemoprophylaxis, and cordon sanitaire are ineffective in preventing or controlling outbreaks(5).

The outbreak of Acute Water Diarrhea (AWD) in Addis-Ababa started on 7 June 2016 and was laboratory confirmed by culture on 8 June 2016. In Gulele sub city as of September 3, the cumulative number of cases reported is 525 including around 5 deaths [CFR 1%]. All the 10 woredas in the sub-cities have reported cases.

Risk factors implicated from initial assessment include drinking water from unprotected sources; exposure to rivers, springs and holy water sites; Contamination of water sources can be explained by the high level of open defecation due to lack of latrines, poor solid waste collection and disposal, poor food hygiene and overcrowding.

The onset of the rainy season could lead to further spread of the outbreak. Large scale population movements in and out of Addis Ababa, the capital city of Ethiopia increase the potential risk of further spread too.

The Government of Ethiopia is leading the response with support from partners through case management, health promotion and WASH and surveillance interventions at all levels.

In this study descriptive study, environmental investigation results and case control findings were conducted in Gulele sub city, A.A, Ethiopia about the AWD outbreak started in June, 2016.

The purpose of this case control study is to determine if a case was more likely to have been exposed to a risk factor in the five days before onset of illness than a similar uninfected person in the community.

Objective

To describe epidemiology, environmental investigation and determine the factor(s) associated with AWD in Gulele sub city, A.A in June 2016.

Specific Objectives

- To describe AWD distribution by place, person and time
- To describe environmental investigation results
- To identify associated factors

Methods and Materials

Study area

This AWD Outbreak study was conducted in Gulele Sub City which has a total of ten woredas and public health centers and a total population of 322,375 based on the 2008EFY population projection.

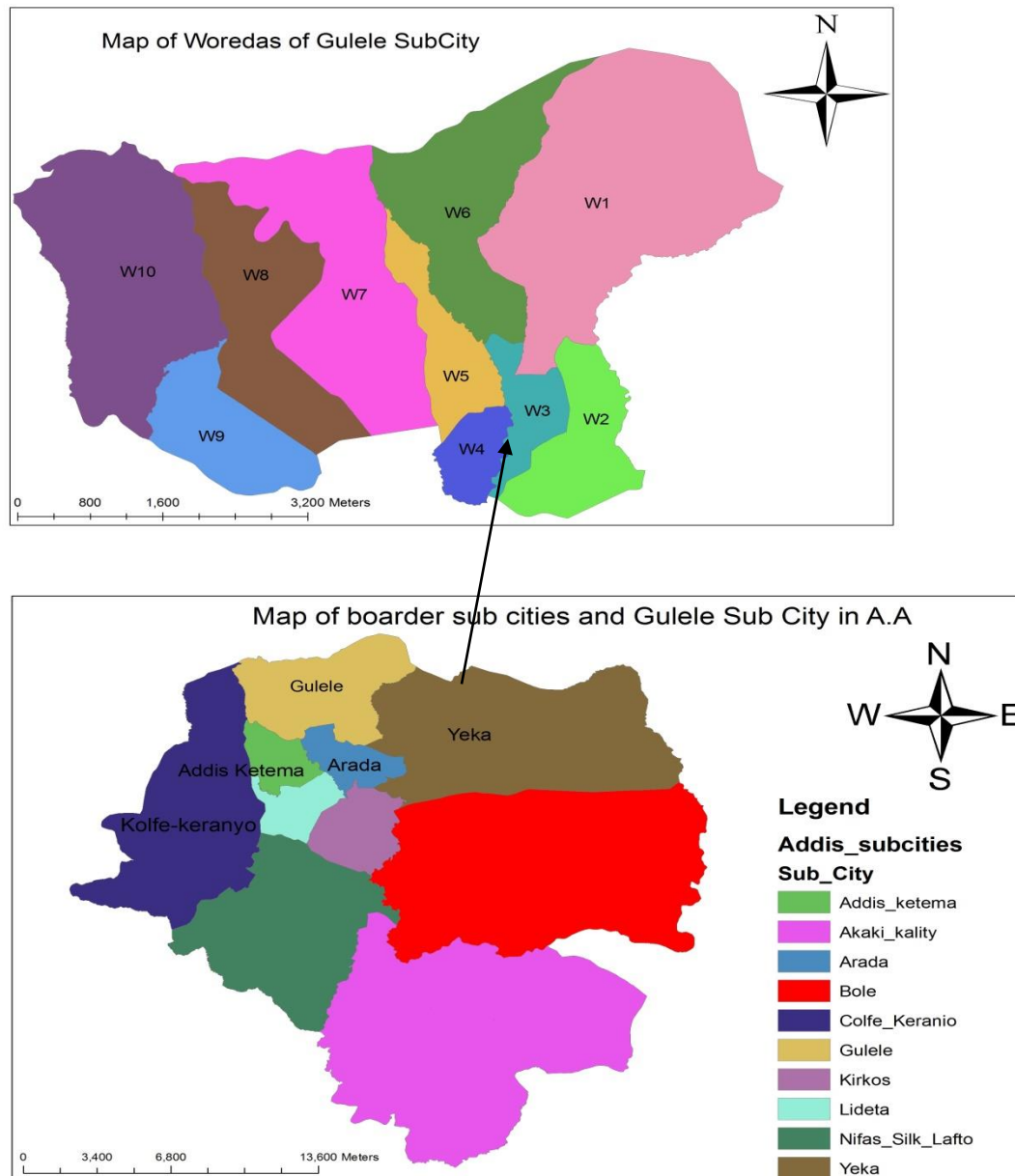


Figure 1: Map of Woredas in Gulele Sub City Addis Ababa, Ethiopia 2016

Study period

The data collection was carried out from July 1 through September 3, 2016.

Study Design

Case-control study design was conducted in five woredas under St. Peter CTC, one of the two CTCs in Gulele sub city.

Source Population

The source population included Persons who live in the 5 woredas in Gulele sub city.

Study population

Cases: They live in the 5 woredas, served by St' Peter CTC, listed in the line list and meet the WHO standard case definition of AWD as adopted by the Ethiopia Ministry of Health (see section below).

Controls: They were defined as persons living in the same community as the case but who had not suffered with AWD until the date of the interview.

Inclusion Criteria

Cases: Any persons having suspected and confirmed AWD or epidemiological linked with AWD cases detected during the outbreak.

Controls: Any person without AWD and from the same community

Exclusion Criteria

Cases: To maintain specificity, children under 5 years old were excluded from this study.

Controls: Less than 5 years old children and Persons who have recently recovered from AWD were also excluded.

Case definition

Suspected case: A patient aged 5 years or more who develops profuse acute watery diarrhea, with or without vomiting.

Sample size determination, sampling and data collection procedure

Sample size determination

Based on sample size formula for comparing proportions as embedded in the 'Statcalc' utility feature of Epi-info statistical software, from the previous cholera outbreak study in Kenya, 3.33 Odds ratio of use of communal latrine and percent of exposure of controls 23.9 was taken(6). By using Confidence level of 95%, Power 80% and control to case ratio 2, then total sample size of 123 [Fleiss W/CC] was obtained, based on the protocol we can use the minimum sample size of cases 50 and controls 100, therefore total sample size of 150 was taken.

Sampling Procedure

Selection of case: The primary study subjects were new cases of AWD admitted into the CTC and they were selected randomly from the line list.

Selection of controls: To understand how rates of exposures to potential source of infection differ between case and uninfected persons, it was necessary to select controls from the general community. Controls was randomly selected as described below and asked for their consent to participate in the study. To maximize the power to show differences in exposures, at least two controls were recruited for each case.

Prospective controls that had not had AWD illness were selected without conducting laboratory confirmation of the absence of AWD infection before selection. They were selected the same day as the cases on the way going for environmental investigation and disinfection. Standing at a middle of the villages' square a pen with its cap was spinning upward to select a road branch. Following the cap of the pen a home was selected randomly. After random selection of the first home, enquire about the members of the household to determine if any resident would meet the requirements for selection as a control in terms not having AWD in the period when the case presented the symptoms. If no eligible in the selected home, the next home was selected. If multiple members of the household would qualify, choose only one control randomly and the second control was selected after counting 5 households to keep randomness.

Data collection technique

Cases (or their care-giver where the case was too ill to speak) and controls subjects was interviewed using structured questionnaire in Appendix and data was collected on some identifying information, demographic information, date of onset and exposure to risk factor for infection including water and food sources within five days prior to onset of disease.

Data analysis

Data entry and analysis was conducted using the Epi-INFO and SPSS software and they were presented with tables & graphs.

Informed consent

During the visit to both cases and controls, the purpose of the study was explained to all eligible subjects and their informed verbal consent were obtained. Verbal consent for children under the age of 15 years was obtained from their parents or guardians.

Evolution of the outbreak

The EFETP residents received an invitation from EPHI & Health Bureau resident mentors to assist the Ministry of Health in Ethiopia in the investigation and control of the AWD outbreak in Addis Ababa started on June 8, 2016. The EFETP residents became part of the rapid response team that was working in Addis Ababa. We were also responsible for collecting data and reporting detail investigation on the AWD outbreak to the sub city and indicating samples to be taken for analysis. On the way we collected the data using the structured questionnaire for case control study and used line list for our descriptive analysis part of academic report or output.

Eating contaminated food, using contaminated small rivers for different purposes that were connected with HH latrines, drinking contaminated tap water through broken pipe and contamination with streams during exchange of water pipe with plastic by A.A Water and Sewerage Authority nearly before the outbreak, persons travelling from AWD areas of country side to A.A, vegetables brought to A.A from AWD area of ‘Arba Minch’ and lack of sanitation infrastructure were hypothesized to be the main risk factors. During that time, several AWD awareness campaigns were taking place in various woredas of the sub city including community education sessions and use of mobile Information Education Communication (IEC) materials that were displayed on cars, posters, radio, television and mobile phone prevention messages.

The sub city HPDP core process conducted training sessions with partners from WHO and us to health personnel on management of AWD in the Health centers/clinics and in the community. Case-patients were presented at CTC with watery diarrhea and other symptoms included vomiting, fever, and leg cramps. They presented with severe and some dehydration. Treatment consisted of oral fluids, doxycycline, and intravenous fluids for severely dehydrated patients. All the case-patients received oral fluids.

Dissemination of findings

The findings of the study were submitted to SPHMMC and shared with the outbreak responders in the sub city to assist in improving the outbreak response interventions in the future.

Results

A. Descriptive Analysis

To complement the case control study, additional epidemiological, microbiological, and environmental investigations and analysis including testing of areas around the new AWD cases household, communities and potential contaminated water and food sources was performed.

Environmental Investigation

An environmental investigation was carried out to assess the general hygiene in the suspected areas by the group. By the physicians and epidemiology residents indication water, food and stool samples were taken to the laboratory at EPHI & Regional to be tested for vibrio cholera. Results of the water samples revealed almost all streams were positive and some of the raw meat also too. Most houses at woreda 1, 3, 4, 5, 6, & 10 were built along the small Rivers. The distance between those houses and the streams were less than 20 meters. The general hygiene especially around woreda 1, 3 & 6 were poor, since they are at the margin of the city and it is forestry area, they used to exercise open defecation. The use of pit latrine was common but most of these latrines were poorly maintained and connected with the streams. It was said that there was illegal slaughter in the forest of Sululta & woreda 01 and washing of meat in the contaminated Rivers.

Laboratory Results

Stool was tested onsite at CTC by RDT almost for all patients though it was not confirmatory and culture was also tested for some suspected patients for those difficult to diagnose. But we only obtained the results for some stool samples that tested by culture and positive for *vibrio cholerae* sero-group O1 and O139 rarely. Using our indication Samples of water and raw meat were collected by the laboratory professionals from EPHI and Regional laboratory to analyze for possible contamination with vibrio cholerae sero-group O1 & O139. Results of the water samples revealed almost all streams were positive and some of the raw meat also too.

Epidemic preparedness and response

None of the woredas or the sub city that we visited had an epidemic preparedness plan or an epidemic preparedness committee in place prior to the outbreak. The protective materials and IV fluids were provided from EPHI and the Region after the occurrence of the outbreak.

The outbreak of Acute Water Diarrhea (AWD) in Addis-Ababa started on 7 June 2016 and was laboratory confirmed by culture on 8 June 2016.

Table 1: Using the line list total data Attack rate of AWD in Gulele sub city, A.A, Ethiopia from 8/6/2016 to 13/9/2016

Woreda	Population			Cases	Attack Rate per 1000 pop.
	Male	Female	Total		
W01	16881	18287	35168	102	2.900363967
W02	12106	13114	25220	34	1.3481364
W03	16268	17624	33892	54	1.593296353
W04	7676	8315	15991	27	1.688449753
W05	14170	15350	29520	45	1.524390244
W06	15104	16362	31466	81	2.574207081
W07	21420	23205	44625	54	1.210084034
W08	18480	20021	38501	69	1.792161243
W09	18920	20497	39417	33	0.837202222
W10	13716	14859	28575	25	0.874890639
Sub City	154740	167635	322375	524	1.625436216

Using total data from the line list as the above table showed In Gulele sub city as of September 3, the cumulative number of cases reported was 525 including around 5 deaths [CFR=1%]. The cumulative Attack Rate (per 1000 pop.) from 8/6/2016 to 13/9/2016 for the sub city was 1.6 and for the most affected woredas were woreda 01 (3), woreda 06 (2.6) and woreda 08 (1.8) while the least affected woreda was W09 (0.84).

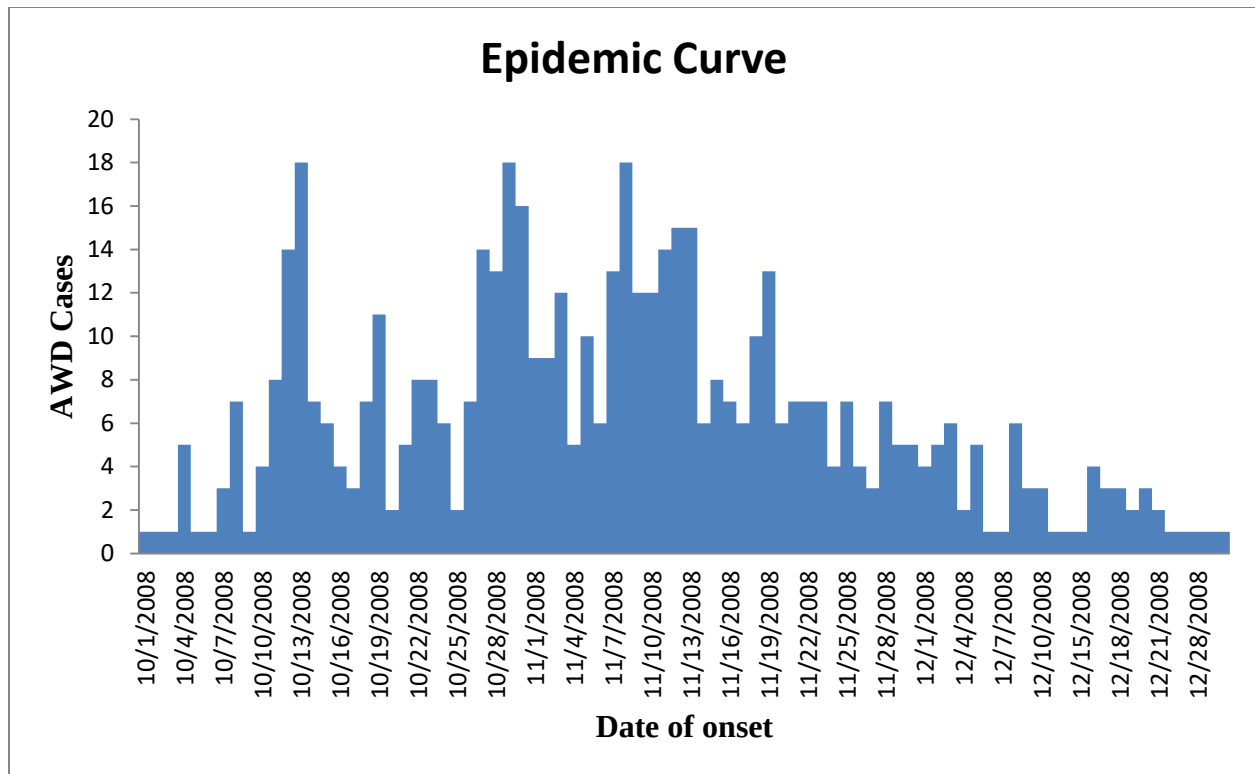


Figure 2: Distribution of AWD cases by date of onset from 08/6/2016 to 04/9/2016 in Gulele Sub City, A.A, Ethiopia

The shape of the above Epidemic curve had a characteristic of common source outbreak with intermittent exposure of long period. This showed people were exposed intermittently to a common contaminated source.

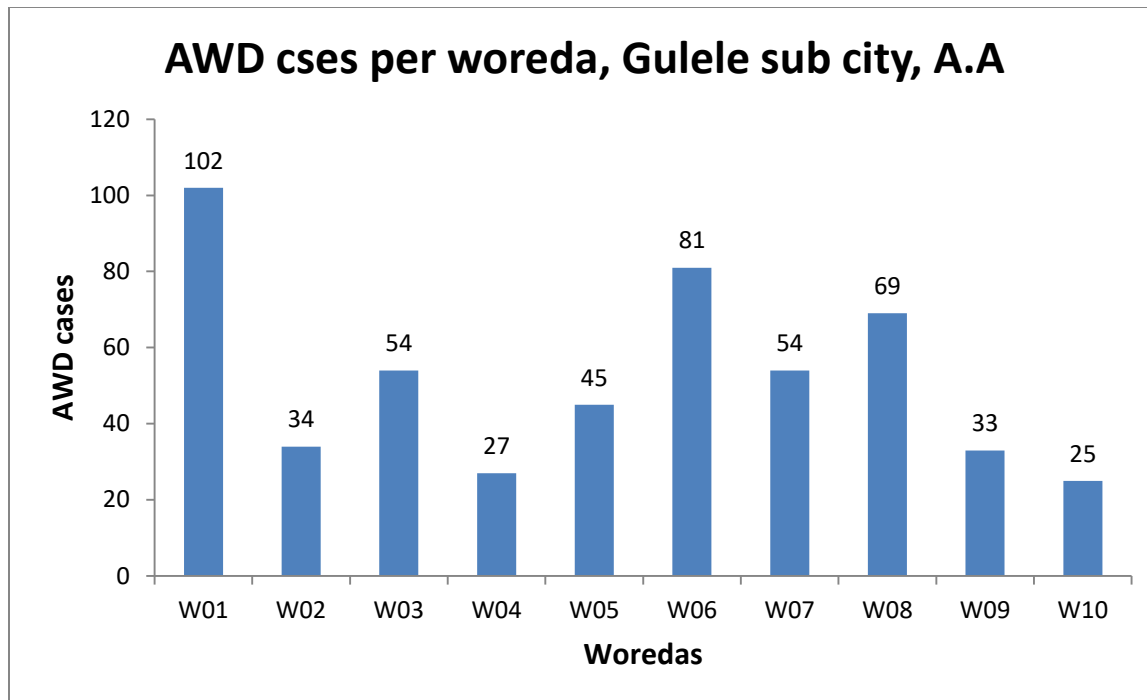


Figure 3: Distribution of AWD cases per woreda of origin in Gulele Sub City, A.A, Ethiopia, 2016

Though the distribution was different, all woredas of Gulele sub city were affected by the outbreak. Most notified cases were from Woreda 01 which was 102 (19.5%) and the least was 25(4.8%) which was from woreda 10 out of 524 cases.

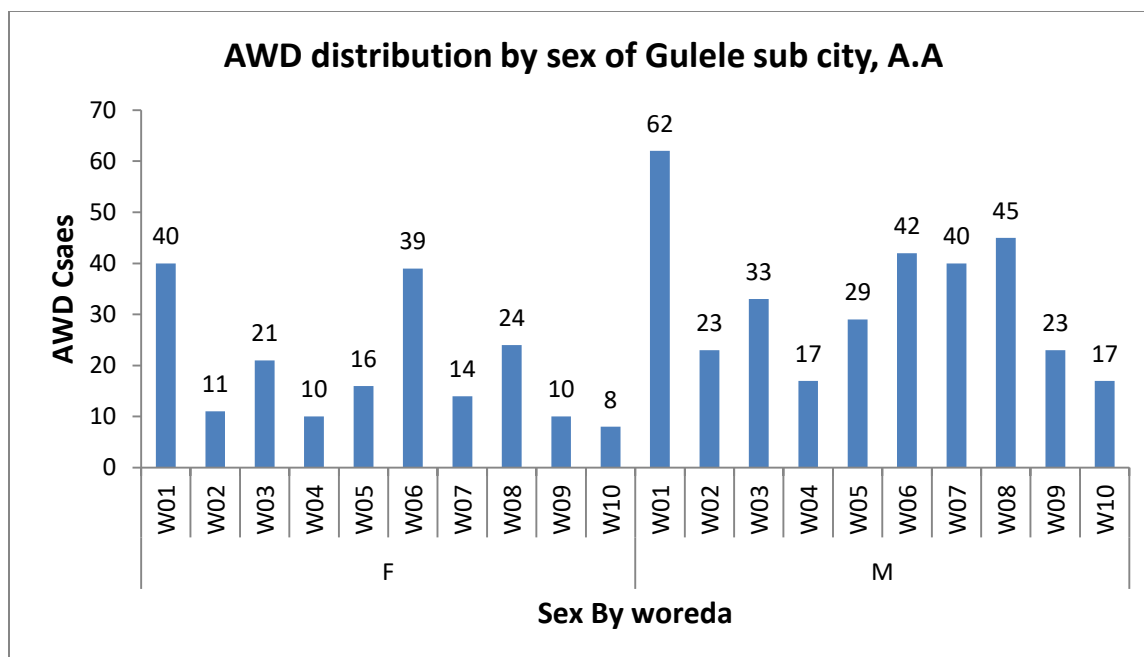


Figure 4: Distribution of AWD cases by sex in Gulele sub city, A.A, Ethiopia 2016

Male were more affected by the outbreak than female. Out of 524 cases, 331(63.2%) were male and 193(36.8%) were female. In every woreda male cases dominated.

The median age of case-patients was 35.46 years, IQR (Inter Quartile Range=24.95) Q1=25.48 & Q3=50.43 with minimum 5 years and maximum 103 years old.

As it was shown from the table below all age groups were affected but out of 524 the 15-44 age groups was highly affected by AWD which was 318(60.1%) and 5-14 age group was the list affected age group 29(5.5%).

Table 2: Distribution of AWD cases by age group in years in Gulele sub city, A.A, Ethiopia 2016

Age group in years	Count & percent of Age Group	
	Cases	(%)
5-14	29	5.5
15-44	318	60.1
44 ⁺	177	33.8
Total	524	100

B. Analytic Analysis

Bivariate analysis

The unadjusted unmatched analysis (Table 3) indicated that persons who ate raw meat (OR = 4.495; 95% C.I = (1.959, 10.314)) & Salad (OR=3.160; 95% CI= (1.558, 6.411)) were riskier for having AWD. The association was statistically significant at $P < 0.05$. Drinking water from HH tap (OR=0.328; 95% C.I = (0.163, 0.663)); and water treatment (OR = 0.193; 95% C.I= (0.092, 0.403)) was significantly protective from AWD. Significant protective associations were observed between AWD and the hygiene related factors like washing hands after using the toilet (OR= 0.2, 95% CI= (0.097, 0.416)), and Washing hands before eating (OR=0.1, 95% CI= (0.045, 0.221)). There were also other associated factors with AWD which are summarized in Table 3 below.

Table 3: Bivariate analysis result, using P value < 0.2 cut off point selected for multiple regression analysis of AWD in St. Peter CTC, Gulele sub city, A.A, Ethiopia, 2016

Associated factors	Exposure status	Cases (%) N=50	$\hat{N}=100$	Odds ratio	95% confidence interval	P values
HH Tap water For domestic use	Yes	25(50)	70(70)	0.429	[0.213 ; 0.863]	0.027
	No	25(50)	30(30)	1	-	-
HH Tap water For drinking	Yes	20(40)	67(67)	0.328	[0.163 ; 0.663]	0.003
	No	30(60)	33(33)	1	-	-
Common Tap water For drinking	Yes	22(44)	26(26)	2.236	[1.094 ; 4.572]	0.041
	No	28(56)	74(74)	1	-	-
Water treatment	Yes	15(30)	69(69)	0.193	[0.092 ; 0.403]	0.00
	No	35(70)	31(31)	1	-	-
Eating Salad	Yes	32(64)	36(36)	3.160	[1.558 ; 6.411]	0.001
	No	18(36)	64(64)	1	-	-
Eating Raw meat	Yes	19(38)	12(12)	4.495	[1.959 ; 10.314]	0.000
	No	31(62)	88(88)	1	-	-
Eating outside of home	Yes	36(72)	48(48)	2.786	[1.341; 5.789]	0.009
	No	14(28)	52(52)	1	-	-
Eating outside at gathering	Yes	11(22)	10(10)	2.538	[0.996; 6.467]	0.046
	No	39(78)	90(90)	1	-	-
Eating cold left-over food	Yes	16(32)	19(19)	2.006	[0.923; 4.36]	0.116
	No	34(68)	81(81)	1	-	-
Eating cold left-over food at home	Yes	14(28)	17(17)	1.899	[0.846; 4.261]	0.117
	No	36(72)	83(83)	1	-	-
Washing hands before eating	Yes	12(24)	76(76)	0.1	[0.045 ; 0.221]	0.00
	No	38(76)	24(24)	1	-	-
Using common latrine	Yes	37(74)	52(52)	2.627	[1.249; 5.527]	0.016
	No	13(26)	48(48)	1	-	-
Using private latrine	Yes	11(22)	39(39)	0.441	[0.202; 0.963]	0.037
	No	39(78)	61(61)	1	-	-
Hand washing after defecation	Yes	17(34)	72(72)	0.2	[0.097; 0.416]	0.00
	NO	33(66)	28(28)	1	-	-
Visiting anyone having diarrhea or vomiting	Yes	12(24)	13(13)	2.113	[0.883; 5.056]	0.141
	No	38(76)	87(87)	1	-	-

Multivariable Analysis Table

Persons who ate Salad (AOR = 4.681, 95% CI = (1.741, 12.582)), outside at gathering, (AOR = 4.389, 95% CI = (1.204; 15.991)), raw meat (AOR = 4.295, 95% CI = (1.443, 12.784)) and using common latrine (AOR = 4.060, 95% CI = (1.424, 11.573)) were at a greater risk of having AWD. Washing hands before eating (AOR = .068; 95% C.I = (.024, .189)) and house hold tap water for drinking (AOR = .310; 95% C.I = (.121, .793)) had significant protective association.

Table 4: Multivariable analysis result for AWD in the five woredas under St. Peter CTC, Gulele sub city, A.A, Ethiopia, 2016

Associated Factors	AOR	95% C.I.	P. Value
HH Tap water For drinking	.310	(.121, .793)	.015
Eating Salad	4.681	(1.741, 12.582)	.002
Eating Raw meat	4.295	(1.443, 12.784)	.009
Eating outside at gathering	4.389	(1.204; 15.991)	.025
Washing hands before eating	.068	(.024, .189)	.000
Using common latrine	4.060	(1.424, 11.573)	.009

Discussion

In the study conducted in Gulele sub city the AWD outbreak was disseminated to all woredas and affected all age groups. In our cases according to the environmental study most of the river water was positive for *V. cholera* so it might be a possible primary source of contamination.

But in a study conducted in Kanpur village of Panchmahal, Gujarat, India in 2010 cases were not localized to any specific area but scattered in village depending on location of children who had eaten ice-cream from local vendor.

Contaminated water was not identified as possible source of the cholera outbreak rather the study confirmed that ice cream consumption from local vendor was associated with the symptoms of the outbreak since odds of having consumed the ice-cream among symptomatic was 4.23 times that of those non-symptomatic(7). While in this study according to multiple binary logistic regressions, eating salad, outside at gathering, raw meat and using common latrine were highly associated as a risk factor for causing AWD.

In a Cholera Outbreak in an Urban North Central Nigerian Community in 2014 out of 18 case patients, 10(55.6%) were male while 8(44.4%) were female, of which 40% are from a sub-urban community of Kurmi tagwaye attack rate was 2/1000 population with two case fatality. Age ranged from 1-84 years: age group of 20-29 years was mostly affected and vibrio cholera serotype Ogawa was isolated from stool. The main water source, Rafin Kumin Tagwaye River was contaminated by resident defecation, post-defecation bath and car washing compared to controls, case patients were likely to have drank from Kumin Tagwaye Rivers (OR= 4.56, 95% CI=[2.75-18])(8). In this study out of 524 cases age range was 5 to 103 years old and the affected males were 331 (63.2%). The most affected age group was the 15-44 years of old (60.1%). Most houses' latrines at some woredas of Gulele sub city were also built along the small Rivers and they had connection with the Rivers and the rivers were also tested positive for *V. Cholera*.

In a report of Cholera Outbreak Investigation in 2014 in Greater Accra the risk of acquiring cholera was reduced by 70%, comparing hand washing after defecating in controls to cases (OR = 0.3; 95% CI: (0.1-0.8))(9). In this study washing hands before eating had 93% protective association (OR=.068; 95% CI= (.024, .189)).

Limitation

Shortage of confirmatory test / culture for cases to confirm diagnosis (to differentiate AWD from other diarrheal diseases) and for controls to exclude carriers of V. Cholera from study subjects (to include only true negatives for control)

Conclusion

The source of the infection was multiple; it includes eating of salad, outside at gathering, raw meat and using common latrine. Washing hands before eating was significantly protective. Cases were not localized to any specific area rather it was disseminated to all woredas with different Attack rate and most of the rivers were positive for Vibrio Cholera.

Recommendation

It was recommended to prevent the further spread of this outbreak and ban on illegal slaughter and who was selling contaminated raw meat and community education on using cooked meat, how to treat salad and proper hand washing by the sub city & woreda health offices.

It was also recommended to educate the community about poor pit latrine infrastructure near the rivers and its consequences by the sub city & woreda health offices.

Proper disposal and treatment of infected cases fecal waste and all contaminated materials (e.g. clothing, bedding, etc.) of AWD patients as well as personal hygiene was advised by the response team.

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Annex 1: Addis Ababa acute watery diarrhea Outbreak investigation information and consent form

Consent Form

Title: Suspected Acute Watery Diarrhea Outbreak Investigation- Addis Ababa, Ethiopia, June 2016

Introduction: Hello, my name is..... I am a member of AWD outbreak Investigation team. Thank you for taking the time to speak with us today. We are investigating AWD outbreak occurred in Addis Ababa, Ethiopia. We are very interested in your experiences and your point of view.

Purpose: To identify etiologic agent and assess the risk factors of AWD outbreak in Addis Ababa, Ethiopia.

Procedure: If you agree to take part, this interview will take about 30 minutes of your time. There are two parts. First, we will ask you about demographic information of you and your family, knowledge you have on acute watery diarrhea, your history of acute watery diarrhea, water, sanitation and hygiene information and your feeding practice.

Second, we will ask you for a stool and drinking water samples to test for acute watery diarrhea causative agents in your stool and drinking water. We need only small amount of samples. The samples will be tested in Ethiopian Public Health Institute using a code so that no one will know about your results. All information collected during this study will be kept private and will only be known by the investigators.

Benefits: This project will help you and other people living in Addis Ababa. We will use these results to prevent and control AWD outbreak in the city.

Risks: There is no risk to you from answering the questions or allowing us to take water and stool samples.

Privacy: we will keep information about you private. We will not collect your name. Only the investigators will have access to the data and only for investigation purpose. We will not use any information that might identify you when we present or publish the study's results.

Payment: There is no cost to you for being part of the project. The approximate time that this study will take is 30 minutes.

Participant Agreement: The project has been explained for me and my house hold members. I have been given a chance to ask questions. I feel that all my questions have been answered. Being in this study is my choice. I may change my mind and leave the study any time during the interview.

Participant Signature_____

Date_____

Name of persons obtaining consent_____

Signature of persons obtaining consent_____

Date_____

Annex 2: Addis Ababa acute watery diarrhea Outbreak investigation questionnaires

This case-control study (survey) is conducted by Ethiopian field epidemiology training program (EFETP), Saint Paul millennium medical college resident in collaboration with Gulele sub city health office as part of the ongoing response related to acute watery diarrhea (AWD) outbreak in Addis Ababa. All personal information collected through this survey will be handled confidentially & your name is not required. This survey is being conducted to improve prevention & control measures against AWD and stop further spread. You may wish to withdraw at any stage of the interview.

Part A: General information

1. Serial no/code.....

2. Case ☐ Control ☐

3. Age (in years)

4. Sex: Male ... ☐ Female ☐

5. Occupation.....

6. Residential address: Region Sub City.....Woreda.....Kebele.....

House number phone number.....

CLINICAL INFORMATION (FOR CASES)

1. Date of onset (dd /mm/yyyy).....

2. Presenting symptoms: A, watery diarrhea B, vomiting C, dehydration D, other (specify)
.....

3. Hospitalized? Yes ☐ no ☐

4. Date of hospitalization (dd/mm/yyyy).....

Part B: exposure

Water

1. What is your regular source of water for domestic use in the last 5 days?

- A, House hold tap water B, Communal tap water C, River
D, Well E, Borehole F, Spring G, Street vended water
H, Tanker (Roto) water I, Bottled water J, Other (specify) -----

2. What is your regular source of water for drinking within the last 5 day?

- A, House hold tap water B, Communal tap water C, River
D, Well E, Borehole F, Spring G, Street vended water
H, Tanker (Roto) water I, Bottled water J, Other (specify) -----

3. Did you treat the water before drinking? Yes ☐ no ☐

4. If yes, how did you treat it? A, filtration B, boiling C, Aqua tab D, water guard E, Bishangare

F, Pure G, Other (Specify) -----

5. Did you drink holy water in the last 5 day? Yes ☐ No ☐

6. If yes, from which holy water site? A, Spring B, Pipe water C, Well
D, Other (Specify) -----

FOOD AND BEVERAGE

7. Did you eat any of the following in the last 5 days?

- A, Vegetable salad B, Fruits C, Raw meet D, Partially roasted meat E, Fish
F, Non-boiled milk G, Other (specify).....

8. Where did you get (buy) food for your household? A, local market B, private garden /farm
C, Street shops D, Supermarkets E, Other (specify).....

9. Did you eat food outside your home in the last 5 days? Yes ☐ no ☐

10. If yes, where? A, Sold by street food venders B, Hotel C, Restaurant & café D, At a gathering

E, School /work cafeteria F, Other (Specify).....

11. Did you eat any cold left-over food in the last 5 days? Yes ☐ no ☐

12. If yes where is the source of the food? A, Home B, Hotel C, Restaurant D, University
E, Other (specify).....

13. Did you drink any of the following local made beverages in the last 5 days?

A, Shameta B, Borde C, Besso D, Other (specify).....

Hygiene and sanitation

14. Do you wash your hands with soap before eating regularly? Yes ☐ no ☐

15. Do you have latrine in your home? Yes ☐ no ☐

16. If yes? Communal ☐ private ☐

17. If no, for Q.15, where do you discharge human feces? A, Open defecation B, In the river
C, Bury in the soil D, Other (specify)

18. Did you wash your hands every time with soap after defecation? Yes ☐ no ☐

19. Where do you dispose of your refuse? A, Open dumping B, Open pit C, In the river D,
Bury

E, Burn F, Collected by solid waste collectors G, Other (specify)

Other exposures

20. In the last 5 days, did anyone in your house hold have diarrhea or vomiting?

Yes ☐ no ☐

21. Did you visit anyone having diarrhea or vomiting in the last five day? Yes ☐ no ☐

22. Did you attend a funeral within last five day? Yes ☐ no ☐

23. Did you travel to place affected with diarrhea or vomiting? Yes ☐ no ☐

24. If yes, where? Region zone woreda kebele.....

Annex 3: Addis Ababa acute watery diarrhea Outbreak Environmental and institutional risk factors investigation form

Environmental and institutional risk factors	Environmental and institutional risk factors observed	Laboratory investigation taken	From where specimen taken	Date specimen taken	Date result arrived	Laboratory result	Remark
Households							
Water sources							
Holy water areas							
Restaurants/hotels/cafeterias							
Slum areas							
Sewerage areas							
Waste disposal facilities and system							
Schools and other major establishments							
Populations at risk (Sanitation workers, street population, daily laborers, construction workers etc.)							

Annex 4: Addis Ababa acute watery diarrhea Outbreak investigation form

Ser . No .	Date	Name Of Cases	Sex	Age	Address					Date of onset	Occupation	Where	Travel Hx.
					Sub City	Woreda	Kebel	Ketena/Sefer (Tele.)	H.No .				
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													

Possible Source Infection												
Occupation	Where	Travel Hx.	Type of Food	Where/Source	When	Source of Water	where/Place	Latrine	Contact With AWD	With Whom?	Where	When

CHAPTER-II Surveillance data analysis

2.1. Typhus Surveillance Data analysis Report in Gulele sub-city, Addis Ababa city administration, April 2016

Abstract

Introduction: Typhus is a bacterial disease spread by lice or fleas, caused by 2 types of bacteria: *Rickettsia typhi* or *Rickettsia prowazekii*, *Rickettsia typhi* causes endemic or murine typhus & it is spread by fleas. *Rickettsia prowazekii* causes epidemic typhus. It is spread by lice (3). Therefore the aim of this study is to describe the burden and distribution of typhus fever in Gulele sub city, Addis Ababa, Ethiopia.

Methods: A Descriptive study was conducted using the Gulele Sub City Typhus Health Management Information System (HMIS) report and data of 2012-2015 taken retrospectively. HMIS report was used because the surveillance data was incomplete & can't be described by place & person. Data of each Woreda's Public & Government Health facilities was taken from the Sub City reports. The support letter from Saint Paul Hospital Millennium Medical College (SPHMMC) was used as ethical clearance. Distribution of typhus was described by age, sex, time of illness and reporting site or woredas. It was also confirmed the presence of outbreaks during the last four years. Statistical analysis was done using Microsoft Excel from May 30, to June 17, 2016. And findings were disseminated to SPHMMC and Gulele sub-city health office.

Result: In this study trend revealed the overall prevalence rate of typhus fever in Gulele Sub City was almost increasing from 2011/12-2014/15 and the increment was by far high in 2014/15 (22.1 per.1000pop. per year). Among the woredas of Gulele Sub City, wereda 5 showed high prevalence in all years except in 2012/13. Generally Wereda 8 and wereda 3 are the least prevalent woredas in Gulele Sub City. When we saw seasonality the fluctuation was insignificant for the three years but in 2014/15 from January to June it was significantly high prevalent except March and April.

Conclusion & Recommendation: All woredas of the sub city were affected by the disease but seasonality was irregular in the sub city. Even if there was no any death report due to typhus fever in the sub city in the past four years, it might present an enormous threat to the future health of the population.

Since epidemic typhus had a potential to become an outbreak in the future, prevention and control measures should be strengthened such as insecticide application and health education. Long-term strategies that address the underlying preconditions of this problem are needed.

Introduction

Typhus is a bacterial disease spread by lice or fleas, caused by 2 types of bacteria: *Rickettsia typhi* or *Rickettsia prowazekii*, *Rickettsia typhi* causes endemic or murine typhus. *Rickettsia prowazekii* causes epidemic typhus. It is spread by lice. Endemic typhus is usually seen in areas where hygiene is poor and the temperature is cold. Endemic typhus is sometimes called "jail fever." The bacteria those cause this type is usually spread from rats to fleas to humans. Additional vectors include the cat flea and the mouse flea. Fleas remain permanently infected with *Rickettsia typhi*, but their lifespan is not shortened by the presence of rickettsiae. Humans are infected by inoculation of infective flea feces in bite wounds. It is often seen during the summer and fall. The actual incidence of murine (Endemic) typhus is difficult to establish since infection can be mild and self-limited, and difficult to distinguish from other causes of rash and fever. It is an uncommon and is rarely deadly (1). Epidemic louse-borne typhus is transmitted by the human body louse, *Pediculus humanus corporis*, which is infected while feeding on the blood of patients with acute typhus fever. (Head lice or pubic lice play no role in transmission.). Infected lice excrete rickettsia onto the skin while feeding on a second host, who becomes infected by rubbing louse fecal matter or crushed lice into the bite wound. There is no animal reservoir (2).

The onset is variable but often sudden, with headache, chills, high fever, prostration, coughing and severe muscular pain. After 5–6 days, a macular skin eruption (dark spots) develops first on the upper trunk and spreads to the rest of the body but usually not to the face, palms of the hands or soles of the feet. The case–fatality rate is 1-20% but 40%-60% in the absence of specific treatment. Louse-borne typhus fever is the only rickettsial disease that can cause explosive epidemics. Typhus fever occurs in colder (i.e. mountainous) regions of central and eastern Africa, central and South America, and Asia. The body louse lives in clothing and multiplies very rapidly under poor hygienic conditions. Lice proliferate rapidly in refugee camps and other crowded, unsanitary conditions and the risk can be expected to increase in rainy seasons, when more clothing and blankets are used. In recent years, most outbreaks have taken place in Burundi, Ethiopia and Rwanda.

In the past, Louse-borne Typhus was associated with wars and human disasters and it is still endemic in the highlands and cold areas of Africa, Asia and Central and South America.

Since World War II, large outbreaks of typhus have occurred mainly in Africa, with reported cases coming predominantly from three countries: Burundi, Ethiopia and Rwanda. In Ethiopia, the number of cases reported annually has ranged between 7,000 and 17,000 (except in 1979, when a higher number was reported), although most have not been confirmed in a laboratory. In the 1970s, major epidemics which occurred in Burundi and Rwanda were documented by serology and isolation (3).

Gulele is one of the Sub Cities of Addis Ababa, Ethiopia .A.A is located between 8⁰49'55.929'' and 9⁰ 5'53.853'' North Latitude and 38⁰ 38'16.555'' and 38⁰54'19.547'' East Longitude. Its vast territory extends within an altitude of 2000 to 3100 meter above sea level (2100 m above sea level at the south and 3100 m above sea level at the north of Entoto Mountain) with the average being 2500mm above sea level .The average annual rainfall of the city is about 1200 mm, the minimum and maximum temperature is 11-14 ° C and 17-21 ° C. Addis Ababa is divided into 10 Sub Cities and 116 Woredas (Districts) (7). Gulele is one of the Sub Cities in A.A and according to the Federal Democratic Republic of Ethiopia Central Statistical Agency Population Projection of Ethiopia, for Gulele Sub City from 2012 – 2015 are 296,660, 302,890, 309,251, & 315,745 respectively. (9)

Rationale

Epidemic typhus disease has been well-known several centuries ago. However, it remains as a major public health problem among peoples living in poor-hygiene conditions which might result due to war, social disruptions, poverty, or gaps in public health management. Poor-hygiene conditions favor a higher prevalence of body lice, which are the main vectors for this disease. Outbreaks of epidemic typhus have occurred in jails and refugee camps in developing countries (8). Therefore an ongoing surveillance data analysis is important for detecting outbreak and unexpected increase or decrease in disease occurrence will help monitoring of diseases trends and evaluating the effectiveness of disease control program in the surveillance system and policies. Studying disease under surveillance also is necessary because they have Public Health importance and are given special attention due to their very nature of being fatal, communicable, having potential to be epidemic (epidemic prone) and preventable by public health intervention. Gulele sub-city is one of the sub-cities of Addis Ababa, population living with slum, overcrowded, poor sanitation and low economic status (7). However surveillance data of typhus fever did not study in sub-city level, therefore trends of the disease does not well known. Since typhus is one of the diseases under surveillance, it is necessary to analyze & describe the four years trend of the disease from 2012-2015, in Gulele Sub City, Addis Ababa, Ethiopia. Therefore describing the typhus trend analysis of Gulele Sub City is helpful to give evidence based information for prioritizing and instituting appropriate public health interventions in the community. And the result may help to give evidence about the disease burden and opportunity for other researchers to study.

Objective

- To determine the distribution and burden of Typhus among Gulele Sub City, Addis Ababa, Ethiopia.

Specific Objectives

- To describe Typhus magnitude and distribution in Gulele Sub City
- To determine the degree of morbidity in the Sub City
- To determine the preventive status of the Sub City

Methods and Materials

Study area, population and period

The study was undertaken at Gulele Sub City epidemic typhus cases on monthly compiled HMIS report, these data were from each Woreda's Public & Private HFs from 2012-2015. The study period was from May 30, to June 17, 2016.

Design and data collection

A Cross-sectional study design was used to describe epidemic typhus by time place & person and data collection check list/tool is used to collect data from the sub city report. HMIS report was used to make the four years data uniform & complete because surveillance data was incomplete and they couldn't be described by place and person. The Sub City & woredas' pop. number were used as a denominator to calculate prevalence.

Ethical clearance

The support letter from SPHMMC to the sub city & verbal communication to clarify the aim of the study was used as ethical clearance.

Analysis

I analyzed distribution of typhus by age, sex, time of illness and reporting sites or woredas, type of reporting form, final classification of cases and confirmed presence of outbreaks during the last four years. Statistical analysis was done using Microsoft Excel.

Dissemination of finding

The finding has been disseminated to SPHMMC and Gulele sub-city health office.

Case definitions: The national Public Health Emergency Management guideline will be used for the case definitions. According to the Federal ministry of health of Ethiopia-Public health emergency management, Typhus is one of the weekly reportable diseases under surveillance. Line listing will be used during an outbreak for reporting of cases.

Suspected case: Any person with an abrupt onset of headache, chills, rapidly mounting fever, malaise, prostration and rash.

Confirmed case: A suspected case is with Weil-Felix reaction of the proteus strain OX-19 with four fold rise in titer or a single titer equal to or greater than 320 in the second week of illness.

All suspected cases of typhus will be finally confirmed based on the blood serology test.

Laboratory confirmed: A suspected Typhus case that is investigated, including the serological confirmation of recent Typhus infection.

Result

The following data were taken from the sub city compiled monthly reports of each Woreda's HFs. The report didn't include laboratory result or hospitalized cases due to typhus fever. But there were no any death that was reported for the past four years.

As we see the trend from table 5 the overall prevalence rate of typhus fever in Gulele Sub City was almost increasing from 2011/12-2014/15 and the increment was by far high in 2014/15 (22.1 per.1000pop. per year).

Table 5: Trends of epidemic typhus by year in Gulele sub city, Addis Ababa city administration from 2011/12-2014/15

years	Population at risk	No of cases	prevalence rate	remark
2011/12	296660	1469	5 per 1000 pop.	
2012/13	302890	2906	9.6 per 1000 pop.	
2013/14	309251	2592	8.4 per 1000 pop.	
2014/15	315745	6978	22.1 per 1000 pop.	

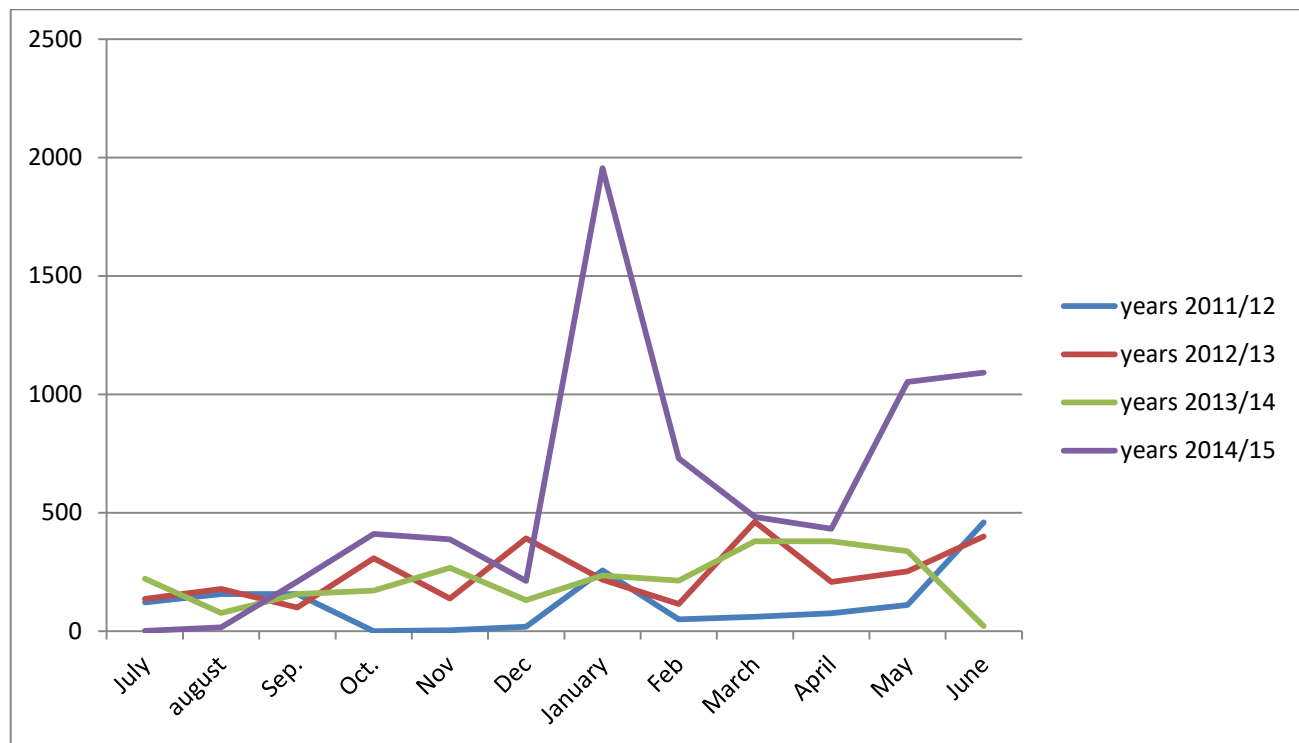


Figure 5: Number of epidemic typhus cases by month of the four years.

From the above figure when we saw seasonality the fluctuation was insignificant for the three years but in 2014/15 from January to June it was significantly high prevalent except March and April.

According to table 6 overall burden of epidemic typhus in woreda 5 was high 5823(41.8%) relative to all weredas in Gulele Sub City, woreda 10 was the second 3007 (21.6%) and woreda 4 and woreda 7 was followed respectively. In all years woreda 5 covered high percent, and the least report was from woreda 3 & 8 respectively. In 2011/12, 2012/13 the report from woreda 10 & 7 was the second and third respectively following woreda 5. For the first three consecutive years of the study period there were zero report from woreda 8, and woreda 1 for the 3rd year, woreda 2 & 4 for the 1st year reported zero.

Table 6: Distribution of epidemic typhus cases by wereda, in Gulele sub city, Addis Ababa, Ethiopia from 2011/12-2014/15 (Relative frequency) (%)

Sr. no	Name of woreda	years								Total	
		2011/12		2012/13		2013/14		2014/15			
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
1	W 1	56	3.8	31	1.06	0	0	598	8.6	685	4.9
2	W 2	0	0	9	0.3	163	6.3	535	7.7	707	5.06
3	W 3	6	0.4	8	0.28	29	1.1	79	1.1	122	0.9
4	W 4	0	0	39	1.3	334	12.9	789	11.3	1162	8.3
5	W 5	789	53.7	1791	61.6	859	33.14	2384	34.16	5823	41.8
6	W 6	79	5.4	207	7.1	427	16.5	51	0.73	764	5.5
7	W 7	221	15	306	10.53	195	7.5	418	5.99	1140	8.17
8	W 8	0	0	0	0	0	0	135	1.93	135	0.96
9	W 9	18	1.2	2	0.1	183	7.1	197	2.8	400	2.9
10	W 10	300	20.5	513	17.7	402	15.5	1792	25.7	3007	21.6
total		1469		2906		2592		6978		13945	

Based on table 7 again wereda 5 showed high prevalence in all years except in 2012/13 wereda 10 with 19 per 1000 pop and wereda 5 with 15 per.1000 pop. Similarly as in the table 2 the second prevalent is wereda 10 except wereda 4 in 2013/14 with 21.7 per.1000 pop and wereda 10 with 14.7 per 1000 pop. , and when I saw overall distribution of the weredas third was wereda 4, followed by wereda 2 & 7 respectively. Generally Wereda 8 and wereda 3 are the least prevalent weredas in Gulele Sub City, A.A, Ethiopia. Overall (4 years average) prevalence in the Sub City was 11.4 per 1000 pop.

Table 7: Prevalence of epidemic typhus per 1000 pop by wereda, in Gulele sub city, Addis Ababa city administration from 2011/12-2014/15

Sr. No.	Name of woreda	Total Population				Number of new cases				Prevalence rate			
		2011/12	2012/13	2013/14	2014/15	2011/12	2012/13	2013/14	2014/15	2011/12	2012/13	2013/14	2014/15
1	W 1	32363	33043	33737	34445	56	31	0	598	1.7	0.9	0	17
2	W 2	23209	23696	24194	24702	0	9	163	535	0	0.4	6.7	22
3	W 3	31188	31843	32512	33195	6	8	29	79	0.2	0.3	0.9	2.4
4	W 4	14715	15024	15340	15662	0	39	334	789	0	2.6	21.7	50
5	W 5	27165	27736	28318	28913	789	1791	859	2384	29	15.5	30	82.5
6	W 6	28956	29564	30185	30819	79	207	427	51	2.7	7	14	1.7
7	W 7	41065	41927	42808	43707	221	306	195	418	5.4	7.3	4.6	9.6
8	W 8	35430	36174	36933	37709	0	0	0	135	0	0	0	3.6
9	W 9	36273	37035	37812	38607	18	2	183	197	0.5	0.05	4.8	5
10	W 10	26296	26849	27412	27988	300	513	402	1792	11.4	19	14.7	64
total		296660	302890	309251	315745	1469	2906	2592	6978	4.9	9.6	8.4	22.1

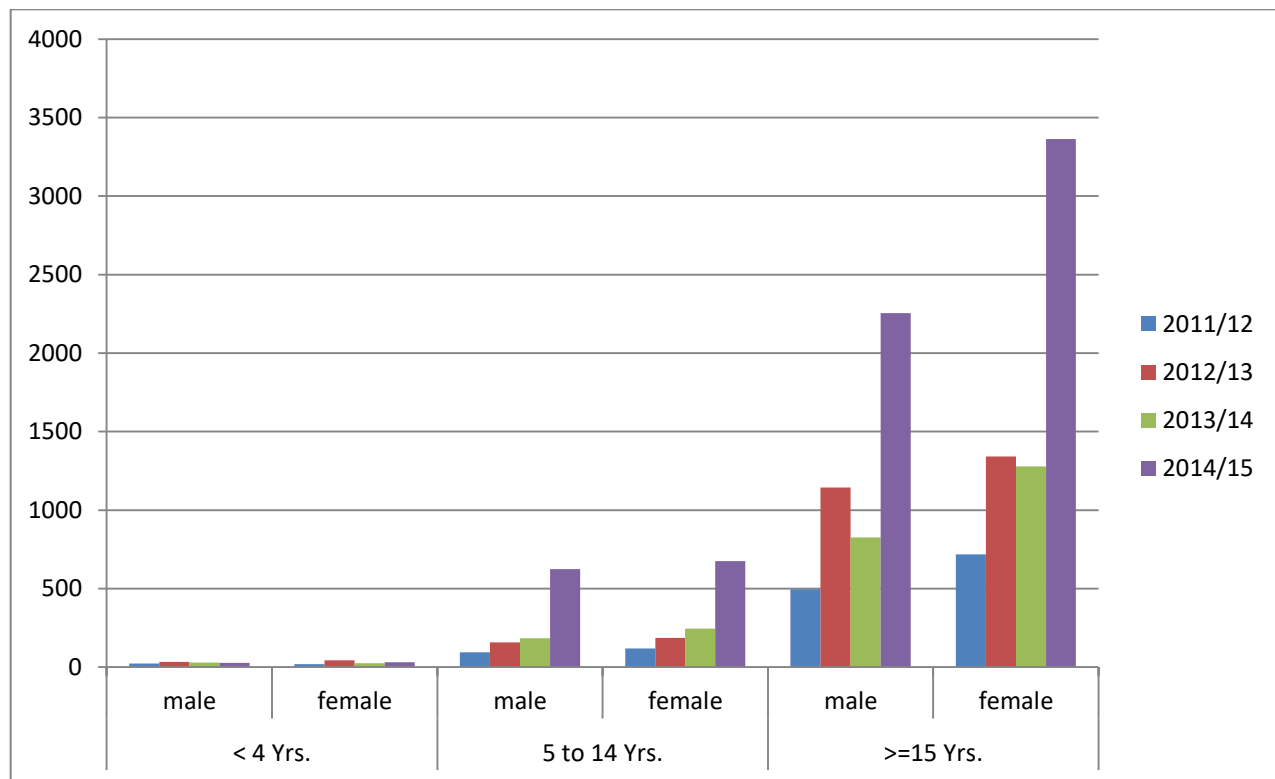


Figure 6 Distribution of epidemic typhus cases by age & sex from 2011/12-2014/15.

Figure 6 clearly showed that prevalence of epidemic typhus increased with age in both sex and in all years, and it was negligible in <4 years age group of both sex, and it was more on females than males specially in >=15 age group in all years. The sex distribution seemed similar in < 4 to 14 years except a slight difference but it is significantly more in females in >=15 years age group in all years.

Discussion

Epidemic typhus is one of the highly prevalent diseases in developing countries. Epidemic typhus is considered primarily a disease of war, and has made a significant contribution to human history. It is still prevalent in areas where poor socioeconomic conditions and a high prevalence of louse infestations exist. The recent circulation or distribution of epidemic typhus is indefinite but since the 1990s, foci of epidemic typhus have been described in Africa, including Algeria and central eastern African countries such as Ethiopia, Zaire, Rwanda and Burundi, in mountainous regions of South America (including Peru), in mountainous or highland regions of North America, in the Himalayan regions in Asia, and in Russia. An autochthonous case of epidemic typhus has been recently reported in France (8). Typhus fever was once called "jail fever" or "ship fever;" because it was common in prisons and on ships that had been at sea a long time. The reason is that lice that hold typhus fever causing organism are widespread in large aggregations of persons who do not clean or change clothes with any regularity and are forced by conditions to live in close accommodations. The lice adhere to the ridge of clothes, in chains, on the edge, or on any other space that provides them a hiding place. They shift from one person to another at a haphazard manner. Simple acts, such as unintentional brushing against, provisional lend of clothing, or simple closeness especially at night can lead to a migration from one person to another. Lice will make a mass migration from a person when death overtakes their host and the rapidly cooling body forces them to find a more hospitable environment (8). Parasitic body lice can serve as a vehicle for transmission of typhus in the community. Since the persistence of the vector enabled the spread of *Rickettsia* from human carriers back to the louse population, the disease is mostly prevalent in peoples living in poverty, overcrowded conditions and poor hygienic environments. In this study the difference in the woredas might be due to their difference in socio economic status, reporting problem, relatively new H.Cs or other factors mentioned above. In the current study the overall prevalence of epidemic typhus in Gulele Sub City was 11.3 per 1000 pop. But in a study conducted at Kality prison in A.A, Ethiopia overall prevalence of epidemic typhus was 26.3%. The prevalence of typhus infection in Kality prison was by far higher than this finding. It might be an evidence for the name mentioned ‘‘jail fever’’ in the above. There are also reports that showed as high as 18.8% and as low as 2% prevalence of typhus infection in Mexico and Algeria respectively (8). The prevalence of typhus infection was higher among male patients in the Kality prison study. Similar study conducted in Jimma, South west Ethiopia, revealed typhus preponderance among male

patients (8). But in this study overall it was higher among female patients, especially in ≥ 15 years age group. In the Kality prison study, epidemic typhus was more prevalent among patients within the age group 41 to 50 years, but based on my finding it increased with age in both sex. However, different studies reported that a wide range of age groups (2 to 58 years) were found infected by *Rickettsia prowazekii* (8). Some reports showed that all age groups are at risk for *Rickettsia* infections but patients over 60 years of age have the highest risk of death. In the Kality prison study the prevalence of epidemic typhus was 30.4% by the year 2008 but a comparatively higher prevalence (31.4%) was observed by the year 2009 in the same prison. A decrease in the prevalence of typhus fever infection (19.9%) was also observed by the year 2010. During the other two consecutive years (2011 and 2012), there was a slight decrease in the prevalence of typhus fever infection (21.7% and 25.3% respectively). The decreased prevalence of epidemic typhus might be due to improvement of preventive and control mechanisms of the disease (8). But the prevalence of the current study of Gulele Sub City revealed increasing from 2012-2015. The increasing trend of prevalence in the Sub City might be due to growing of the newly H.Cs in capacity of materials, Laboratory & human resources, improved reporting, or other factors. Epidemic typhus was first considered a disease restricted to the human being, with human to human transmission occurring via the human body louse (*Pediculus humanis corporis*). The possibility of recurrent infection in humans (referred to as BrillZinsser disease) suggested that man may act as a reservoir for the bacteria and explained the maintenance of the disease between epidemics (8). However, *R. prowazekii* has been recently isolated from flying squirrels (*Glaucomys volans*) in North America (8), and the disease (referred as indigenous epidemic typhus) may be acquired from flying squirrel-parasitizing arthropods. It has also been found in *Amblyomma* ticks in Ethiopia and Mexico (8). Therefore, traditional preventive methods such as the application of insecticide and delousing should be supported with additional and new methods that possibly prevent the transmission of *Rickettsia* from other sources. Another important finding in Kality prison study was that a higher prevalence of typhus fever found during the fall and winter seasons. This might be due to cold climatic condition of the seasons which favors the transmission of *Rickettsia prowazekii*. Most cases of epidemic typhus occur during the cold months, when heavy clothing and poor sanitary conditions allow infestation by body lice. There are reports that documented highest infection rate in May as compared to July, August, and October in Denmark (8). In this study we saw no seasonality.

Study Limitations

The limitations of the current study were that complete data on surveillance report was not available in the Sub City and there were no data those show differences in socio economic background, topography & weather condition among woredas except population density.

Conclusion

The overall prevalence rate of epidemic typhus in Gulele Sub City was almost increasing from 2011/12-2014/15 and the increment was by far high in 2014/15, outbreak of typhus fever has had potential to be established. All weredas of the sub city were affected by the disease but seasonality was irregular in the sub city. Even if there was no any death report due to typhus fever in the sub city in the past four years, it might present an enormous threat to the future health of the population.

Recommendation

Since epidemic typhus had a longer history of endemic & epidemic nature in our country and potentially it may become an outbreak in the future, the sub city & woredas should give more attention & it is important to strengthen the prevention and control measures such as insecticide application and health education. Long-term prevention and control strategies that address the underlying preconditions of this problem are needed. The discrepancy between HMIS report and surveillance report needs further study and the surveillance report format should include variables like, age, sex, wereda, and laboratory confirmation, this should be done by health bureau PHEM.

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Annex 5: Surveillance data analysis, data collection tool

Trends of Typhus fever in Gulele sub city, Addis Ababa city administration from 2011/12-2014/15

years	Population at risk	No of cases	Incidence rate	remark
2011/12				
2012/13				
2013/14				
2014/15				

Number of typhus fever cases by month, in Gulele sub city, Addis Ababa city administration from 2011/12-2014/15

months	years			
	2011/12	2012/13	2013/14	2014/15
July				
august				
Sep.				
Oct.				
Nov				
Dec				
January				
Feb				
March				
April				
May				
June				
total				

Distribution of typhus fever cases by woreda, in Gulele sub city, Addis Ababa city administration from 2011/12-2014/15

Sr.no	Name of woreda	years				remark
		2011/12	2012/13	2013/14	2014/15	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
total						

Incidence of typhus fever by woreda, in Gulele sub city, Addis Ababa city administration from 2011/12-2014/15

Sr.no	Name of woreda	Population at risk				Number of new cases				Incidence rate				remark
		2011/12	2012/13	2013/14	2014/15	2011/12	2012/13	2013/14	2014/15	2011/12	2012/13	2013/14	2014/15	
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
total														

Distribution of typhus fever cases by age & sex, in Gulele sub city, Addis Ababa city administration from 2011/12-2014/15

Year	Age(years)						
	< 4		5-14		>=15		Total
	male	female	male	female	male	female	
2011/12							
2012/13							
2013/14							
2014/15							
Total							

CHAPTER-III Surveillance System Evaluation

3.1 Typhoid Fever Surveillance Performance in Gulele sub-city, Addis Ababa city administration, February 2017

Abstract

Introduction: Public health surveillance is an 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. This is through revealing disease burdens and guiding the action to be taken, the health policy, planning, evaluation of health programs, the evaluation was conducted to describe the surveillance system of typhoid fever and the system attributes were evaluated. Objective of this evaluation is to assess the performance of the existing surveillance system by selecting Typhoid fever in five woredas and the sub city health office of Gulele Sub City, A. A, Ethiopia

Methods and Materials: Cross-sectional study design was conducted to evaluate the existing surveillance system in Gulele Sub City, Addis Ababa city administration from February 6 to February 24, 2017. The study units were selected on a convenience basis. In the sub city there are 21 study units, out of them 11(52%); five governmental health centers, five woreda health offices, and the Sub City health office were assessed. Data was collected using World Health Organization (WHO) adopted surveillance system evaluation check list and it was analyzed using Microsoft Excel and presented with tables and graphs.

Results: At the five health centers' laboratories out of 5061 who were tested for typhoid fever using widal test, a total of 1466(29%) reactive cases were registered in the laboratory registration book in fourteen WHO epidemiologic weeks (from Oct.31, 2016-Feb 5, 2017) . From these five health centers out of 1466 reactive cases only 857(58.5%) typhoid cases were reported to Gulele sub city Public Health Emergency Management (PHEM). According to surveillance report in the last three months typhoid trend the highest was in WHO week 29, 50 & 52, 2016 and week 4 & 5, 2017 and the lowest was week 2, 2017. In woreda 8 there were overlooked typhoid fever epidemics twice on week 29 and 50, 2016 but there was no any epidemic during the period following the sub city compiled data. Positive Predictive Value (PPV) for Typhoid fever couldn't be determined. Regarding typhoid fever the surveillance system had data discrepancy, therefore the system usefulness and data quality attribute found to be compromised.

Conclusion & Recommendation: The surveillance work was taken as an additional work in the health center level and the focal persons didn't do trend analysis therefore the system was not sensitive & useful to detect outbreak, to estimate magnitude of the morbidity and mortality. In Gulele sub city the system was not satisfactory and there was also report discrepancy in typhoid fever. But the system was simple and flexible by all assessed sites.

The system will be more effective if it is taken as main work unit/department, make the human power more than one and allocate budget in a sub city level. Timely written feedback and refreshment training should be needed. To reduce the discrepancy between laboratory results of typhoid fever and report from clinical registration book, health centers should use both. To improve sensitivity of the surveillance system and to detect unusual increase and outbreak the focal persons should do trend analysis. Date of sent and receipt of the report form should be written or internet should be accessed at the woreda/Health Center level for report timeliness.

Introduction

Public health surveillance is an 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. Data disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation and formulating research hypothesis.

Data from a public health surveillance system can be used to guide immediate action for cases of public health importance; measure the burden of a disease (or other health-related event), including changes in related factors, the identification of populations at high risk, and the identification of new or emerging health concerns; monitor trends in the burden of a disease (or other health-related event), including the detection of epidemics (outbreaks) and pandemics; guide the planning, implementation, and evaluation of programs to prevent and control disease, injury, or adverse exposure; evaluate public policy; detect changes in health practices and the effects of these changes; prioritize the allocation of health resources; describe the clinical course of disease; and provide a basis for epidemiologic research(1).

The Federal Ministry of Health (FMOH) initiated Integrated Diseases Surveillance (IDS) focusing on 17 priority diseases in 1996. Following the endorsement of IDSR as a regional strategy by WHO/AFRO in September 1998, the country adopted the strategy and conducted comprehensive assessment of the existing surveillance, epidemic preparedness and response system of the country in October 1999. Based on the findings, a five-year strategic plan covering 2000-2004 was developed and implemented. As the five year implementation period came to an end, the FMOH decided to conduct an evaluation of the process, inputs, outputs and outcomes of IDSR implementation including training, supervision, resource mobilization and coordination, the quality of the surveillance system(completeness, timeliness, usefulness, and relevance) and the strengths, limitations, opportunities, and threats of IDSR implementation(2).

Currently in Ethiopia 20 diseases (13 are immediately reportable whereas 7 are weekly reportable) are selected to be included into the routine surveillance. These diseases and conditions are selected based on one or more of the following criteria:

Diseases which have high epidemic potential (anthrax, avian human influenza, cholera, measles, meningococcal meningitis, pandemic influenza, smallpox, severe acute respiratory syndrome (SARS), viral hemorrhagic fever (VHF), and yellow fever),

- Required internationally under IHR2005 (smallpox, poliomyelitis due to wild-type poliovirus, human influenza caused by a new subtype, SARS),
- Diseases targeted for eradication or elimination (poliomyelitis due to wild-type poliovirus, dracunculiasis, neonatal tetanus (NNT),
- Diseases which have a significant public health importance (rabies, dysentery, malaria, relapsing fever, typhoid fever, typhus and severe malnutrition);
- Diseases that have available effective control and prevention measures for addressing the public health problem they pose(3).

A communicable disease surveillance system serves two key functions; early warning of potential threats to public health and programme monitoring functions which may be disease specific or multi-disease in nature. The early warning functions of surveillance are fundamental for national, regional and global health security. The International Health Regulations (IHR) 2005 underscore the commitment to the goal of global security and request all Member States to establish and implement effective surveillance and response systems to detect and contain public health threats of national and international importance. All Member States should enhance their national surveillance systems for communicable diseases in order to meet the various objectives. A structured approach to strengthen national communicable disease surveillance systems could include:

- Assessment of communicable disease risks identifying major public health threats.
- Prioritization of public health threats to ensure that surveillance is limited to the important public health events.
- Assessment of existing systems to review strengths, weaknesses, and opportunities for strengthening the systems.
- Development of a strategic plan of action based on the findings of the assessment.

- Implementation of activities planned to strengthen the systems.
- Monitoring progress in implementation of planned activities, the evolution and performance of the surveillance system.
- Evaluating outcomes and overall impact of the surveillance system(4).

Regular and relevant evaluations of surveillance systems are essential to improve their performance and cost-effectiveness(5).

Typhoid fever

Typhoid fever is weekly reportable and one of the twenty communicable diseases under surveillance which has a significant public health importance in Ethiopia.

Salmonella enterica serotype Typhi (S. Typhi) was estimated to cause more than 21 million illnesses and over 200,000 deaths worldwide in 2000. Over 400,000 of these illnesses occurred in Africa.

Typhoid fever may present as sustained fever, headache, abdominal pain, nausea, loss of appetite, and constipation or sometimes diarrhea. However, typhoid fever may be difficult to confirm if the diagnosis is based only on the clinical presentation(6). Novel typhoid diagnostics currently under development have the potential to improve clinical care, surveillance, and the disease burden estimates that support vaccine introduction. Blood culture is most often used as the reference method to evaluate the accuracy of new typhoid tests; however, it is recognized to be an imperfect gold standard. If no single gold standard test exists, use of a composite reference standard (CRS) can improve estimation of diagnostic accuracy(7).

In many countries including Ethiopia, the Widal test is the most widely used test in typhoid fever diagnosis because it is relatively cheaper, easy to perform and requires minimal training and equipment.

Although Widal test has been in use for more than a century, the value of the test to diagnose typhoid fever has been debated for as many years as it has been available. A study conducted on 270 febrile patients in St. Paul's General Specialized Hospital from mid December 2010 to March

2011 has shown Widal test has a low sensitivity, specificity and PPV, but it has good NPV which indicates that negative Widal test result have a good indication for the absence of the disease(8).

To Verify and evaluate the Performance of surveillance system in the Sub City the glance summary of one of the weekly reportable nationally identified diseases (Typhoid fever) was selected from the following table.

Table 8: List of PHEM immediately and weekly reportable diseases

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

Rationale of the study

The purposes of surveillance system evaluation are therefore to identify and analyze the existing health surveillance systems approaches in order to allow end users (i.e. decision makers in health surveillance programs at all administrative levels of implementation) to select the most appropriate approach based on their objective(s) and also to inform the development of an evaluation framework within the health surveillance systems(5).

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, to assess the quality, efficiency, efficacy, usefulness and gap of the existing system accordingly to improve the surveillance system.

For most low- and middle-income countries accurate incidence data are limited caused by a lack of rapid and sensitive diagnostic tools and poor reporting systems. Surveillance is the primary means through which infectious disease patterns can be identified and used to report on disease-specific incidence, morbidity, and mortality rates. Facility-based or passive surveillance is most commonly used; however, the method can be hampered by varied healthcare utilization patterns of the local population(s), and inaccurate diagnoses and disease recording and reporting. Active surveillance entails health providers seeking cases outside of health facilities; however it is potentially labor intensive and costly(6).

Disease under surveillance (Typhoid fever) was selected based on the public health importance and its frequency in the Sub City.

General Objectives

To evaluate the performance of the existing surveillance system by selecting typhoid fever in five woredas and the sub city health office of Gulele Sub City, A. A, Ethiopia

Specific Objectives:

- To investigate the implementation of core surveillance activities of notify-able diseases reporting system in respect to case detection, registration, confirmation, reporting, epidemic preparedness and response.
- To assess supportive activities of surveillance system such as supervision, staff training, information feedback, equipment and financial support.
- To assess the status of surveillance system attributes like sensitivity, simplicity, positive predictive value, flexibility, completeness, timeliness, acceptability, representativeness, acceptability and specificity
- To describe constraints and challenges faced in the process of implementing the surveillance system

Methods and Materials

Study area: This surveillance system evaluation was conducted in Gulele Sub City which has a total of ten woredas and public health centers and a total population of 335,319 based on the 2009EFY population projection.

Study period: The field work was carried out from February 6 to February 24, 2017

Study Design: A cross-sectional study design was employed in Gulele Sub City, Addis Ababa city administration.

Study population: They are Governmental Health centers, woreda health offices, and Gulele Sub City health office.

Study unit: out of 21 the surveillance system evaluation included a total of 11(52%) study units; five governmental health centers, five woredas health offices, and the Sub City health office.

Sampling & Data collection methods: We were assigned on a convenience basis to five of the ten woredas by our supervisors (the sub city PHEM officers) using proximity to our residence taking into consideration time and transport constraints; while we evaluated the sub city health office together.

Typhoid fever was considered in the system evaluation. Data was collected using WHO adopted evaluation check list by interviews with woreda PHEM officers, sub city PHEM officers and health center surveillance focal persons and certain extraction of weekly report and laboratory results were also done:

- Performance of the core activities of surveillance system of the sub city which includes case definitions, case detection, registration, reporting, data analysis, interpretation, dissemination and epidemic preparedness and response was assessed
- Supportive activities of the surveillance system in regard to supervision, staff training, information feedback, equipment (communication materials) and financial support were assessed.
- Status of system attributes (sensitivity, positive predictive value, Timeliness, completeness, simplicity, data quality, flexibility, usefulness, and acceptability) was evaluated

In addition posted flow charts of the surveillance system, graphs, tables and maps of the selected diseases were checked. Records of registration book, feedback reports of surveillance, weekly and

immediately reports of surveillance in the past three months, and line lists of outbreak investigation were reviewed.

Data Analysis: Data was analyzed using the Microsoft Excel and presented with tables and graphs.

Dissemination of the Study: The result of the study was submitted to SPHMMC and Gulele sub city health office, and the finding was presented to the sub city and the college.

Ethical issue: This work was realized based on the support letter from SPHMMC to the sub city and from the sub city to woredas and Health centers.

Surveillance System Attributes

Simplicity: the simplicity of a public health surveillance system refers to both its structure and ease of operation. Surveillance systems should be as simple as possible while still meeting their objectives.

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

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

Flexibility: A flexible public health surveillance system can adapt to changing information needs or operating conditions with little additional time, personnel, or allocated funds. Flexible systems can accommodate, for example, new health-related events, changes in case definitions or technology, and variations in funding or reporting sources. In addition, systems that use standard data formats (e.g., in electronic data interchange) can be easily integrated with other systems and thus might be considered flexible.

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

Positive Predictive Value: Predictive value positive (PVP) is the proportion of reported cases that actually have the health-related event under surveillance.

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

Timeliness: Interval between the occurrence of an adverse health event and (I) the report of the event to the appropriate health agency, (ii) the identification by that agency of trends or outbreaks, for the implementation of prevention & control measures.

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

Definition of Terms

Usefulness: How helpful the system is to public health staff in taking actions as a result of interpreting and analyzing its data. It is said useful, if it contributes to the prevention and control of adverse health-related events.

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

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

Specificity: Measure of how infrequently a system detects false positive health events, i.e., the number of individuals identified by the system as not being diseased or not having a risk factor, divided by the total number of all persons who do not have the disease or risk factor of interest.

Accuracy: Degree to which a measurement or an estimate based on measurements represents the true value of the attribute that is being measured.

Feasibility: Ease with which statistical information can be obtained from the agency. This includes the ease with which the existence of information can be ascertained, as well as the suitability of the form or medium through which the information can be accessed. The cost of the information may also be an aspect of accessibility for some users.

Willingness of persons and organizations to participate in the surveillance system and it will be measured quantitatively through reviewing completeness of report forms for the past three months and timeliness of data reporting.

A case definition: is a set of criteria used to decide if a person has a particular disease, or if the case can be considered for reporting and investigation.

Standard case definition: is a case definition that is agreed upon to be used by everyone within the country. Standard case definition can be classified as confirmed, probable, and possible or suspected.

A standard case definition of suspected and confirmed cases must be used at all levels including the community, health professionals working at health posts, health centers, hospitals, health offices at different levels, private health facilities, other government health facilities and NGO clinics.

As per PHEM guideline there are two types of case definitions

Standard case definition

Suspected Cases

Suspected Typhoid fever: - Any person with gradual onset of remittent fever (rising in step ladder fashion) in the 1st week, headache, arthralgia, anorexia, constipation and abdominal pain.

Confirmed Cases

Confirmed Typhoid fever: - A suspected case with Widal test, “O” titer of 1/160 and more, is very suggestive, A suspected case with positive blood culture at the 1st week or positive stool culture at 3rd, 4th and 5th week of illness is very definitive.

Simplified Case Definitions for Community

Acute Febrile Illness: - Any person with fever, severe headache and /or diarrhea

It includes Typhoid fever, Typhus fever, Relapsing fever, Yellow fever and sometimes malaria if it is not confirmed by laboratory.

Result

Actual Information flow found in Gulele sub city Surveillance System Evaluation

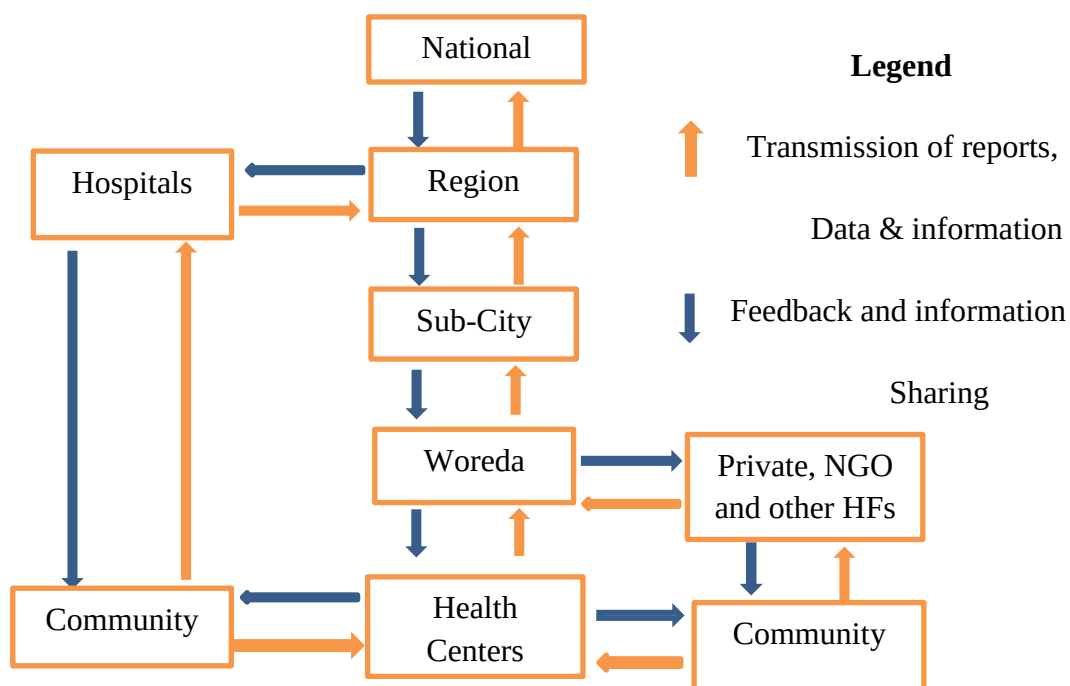


Figure 7: Actual finding of Data and Information flow of surveillance system in Gulele sub city, A.A City Administration

As we see from the above diagram it is a little bit different from the diagram on the National PHEM guideline that shows flow of surveillance reports, data, information and feedback within the system. Hospitals that found in Gulele sub city reported directly to the regional Health Bureau and again received feedback the same way; otherwise it was the same with the national flow diagram.

Population under Surveillance

According to scope of National PHEM guideline, surveillance system is applicable in all population of the country for prevention and control of diseases under PHEM. Following established regional PHEM since 2009, activities are implementing in all setting of the population. Therefore surveillance system is applicable to all population of Gulele sub city.

Table 9: Population under Surveillance of Gulele Sub City and visited Health Centers February 2017

S. No.	Sub city and Health Centers	Total Population of 2009EFY (projected from 2007 E.C) census)
	Gulele sub city	335,319
1	Woreda5 Health Center	30357
2	Woreda7 Health Center	46978
3	Woreda8 Health Center	39593
4	Woreda9 Health Center	40647
5	Woreda10 Health Center	30473

Communication and Reporting system

Of the five visited health centers three health centers were using telephone first in addition to hand delivery for timeliness and all health centers use hand delivery as well to report for sub city health office PHEM. All the visited five health centers had address of the sub city PHEM officers. All health centers sent their weekly report every Monday and the sub city sent to region every Tuesday. In case of immediately reportable diseases all the health centers communicate with the sub city using both wired and mobile phone and one health center uses Taxi too. No health center and the sub city sent summary report to the administrative, program leaders or other responsible organ other than the PHEM officers in the system. Three of the five health centers and the sub city PHEM officers respond that, their problems during communicating and reporting were mobile phone cost, transportation cost and the runner's absenteeism and the alternative solution they took to tackle the problem was using their phone/cost and reporting through phone. During the visit all the five woredas' PHEM officers were newly hired and they were in training, so the health centers were directly reported to the sub city. Gulele sub city is using telephone and internet to report weekly surveillance activities to Addis Ababa regional health bureau.

Availability of Surveillance Documentation, Registers, and Forms

Standard case definitions for all priority diseases were available in the guideline and they all have PHEM guideline but there was poor utilization of guidelines especially at the health center level for case detection by using it. Only some of the immediately reportable diseases e.g. AFP, AWD, and Measles case definitions were posted on the wall of some rooms at the health centers like, EPI and for all weekly reportable diseases were not posted. No case definition was posted in the sub city. Among 5 visited health centers and the sub city all had no a separate action threshold defined for each priority diseases except using PHEM guideline. Three health centers and the sub city had case reporting form for outbreak. The sub city and only one health center had guideline for specimen collection, handling and transportation and no health center had a trained laboratory professional for the mentioned specimen management except the surveillance focal persons. The sub city and only one Health center had line list (AWD line list) for reporting outbreak. For the last three months, two health centers faced shortage of weekly and immediately PHEM reporting formats and they use copy, the shortage was even in the sub city. All had case registration book.

Data analysis, Computer skill and Training

Of five, four health center's surveillance focal persons were trained on IDSR for 2-4 days duration 2-3 years back while one didn't trained, the sub city officers trained ten months back for two weeks but all health centers' surveillance focal persons compiled the data equally. Although all health centers had computer, surveillance focal persons had no separate PHEM unit and computer in their unit, even the surveillance focal persons do the surveillance work as additional to other works. In the sub city, even if the officers assigned as a full timer, they don't have a separate computer for surveillance but they use computer for data compilation except Epi-info. Health center officers didn't have data compilation and entry instrument, they compiled manually. They weekly collect diseases under surveillance from the morbidity and mortality registration books of the health center and whenever they detected or were told any immediately reportable diseases they have reported; otherwise they had another main assignment or work. All surveillance focal persons had computer skill on Word, three of them had excel and power point as well but none of them had Epi-info skill. At sub city level since February 2017, they have started analysis of Typhoid fever and other notify-able diseases weekly by time and place and included in the weekly bulletin but the results were not notified to higher or lower level stake holders due to shortage of time and less attention given to the analysis. All health centers have denominators for analysis like, total, Male, Female and under-five years of age population, but at all visited health centers data analysis by time, place and person & trend analysis were not performed for weekly reportable diseases. These were due to lack of time, awareness, training, commitment, lack of order or demand from higher levels, resources such as computer and printers, giving less attention and being not familiar activity were the given responses.

Epidemic response and preparedness

No health center had epidemic response and preparedness plan and had no emergency stocks of drugs and supplies but when they were asked as how they control the epidemic, they answered that, using support from A.A health bureau, sub city, EPHI, Partners, and using the health centers regular budget (for drugs & supplies). Even the sub city had no plan and emergency stocks of drugs and supplies. During the AWD outbreak in 2008 EFY, the sub city and three health centers experienced shortage of drugs and supplies. In all visited health centers and the sub city there were RRT and they had regular meeting during the outbreak but all including the sub city had no emergency management committee. Of the five health centers, only one health center and the sub

city had case management protocol for epidemic prone diseases. All health centers had multi health professional emergency preparedness and response task force and they had daily meeting during the outbreak. Partners were working together during the outbreak and they gave training, technical, material and vehicle support. In all health centers and the sub city there were no any allocated budget for epidemic response but they guess the source of the budget was from sub city administration, A.A regional health bureau or FMOH. All experienced challenge from the outbreak during 2008EFY, such as, fear of being infected, transportation and mobile phone cost, disorganized and delayed response from higher level, lack of human power for disinfection sprayer of households, space in the health center, drugs, supplies and shortage of cholera bed. Measures taken to tackle these challenges were using own mobile phone, participating non-health professionals /Daily Laborers/, using every car from other sectors including the car of the sub city's head and repairing the broken beds.

Outbreak investigation and case confirmation

All health centers investigated AWD outbreak in 2008EFY but it investigated using PHEM guideline case definition. For all health centers the laboratory confirmation of cases was done in EPHI and Regional Laboratory. For three health centers responsible persons to investigate outbreak were all Health center professionals while for one health center it was surveillance focal person and for the other health center it was RRT. The challenges during the outbreak control in the health centers were Professional panic, ambulance delay, differential diagnosis and shortage of isolation space. To tackle these challenges they used onsite management of cases, using RDT & sending sample for culture for some cases, and using tent, the available offices and even tea room.

Supervision and feedback

Gulele sub city health office had no written plan but conducted supervision and has not given written feedback for all health centers in recent three months. All health centers were supervised by the sub city PHEM officers. Three health centers each was supervised once, one health center twice, and woreda 9 four times and all health centers received oral feedback.

Usefulness of the surveillance system

At sub city level and all visited health facilities, it was identified that the current surveillance system is not useful for public health staff for taking action based on analysis and interpretation of Typhoid fever data because it had report discrepancy between the clinical log book and laboratory registration book so it is poor to estimate the magnitude of morbidity. Respondents at sub city, and all visited health facilities believe that the system is good enough to estimate magnitude of morbidity of selected diseases, identify factors associated with these diseases and able to evaluate of prevention and control programs. However, the inaccurate magnitude of report/data of typhoid fever was not useful in early detection, prevention, control and management of outbreaks.

Simplicity

All respondents at Sub city and health facility agreed that case definitions of selected disease (Typhoid fever) is easy and applicable for case detection by all level professionals and even if it is not confirmatory agglutination laboratory test of widal is available in all health centers and takes only 30 minutes to have the result and the health professionals follow the case definition. All respondents at each level were familiar with when and for whom report will be sent. Respondents at all level told that it takes 10 - 15 minutes to fill weekly reporting format on morbidity and mortality of priority disease. Similarly, respondents at sub city and health center levels agreed that it takes about 10-15 minutes to disseminate weekly reports through phone.

Flexibility

By adding additional rows at the end of the current reporting formats of both weekly and immediately that could be namely and others, it can accommodate newly occurring health events/diseases to fill on without any difficulty. Also, weekly reporting format can be modified based on current situation and different concerns. Existing reporting format was updated in 2009 to include newly emerged diseases such as Avian Influenza, Pandemic Influenza and SARS. Therefore, Surveillance system was found to be flexible by all assessed sites. And it easily could integrate with electronic system.

Data Quality

Reporting formats of weekly and immediately reportable diseases are well understood at Sub city and health center levels. Even though training has been conducted at sub city level for PHEM officers on data quality management, lack of refresher training for health center focal persons were observed, therefore some problems occurred in health centers regarding reporting system that resulted from lack of validity. It was identified that the current surveillance system was not accurate regarding typhoid fever because it had a big discrepancy.

- Blank spaces that should be filled with zero (0) number was filled in all visited health facilities and the sub city except date of sent and received (it was more than 90% complete). ‘‘Blanks’’ and ‘‘unknowns’’ were not more than 10%.

As we see from the table below there was a discrepancy between the RR (Reactive) column and Surveillance report column in every woredas' health center. This was because the specific diagnosis of acute febrile illnesses reports was not verified by focal persons with the laboratory registration books in all health centers. At the five health centers' laboratories out of 5061 who were tested for typhoid fever using widal test, a total of 1466(29%) reactive cases were registered in the laboratory registration book in fourteen WHO epidemiologic weeks or a quarter (from Oct.31, 2016-Feb 5, 2017) . From these five health centers out of 1466 reactive cases only 857(58.5%) typhoid cases were reported to Gulele sub city PHEM in three months. This discrepancy was found on the way during data collection from laboratory registration book for Positivity rate determination using agglutination test of widal.

Table 10: Comparison between surveillance data reported to Gulele sub city & tested in the laboratory of the same health centers from 31/10/2016-5/2/2017.

H.Cs widal Result from laboratory					H.C Typhoid data from surveillance Report
	RR	NR	Total	Positivity rate (%)	
W5	280	697	977	28.6591607	235
W7	189	804	993	19.03323263	19
W8	473	1118	1591	29.72972973	298
W9	201	440	641	31.35725429	2
W10	323	536	859	37.60186263	303
Total	1466	3595	5061	28.96660739	857

Acceptability

Active participation of agents in reporting system of surveillance activities in regular pattern is a major attribute for system's acceptability. PHEM weekly reporting rate was 100% (completeness) for Gulele sub city health office. All health facilities are equally send weekly report. This was due to accepting and understanding the relevance of data and they were well engaged to the surveillance system. Focal persons send their report using the current and appropriate surveillance reporting format. Surveillance system was found to be acceptable by all assessed sites.

Representativeness

Representativeness refers to the degree to which the reported cases accurately reflect the occurrence and distribution by Person, Place and Time of all the cases in the population under surveillance. Geographical representativeness and health service physical accessibility in the sub city is particularly greater important in an early warning system to ensure detection of outbreaks and nationally notify-able diseases. In relation to the potential health service coverage of visited health centers in the sub city it was above 100%, therefore the surveillance system in the sub city was representative.

Timeliness

Timely report of surveillance data is important for early public health interventions. Timeliness is a speed between steps in a public health surveillance system. As per standard of National PHEM the expected level of report timeliness is 80% and above. Early case detection is another key attribute of timeliness assessment. It was unable to describe weekly PHEM report timeliness to the sub city, since date of sent by reporting sites and date received by the sub city was not written properly. When we saw early epidemic detection part of timeliness, typhoid fever trends was not monitored and analyzed in both level facilities. Respondents at all level told that it takes 10 - 15 minutes to fill weekly reporting format on morbidity and mortality of priority disease. Therefore, timeliness attribute was poor.

Sensitivity

Sensitivity is the proportion of cases of a disease (or other health-related event) detected by the surveillance system and ability of outbreak detection. It was sensitive to detect typhoid fever at the level of reporting using case definition & lab but the focal persons didn't do trend analysis to detect outbreak. Regarding sensitivity and specificity of widal test it is debatable and needs further investigation. For example there was a study done in Saint Paul's hospital detecting false positives (positive by widal) those were confirmed as negative by culture but there were no false negatives identified by system (negative by widal) and later confirmed by culture test as true positive. The study result revealed widal seems less sensitive. In general using trend analysis to detect an outbreak by the professionals was poor; therefore sensitivity of the surveillance system was also poor.

Diagrammatic presentation of eight months weekly Typhoid fever cases

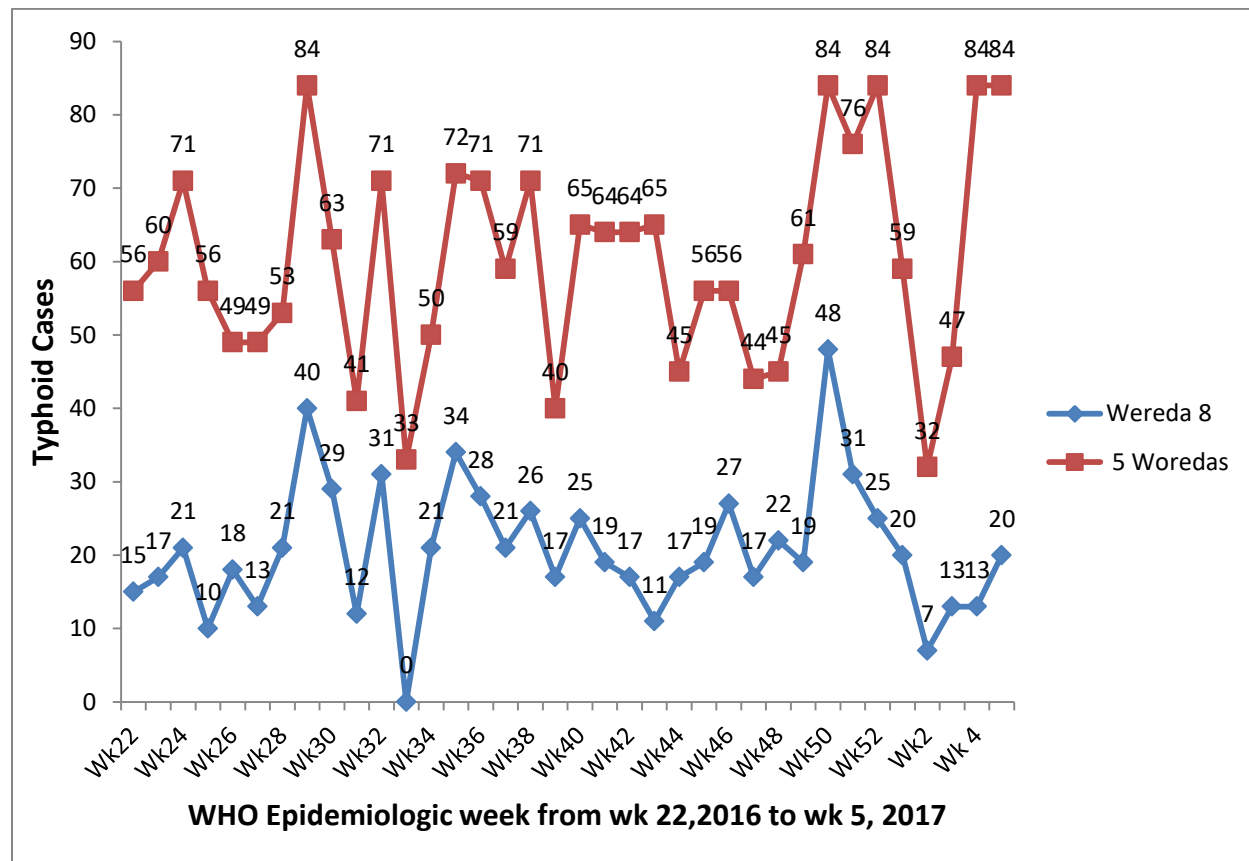


Figure 8: The five H.Cs and Woreda 8 typhoid cases reported to Gulele sub city from surveillance Report, from 30/5 /2016-5/2/2017 by WHO Epidemiologic Week.

According to surveillance report weekly typhoid trend in Gulele sub city the highest was in WHO week 29, 50 & 52, 2016 and week 4 & 5, 2017 and the lowest was week 2 of 2017. Based on PHEM guideline threshold levels for declaring an epidemic for typhoid fever is unusual increase of the cases or doubling of cases on subsequent weeks. So from the above graph there was no epidemic in the sub city compiled data and the rest four woredas but when we saw distribution by woredas, Woreda 8 showed epidemics in week 29 and 50, 2016 but it wasn't investigated.

Predictive Value Positive (PVP)

It is the proportion of reported cases that actually have the disease. The PVP reflects the sensitivity and specificity of the case definition and the prevalence. We used widal all over the country and all assessed health centers do lab tests before reporting but the test type

(agglutination) was not confirmatory according to the national guideline. Therefore we can't determine the PVP and we can't determine sensitivity & specificity of the standard case definition too.

Stability

Stability is reliability and availability of the public health surveillance system without interruption. Availability of PHEM officers at sub city and Health facility level is a good opportunity for running surveillance system even with limited resources. Except a few budget distributed for specific activities for the sub city, there is no specific budget line/source for surveillance activities at sub city and health center level. Shortage of budget and logistics was hindering supervision and capacity building activity at sub city and health center level. Respondents at sub city and most health centers believe that shortage of allocating funds and human power has compromised stability of the surveillance system in Gulele sub city.

Discussion

Epidemic preparedness refers to the existing level of preparedness for potential epidemics and includes availability of preparedness plans, stockpiling, designation of isolation facilities, setting aside of resources for outbreak response. There is no written epidemic preparedness and response plan at all visited health centers and the sub city. This may cause weak case detection and response during epidemics. The aim of preparedness is to strengthen capacity in recognizing and responding to public health emergencies through conducting regular risk identification and analysis, establishing partnership and collaboration, enhancing community participation and implementing community-based interventions and strategic communication during the pre-emergency phase and ensuring their monitoring and evaluation. According to the trend in woreda 8 there were Typhoid epidemics twice on week 29 and week 50, 2016 but there were no evidence of investigation or action taken. The epidemic could be detected simply by doing trend analysis at the woreda or sub city level but they didn't do. After compilation of all woredas report by the sub city, it might be difficult to detect outbreak from the same report; therefore at regional level the outbreak might not be detected.

Feedback is a core function of public health surveillance system. At all visited level there is no strong written feedback. As region and sub city are essential role player in preparing and disseminating feedback of surveillance activities for sub city and health center in different method, it was not done well mainly in written forms. Current practice of the sub city on preparation and dissemination weekly bulletin is a good starting to strength feedback system.

Absence of allocated budget either from government or non-governmental organizations for surveillance activities at sub city, woreda and health center level remains a major problem to run tasks under PHEM towards their objectives. Additionally less attention given for data management is being a challenge to generate and disseminate PHEM reports maintaining their quality. If there is a need, though they are not involved in the surveillance system, laboratory professionals have helped surveillance focal persons to collect (phlebotomy), centrifuge & refrigerate specimen during transportation to EPHI or regional laboratory.

There were no problems on the simplicity of the system regarding case definitions and data collection of selected diseases at all visited levels. It was agreed by all respondents that the surveillance system is flexible for newly occurring health and health related events. Reporting

formats of priority diseases are easy and clear to fill for focal persons at sub city and health facility levels. Timeliness and completeness of report is important for timely public health interventions. The average quarter completeness of weekly report at sub city and health center level is 100% which is above national minimum expected level (80%) from 31/10/2016-5/2/2017. Due to negligence of data importance date of sent and received was not written on the report form; therefore timeliness of health centers' reports was not determined.

Low Positive Predictive Value is either due to high sensitivity of the standard case definition or low specificity of the standard case definition. In this study the clinicians use the standard case definition and the health centers did widal agglutination test which is not confirmatory according to national guideline; as a result the PPV couldn't be determined without confirmatory test and we couldn't talk about sensitivity and specificity of the case definition.

There was a problem regarding Usefulness, and Data quality system attribute. In the morbidity & mortality log book at health centers it is not unusual giving a general diagnosis of 'acute febrile illness' to record typhoid fever, typhus fever, relapsing fever, and other acute febrile illnesses before sending to the laboratory. Later the diagnosis is not corrected by the clinicians according to the reported laboratory result. They only saw the reported result, prescribe the drug/s according to the result. Finally the diagnosis remains as 'acute febrile illnesses'. Then the focal persons missed this general diagnosis and collected, compiled & reported only the specific diagnosis of typhoid fever from the morbidity & mortality registration book. At the end the report only from this log book is understated because this general diagnosis 'acute febrile illness' is not reported by the surveillance system, this affected the actual data report (accuracy) or validity which in turn affected the usefulness of the system and data quality attribute.

Limitation

No feasible confirmatory tests available for typhoid fever.

To see timeliness the space provided for time sent and received on report form were not filled.

Documentation of weekly report was incomplete and was not organized in orderly manner so it was difficult to collect enough data and see the last full year trend.

Conclusion

The surveillance work was taken as an additional work in the health center level. In Gulele sub city the surveillance system was not satisfactory and there was also report discrepancy in typhoid fever so efforts should be exerted to improve the system mainly on data quality, supervisory activities, proper and timely written feedback, data management and analysis of priority diseases. Finally, the surveillance system of typhoid fever was not useful to take PH action and was not sensitive to detect outbreaks, but it was sensitive to detect cases at reporting level. However, the surveillance system was simple and flexible by all assessed sites.

Recommendation

The system will be more effective if it is taken as main work unit/department, make the human power more than one and allocate budget in a health center & sub city level. Continuous data monitoring and analyzing trends by time, place and person should be there to detect epidemic. Timely written feedback system, refreshment training and close supportive supervision should be conducted by health bureau & sub city. Relying only on clinical registration book compromises the data usefulness and quality. To reduce the discrepancy between laboratory results of typhoid fever and AFI on the clinical registration book, health center focal persons should incorporate both to verify the specific diagnosis and further investigate the discrepancy before reporting to the next higher level. In general the surveillance focal persons of the health centers should give due attention for data discrepancy and the woreda & sub-city PHEM officers should also monitor the data quality. To keep timeliness of reports the health centers or woredas should write date of sent and receipt of the report or be accessed with internet. The laboratory professionals of the health centers also should be trained and involve in the surveillance system.

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Annex 6: Surveillance system evaluation questionnaire (tools)

Questionnaire for Attributes and level of Usefulness:

Total population under surveillance -----male-----female-----Under5-----

Level of Usefulness of the Surveillance System for country priority diseases

Is the surveillance system help?

1. To detect outbreaks of priority diseases early on time to permit accurate diagnosis? ☐ Yes
☐ No
2. To estimate the magnitude of morbidity and mortality related to the diseases, including identification of factors associated with these diseases? ☐ Yes ☐ No
3. Permit assessment of the effect of prevention and control programs? ☐ Yes ☐ No
4. To estimate research intended to lead to prevention and control? ☐ Yes ☐ No

Describe Each System Attributes:

i. Simplicity:

1. Is the case definition of the priority diseases easy for case detection by all level health professionals? ☐ Yes ☐ No
2. The surveillance system allow all levels of professionals to fill data ☐ Yes ☐ No
3. Does the surveillance system help to record and report data on time? ☐ Yes ☐ No
4. Does the surveillance system have necessary information for investigation? ☐ Yes ☐ No
5. Does the surveillance system allow updating data on the cases? ☐ Yes ☐ No
6. How long it takes to fill the format? ☐ <5 minute ☐ 5 to 10 minute ☐ 10 to 15 minutes ☐ >15 minutes
7. How long does it take to have laboratory confirmation? -----

ii. Flexibility

1. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? ☐ Yes ☐ No

2. Did you think that any change in the existing procedure of case detection and reporting formats will be difficult to implement? ☐ Yes ☐ No , Add your explanation-----

3. Is the system easy to add new variables? ☐ Yes ☐ No

4. Is the surveillance system easy to integrate with other systems? ☐ Yes ☐ No

5. Is the surveillance system easy to add new disease on report? ☐ Yes ☐ No

6. Is the system easy to add new information technology? ☐ Yes ☐ No

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

1. Are all reported forms Complete? ☐ Yes ☐ No

2. If answer for Q1 is No, how many unfilled spaces are in your 2009 EFY report? -----

3. Percentage of unknown or blank responses to variables from the total reports of 2009 EFY report-----

4. Percent of reports which are complete (that is with no blank or unknown responses) from the total reports -----

5. Is the recorded data clear to read and understand? ☐ Yes ☐ No

6. If answer for Q5 is No, how many records are not clear/are difficult to understand in 2009 EFY report? -----

7. Percent of records which are difficult to read/ understand. -----

iv. Acceptability

1. Do you think all the reporting agents accept and well engaged to the surveillance activities?

☐ Yes ☐ No

2. If yes, how many are active participants (of the expected)? -----

3. If No, what is the reason for their poor participation in the surveillance activity?

A) Lack of understanding of the relevance of the data to be collected

B) No feedback / or recognition given by the higher bodies for their contribution;
i.e. no dissemination of the analysis data back to reporting facilities

C) Reporting formats are difficult to understand D) Report formats are time consuming

E) Other: -----

4. Were all participants using the standard case definition to identify cases? ☐ Yes ☐ No

5. Were all the reporting agents send their report using the current and appropriate surveillance reporting format? ☐ Yes ☐ No

6. Were all the health professionals aware about the surveillance system? ☐ Yes ☐ No

7. Was all PHEM officers send report on time? ☐ Yes ☐ No

v. Representativeness

1. What is the health service coverage of the Woreda? _____%

2. Do you think the populations under surveillance have good health seeking behavior for these diseases? Yes / No

3. was the surveillance system enabled to follow the health and health related events in the whole community? ☐ Yes ☐ No

4. Are all the Socio demographic variables included in the surveillance reporting format? ☐
Yes ☐ No

5. If the answer for Q4 is No, which a) Sex----- b) age group-----

C) ethnic group----- d) religion----- is less represented?

vi. Timeliness

1. Are all weredas/health facilities reporting on time? ☐ Yes ☐ No

2. Percent of weredas that report on time. -----

3. Are all H.Cs reporting on time? ☐ Yes ☐ No

4. Percent of H.Cs that report on time. -----

Fill the table below

Weekly H.C /Woreda reports received on time for 2009 EFY report by WHO epidemic week (Nov.2016— Feb., 2017) (to be field at wereda health office /Sub City respectively)

WHO epid wk	NO of weredas expected to report	NO of weredas that report on time	NO of H.Cs expected to report	NO of H.Cs that report on time	Remark
44					
45					
46					
47					
48					
49					
50					
51					
52					
1					
2					
3					
4					
5					

vii. Completeness

1. Are all weredas reporting (including late report)? ☐ Yes ☐ No

2. Percent of weredas that send report of each week in 2009 EFY. -----

3. Are all H.Cs reporting? ☐ Yes ☐ No

4. Percent of H.Cs that send report of each week in 2009 EFY. -----

Fill the table below

Total weekly reports received from weredas/H.Cs (including late reports, from Nov.2016— Feb., 2017) (for Sub City/ wereda health office respectively)

WHO epid wk	NO of weredas expected to report	NO of weredas that report (including late report)	NO of H.Cs expected to report	NO of H.Cs that report (including late reports)	Remark
44					
45					
46					
47					
48					
49					
50					
51					
52					
1					
2					
3					
4					
5					

viii. Stability

1. Was any new restructuring affected the procedures and activities of the surveillance of these diseases? ☐ Yes ☐ No

2. Was there lack of resources that interrupt the surveillance system? ☐ Yes ☐ No

3. Was there any time /condition in which the surveillance is not fully operating? ☐ Yes ☐ No

4. If the answer for Q3 is yes When/what is the condition that talks the system not to function properly?-----

NB: the above assessment check lists for the system attribute and level of usefulness are for both Sub City and wereda health offices.

Questionnaires for Sub City

A. Communication and reporting system assessment

1. Which communication material did you have? ☐ E-mail ☐ wired phone ☐ mobile ☐ radio ☐ fax ☐ other-----

2. Did you have address of regional PHEM officers? ☐ Yes ☐ No

3. How frequently are you communicating with the regional PHEM officers on emergencies and other daily activities? ☐ Daily ☐ weekly ☐ every 2 week ☐ monthly ☐ quarterly ☐ every 6 month ☐ yearly ☐ others-----

4. Did you have address of wereda/health facility PHEM officers? ☐ Yes ☐ No

5. How frequently are you communicating with the wereda/health facility PHEM officers on emergencies and other daily activities? ☐ daily ☐ weekly ☐ every 2 week ☐ monthly ☐ quarterly ☐ every 6 month ☐ yearly ☐ others-----

6. When are you expected to send weekly report to the Regional PHEM unit? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

7. When are you expected to receive weekly report from weredas /health facilities? ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

8. How is the Sub City communicating the wereda/health facility PHEM officers in case of immediately reportable diseases? ☐ by e-mail ☐ by phone ☐ by fax ☐ regular weekly report ☐ others-----

9. Did you send summary or short report to the administrative /program leaders or other responsible organs on planning, prevention and control activities addressing important issues at community level that have arisen through the surveillance system? ☐ Yes ☐ No

10. If answer for Q9 is yes to whom did you send? -----

11. If you faced any problems on communicating and reporting, list them-----

12. Mention the alternative solutions that you take to tackle the problems you above? -----

B. Assessment of availability of Surveillance Documentation, Registers, and Forms

1. Did you have National Guide line for PHEM? ☐ Yes ☐ No ☐ Not Applicable

2. Did you have standard case definition for all country priority diseases? Like Typhoid Fever ☐
Yes ☐ No ☐ Not Applicable

3. Was the case definition posted? ☐ Yes ☐ No

4. If answer for Q2 is No, for which disease(s) did you lack the case definition?-----

5. Have an action threshold defined for each priority disease?

Do you have an action threshold defined for malaria, Measles, and typhoid fever?
Yes ☐ No ☐

6. Did you have case reporting formats for out breaks? ☐ Yes ☐ No ☐ Not Applicable

7. Was there national manual for surveillance? ☐ Yes ☐ No ☐ Not Applicable

8. Was there guide line for specimen collection, handling and transportation to the next level? ☐
Yes ☐ No ☐ Not Applicable

9. Did you have line list for reporting outbreaks? ☐ Yes ☐ No ☐ Not Applicable

10. Did you face shortage of surveillance reporting and recording formats? ☐ Yes ☐ No

11. If answer for Q10 is yes, which form? -----

C. Data analysis, Computer skill and training assessment

1. Had you trained on surveillance system? ☐ Yes ☐ No

2. If answer for Q1 is yes a) when-----? b) Topic-----?

c) For how long? -----

3. Did you give any onsite training / orientation about surveillance system for the wereda or health facility PHEM focal persons? ☐ Yes ☐ No

4. Was data compiled and registered? ☐ Yes ☐ No

5. Did you have computer on your office? ☐ Yes ☐ No

6. Did you have computer on your department (PHEM unit)? ☐ Yes ☐ No

7. What is the data entry and compilation instrument? ☐ Manual ☐ Computer ☐ other-----

8. Did you have computer skill on ☐ Ms word ☐ Ms excel ☐ MS power point ☐ Epi-info

9. Did you analyze data of the surveillance system? ☐ Yes ☐ No

10. If answer for Q9 is yes, did you describe data by ☐ time ☐ place ☐ person

11. Did you have denominators for data analysis? ☐ total population ☐ male ☐ female ☐ U5

12. Please indicate the frequency of your data analysis. ☐ weekly ☐ every two week ☐
Monthly ☐ quarterly ☐ every 6 month ☐ annually ☐ No regular time

13. Did you notify the results of your analysis to the higher level PHEM? ☐ Yes ☐ No

14. Did you notify the results of your analysis to the lower level PHEM? ☐ Yes ☐ No

15. If answer for Q9 is No, what is the reason? ☐ lack of knowledge ☐ shortage of time do you to work load ☐ less attention given to data analysis ☐ shortage of materials ☐ analysis is not familiar activity in place ☐ negligence ☐ Other-----

D. Epidemic response and preparedness assessment

1. Did you have plan for epidemic response and preparedness? ☐ Yes ☐ No

2. Did you have emergency stocks of drugs and supplies? ☐ Yes ☐ No

3. If answer for Q2 is No, how did you control epidemics? -----

4. Had you experienced shortage of drugs, vaccines and supplies in 2009 EFY? ☐ Yes ☐ No

5. Was an epidemic management committee built in your office? ☐ Yes ☐ No ☐ Not Applicable

6. Did the epidemic management committee have regularly scheduled meeting time? ☐ Yes
☐ No

7. Was Rapid response team built in your office? ☐ Yes ☐ No ☐ Not Applicable

8. Did the Rapid response team have regularly scheduled meeting time during epidemics? ☐
Yes ☐ No

9. Did you have case management protocol for epidemic prone diseases? ☐ Yes ☐ No
☐ Not Applicable

10. Did your PHEM have multi sectoral emergency preparedness and response task force?
☐ Yes ☐ No ☐ Not Applicable

11. In what frequency did the task force meet during outbreaks? -----

12. Were partners working together with your office on emergencies? ☐ Yes ☐ No

13. If answer for Q12 is yes, what type of supports did they give to your office? -----

14. Was there a budget for epidemic response? ☐ Yes ☐ No

15. Who had the authority to mobilize the emergency finance? ☐ Sub City head ☐ Sub City health office ☐ experts ☐ other-----

16. Had you a car assigned for emergencies (PHEM)? ☐ Yes ☐ No ☐ Not functional

17. If answer for Q16 is NO, how did you address emergencies? -----

18. Had you faced any Challenges on epidemic response and preparedness in 2009 EFY?
☐ Yes ☐ No

19. If answer for Q18 is yes, a) list the challenges-----

b) what measures did you take to tackle the challenges?-----

E. Outbreak investigation and case confirmation assessment

1. Had you investigated any outbreak in 2009 EFY? ☐ Yes ☐ No

2. Did you have outbreak investigation check list? ☐ Yes ☐ No

3. If answer for Q2 is No, how did you know possible factors for the outbreak? -----

4. Where was laboratory confirmation of cases done? ☐ Regional laboratory ☐ Hospital

☐ EPHI ☐ health center ☐ contracted private laboratory ☐ other-----

5. Who was responsible to investigate an outbreak? ☐ Rapid response team ☐ HEW ☐ staffs of wereda health office ☐ experts organized randomly ☐ health facility staffs ☐ other-----

6. If answer for Q1 is yes how many out breaks did you investigated in 2008 EFY? -----.

Fill the table below

S.No	Name of out break	Place (wereda)	No of cases			No of deaths			Start date of the out break	Investigation date	Remark
			M	F	U5	M	F	U5			
1											
2											
3											
4											
5											

7. Had you faced any challenge in outbreak investigation in 2008 EFY? ☐ Yes ☐ No

8. If answer for Q7 is yes, a) list the challenges-----

b) list the alternatives that you take to tackle the challenges.-----

F. Supervision and feedback assessment

1. Did you have supervision plan in 2008 EFY? ☐ Yes ☐ No

2. If answer for Q1 is No, how did you supervise? -----

3. If answer for Q1 is yes, did you supervise the weredas and health facilities? ☐ Yes ☐ No

4. If answer for Q3 is No, what is the reason? -----

5. If answer for Q3 is yes, how many times did you supervise each wereda and health facilities in 2008 EFY? Wereda ----- Health facility-----

6. Had you reviewed about surveillance practice by higher level supervision ☐ Yes ☐ No

7. Did you have regular supervision checklist? ☐ Yes ☐ No

8. If answer for Q7 is No, how did you supervise the weredas and health facilities? -----

9. Were you supervised by higher level (regional) officers in 2008 EFY? ☐ Yes ☐ No

10. If answer for Q9 is yes, how many times in 2008 EFY? -----

11. Did you send feedback of your supervision to the weredas and health facilities commenting/indicating their strong and weak sides? ☐ Yes ☐ No

12. If answer for Q11 is No, why?-----

13. If answer for Q11 is yes, for how many weredas and health facilities did you send a feedback in 2008 EFY? Wereda----- health facilities-----

14. Had you received feedback from higher level supervisors in 2008 EFY? ☐ Yes ☐ No

15. If answer for Q14 is yes, how many feedbacks did you received in 2008 EFY? -----

16. Had you faced any challenge on supervision and feedback in 2008 EFY? ☐ Yes ☐ No

17. If answer for Q16 is yes, a) list the challenges.-----

b) list the measures that you take to tackle the challenges.-----

Questionnaire for the wereda health offices

A. Communication and reporting system assessment

1. Which communication material did you have? ☐ E-mail ☐ wired phone ☐ mobile ☐
radio ☐ fax ☐ other-----
2. Did you have address of Sub City PHEM officers? ☐ Yes ☐ No
3. How frequently are you communicating with the Sub City PHEM officers on emergencies and other daily activities? ☐ Daily ☐ weekly ☐ every 2 week ☐ monthly ☐ quarterly ☐
every 6 month ☐ yearly ☐ others-----
4. Did you have address of HC PHEM focal persons? ☐ Yes ☐ No
5. How frequently are you communicating with the HC PHEM focal persons on emergencies and other daily activities? ☐ daily ☐ weekly ☐ every 2 week ☐ monthly ☐ quarterly ☐ every
6 month ☐ yearly ☐ others-----
6. When are you expected to send weekly report to the Sub City PHEM unit? ☐ Monday
☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday
7. When are you expected to receive weekly report from HCs? ☐ Monday ☐ Tuesday ☐
Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday
8. How is the wereda communicating the HCs PHEM officers in case of immediately reportable diseases? ☐ by e-mail ☐ by phone ☐ by fax ☐ regular weekly report ☐ others
9. Did you send summary or short report to the administrative /program leaders or other responsible organs on planning, prevention and control activities addressing Important issues at community level that have arisen through the surveillance system? ☐ Yes ☐ No
10. If answer for Q9 is yes to whom did you send? -----

11. If you faced any problems on communicating and reporting, list them-----

12. Mention the alternative solutions that you take to tackle the problems you above? -----

B. Assessment of availability of Surveillance Documentation, Registers, and Forms

1. Did you have National Guide line for PHEM? ☐ Yes ☐ No ☐ Not Applicable

2. Did you have standard case definition for all country priority diseases? Like Typhoid Fever ☐
Yes ☐ No ☐ Not Applicable

3. Was the case definition posted? ☐ Yes ☐ No

4. If answer for Q2 is No, for which disease(s) did you lack the case definition?-----

5. Have an action threshold defined for each priority disease?

Do you have an action threshold defined for malaria, Measles, and typhoid fever?
Yes ☐ No ☐

6. Did you have case based reporting formats for out breaks?☐ Yes ☐ No ☐ Not Applicable

7. Was there national manual for surveillance? ☐ Yes ☐ No ☐ Not Applicable

8. Was there guide line for specimen collection, handling and transportation to the next level? ☐
Yes ☐ No ☐ Not Applicable

9. Did you have line list for reporting outbreaks? ☐ Yes ☐ No ☐ Not Applicable

10. Did you face shortage of surveillance reporting and recording formats?☐ Yes ☐ No

11. If answer foe Q10 is yes, which form? -----

C. Data analysis, Computer skill and training assessment

1. Had you trained on surveillance system? ☐ Yes ☐ No
2. If answer for Q1 is yes a) when-----? b) Topic-----? c)
For how long? -----
3. Did you give any onsite training / orientation about surveillance system for the HC PHEM focal persons? ☐ Yes ☐ No
4. Was data compiled? ☐ Yes ☐ No
5. Did you have computer on your office? ☐ Yes ☐ No
6. Did you have computer on your department (PHEM unit)? ☐ Yes ☐ No
7. What is the data entry and compilation instrument? ☐ Manual ☐ Computer other-----

8. Did you have computer skill on ☐ Ms word ☐ Ms excel ☐ MS power point ☐ Epi-info
9. Did you analyze data of the surveillance system? ☐ Yes ☐ No
10. If answer for Q9 is yes, did you describe data by, ☐ time ☐ place ☐ person
11. Did you have denominators for data analysis? ☐ total population ☐ male ☐ female
☐ under five
12. Please indicate the frequency of your data analysis. ☐ weekly ☐ every two week ☐
Monthly ☐ quarterly ☐ every 6 month ☐ annually ☐ No regular time
13. Did you notify the results of your analysis to the higher level PHEM? ☐ Yes ☐ No
14. Did you notify the results of your analysis to the lower level PHEM? ☐ Yes ☐ No
15. If answer for Q9 is No, what is the reason? ☐ lack of knowledge ☐ shortage of time do you
to work load ☐ less attention given to data analysis ☐ shortage of materials ☐ analysis is not
familiar activity in place ☐ negligence ☐ Other-----

D. Epidemic response and preparedness assessment

1. Did you have plan for epidemic response and preparedness? ☐ Yes ☐ No

2. Did you have emergency stocks of drugs and supplies? ☐ Yes ☐ No

3. If answer for Q2 is No, how did you control epidemics? -----

4. Had you experienced shortage of drugs, vaccines and supplies in 2008 EFY? ☐ Yes ☐ No

5. Was an epidemic management committee built in your office? ☐ Yes ☐ No ☐
Not Applicable

6. Did the epidemic management committee have regularly scheduled meeting time? ☐ Yes
☐ No

7. Was Rapid response team built in your office? ☐ Yes ☐ No ☐ Not Applicable

8. Did the Rapid response team have regularly scheduled meeting time during epidemics? ☐
Yes ☐ No

9. Did you have case management protocol for epidemic prone diseases? ☐ Yes ☐ No ☐
Not Applicable

10. Did your PHEM have multi sectoral emergency preparedness and response task force? ☐
Yes ☐ No ☐ Not Applicable

11. In what frequency did the task force meet during outbreaks? -----

12. Were partners working together with your office on emergencies? ☐ Yes ☐ No

13. If answer for Q12 is yes, what type of supports did they give to your office? -----

14. Was there a budget for epidemic response? ☐ Yes ☐ No

15. Who had the authority to mobilize the emergency finance? ☐wereda head ☐ wereda health office ☐ experts ☐ other-----

16. Had you a car assigned for emergencies (PHEM)? ☐ Yes ☐ No ☐ Not functional

17. If answer for Q16 is NO, how did you address emergencies? -----

18. Had you faced any Challenges on epidemic response and preparedness in 2008 EFY? ☐
Yes ☐ No

19. If answer for Q18 is yes, a) list the challenges-----

-----b) what
measures did you take to tackle the challenges?-----

E. Outbreak investigation and case confirmation assessment

1. Had you investigated any outbreak in 2008 EFY? ☐ Yes ☐ No

2. Did you have outbreak investigation check list? ☐ Yes ☐ No

3. If answer for Q2 is No, how did you know possible factors for the outbreak? -----

4. Where was laboratory confirmation of cases done? ☐ regional laboratory ☐ Hospital ☐
EPHI ☐ health center ☐ contracted private laboratory ☐ other-----

5. Who was responsible to investigate an outbreak? ☐ rapid response team ☐ HEWs ☐
staffs of wereda health office ☐ experts organized randomly ☐ health facility staffs ☐
other-----

6. If answer for Q1 is yes how many out breaks did you investigated in 2008 EFY? -----

Fill the table below

S.No	Name of out break	Place (wereda)	No of cases			No of deaths			Start date of the out break	Investigation date	Remark
			M	F	U5	M	F	U5			
1											
2											
3											
4											
5											

7. Had you faced any challenge in outbreak investigation in 2008 EFY? ☐ Yes ☐ No

8. If answer for Q7 is yes, a) list the challenges-----
 ----- b)
 list the alternatives that you take to tackle the challenges.-----

F. Supervision and feedback assessment

1. Did you have supervision plan in 2008 EFY? ☐ Yes ☐ No

2. If answer for Q1 is No, how did you supervise? -----

3. If answer for Q1 is yes, did you supervise the health centers (HCs) according to your plan in 2008 EFY? ☐ Yes ☐ No

4. If answer for Q3 is No, what is the reason? -----

5. If answer for Q3 is yes, how many times did you supervise each health center (HC) in 2008 EFY? -----

6. Had you reviewed about surveillance practice by higher level supervision? ☐ Yes ☐ No

7. Did you have regular supervision checklist? ☐ Yes ☐ No

8. If answer for Q7 is No, how did you supervise the weredas and health facilities? -----

9. Were you supervised by higher level officers in 2008 EFY? ☐ Yes ☐ No

10. If answer for Q9 is yes how many times in 2008 EFY? -----

11. Did you send feedback of your supervision to the health centers (HCS) commenting/indicating their strong and weak sides? ☐ Yes ☐ No

12. If answer for Q11 is No, why?-----

13. If answer for Q11 is yes, for how many HCs did you send a feedback in 2008 EFY? -----

14. Had you received feedback from higher level supervisors in 2008 EFY? ☐ Yes ☐ No

15. If answer for Q14 is yes how many feedbacks did you received in 2008 EFY? -----

16. Had you faced any challenge on supervision and feedback in 2008 EFY? ☐ Yes ☐ No

17. If answer for Q16 is yes a) list the challenges.-----

b) list the measures that you take to tackle the challenges .-----

Questionnaires for Health Centers

A. Communication and reporting assessment

1. Which communication material did you have? ☐ E-mail ☐ wired phone ☐ mobile ☐ radio
☐ fax ☐ other-----

2. Did you have address of Sub City/wereda PHEM officers? ☐ Yes ☐ No

3. How frequently are you communicating with the Sub City /wereda PHEM officers on emergencies and other daily activities? ☐ Daily ☐ weekly ☐ every 2 week ☐ monthly ☐ quarterly ☐ every 6 month ☐ yearly ☐ others-----

4. When are you expected to send weekly report to the Sub City /wereda PHEM unit? ☐ Monday
☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday ☐ Sunday

5. How is your facility communicating the Sub City /wereda PHEM officers in case of immediately reportable diseases? ☐ by e-mail ☐ by phone ☐ by fax ☐ regular weekly report ☐ others-----

6. Did you send summary or short report to the administrative /program leaders or other responsible organs on planning, prevention and control activities addressing Important issues at community level that have arisen through the surveillance system? ☐ Yes ☐ No

7. If answer for Q6 is yes, to whom did you send? -----

8. If you faced any problems on communicating and reporting, list them-----

9. Mention the alternative solutions that you take to tackle the problems you above? -----

B. Assessment of availability of Surveillance Documentation, Registers, and Forms

1. Did you have National Guide line for PHEM? ☐ Yes ☐ No ☐ Not Applicable

2. Did you have standard case definition for all country priority diseases? ☐ Yes ☐ No ☐ Not Applicable

3. Was the case definition posted? ☐ Yes ☐ No

4. If answer for Q2 is No, for which disease(s) did you lack the case definition?-----

Have an action threshold defined for each priority disease?

5. Do you have an action threshold defined for malaria, Measles, and typhoid fever?
Yes ☐ No ☐

6. Did you have case reporting formats for out breaks? ☐ Yes ☐ No ☐ Not Applicable

7. Was there national manual for surveillance? ☐ Yes ☐ No ☐ Not Applicable

8. Was there guide line for specimen collection, handling and transportation to the next level? ☐
Yes ☐ No ☐ Not Applicable

9. Did you have line list for reporting outbreaks? ☐ Yes ☐ No ☐ Not Applicable

10. Was there a clinical register/logbook in your health facility? ☐ Yes ☐ No

☐ Not Applicable

11. Did you face shortage of surveillance reporting and recording formats? ☐ Yes ☐ No

12. If answer for Q11 is yes, which form? -----

C. Data analysis, Computer skill and training assessment

1. Had you trained on surveillance system? ☐ Yes ☐ No

2. If answer for Q1 is yes a) when-----? b) Topic-----? c)
For how long? -----

3. Was data compiled? ☐ Yes ☐ No

4. Did you have computer on your office? ☐ Yes ☐ No
5. Did you have computer on your department (PHEM unit)? ☐ Yes ☐ No
6. What is the data entry and compilation instrument? ☐ Manual ☐ Computer ☐ other-----

7. Did you have computer skill on ☐ Ms word ☐ Ms excel ☐ MS power point ☐ Epi-info
8. Did you analyze data of the surveillance system? ☐ Yes ☐ No
9. If answer for Q8 is yes, did you describe data by ☐ time ☐ place ☐ person
10. Did you have denominators for data analysis? ☐ total population ☐ male ☐ female
☐ U5
11. Please indicate the frequency of your data analysis. ☐ weekly ☐ every two week
☐ Monthly ☐ quarterly ☐ every 6 month ☐ annually ☐ No regular time
12. Did you notify the results of your analysis to the higher level PHEM? ☐ Yes ☐ No
13. If answer for Q8 is No, what is the reason? ☐ lack of knowledge ☐ shortage of time do you
to work load ☐ less attention given to data analysis ☐ shortage of materials ☐ analysis is not
familiar activity in place ☐ negligence ☐ Other-----

D. Epidemic response and preparedness assessment

1. Did you have plan for epidemic response and preparedness? ☐ Yes ☐ No
2. Did you have emergency stocks of drugs and supplies? ☐ Yes ☐ No
3. If answer for Q2 is No, how did you control epidemics? -----

4. Had you experienced shortage of drugs, vaccines and supplies in 2008 EFY? ☐ Yes ☐
No

5. Was an epidemic management committee built in your facility? ☐ Yes ☐ No ☐ Not Applicable

6. Did the epidemic management committee have regularly scheduled meeting time? ☐ Yes ☐ No

7. Was Rapid response team built in your office? ☐ Yes ☐ No ☐ Not Applicable

8. Did the Rapid response team have regularly scheduled meeting time during epidemics?
☐ Yes ☐ No

9. Did you have case management protocol for epidemic prone diseases? ☐ Yes ☐ No
☐ Not Applicable

10. Did your PHEM have multi sectoral emergency preparedness and response task force?
☐ Yes ☐ No ☐ Not Applicable

11. In what frequency did the task force meet during outbreaks? -----

12. Were partners working together with your office on emergencies? ☐ Yes ☐ No

13. If answer for Q12 is yes, what type of supports did they give to your office? -----

14. Was there a budget for epidemic response? ☐ Yes ☐ No

15. Who had the authority to mobilize the emergency finance? ☐ Sub City/wereda head ☐ Sub City/wereda health office ☐ experts ☐ other-----

16. Had you faced any Challenges on epidemic response and preparedness in 2008 EFY? ☐ Yes ☐ No

17. If answer for Q16 is yes, a) list the challenges-----

b) what measures did you take to tackle the challenges?-----

E. Outbreak investigation and case confirmation assessment

1. Had you investigated any outbreak in 2008 EFY? ☐ Yes ☐ No

2. Did you have outbreak investigation check list? ☐ Yes ☐ No

3. If answer for Q2 is No, how did you know possible factors for the outbreak? -----

4. Where was laboratory confirmation of cases done? ☐ regional laboratory ☐ Hospital ☐
EPHI ☐ health center ☐ contracted private laboratory ☐ other-----

5. Who was responsible to investigate an outbreak? ☐ Rapid response team ☐ HEW ☐ staffs of
wereda health office ☐ experts organized randomly ☐ health facility staffs ☐
other-----

6. If answer for Q1 is yes how many out breaks did you investigated in 2008 EFY? -----

Fill the table below

S.No	Name of out break	Place (wereda)	No of cases			No of deaths			Start date of the out break	Investigation date	Remark
			M	F	U5	M	F	U5			
1											
2											
3											
4											
5											

7. Had you faced any challenge in outbreak investigation in 2008 EFY? ☐ Yes ☐ No

8. If answer for Q7 is yes, a) list the challenges-----

b) list the alternatives that you take to tackle the challenges.-----

F. Supervision and feedback assessment

1. Had you reviewed about surveillance practice by higher level supervision? ☐ Yes ☐ No

2. Were you supervised by higher level (regional) officers in 2008 EFY? ☐ Yes ☐ No

3. If answer for Q2 is yes, how many times in 2008 EFY? -----

4. Had you received feedback from higher level supervisors in 2008 EFY? ☐ Yes ☐ No

5. If answer for Q4 is yes, how many feedbacks did you received in 2008 EFY? -----

6. Had you faced any challenge on supervision and feedback in 2008 EFY? ☐ Yes ☐ No

7. If answer for Q6 is yes a) list the challenges.-----

----- b) list the measures that you take to tackle the challenges.-----

Appendix

Table of weekly Typhoid fever cases that shows trends by woreda from May 30, 2016 to February 5, 2017

WHO Epidemiologic Week	Woreda 5	Woreda 7	Woreda 8	Woreda 9	Woreda 10	Total
Wk 22	21	0	15	0	20	56
Wk 23	18	0	17	1	24	60
Wk 24	24	0	21	8	18	71
Wk 25	24	0	10	1	21	56
Wk 26	19	0	18	1	11	49
Wk 27	18	1	13	2	15	49
Wk 28	22	0	21	0	10	53
Wk 29	25	0	40	1	18	84
Wk 30	13	3	29	1	17	63
Wk 31	10	0	12	1	18	41
Wk 32	16	1	31	0	23	71
Wk 33	12	0	0	1	20	33
Wk 34	8	1	21	0	20	50
Wk 35	13	0	34	2	23	72
Wk 36	20	0	28	1	22	71
Wk 37	14	2	21	0	22	59
Wk 38	13	2	26	0	30	71
Wk 39	9	0	17	1	13	40
Wk 40	19	0	25	0	21	65
Wk 41	13	2	19	2	28	64
Wk 42	20	0	17	2	25	64

Wk 43	17	2	11	0	35	65
Wk 44	23	4	17	1	0	45
Wk 45	22	0	19	0	15	56
Wk 46	11	1	27	0	17	56
Wk 47	11	0	17	0	16	44
Wk 48	8	2	22	0	13	45
Wk 49	4	4	19	0	34	61
Wk 50	10	0	48	0	26	84
Wk 51	6	0	31	1	38	76
Wk 52	26	3	25	0	30	84
Wk 1	25	0	20	0	14	59
Wk 2	11	2	7	0	12	32
Wk 3	17	2	13	0	15	47
Wk 4	36	0	13	0	35	84
Wk 5	25	1	20	0	38	84

CHAPTER-IV Health profile report

4.1 Wereda 9, Gulele sub city, Addis Ababa, Ethiopia health profile report 2016

Abstract

Introduction: Health profile is presentation and discussion of health related data and important health related indicators to describe the health and related socio-demographic factors in the geographic area under discussion. The health profile is a living document, with sections added to the health unit and allow for better response to changing demography and health of the residents of the area. Health problems are worse due to many factors like poor economic status, low health service coverage, lower education, and poor infrastructure. Therefore, it was necessary to assess and describe the health profile to identify the health constraint and service status.

Methods: Health profile of Woreda 9 in Gulele Sub City was described. Cross-sectional study design was employed. The reporting period covered from April, 11 to first week of May, 2016. Interview using data collection format were the main tools for primary and secondary data collection. The woreda health office, Finance and Economic, Education, the sub city Health office in which the woreda is situated and the Woreda Administration Bureau were visited and asked to give information related to their respective sector. Finally data were compiled and analyzed using Microsoft Excel & Arc GIS for mapping.

Result: Woreda 9 is under Gulele Sub-City with a current total estimated population of 39418 & household of 6363 with an average family size of 6.2, this year the health sector takes 32 % (7,110,690 ETB) of the Woreda budget excluding internal revenue.

In the year 2015/16 the numbers of students enrolled were 12,513 of which 6122 & 6391 were males and females students respectively. In all grade-levels female outnumbered male students except students enrolled in Kinder Garden (K.G) grade level school.

Safe water supply coverage in the Woreda was 100% but latrine coverage was unknown. There was 100% coverage of telecommunication, and electricity power supply in the Woreda except some interruption of water & electricity supplies due to different reasons. Transportation & Health are 100% accessible. The woreda has one Health Center with total of 82 health workers and 52 supportive employees.

Acute Upper Respiratory Infections were the top leading causes of Out Patient Department (OPD) visit for three consecutive years in the woreda. There was no information regarding the Woreda Tuberculosis (TB) and HIV/AIDS prevalence.

Conclusion & Recommendation: In the last three years, Acute Upper Respiratory Infection, Other or unspecified infectious & parasitic diseases and Diarrhea were the leading causes of Morbidity in the Woreda which may attribute to poor sanitation and low public awareness of environmental health & personal hygiene practices.

Vital Statistics, infant and child mortality should be registered and documented.

Health education to the population is needed regarding environmental health & personal hygiene.

Introduction

Health profile is presentation and discussion of health related data and important health related indicators to describe the health and related socio-demographic factors in the Woreda under discussion. The health profile will be a living document, with sections added to the health unit and allow for better response to changing demography and health of the residents of the area. The data in a profile reflect the health of a given community from many different angles[6]. A community can refer to a country, a locality within a country, a tribe, or a multi-country region. The information may include data already collected and published about a community or information collected by the organizations or individuals creating the profile. As societies grow more complex and people are increasingly bombarded with health information and misinformation, health literacy becomes essential. People with strong health literacy skills enjoy better health and well-being, while those with weaker skills tend to engage in riskier behavior and have poorer health.

Health Profiles are designed to help local government and health services identify problems in their areas and decide how to tackle them[8]. They provide a snapshot of the overall health of the local population, and highlight potential problems through comparison with other areas and with the national average. In general, health profile is summarized auditing and discussing health related data and important health related indicators to describe the health and related social, economic, political and cultural factors in the geographic area under discussion. Subsequently, it is vital for prioritizing major health and health related problems of the community at any level. It is for planning and for appropriate intervention and is an entry point for operational research. Stake holders of health and health related issues will access evidence based information from well compiled health profile, but such valuable information was not fully found in Woreda 9 of Gulele Sub City.

Rationale

Health profile assessment is a way to gain a snapshot of a community's current assets and needs by examining and recording community strengths, challenges, and resources. Therefore, an assessment of current health profile of a Woreda is important to provide a way for a coalition to get a better understanding of the community's health and what the current needs may be. Health problems are worse due to many factors like poor economic status, low health service seeking behavior, lower education, and poor infrastructure. Therefore, it was necessary to assess and describe the health profile to identify the health constraint and service status of the Woreda.

General objective

The objective of this study is to describe the general overview of health and multi-sectorial contribution to health and health related problems in wereda 9, Gulele Sub City in 2016.

Specific Objectives

- To review existing health profile of Woreda 9.
- Ensures that decisions are based on solid information and evidence.
- Clearly present a community's health needs and priority setting.
- To assess and describe demographic, social and economic information.

Methods and Material

Health and health related data were collected from Woreda 9 of Gulele Sub City. Cross-sectional study design was employed. The reporting period covered from April, 11 to first week of May, 2016. Based on CSA 2.1% annual population projection factors the woreda pop. number was used as a denominator. These data were collected from all stakeholders & offices of the woreda 9 that have direct or indirect connection with health. The Woreda Health, Finance and Economic, Education, and the Woreda Administration Bureau were visited and asked to give information that are related to their respective sectors. Interview and document review using data collection format were the main tools for primary and secondary data collection. The interview was conducted to the relevant health worker and officials. Different health related records were also checked. In addition to this, data that were missed during the visit were obtained by phone from the concerned persons of the sectors. Data were compiled and analyzed using Microsoft Excel & Arc GIS for mapping. Support letter was written to Gulele Sub City Health Office from SPHMMC and again to woreda 9 to cooperate during the data collection period and used as an ethical clearance. Finally findings of the health profile were disseminated to wereda 09 health office, Selam H.C and SPHMMC department of public health.

Result

Background Information

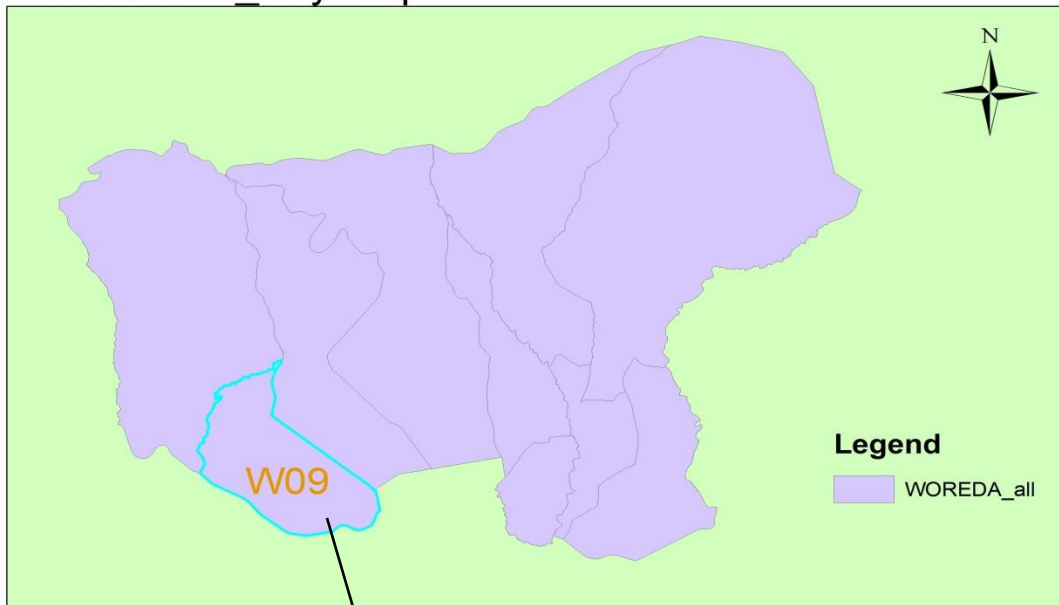
Geography and climate

Addis Ababa, the capital city of Ethiopia, which is located between 8° 49' 55.929'' and 9° 5' 53.853'' North latitude and between 38° 38' 16.555'' and 38° 54' 19.547'' East Longitude, covers an area of 51948.85 hectare & according to 2007 Census, it has a Population of 2,738,248 persons which is 60% of the total urban population of Ethiopia .Gulele is one of the ten sub-cities in Addis Ababa administration with land area of 3119.1 hectares. It suited in the North part of Addis Ababa, bordered from south by Addis- Ketema and Arada, from west by Kolfe-keranio, from north Oromia region and from east by Yeka. In the sub-city the altitude ranged from 2449 to 3016 meters above sea level which has a range of 567 meters. (4)

Administrative and Political Organization

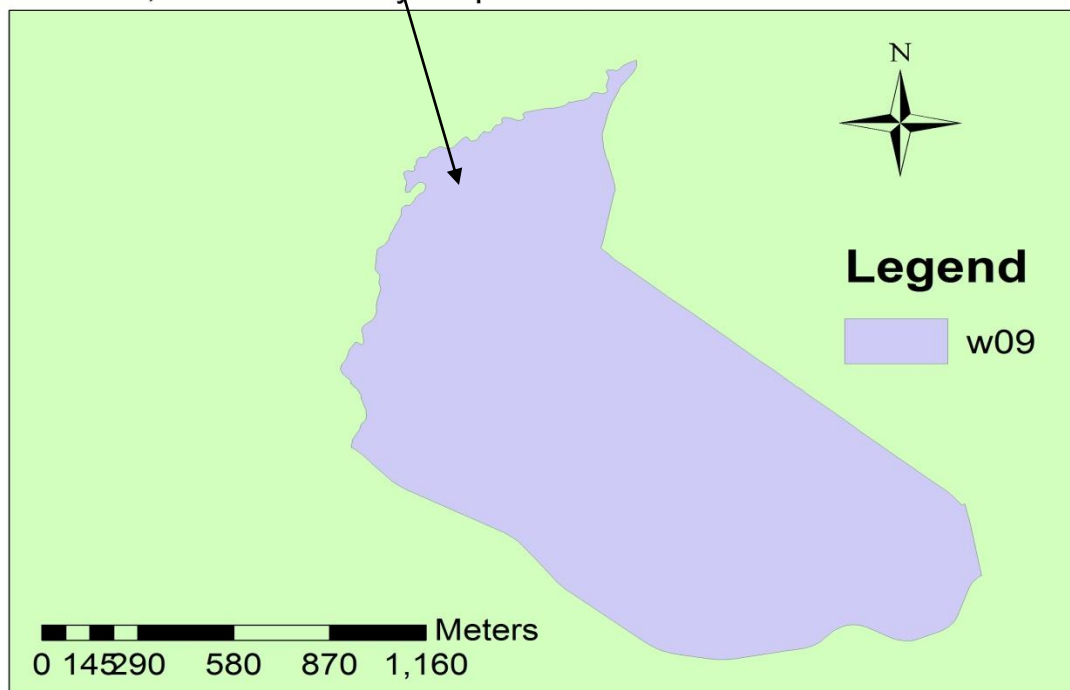
According to the amended Addis Ababa city government charter proclamation No.311/2002 the structure of the organs of power of the sub-city include in the sub-city are 10 woredas ,73 sub woredas, 200 'Sefers' and 546 blocks. The power organs of the of sub-city are the Gulelle sub-city council, Gulele sub-city chief executive, and Gulele sub-city standing committee, and that of woredas have woreda council, woreda chief executive, woreda standing committee, and woreda social court. Therefore, Woreda 9 undertakes its administrative duties and responsibilities in 6 kebeles.

Gulele Sub_City Map



Source:A.A ILIC
Coordinate System:Adindan_UTM_Zone_37N

Woreda 9,Gulele Sub-City Map



Source:A.A ILIC
Coordinate System:Adindan_UTM_Zone_37N

Figure 9: Map of woreda 9 Gulele sub city, A.A, Ethiopia, 2016

Demography

Gulele Sub-city in 2014/15 has a total population of 319, 470 from which 48% are males and 52% females. This constitutes 10% of the entire population of A.A city which makes Gulele the 6th highly populated sub-city. From the total population of Gulele Sub City most of them live in woreda 7, with population number of 42,740 which is 16 % of the sub-city population. And relatively few people live in woreda 04 with population number of 15,662 which is 5.8% of the sub-city population.

The most densely populated woreda in Gulele sub-city is woreda 03 with population density of 304.35people/hectare and the least dense woreda is woreda 01 with population density of 38.35people/hectare.

Background of Woreda 9

Woreda 9 is sub divided by six old Kebeles and administered under Gulele Sub City, A.A City administration. It situated in the North part of Addis Ababa, bordered from south by Arada sub-city, from west by Adiss ketma sub-city, by Gulele Sub-City, Woreda 10 & 8 from North and East respectively. Woreda 9 in 2014/15 has a total population of 38,607 from which 49.8% are males and 50.2% females. Now in 2015/16 the population is grown to 39,418 by 2.1% annual population growing projection. There were about 23 sectors & offices in the woreda. Selam H.C is one of the sectors in Woreda 9 and one of the ten public Health centers in Gulele sub city with a catchment population of 39,418, it is one of the top performing Health Centers that received several awards from FMOH, Addis Ababa RHB and the Sub City, it has been constructed in1995E.C by Ethiopian Social Rehabilitative & Development fund and the surrounding beneficiary community and started giving service on October 2, 1996 E.C. It is landed on the area of 3273 m².

Wereda Health Office/H.C Structure

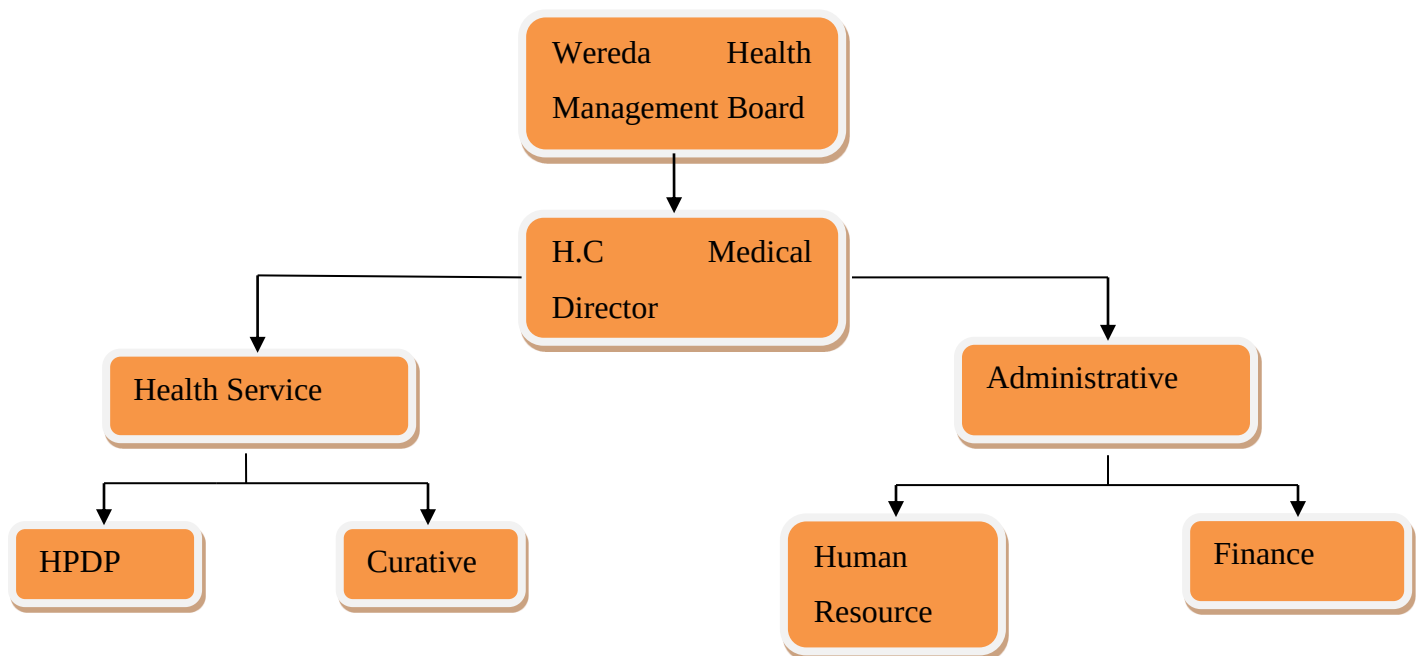


Figure 10: Woreda Health Office (H.C) structure

The Woreda Health Office & the H.C structure was organized under two broad categories, Health Service & Administrative departments. The Health service was led by Health Promotion & Disease Prevention Core Processor and Curative Core Processor, and the administrative was led by Human resource & Finance Supportive Processors. Under each Core & Supportive Processes there were one or more Case teams & Case team leaders. The functions of those processes & teams are:

- Undertaking all management responsibilities to ensure smooth implementation of health services in the Woreda

In the year 2014/15 the population number of Woreda 9 was 38,706, in the year 2015/16 the size of the Woreda 9 population is 39,418 of which 18,920 (48%) male and 20,498 (52%) female. The pyramidal age structure reflects that 6626(16.8%) were children under age 15 and females of reproductive age group accounting for 13654(66.6 %) of the female population, while only about 918 (6.7%) were pregnant (table: 11). From the Health office or Vital Statistics Office there was

no information regarding distribution of Ethnicity & Religion. The total household in the Woreda obtained by actual visit of HEWs was 6373 in 2014/15, with an average family size of 6.1.

Table 11: Demographic Data by Age and Sex, Woreda 9, Gulele Sub City, A.A, Ethiopia, 2016

Population data by age and sex								Total
Male	<1Yr.	1-4Yr.	5-15Yr.	>=15Yr.				
	424	930	1827	15740				18921
Female	<1Yr.	1-4Yr.	5-15Yr.	>=15Yr.	15-49Yr.	PW		
	459	1009	1977	17052	13654	918		20497
Total	883	1939	3804	32792				39418

Source: 2015/16 H.C Plan

Economic situation

The Woreda Finance & Economic Development Office had no enough information about the wereda resident's economic status & main source of income.

Health budget allocation

Based on the information from the Woreda Finance & Economic Development Office, the annual budget allocated from the Sub city in the year 2015/16 for the Woreda was 16, 000, 000 ETB. Of that the amount budgeted to the Woreda Health Office was 980,670 ETB (6.1%). The budget allocated for the Health Center is independent. It was unknown about the donors and partners contribution of funds. In 2013/14 the H.C was awarded 500,000 ETB as a top performer of the year from A.A & third from the national H.Cs.

Table 12: Government Budget from 2013/14-2015/16, Woreda 9, Gulele Sub City, A.A, Ethiopia, 2016.

Year	Woreda budget(ETB)	Health Center budget(ETB)	Proportion of Health budget from wereda for Health Office (%)	Additional Internal Revenue of H.C
2013/14	7,000,000	3,337,455.96	694,729(9.9%)	964,916
2014/15	9,128,800	4,184,320	789,074(8.6%)	491,500
2015/16	16,000,000	6,130,020	980,670(6.1%)	763,980

Education

In the year 2013/14 according to the Gulele sub city education office, in the Woreda there were 9 (K.G) grade-level of schools & 12 primary Schools. Similarly there were 2 Secondary schools. It had one Preparatory school (11-12) and one College. In the year 2015/16 based on the wereda education office, currently there are 12 K.Gs, 13 Primary Schools, 7 Secondary & Preparatory, and one college. The numbers of students enrolled were 12,513 of which 6122 & 6391 were males and females students respectively (Table 13).

Table 13: School enrolment by Sex: Woreda 9, Gulele Sub-City, A.A, Ethiopia, 2016.

S.N	Grade	Sex		Total	Achievement	Sex Ratio (M:F)
		Male	Female			
1	K.G	1124	974	2098	(99.9%)	1.2:1
2	1-8	3272	3513	6785	(96%)	1:1.1
3	9-12	1726	1904	3630		1:1.1
	Total	6122	6391	12513		1:1

Water Supply coverage

The total safe water supply coverage in the Woreda was 100% based on the Woreda Administration. In the Woreda, all were getting safe water through pipe at least from common source.

Transport, Telecommunication, Power supply

In this study according to the werda Construction office 96% of the wereda roads were covered with cobble stone in 2014/15 & before, the remaining & planned for 2015/16 was only 930meters. All kebeles have access to transportation; moreover every social infrastructure is accessible proximally for the wereda residents and the cell phone (mobile) network system covers the whole kebeles. In energy resource, all households were supplied by hydroelectric power. The Health Center and Schools in the Woreda had water & electricity power supply.

Table 14: Health service coverage, Woreda 9, Gulele Sub City, A.A, Ethiopia, 2016

S.N	Type of Health Institution	Number	HF Population Ratio	Remark
1	Government Hospital	1	1:39418	St' Paul
2	Government Health Center	1	1:39418	
3	Government Health Post	1	1:39418	Office
4	Private Clinics (All Medium)	3	1:13139	
5	Drug Store	6	1:6570	
6	Pharmacy	1	1:39418	
7	Health Office	1	1:39418	

Human resource; health workers and supportive staffs

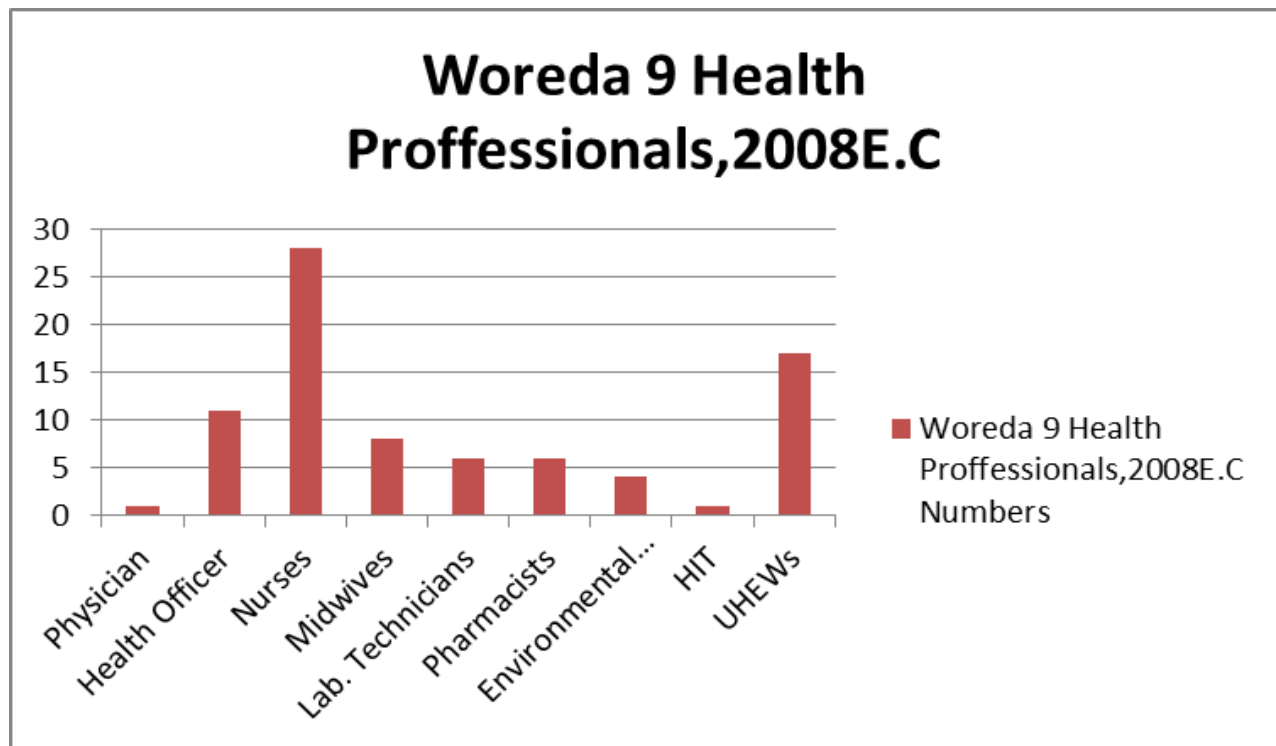


Figure 11: Woreda 9 Health Professionals

The Woreda had a total of 82 health workers and 52 supportive employees. The health workers found in the Woreda were; one General Practitioner , 11 Health Officers , 28 Nurses , 8 Midwives , 6 Laboratory Technicians , 6 Pharmacists , 4 Environmental Health worker, 1 Health Information Technologists , and 17 Urban Health Extension Workers respectively (Figure 11).

Vital statics

As the woreda vital statistics office were a newly established, it had no enough information about crude birth rate, crude death rate and maternal deaths. In the Woreda it was not possible to find out infant mortality and child mortality rates.

Immunization Coverage

The immunization coverage in Woreda 9 in 2014/15 was 827 (92%) for BCG, 842 (97.5%) for Measles, 907 (105%) for PCV3, 827 (102%) for PAB (Protection of Neonate from neonatal tetanus at Birth) and 842 (97.5%) for fully immunization. Only TT2+NPW (TT for Non Pregnant women achievement was 153(6%) low. (Table: 15).

Table 15: Immunization coverage by antigen, Woreda 9, Gulele Sub City, A.A, Ethiopia, 2016

S.N	Antigen	Plan to Vaccinate	Coverage	Percent
1	BCG	899	827	92
2	Measles	864	842	97.5
3	Penta 3	2274	1445	63.5
4	PCV 1	864	847	97
5	PCV 3	864	907	105
6	PAB	809	827	102
7	Fully Immunization	864	842	97.5
8	TT2+PW	809	1057	131
9	TT2+NPW	2492	153	6

Maternal Health Service

In woreda 9, there were 929 estimated pregnant women in 2014/15. Among those women 627 (67.5%) got 4th antenatal care service, 584 (63%) had their delivery attended by skilled birth personnel, and 891 (52%) was the Post natal care coverage of those target eligible in the woreda.

The Woreda contraceptive acceptance rate was 1434 (18%). As we see from the table injectable was more preferred by the clients to all other short term contraceptives, it accounts 706 out of 838 or 84%.

Table 16: Maternal health service Woreda 9, Gulele Sub City, A.A, Ethiopia, 2016

S.N	Service delivered	Target Eligible	Coverage	%
1	Short term Contraceptive including injectable	4236	838	19.8
2	IUCD	747	171	22.9
3	Implant	2990	365	12.2
4	Injectable	No separate target	706	-
5	ANC 1	-	1123	-
6	ANC 4	929	627	67.5
7	Delivery by skilled attendants	929	584	63
8	PNC	-	891	52

Environmental Health and Sanitation

Regarding Latrine coverage in Woreda 9, there was no data in the Health Office. There was solid and liquid waste management facility in the Woreda. The Woreda health education has been focusing on raising awareness in the population about the 16 Health package like, Health Promotion & Disease Prevention and screening for malnutrition. It was given at the health Center by H.C professionals & at School, Youth Center and community (HH level) by UHEWs.

Top ten leading causes of morbidity in the woreda

Top ten leading causes of OPD visit (morbidity)

According to the information obtained from Selam Health Center, the ten leading causes of Adult & under 5 outpatient visits in the Woreda during 2012/13, 2013/14 & 2014/15 are listed below in their descending order (Table 17 through Table 22).

As it could be seen in the three tables below, Acute Upper Respiratory Infections and Other or unspecified infectious & parasitic diseases were the first two diseases from the top ten leading causes of OPD visit in the three consecutive years.

Table 17: Top Ten Causes of OPD during 2012/13, Woreda 9, Gulele Sub City, A.A, Ethiopia, 2016.

DISEASE(2012/13)		No of cases	%
1	Acute upper respiratory infections	8110	33.01
2	Other or unspecified infectious & parasitic diseases	3479	14.16
3	Disease of the musculoskeletal system and connective tissue	2821	11.48
4	Dyspepsia	2016	8.2
5	Urinary tract infection	1819	7.4
6	Infections of the skin & Subcutaneous tissue	1563	6.36
7	Acute Febrile Illness (AFI)	1521	6.19
8	Other or unspecified disease of the eye and adnexa	1247	5.08
9	Diarrhea (non-bloody)	1074	4.37
10	Pneumonia	921	3.75

Table 18: Top Ten causes of OPD during 2013/14, Woreda 9, Gulele Sub City, A.A, Ethiopia, 2016

No	DISEASE (2013/14)	No of cases	%
1	Acute upper respiratory infection	6180	32.27
2	Other or unspecified infectious & parasitic diseases	2532	13.22
3	Disease of musculoskeletal system and connective tissue	2130	11.12
4	Dyspepsia	1570	8.2
5	Urinary tract infection	1400	7.31
6	Infections of the skin & Subcutaneous tissue	1273	6.65
7	Acute febrile illness	1185	6.19
8	Pneumonia	1165	6.08
9	Other or unspecified disease of the eye and adnexa	942	4.92
10	Diarrhea (non-bloody)	772	4.03

Table 19: Top ten causes of OPD during 2014/15, Woreda 9, Gulele Sub City, A.A, Ethiopia, 2016

No	DISEASE(2014/15)	No of cases	%
1	Acute upper respiratory infection	4521	31.42
2	Other or unspecified infectious & parasitic diseases	1419	9.86
3	Diarrhea (non-bloody)	1331	9.25
4	Disease of musculoskeletal system and connective tissue	1313	9.12
5	Acute febrile illness	1208	8.39
6	Urinary tract infection	1148	7.98
7	Dyspepsia	1071	7.44
8	Infections of the skin & Subcutaneous tissue	1050	7.3
9	Pneumonia	711	4.94
10	Other or unspecified disease of the eye and adnexa	619	4.3

Top ten causes of under 5 (Morbidity)

Table 20,21 & 22 below revealed that among the top ten leading causes of under 5 Morbidity, Acute Upper Respiratory Infection, Diarrhea (non-bloody) & Pneumonia were the top 3 diseases in the year 2012/13 ,2013/14 & 2014/15.

Table 20: Top Ten causes of under5 morbidity during 2012/13, Woreda 9, Gulele Sub City, A.A, Ethiopia, 2016.

No	DISEASE(2012/13)	No of cases	%
1	Acute upper respiratory infection	2160	40.26
2	Diarrhea (non- bloody)	1002	18.68
3	Pneumonia	738	13.76
4	Infections of the skin & Subcutaneous tissue	500	9.32
5	helminthiasis	235	4.38
6	Other or unspecified infectious & parasitic diseases	187	3.49
7	Other or unspecified disease of the eye and adnexa	185	3.45
8	Other or unspecified disease of the ear and mastoid process	133	2.48
9	Moderate acute malnutrition	127	2.37
10	Malaria/clinical/	98	1.83

Table 21: Top ten causes of under5 during morbidity 2013/14, Woreda 9, Gulele Sub City, A.A, Ethiopia, 2016.

No	DISEASE(2013/14)	No of cases	%
1	Acute upper respiratory infection	1654	41.42
2	Diarrhea (non-bloody)	686	17.18
3	Pneumonia	486	12.17
4	Infections of the skin & Subcutaneous tissue	352	8.82
5	Other or unspecified infectious & parasitic diseases	242	6.06
6	Malaria Clinical	165	4.13
7	Other or unspecified disease of the eye and adnexa	165	4.13
8	helminthiasis	142	3.56
9	Other or unspecified disease of the ear and mastoid process	60	1.5
10	Bloody Diarrhea	41	1.03

Table 22: Top ten causes of under- 5 during morbidity 2014/15, Woreda 9, Gulele sub city, A.A, Ethiopia, 2016.

No	DISEASE(2014/15)	No of cases	%
1	Acute upper respiratory infection	1570	41.12
2	Diarrhea (non-bloody)	817	21.4
3	Infections of the skin & Subcutaneous tissue	385	10.08
4	Pneumonia	310	8.12
5	Other or unspecified infectious & parasitic diseases	282	7.39
6	Other or unspecified disease of the eye and adnexa	149	3.9
7	helmenthiasis	97	2.54
8	MAM	85	2.23
9	Other or unspecified disease of the digestive system	80	2.1
10	Other or unspecified disease of the ear and mastoid process	43	1.13

Community Health Service

There was active involvement of the community in planning and implementing of all disease prevention and control activities in the Woreda through WDA (Women Development Army). In this process, there were also a newly launched community based service in 2014/15, wereda 9 was the only wereda from Gulele Sub City from the three pilot weredas. The program started by selecting HHs of the most at risk population groups, such as HHs in which there is Under 5years of age, pregnant women and elderly & Handicaps who couldn't come to HFs. The house Holds have been visited & given home based medical services on a daily bases by 5 teams, the team carries the necessary selected Drugs & supplies, these teams were formed from 17 UHEWs,11 HOs,28 Degree & Diploma Nurses from the wereda H.C by turn. Ideally if available, the team includes physician, Environmentalist, social worker, and Psychiatrist. There were also International and Local NGOs who support the Woreda community health service activities technically and financially.

Endemic diseases

HIV/AIDS prevention and control

According to the 2014/15 Selam H.C Report, total 1291 people screened for HIV, 0 at VCT, 194 at PIHCT, and 1097(100%) at PMTCT, Percentage of compiled Gulele Sub City Weredas' pregnant and lactating women who were tested for HIV and who know their results was 87%, during the year due to shortage of diagnostic Kit VCT was closed in Selam H.C. And from 1291, 65 (5%) were positive for HIV. A total of 90 TB patients (100%) were tested for HIV and from those 27 (30%) were positive for HIV. Proportion of HIV Positive pregnant and lactating Women who received ART previously, at ANC, L.D(Labor & Delivery), PNC, and for the first time based on option B+ is 27(100%). They were estimated that 2566 people living with HIV/AIDS in the Woreda (ever enrolled) out of this 118 were ≤ 15 years of age. There was no prevalence report in the wereda. Number of patients ever started on ART in Selam H.C was 1418 and number of patients currently on ART was 957 from this 30 were children. Number of condom distributed was 9212(55%) of the target set (16,755) in 2014/15 and STI cases managed were 271(68.8%) of the target 394. The priority intervention area in the Woreda in relation to HIV/AIDS to date were IEC/BCC, condom promotion and distribution, voluntary counseling and testing (VCT), management of sexually transmitted infections (STIs), prevention of mother to child transmission of HIV (PMTCT), management of opportunistic infections, infection prevention/universal precaution, care and support to the infected and affected.

TB and Leprosy

In wereda 9 prevalence of TB was 5.2 per 10,000 populations and case fatality rate of TB was 1.14% in 2014/15 and other TB indicators are listed below in table 23.

Table 23: TB Indicators, Woreda 9, Gulele Su City, A.A, Ethiopia 2007 E.C.

S.N	TB indicators	Coverage by %	
1	Tuberculosis detection rate	100	
2	TB treatment completion rate	25	
3	Tuberculosis cure rate	70.8	
4	TB treatment success rate	95	
5	Total TB patients screened for HIV	100	

Source: Selam Health Center

In the Woreda in 2014/15, TB detection rate and TB patients screened for HIV was 100% of the target. There was zero leprosy case report in the Woreda in the year 2014/15.

Nutrition, Food Shortage and any Other Disasters

From a target of 63 MAM & 34 SAM children less than 5 years of age, 93 MAM and 28 SAM were screened in 2014/15 and treated as outpatient. Also there was a target of 397 MAM & 198 SAM ART patients, out of these only 33 MAM and 22 SAM were screened in the same year.

Essential drugs shortage

According to the Woreda Health Center pharmacist report, coverage of essential drugs in the year 2013/14 was 86% but in 2014/15, it was 100%.

Discussions

Demography

Wereda 9 in 2014/15 has a total population of 38,607 from which 49.8% are males and 50.2% females. Now in 2015/16 the population is grown to 39,418 by 2.1% annual population growing projection. In this study it was found family size of 6.1. It was dense compared to estimated target set in A.A the average household size of 4.1 persons (5).

Education

Education is a key determinant of individual opportunities, attitudes, and economic and social status. Studies have consistently shown that educational attainment has a strong effect on reproductive behavior, fertility, infant and child mortality and morbidity, and attitudes and awareness related to family health, use of family planning, and sanitation(5). A study reveals there is increment from 2007/8- 2012/13 in girls' enrolment and better gender parity in primary schools in general. However, primary school girls' dropout and repetition rates are high. Female students' progression towards upper levels of the education system, secondary school, is low (9). Based on sex ratio shown in this study, in Primary & Secondary education level female's outnumbered male students, except students enrolled in K.G grade level. The target set by the wereda for K.G was 2100 and for primary it was 7060. According to this finding, K.G attendance was 2098 (99.9%) & primary school attendance was 6785(96%).

Health Infrastructure

Previously the numbers of health Centers administered under Gulele Sub City that directly provide services to all people of the Sub City were only two, Selam & Shiromeda H.Cs. In 2012/13 they became 10, currently every worda has one H.C. Therefore Selam H.C is under worda 9 with a catchment pop. of 39418. Based on current Ethiopian Health policy in the urban one Health Center serves for 40,000 people. This makes the Woreda health service coverage about 100%.

Vital statics

Based on the Ethiopian Federal Democratic Republic MOH, HSTP 2015/16-2019/20, currently MMR is 199/100,000 live births, under 5MR is 30/1000 Live Births, IMR is 20/1000 Live Births, & NMR is 10/1000 Live Births. As the woreda vital statistics office were a newly established, it had no enough information about crude birth rate, crude death rate and maternal deaths but based on this study the woreda UHEWs search for any women death in the woreda and report to the H.C MDSR committee, then the committee find out either the death was maternal or other. According to this committee there was no recorded maternal death in the year 2015/16. In the Woreda it was not possible to find out infant mortality and child mortality rates.

Immunization Coverage

The history of immunization services in Ethiopia prior to 1980 has not been documented very well although the smallpox eradication activities have left some legendary memories[7]. The Expanded Program on Immunization (EPI) was launched in Ethiopia in 1980 based on the international, as well as national, experiences and resources gained during the smallpox eradication activities in the late 1970s[7]. The Woreda immunization coverage was satisfactory compared to the A.A and the National immunization targets except TT2+NPW (TT for Non Pregnant women achievement which was 153(6%) low. Therefore, the Woreda Health office (the H.C) should keep the immunization coverage maximum & establish outreach program for TT2+NPW to achieve more.

Maternal Health Service

In woreda 9, there were 929 estimated pregnant women in 2014/15. Among those women 627 (67.5%) got 4th antenatal care service compared to weredas compiled 2014/15 report (32%), 584 (63%) had their delivery attended by skilled birth personnel compared to weredas compiled 2014/15 report (41%) , these were even greater achievement than 2015/16 plan that is 45% & 52% respectively, and 891 (52%) was the Post natal care coverage of those Target Eligible in the Woreda .It was also higher than compiled weredas' 2014/15 report (40%). One of the targets of the Ministry of Health, with respect to improving maternal and child health is to increase the Modern FP methods to 40 percent by 2015 [1]. The Woreda contraceptive acceptance rate was 1434 (18%), lower achievement than 2015 compiled weredas' report (40%), not achieved the

national program. As we see from the table injectable was more preferred by the clients to all other short term contraceptives, it accounts 706 out of 838 or 84%.

Endemic diseases

HIV/AIDS prevention and control

In this study prevalence of HIV/AIDS in woreda 9 was 6.1%. According to the Health indicator target set for A.A current prevalence is 5.2% for adult & 1% for <15 years children, it was higher than the target.

TB and Leprosy

According to HSTP 2015/16-2019/20 death due to TB should be decreased by 45%, TB detection & cure rates should achieve 87% and 90% respectively. In wereda 9 prevalence of TB was 5.2 per 10,000 populations. The target set for A.A city Administration for TB control in 2014/15 was, TB detection rate 32%, TB treatment Success rate 27 %, and TB cure rate 24% and the proportion of PLWHA screened for TB 100%. In the Woreda in 2014/15, TB detection rate and TB patients screened for HIV was 100% of the target. While TB treatment completion rate and TB treatment success rate was below & above the target respectively. The pocket guide of TB defines'' treatment success is the sum of cured and treatment completed'', but as we see from table 13 it was different so there might be recording and/or reporting accuracy problem.

Nutrition, Food Shortage and any Other Disasters

According to the Ethiopian Federal Democratic Republic MOH, HSTP 2015/16-2019/20, currently prevalence of stunted & wasted children is 26% & 4.9% respectively. Based on the information on Table 10, 11 & 12 above malnutrition is not as such a serious problem in wereda 9. From a target of 63 MAM & 34 SAM children less than 5 years of age, 93 MAM and 28 SAM were screened in 2014/15 and treated as outpatient. Also there was a target of 397 MAM & 198 SAM ART patients, out of these only 33 MAM and 22 SAM were screened in the same year. The major implementation approaches include, growth monitoring, promotion and community conversation to assess the nutritional status of their children, analyze the causes of malnutrition and take action. Regarding this the newly established FHT (family Health Team) has had a great role.

Essential drugs shortage

According to Selam Health Center finance department, budget was clearly known & consumes much of it for drugs and other medical supplies. In addition, the internal revenue from dispensing Drugs, laboratory & medical services can be used to purchase drugs & other medical related expenses including medical instruments & medical equipment however, the Woreda Health Center pharmacist reported that due to budget deficit there was shortage of some essential drugs in the year 2013/14 & before, which was 86% 2013/14 but according to the target essential drugs should 100% available throughout the year & every month, in 2014/15, it was 100% due to the award 500,000 ETB.

Study Limitations

In the Woreda, Language, Religion and Occupational characteristics (community main Income) were not clearly documented, and some essential health and economic indicators like Infant mortality, Child mortality, and Average income per capital, Fund from NGOs were also not found.

Conclusion

This Woreda Health profile includes both previously identified health issues, and the identification of newly emerging health problems. In the last three years, Acute Upper Respiratory Infection, Other or unspecified infectious & parasitic diseases and Diarrhea were the leading causes of Morbidity in the Woreda which may attribute to poor sanitation and low public awareness of environmental health (inappropriate solid & liquid waste disposal, like segregation problem & putting solid & liquid wastes in to the pipe & open ditch), personal hygiene practices and poor housing with respect to waste management and liquid waste disposal pipe network construction & maintenance of the city.

Recommendation

- Vital Statistics like infant mortality and child mortality should also be registered and documented by the woreda.
- Health education to the population is needed regarding environmental health & personal hygiene by the woreda health office & health center.
- The City should improve & maintain the existing sewerage system and the future construction of Roads and Buildings should also be considered and included in the design.

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Annex 7: Health Profile data collection tool

Health profile assessment questionnaire Woreda 9, Gulele Sub City, A.A 2016

1. Historical aspects of the Woreda

- Woreda Name _____
- How & why the name given _____
- How and when the Woreda was formed _____
- Any other historical aspect about the Woreda _____

2. Geography and Climate

Woreda map _____

- Location Gulele Sub City Direction Northern A.A
- Altitude _____
- Surface Area -----

Geographical coordinate

- Latitude
- Longitude
- Annual rain fall(average)
- Annual temp(average)

3. Woreda boundaries

•Average household size_____

	Old Kebeles	Total Population	Sex		Residency
S.N			Male	Female	Ketena /Village/

4. Population pyramid

Population data by age and sex								
Male								
Female								
Total								

Pop. Characteristics	Frequency	Percentage
Ethnic/language		
Oromo		
Amhara		
Tigre		
Gurage		
Others		
Religion		
Orthodox		
Muslim		
Protestant		
Others		
Occupation		
GOV employee		
Private employee		
Small Business		
Others		
Water Source		
Pipe/private/		
Pipe/Common/		
Pipe/community/ or 'Bono'		
Others		

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

Main income sources

- GOV employment_____
- Private employment_____
- Other business_____

House hold income source

- Government Employer_____
- Private Employer_____
- Daily Laborer _____
- Different business_____
- Average Income per year_____

6. Education

Characteristics	Frequency	Percentage
Educational institution		
K.G		
Primarily School (1-8)		
Secondary (9-10)		
Preparatory(11-12)		
College/ University		
TVET		
School health activities:		
Number of schools with Water supply		
Schools with functional latrines		
Male		
Female		
Schools with HIV/other Health clubs		

Educational Status

School Enrolment	Sex				
	Male		Female		Total
	Frequency	Percentage	Frequency	Percentage	Frequency
Illiterate					
KG					
1_8					
9_12					
TVT					
Collage/University					
School Age Children (target)					
Coverage					
School dropout in 6 months or year 2007					

7. Water coverage

Characteristics	Frequency	Percentage
Total safe water coverage		
Safe water supply coverage by kebeles		
Main source of water supply		
Kebeles getting safe water		
Population getting safe water		
Daily water consumption per day per person		

Other Facilities

Characteristics	Frequency	Percentage
Transport		
Accessibility (to Health Facility)		
Type of road		
How many kebeles have access to transportation		
Flow of transportation per day		
Telecommunication		
How many people have access to fixed telephone		
How many people have access to mobile phone (coverage)		
Post Office		
Bank		
Power supply		
How many house hold get power supply		

8. Disaster situation in the Woreda

- Was there any disaster (natural or manmade) in the Woreda in the last one year?

- Any recent disease outbreak/other public health emergency _____
- If yes cases_____ and deaths_____

9. Wereda health system

- The general health system structure of the Woreda (flow chart) _____
- -Is there health management team (HMT) at Woreda levels? Yes/no
- -If yes, describe the HMT in detail (composition, functions, etc)

- Do you have NGOs working on health and health related issues? yes/no
- List the NGOs (and what they are doing) working on health and health related issues in your Woreda

10. Vital Statics and Health Indicators

- Infant Mortality Rate (IMR) _____(total <1 yr. deaths of 2007E.C)
- Child Mortality Rate_____ (Last year total <15 yr. deaths)
- Crude Birth Rate_____
- Crude Death Rate_____ (total deaths in 2007E.C _)
- Maternal Mortality Rate_____ (2007 total maternal deaths_____)
- Contraceptive prevalence rate
- Contraceptive acceptance rate _____
- ANC rate (how many of the total expected pregnancies attended ANC)
- Percentage of deliveries attended by skilled birth attendants
- Percentage of deliveries attended by HEWs
- Percentage of Home deliveries _____
- PNC rate(how many of the total expected Mothers attended PNC)
- Average family size

11. Immunization Coverage

S.N	Type of Vaccine	Vaccination Status			
		PLAN TO VACCINATE	ACHIEVEMENT	PERCENTAGE	RANK
1	BCG				
2	Penta 1				
3	Penta 3				
4	Measles				
5	PCV 1				
6	PCV 3				
7	Fully immunized				
8	TT2+PW				
9	TT2+NPW				
10	PAB				

12. Health Service

Type and Number of Health Institution

Type	Number	Total No. of beds	HF: Population Ratio
Gov. Hospital			
Gov. Health center			
Private H.Fs (clinics/diag. lab/drug stores)	Clinics (all type)		
	Diag. Lab.		
	Drug store		
NGOs	H.Cs		
	Hospitals		
	Clinics		
Health service coverage			

Type and Number of health professionals

Type	Frequency	Percentage	Health Professional: Population Ratio
Specialist			
G.P			
HO			
Nurses (Deg. and Dip.)			
Mid wife (Deg. and Dip.)			
Lab. (Deg. and Dip.)			
Pharmacy (Deg. and Dip.)			
Env. Health (Deg. and Dip.)			
HIT			
Health education			
HEWs			
Total			

13. Top causes of morbidity

Top ten leading causes of OPD visit (morbidity)

DISEASE(2005)		No of cases	%
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

No	DISEASE (2006)	No of cases	%
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

No	DISEASE(2007)	No of cases	%
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Top ten causes of admissions (Morbidity)

No	DISEASE(2007)	No of cases	%
1			
2			
2			
4			
5			
6			
7			
8			
9			
10			

•Top ten causes of deaths (mortality).

14. Health budget allocation

Government

- Total budget allocated for the Woreda _____(consecutive 3 years)
- Total budget allocated for health _____ (____ %)

Years	Woreda budget	Health budget	%
2005			
2006			
2007			

Funds from NGO

- Total _____ (purpose/programs)_____

15. Community Health Services

Status of services provided by community health workers namely:

- Family Health Team /FHT/
- No. of FHT and their responsibility /function
- Responsibility of HEPs
- Others; Like WDA

16. Status of Primary Health Care Components – with focus on the eight PHC elements and MDG

- MCH (Delivery, ANC, PNC): ANC 1____, ANC 4____, Delivery by Skilled attendants_____, PNC_____ (Plan).

FP

- Family Planning Methods

Methods	Frequency	Percentage
Short term contraceptive		
IUCD		
Implant		
Injection		

• Contraceptive prevalence rate_____

• Contraceptive acceptance rate_____

Is there EPI (outreach service?)

- Yes
- No

Conduct cold chain or vaccine management supportive supervision

- Yes
- No

If yes, do you have checklist?

- Yes
- No

Environmental Health and Sanitation

- Latrine coverage & utilization rate

Type of Latrine

Type of Latrine	Frequency	Percentage
Open field		
Pit Latrine/private /		
Pit Latrine/common /		
Pit Latrine/Community/		
Ventilated Pit Latrine/private/		
Ventilated Pit Latrine/common/		
Ventilated Pit Latrine/Community/		
Improved Type/Water Flushed/		
Others		

Solid waste management

Is their solid waste container?

- Yes
- No

Is their solid waste container loader?

- Yes
- No

If yes, frequency of solid waste collection_____

- Liquid waste management only in the wereda /Health Center/
- others_____

- Health Education (what, when, where, how and who conducted health education)_____

17. Endemic diseases

TB/Leprosy:

- Total TB cases _____
- PTB negative _____
- PTB positive _____
- Extra PTB _____
- TB detection rate _____
- TB Rx completion rate _____
- TB cure rate _____
- TB Rx success rate _____
- TB defaulter _____
- Death on TB Rx _____
- Total TB patients screened for HIV _____
- Total Leprosy cases on Rx_____

HIV/AIDS

- Total people screened for HIV (last year) _____.
- VCT_____ PIHTC _____ PMTCT_____
- HIV prevalence_____
- HIV Incidence_____
- Total PLWHA _____
- On ART _____
- On Pre-ART _____
- Other HIV prevention activities_____

Nutrition

- Total OTP _____
- Total admissions to SC_____
- NRC Status_____

18. Essential drugs (shortage) -----

Discussion of the highlights and the main findings of the health profile assessment and description

1. Problem Identification and Priority Setting – set priority health problems based on the public health importance, magnitude, seriousness, community concern, feasibility

2. Conclusions made about the health status of the Woreda based on the findings

3. Action plan and recommendations- on how to address the problems identified clearly depicting responsibilities, required resource and timeline

CHAPTER-V Thesis

5.1 Utilization of integrated management of neonatal and childhood illness algorithm and associated factors among health professionals assigned at under-five unit in governmental health centers in Addis Ababa, Ethiopia, 2017

Abstract

Background: More than 70% of children in developing countries die due to five diseases, namely pneumonia, diarrhea, malaria, measles and malnutrition, and often to a combination of these conditions. To tackle this World Health Organization in 1992 initiated the integrated management of childhood illness program as a strategy. Ethiopia contributed immensely to the development of Integrated Management of Childhood Illness and officially adopted it in 1997.

Objective: The purpose of this study is to assess factors affecting utilization of Integrated Management of Childhood & Neonatal Illness algorithm in management of childhood illness among health workers at public health centers in A.A, Ethiopia, 2017

Method: An institutional based cross-sectional study was conducted from October 30, 2017 – December 18, 2017. All health workers in the selected health centers in Addis Ababa were taken. From the 94 health centers in Addis Ababa 72 were sampled using simple random sampling based on calculated sample size and samples allocated to health centers proportional to size of their number in every sub city. They were assessed for knowledge and attitude using self-administered questionnaire and observed for practice. The assessment of the practice was supplemented with review of log book. Structured and pretested questionnaires were used. Data was managed using Epi Info 7 and SPSS version 21. Univariate and bivariate analysis was performed. Multivariable analysis was also done.

Results: Data were obtained from 144 health workers, yielding a response rate of 100%. The overall IMNCI implementation was 57% as a good practice. In multivariable binary logistic analysis the implementation of IMNCI was higher among IMNCI trained health workers AOR = 4.302, 95% CI = (1.880, 9.843), and among those who scored positive attitude towards IMNCI strategy AOR = 2.458; 95% C.I = (1.182, 5.109).

Conclusion and Recommendations: IMNCI strategy can be better implemented through provision of training for the health workers and through creating positive attitude for health workers about the strategy. Emphasis should be given to training of health workers and attitude.

Key Words: IMNCI Practice, Health workers, Public health center, in A.A.

Introduction

Background

More than 70% of children in developing countries die due to five diseases, namely pneumonia, diarrhea, malaria, measles and malnutrition, and often to a combination of these conditions. As children usually present with more than one of these conditions, it was recognized that there was a need for an integrated approach in order to manage the child in a holistic manner (taking into account all of the child's problems including the major childhood illnesses in the assessment and treatment of illness). This led to the development of the IMNCI strategy (1) .

The IMNCI guidelines are a simplified system of diagnosis and treatment that is designed for the use by health worker with limited training and little or no lab support (2). WHO in 1992 initiated the IMCI program as a strategy to provide an integrated approach for the management of major causes of childhood morbidity and mortality. IMNCI is a program adapted from the IMCI program incorporating neonatal care along with child care. This adaptation was started in India and then adopted by Pakistan (3).

IMCI has become a main child survival strategy in almost all countries in the African region, creating a unique opportunity to scale up newborn health interventions using IMCI as a vehicle (4). Ethiopia contributed immensely to the development of IMCI and officially adopted it in 1997 (5). The IMCI approach has been in use in Ethiopia since its adoption as a major strategy to reduce childhood mortality (6).

Statement of the problem

Globally, an estimated 8.1 million children under-five die every year due to conditions that can be prevented or treated with evidence-based medicines (7). 5.9 million children under age five died in 2015, nearly 16 000 every day, 83% of deaths in children under age five are caused by infectious, neonatal or nutritional conditions. Although much progress has been made in the last decade, 7.6 million children worldwide still die each year before their fifth birthday, and half of the 4.5 million deaths among children between one and 59 months old are due to pneumonia, diarrhea, and malaria (8).

Despite significant improvements in quality of care after IMCI training, important performance gaps remain, with some studies indicating that about one-third of sick children still do not receive correct treatment for potentially life-threatening conditions after health workers receive IMCI training. Significant decreases in mortality after IMCI training have been found in a few studies but not in others, likely due to both low use of the formal health care system, lack of health system infrastructure, and gaps in health worker performance (8).

In a study done in Afghanistan, 50% of primary care facilities had no IMCI trained health worker. Minimal supervision was provided to health workers after training and consequently, the quality of the assessment and treatment of sick children was poor (9). The Health Facility Survey conducted by the National Institute of Health Research and Development, Ministry of Health, reported that 80% of health centers in Indonesia have adopted IMCI, although its implementation varied widely across provinces, from 38% in Papua to 98% in Bali. West Java province is reported as one of the provinces with a high percentage of health centers implementing the IMCI strategy (89% of health centers) (10).

The global under-five mortality rate is falling faster since 1990–1995, reduces more than tripling from 1.2 % to 4.0 % in 2005–2013, despite these gains, progress remains insufficient in Sub-Saharan Africa (11). Studies show that health workers' adherence to IMCI guidelines could still be improved, with some investigators calling attention to the need for ongoing support for health workers after IMCI training (12). Despite evidence supporting IMCI as a strategy to improve pediatric care in countries with high child mortality, its implementation faces challenges (13).

Adopted in over 100 countries, IMCI improves health worker performance and may lower mortality. However, research has shown that many health workers do not adhere to IMCI guidelines, particularly for the management of severe illness(14).

About half the world's deaths due to pneumonia and diarrhea occur in just five mostly poor and populous countries: India, Nigeria, Democratic Republic of the Congo, Pakistan and Ethiopia(15). However in Ethiopia under-5 mortality rates (deaths per 1,000 live births) declined from 166 in 2000 to 123 in 2005 and 88 in 2011 to reach 67 in 2016(16). In Ethiopia every year half a million children under five die. More than 70% of these deaths occur from the five IMCI targeted diseases namely acute respiratory infections (28%), malaria (20%) diarrhea (20%) and malnutrition (55%) and often in combination(17), but no research or health facility survey document has been found in Ethiopia that showed the current magnitude of health workers performance in practicing IMNCI guideline in the country.

To help close gaps in case-management quality, it is important to understand more fully about health workers performance of using IMNCI strategy and the factors influencing health workers performance, but definitive evidence on determinants of health worker performance is lacking. In Ethiopia no studies was found regarding assessment or evaluation of knowledge or skill among health workers assigned at under-five units in public health centers of urban setting. In this study we will have a unique opportunity to examine associated factors including knowledge and attitude of health care workers towards implementation of IMNCI strategy.

Significance of the study

Under-five diseases remains a leading cause of morbidity and mortality in developing countries. Despite the effectiveness of IMNCI for management of childhood illnesses, in many countries' studies I have read, health workers were not seen while following IMNCI algorithm comprehensively for case management. Therefore, this study will determine the gap of health workers on current management of childhood illness following IMNCI algorithm in under five children at public health centers. Moreover, the study result will provide an evidence for policy makers to act upon accordingly, in order to alleviate communities health problem, and it will serves as a guide for the researcher to use it as a baseline because to the best of my knowledge, research done in the study area is limited, beyond this it will be used at health center level to reduce child morbidity and mortality. Furthermore this research will contribute for development of both knowledge and skill of child health management and promote professional career. From the finding professionals will understand the gap exists on proper use of IMNCI algorithm in management of childhood illness.

Literature Review

The IMNCI recommended algorithm for management of childhood illness should be following steps of comprehensive assessment approach for every child presenting to a clinic with a single symptom/s or even for well child. It includes assessment and management of danger signs, the four main symptoms (cough, diarrhea, fever & ear problem), malnutrition, anemia, growth monitoring, vaccination, HIV status, feeding, classification, treatment, giving first dose at clinic, demonstrating the prescribed drug, (pre-referral treatment & referral if needed), home care advise and follow up care. While in many studies health workers are seen managing only the presenting symptom/s or some parts of the algorithm steps due to different factors which is mentioned in the following literatures.

In this part results & ideas that were reviewed from different literatures including journals and others related to factor influencing implementation of IMNCI and magnitude of its practice by health workers in health institutions were presented.

Description of knowledge of health workers about IMNCI algorithm

In a study conducted in Zanzibar in 2015, health care workers are found to have a good knowledge of IMCI strategy(18). But Findings of a study conducted in Mwanza, Tanzania in 2014, showed only 51% of healthcare workers interviewed had been trained. Sixty nine percent of trained Healthcare workers expressed understanding of the IMCI approach(19).

Description of attitude of health workers towards IMNCI algorithm

A related study done at community health centers in West Java province, Indonesia in 2012 showed Nearly all health workers acknowledged the importance of IMCI in their routine services and very few did not perceive its benefits(10). Also in the same study conducted in Zanzibar in 2015, health care workers are found to have a positive attitude toward the IMCI strategy and commented it is a better approach in managing common childhood illnesses(18). In the study conducted in Mwanza, Tanzania in 2014, Most of the respondents (77%) had a positive attitude that IMCI approach was a better approach in managing common childhood illnesses especially with the reality of resource constraint in the health facilities(19).

Study by Wafula and Mullei in Kenya in 2014 revealed that nurses generally expressed positive attitudes about IMCI, while some clinical officers and doctors have not accepted the IMCI approach. They feel that the guidelines are simplistic and do not allow them to make full use of their clinical training(20).

Description of level of IMNCI algorithm practice by health workers

The same study in West Java province, Indonesia in 2012 showed Almost all ($N = 79$) health centers implemented the IMCI strategy; however, only 64% applied it to all visiting children(10).

According to a study done in United Republic of Tanzania in 2009, in total, 502 cases were reviewed at 62 facilities. Of 240 children classified as having “very severe febrile disease”, none received all IMCI-recommended therapies, and only 25% of severely ill children were referred. Lethargy and anemia diagnoses were independently associated with referral. Most (91%) health workers indicated that certain severe conditions can be managed without referral(14).

A study in Tanzania indicates that, although all the districts have received training on IMCI, the main challenge is poor adherence to the guidelines, with most of the health care workers trained in IMCI not following the protocol consistently(21). In Tanzania health care workers diagnose children in terms of a single disease & prescribe accordingly. Referral practices are also poor, with less than 50% of severely ill children being referred(21). In Tanzania, health workers compliance to IMCI algorithms is uneven & often low, both in rural and urban settings(22). Holistic and comprehensive achievement in utilization and application of IMCI program in a region remains unclear in western Kenya(20).

According to a study done in South Africa in 2009, each health worker was observed for up to 20 consultations with sick children presenting consecutively to the facility, each child was then reassessed by an IMCI expert to determine the correct findings. Observed health workers had been trained in IMCI for an average of 32.2 months, and were observed for a mean of 17.7 consultations; 50/77(65%) HW's had received a follow up visit after training. In most cases health workers used IMCI to assess presenting symptoms but did not implement IMCI comprehensively. All but one health worker referred to IMCI guidelines during the period of observation. Nine (12%) observed health workers checked general danger signs in every child, and 14(18%) assessed all the main symptoms in every child. 51/109(46.8%) children with severe classifications were correctly identified. Nutritional status was not classified in 567/1357(47.5%) children(23). Health workers are implementing IMCI, but assessments were frequently incomplete, and children requiring urgent referral were missed(23).

In the study conducted in Zanzibar in 2015, health care workers are found to have a good knowledge of IMCI strategy with positive attitudes toward the IMCI strategy and commented it

is a better approach in managing common childhood illnesses. Also is observed that there is malpractice in assessment of IMCI indicators, poor adherence of the standard treatment guideline and misuse/overuse of antibiotics. Also outlines lack of pre-referral treatment for urgent referral and poor counseling and advice to the caregivers(18).

In a study done in Alexandria Governorate in Egypt in 2016, the highest adherence score reported was that of writing disease classification (100%). As regards infants aged up to 2 months, the highest physicians' adherence score reported was that of jaundice and possible bacterial infection assessment (100% and 95% respectively). And in spite of its importance, only 85.7% of physicians were complied with weight assessment and its plotting in the growth curve. For children aged from 2 months up to 5 years physicians were generally well complied with the guidelines especially for assessment of dangerous signs and possible bacterial infection(24).

Evidence from Bhutta et al (2003) study, suggests that IMCI trained staff often fail to follow case management guidelines: for example, few children are checked for general danger signs of severe disease, less than half have their weights checked against the growth chart, and referral rates are low (20).

According to a study done in WEST ARSI ZONE, ETHIOPIA, 2016, the overall IMNCI implementation was 58.7% as high level implementation and 41.3% as low level implementation(25).

Literatures regarding associated factors of IMNCI implementation

In West Java province, Indonesia in 2012 study several barriers to IMCI implementation were identified, including shortage of health workers trained in IMCI (only 43% of health centers had all health workers in the child care unit trained in IMCI and 40% of health centers conducted on-the-job training)(10). Findings of the study conducted in Mwanza, Tanzania in 2014, showed the main challenges identified in the implementation of IMCI are low initial training coverage among health care workers, lack of refresher courses and others(19).

In a book titled ‘‘Implementation Introduction’’ IMCI distance learning course by WHO in 2014, Once staffs are trained, high turnover poses an additional challenge(26).

According to the study done in WEST ARSI ZONE, ETHIOPIA, 2016, in multivariate analysis the implementation of IMNCI was higher among IMNCI trained nurses and among those whose always referring chart booklet(25).

In a study done in Rwanda in 2014, the only significant differences detected between nurses in the long and short training of IMNCI was the classification of fever and treatment of pneumonia. Nurses in the short training had 30% more likely for appropriate classification and 20% more likely for appropriate treatment than in the long training for these two conditions(27).

Conceptual framework

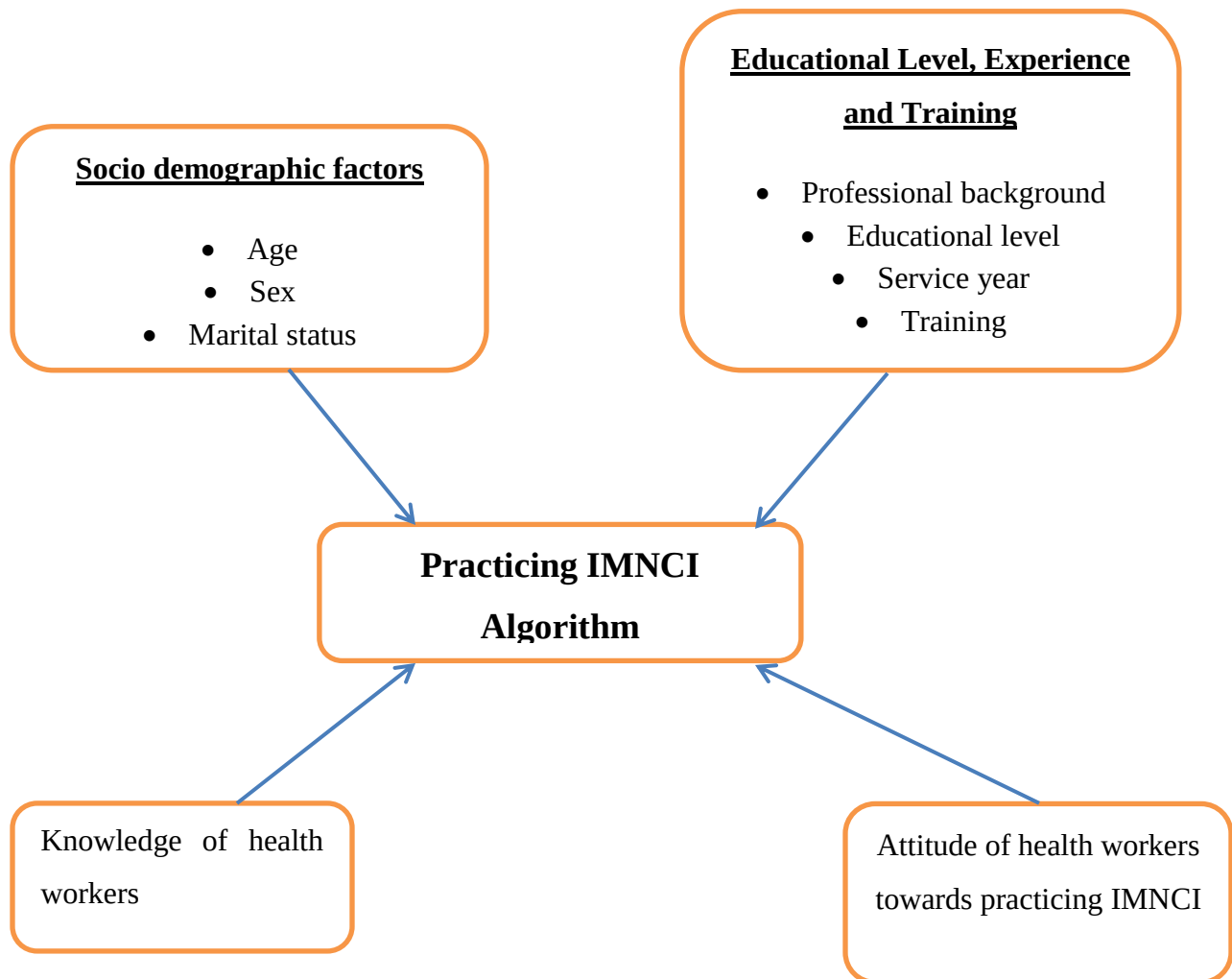


Figure 12: Conceptual framework on factors that influence following of IMNCI algorithm

General objective

- To assess practice and factors affecting following of IMNCI algorithm steps (practice) in management of childhood illness among health workers at public health centers in A.A, Ethiopia, 2017

Specific objectives:-

- To determine level of practice of IMNCI algorithm
- To identify factors associated with IMNCI algorithm use

Methodology

Study Area

The study was conducted at selected health centers in Addis Ababa, Ethiopia. A.A is the capital city of Ethiopia with the total population of 3,364,018 according to 2015 population projection(28). In Addis Ababa there are 13 governmental hospitals, 98 HCs, 904 private and 16 NGO health Facilities(29).

Study period

The study was conducted from October 30, 2017 – December 18, 2017.

Study Design

Institution based cross-sectional study design was conducted.

Source Population

Health workers who were assigned in under-five unit and working in public health centers of A.A.

Study Population

Health workers who were working at under-five unit in selected public health centers of A.A

Inclusion and Exclusion Criteria

Inclusion Criteria

All health workers (GP, HO, B.Sc. or diploma nurse), who were working at under-five unit in health centers and available during the study period

Sample Size Determination

Calculation of samples size based on single population proportion for dependent variable of overall implementation of IMNCI protocol from literature

$$n = \frac{\left[\frac{Z_{\alpha}}{2} \right]^2}{d^2} \cdot \rho q$$

Where

Z_{α} =level of confidence (Z score) (95%)

n= number of health workers to be participated in the study

p= proportion of health workers high level implementation of IMNCI protocol was 58.7% from literature.(25)

q= 1-p = 41.3%

d= margin of error (0.05)

$$n = \frac{(1.96)^2}{0.05^2} * 0.587 * 0.413 = 373$$

My sample is from small source population of **188** (N<10,000), therefore the above sample size can be adjusted because it is above 5% of N. Using finite population correction formula, the

$$\text{adjusted (reduced) sample size was: } n_1 = \frac{n}{1 + \frac{n-1}{N}} = \frac{373}{1 + \frac{372}{188}} = 126$$

Calculation of samples size based on double population proportion for an independent variable of training of health workers that had significant association with IMNCI implementation, using a formula embedded in Epi-info 7 statcalc software

Associated factor	IMCI implementation		CL	Power	Ratio	OR	Sample size		Total Sample Size	Reference
	P1	P2					Exposed	Unexposed		
Training	69.2%	43.6%	95%	80%	1	2.9	66	66	132	(25)

Final sample size including non-response rate of 10%, using the larger sample size of **132**, was:

$$n_2 = 132 + 10\% \text{ of } 132 = \underline{\underline{144}}$$

Sampling Procedure

The 144 sample size was allocated to each of the following sub cities proportion to size of their health centers and health workers, from the 94 public health centers which have implemented IMNCI strategy 72 was selected using simple random sampling and all health workers assigned in under-five units of the selected health centers was taken because on average each health center assign 2 professionals. Out of the 98 health centers in A.A, 4 health centers have not yet started IMNCI.

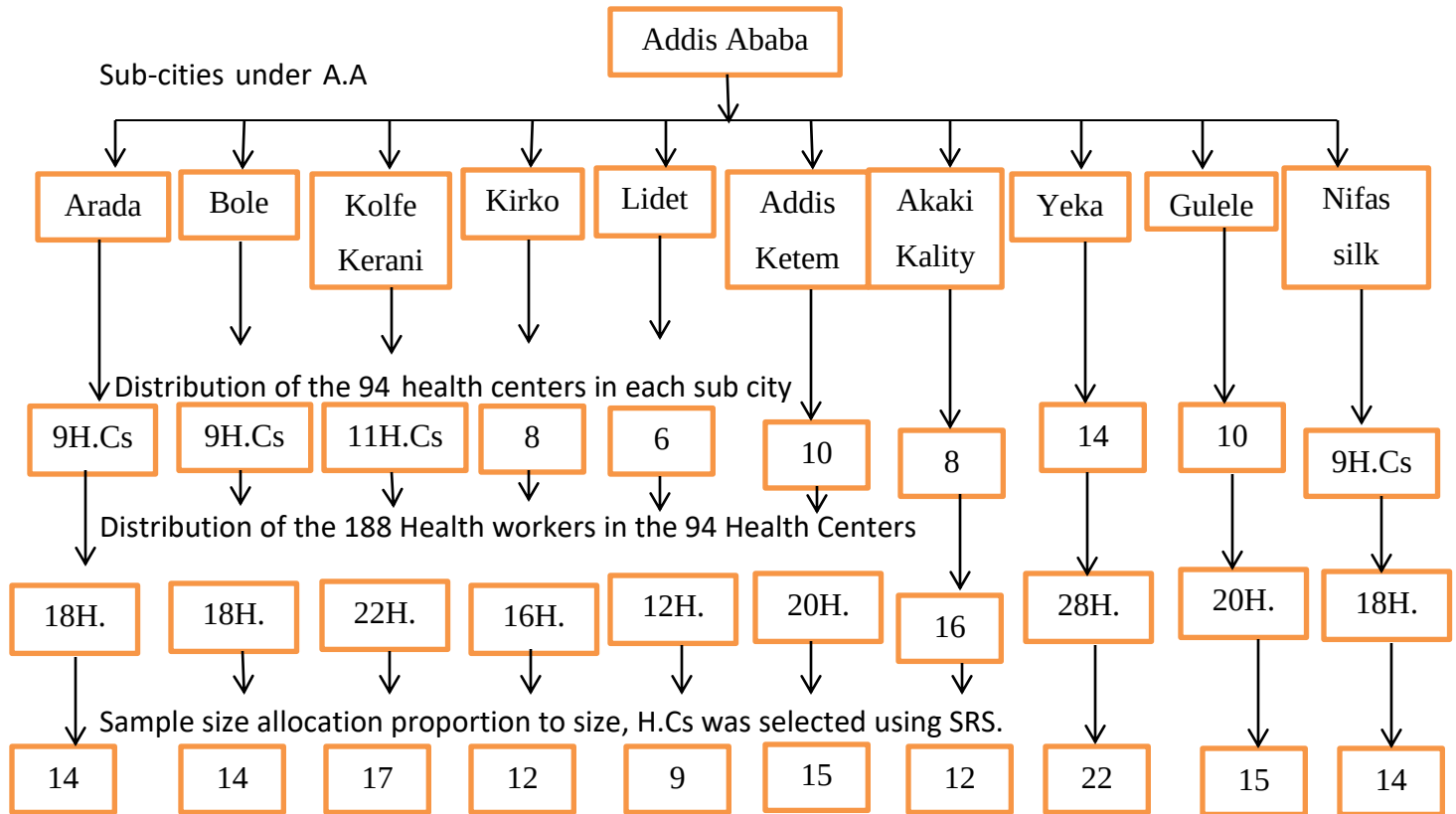


Figure 13: Schematic representation of sampling procedure.

Data collection Procedure and Quality control

An English version structured questionnaire was adapted and contextualized by reviewing different literatures (30–33) and pretest was done to check its validity in 8 (5%) of health workers, it was done in Arada and Gulele sub cities in unselected health centers. Since the study participants and data collectors were health workers, the English version questionnaire needs not to be translated and back translated. It includes four main parts, socio demographics, knowledge, attitude and practice of health workers towards IMNCI strategy at public health centers.

For independent variables including knowledge and attitude part data was collected by self-administered questionnaires but for the practice part they were observed by using a check list during managing a sick young infant or sick child (only one consultation was observed). They were informed about the aim of the study using the same information sheet and consent sheet. To triangulate the observation and minimize information bias, use of chart booklet, IMNCI registers and growth monitoring charts was also assessed. Observation was conducted first and self-administered questionnaire was followed to reduce information bias. Data was collected by 20

IMNCI trained health workers. Two health workers were selected and deployed from each sub city from unselected health centers for the study and the data collection process was supervised by 5 supervisors and the principal investigator. Before the date of actual data collection, training was given for data collectors and supervisors for three days about IMNCI protocol, the data collection and how to handle the data and the content of the instrument. Collected data was cleaned using Epi info version 7 statistical software and checked for completeness and consistency. Self-administered questionnaires were filled by health workers in their respective work place.

Variable

Dependent

Practice – Following steps of IMNCI recording form in the chart booklet

Independent

Socio demographic characteristics of Health workers (sex, age, marital status)

Profession (HO, Nurse, Midwife, Physician)

Educational level (Diploma, B.Sc., MD)

Work experience (total work experience, work experience in IMNCI)

Training (pre-service & in service and basic training & refresher training)

Knowledge (knowledge of health workers in assessment, classify & treatment of sick young infant and sick child)

Attitude (attitude of health workers towards use of IMNCI protocol in management of sick young infant and sick child)

Operational Definition of Terms

Health workers:-according to this study, it included General practitioners, Health Officers, B.Sc. Nurses and Diploma Nurse.

Knowledge: - Since cut-off point was not found to differentiate knowledge level of health workers, it needed to use either mean or median score. Again according to this study the distribution of knowledge scores were not normal. Therefore median score was selected as a cut-off point. Those respondents who answered knowledge questions of the median score and above it have adequate knowledge and those who answered below the median score have inadequate knowledge. To determine the knowledge level of the health workers 18 questions were asked (24), (34). The same procedures were followed for attitude and practice regarding cut-off point.

Attitude: - To determine the attitude towards IMNCI practice 11 questions were asked. The median score was used to classify the health care workers' attitude into positive and negative attitude towards following IMNCI strategy in childhood case management(24), (34).

Practice: - When a health worker scored the median or above the median score of the total observation checklist result, they were categorized under good practice otherwise poor practice of following IMNCI protocol was taken as a cut-off value(24), (34).

Data Processing and Analysis

The collected data was coded, entered and cleaned into computer using Epi info version 7 and exported into SPSS version 21 for analysis. The univariate analysis such as percentage and frequency distribution of different characteristics of the questionnaire was analyzed using Epi info and SPSS and presented with tables and graphs. Bivariate analysis was used to see the association of independent with the dependent variable, variables with P-value of 20% significant was selected for multiple regressions. Multivariable binary Logistic regression model was employed to control confounding variables, variables included in the model were restricted to those significantly related to IMNCI practice at the bivariate level and some of the statistical test like, odds' ratio (crude & adjusted) were used to measure their association, at this stage 5% significant was used for P-value. The multivariable result was presented with tables.

Ethical Consideration

Letter of ethical approval was obtained before the beginning of data collection from SPHMMC and Addis Ababa Public Health Research and Emergency Management Core Process. Permission letters were provided to sub city health offices, and in turn to the health centers for proceeding data collection. After that participants were well oriented about the purpose and procedure of data collection, and the confidentiality and privacy were ensured. It was also cleared that participation were fully based on the willingness of participants using written consent; name and address of the interviewee was not recorded in the questionnaire.

Dissemination of Results

The findings of this study will be communicated through SPHMMC, the College library, Addis Ababa Public Health Research and Emergency Management Core Process, MOH, and attempts will also be made to publicize on national and international peer reviewed journals if possible.

Result

Socio-demographic characteristics of study population

A total of 144 health workers were participated making the response rate 100%.

Among the study population 88(61.1%) females and 56(38.9%) were males. Regarding the age of the respondents 66(45.8%) was aged between 25-29 years. The median age was 29years; the range was 35 years with minimum 21 and maximum age of 56 years.

Among the study participants 78(54.2%) were currently married, the rest were single with no divorced or widowed (Table.24).

Table 24: Socio-demographic characteristics of respondents among health workers in public health centers in A.A, Ethiopia, 2017 (n=144)

Variables	Frequency	Percent
Sex		
Male	56	38.9
Female	88	61.1
Age of respondents		
20-24	17	11.8
25-29	66	45.8
30-34	30	20.8
35-39	18	12.5
40-44	3	2.1
45-49	2	1.4
50-54	7	4.9
55-59	1	.7
Marital status		
Married	78	54.2
Single	66	45.8

With regard to level of qualification 65(45.1%) were BSc nurses, 54(37.5%) Health Officers and 25(17.4%) were Diploma nurses. Concerning health workers service year, the most frequent service year group was ≤ 5 years (50.7%). Service years in IMNCI showed higher frequency 69 (47.9%) in 0 to 1 years category.

Regarding IMNCI training, 109(75.7%) of respondents attended IMNCI training at different periods, from this 82(75.2%) of participants attended between 2006-2010E.C. Of the total, who had attended training almost half 69(63.3%) of respondents attended in service training. Of the 109, 81 health workers (74.3%) attended 7 days duration of training, the rest attended 11 days.

Only 26 of the study participants are received refresher training, of which 21 received in 2009-2010E.C (Table.25 below).

Table 25: Factors related to educational background, work experience and training of health workers that affects implementation of IMNCI strategy

Variables	Frequency	Percent
Educational Level		
HO	54	37.5
B.Sc. Nurse	65	45.1
Diploma Nurse	25	17.4
Service year		
<=5	73	50.7
6-10	48	33.3
11-15	12	8.3
16+	11	7.6
Service year in IMNCI		
0-1	69	47.9
2-3	56	38.9
4-5	14	9.7
6-7	2	1.4
8-9	2	1.4
10+	1	0.7
Basic training		
Yes	109	75.7
No	35	24.3
Type of training		
In service	69	63.3
Pre service	40	36.7
Duration of training		
7 days	81	74.3
11 days	28	25.7
Year of training in E.C		
<=2000	7	6.4
2001-2005	20	18.3
2006-2010	82	75.2
Refresher training		
Yes	26	18
No	118	82
Year of training		
<=2008	5	19.2
2009-2010	21	80.8

Knowledge of study population

Based on 18 selected knowledge questions answered by 144 respondents median, range, maximum and minimum scores were 12, 12, 18 and 6 respectively. Since the distribution of knowledge score of the 144 study participants were not normal by SPSS application software, median score 12(67%) was taken as a cut of point to measure knowledge. Therefore 90 (62.5%) participants were knowledgeable because they scored the median score 12 and above it. Fifty four (37.5) scored below median (12).

Attitude of study population

The same mechanism was used to differentiate attitude of health workers in to two categories as positive and negative attitudes towards implementing IMNCI strategy. Again the distribution of attitude score was not normal using SPSS normality test; therefore median was taken as a cut of point. There were 11 attitude questions; out of this 9(82%) was the median, range, minimum and maximum score of the 144 respondents were 7, 4, and 11 respectively. Using this 91 (63.2%) of the respondents scored 9 and above, therefore they were considered as having positive attitude to follow IMNCI protocol to manage childhood illnesses the rest 53 (36.8%) were taken as having negative attitude to use the strategy. Fifty one (65%) of the respondents agreed that following all the steps of IMNCI for all children is time taking but only 20 (14%) agreed on management of only the presenting symptoms.

Practice of study population

Again the practice scores of the 144 study participants were not normally distributed so median score was used as a cut of point to categorize poor and good practice. Sixteen to seventeen questions/check lists were used to observe the health workers practice during one consultation and checking the registers of the IMNCI log book to minimize information bias during observation, then practice score was given. Out of the 144 observation scores 8(50%) was found to be the median score of the study participants. The range, minimum and maximum scores of the practice were 12, 1, and 13 respectively. Therefore 82(57%) participants scored ≥ 8 so they were taken as practicing good, the rest 43% of study participants experienced poor practice (scored below 8).

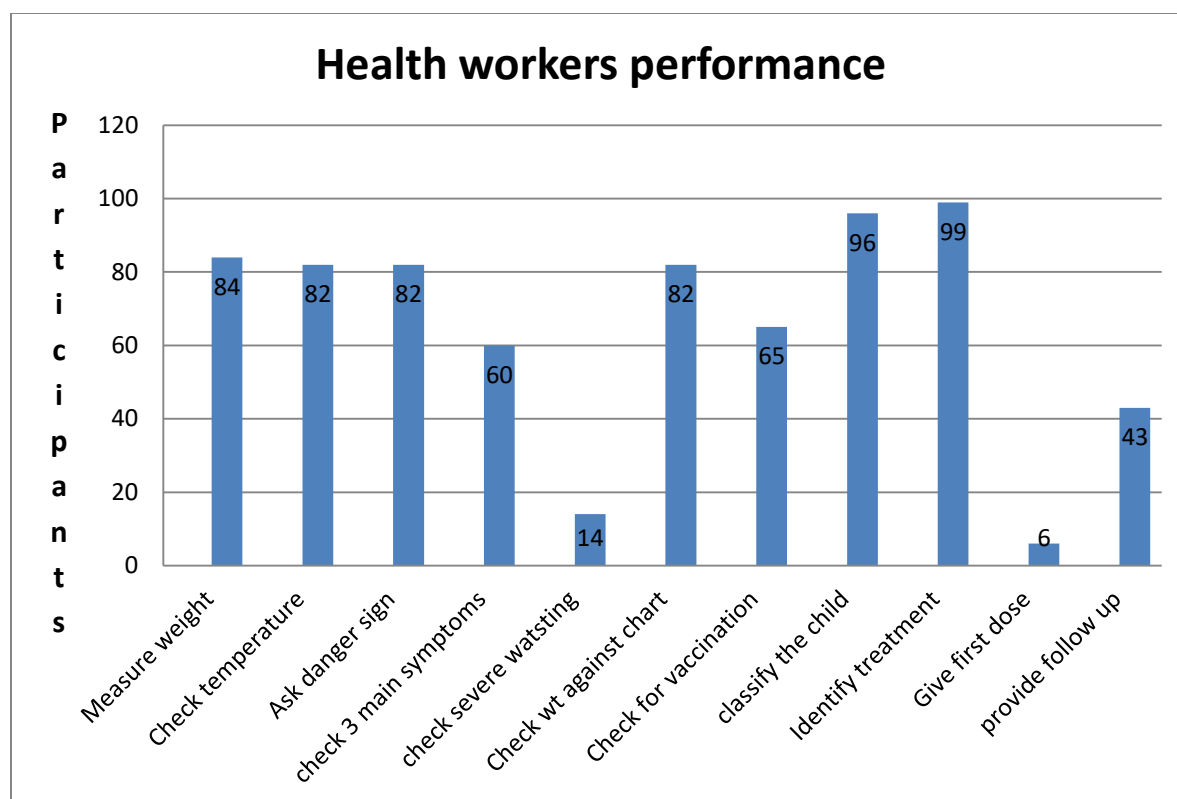


Figure 14: Performance of the study participants in implementing different activities of IMNCI steps, A.A, Ethiopia, 2017

One hundred-forty tow (98.6%) of respondents answered that they are always performing the IMNCI recommended activities as per the guidelines. While out of 144 study participants, 84(58.3%), 82(56.9%), 82(56.9%), 60(41.7%), 14(9.7%), 82(56.9%), 65(45.1%), 96(66.7%), 99(68.8%), 6(4.2%), 43(29.9%) were measure weight, check temperature, ask danger sign ,ask 3 main symptoms, check sever wasting, and checking weight against chart, check vaccination, classify the child, identify treatment, gave first dose and provide follow up respectively. Only 3(2%) of respondents answered as they are not performing IMNCI recommended tasks at all. (See fig 14. above)

According to observation of the register in the log book 88/141(62.4%) prescribed according to IMNCI recommended drugs, 77/141(54.6%) made referral accordingly and only 2/141 observations gave pre-referral treatments.

Multivariable Analysis Result

Health workers who had basic IMNCI training (AOR = 4.302, 95% CI = (1.880, 9.843)), were better for good practice of IMNCI strategy than non-trained, also health workers who had positive attitude towards IMNCI strategy (AOR = 2.458; 95% C.I = (1.182, 5.109)) were better for implementation of IMNCI protocol than who had negative attitude. (Table. 3 below)

Table 26: Bivariate and Multivariable analysis result of factors associated to IMNCI practice of health workers, A.A, Ethiopia, 2017

Associated factors	Category	Good Practice N (%)	Poor Practice N (%)	COR at 95% confidence interval	AOR at 95% confidence interval
Sex	F	51(59.3)	37(63.8)	0.827(0.416, 1.644)	
	M	35(40.7)	21(36.2)	1	
Age	20-29	45(52.3)	38(65)	0.526 (0.150, 1.845)	
	30-39	32(37.2)	16(27.6)	0.889 (0.237, 3.334)	
	40+	9(10.5)	4(6.9)	1	
Marital status	Married	49(57)	29(50)	1.324 (0.679, 2.585)	
	Single	37(43)	29(50)	1	
Educational level	B.Sc. Nurse	40(46.5)	25(43.1)	0.941 (0.447, 1.982)	
	Diploma Nu	12(13.9)	13(22.4)	0.543 (0.208, 1.417)	
	HO	34(39.5)	20(34.5)	1	
Total service Year	<= 5	40(46.5)	33(56.9)	0.727 (0.346, 1.531)	
	6 - 10	30(34.9)	18(31)	1	
	>= 11	16(18.6)	7(12.1)	1.376(0.474, 3.971)	
Service year in IMNCI	<= 2	61(70.9)	49(84.5)	0.448 (0.192, 1.048)	
	3 - 10	25(29.1)	9(15.5)	1	
IMNCI basic training	Yes	74(86)	35(50.3)	4.052(1.811, 9.068)*	4.302(1.880, 9.843)**
	No	12(14)	23(39.7)	1	
Type of IMNCI	In service	46(53.5)	23(39.7)	1	
	Pre service	28(70)	12(30)	1.167 (0.503, 2.706)	
Duration of the training	7 days	54(73)	27(77.1)	0.8 (0.312, 2.050)	
	11 days	20(27)	8(22.9)	1	
Time of the training in E.C	< 2008	37(50.7)	18(50)	1.028 (0.463, 2.284)	
	2008 - 2010	36(49.3)	18(50)	1	
Refresher training	Yes	18(20.9)	8(13.8)	1.654(0.666, 4.107)	
	No	68(79.1)	50(86.2)	1	
Time of refresher	<= 2008	4(80)	1(20)	2 (0.187, 21.431)	
	2009 - 2010	14(66.7)	7(33.3)	1	
Knowledgeable	Yes	58(67.4)	32(55.2)	1.683(0.847, 3.344)*	
	No	28(32.6)	26(44.8)	1	
Positive Attitude	Yes	61(70.9)	30(51.7)	2.277(1.137, 4.559)*	2.458(1.182, 5.109)**
	NO	25(29.1)	28(48.3)	1	

• * P value < 0.2 cut off point selected for multiple regression analysis

• ** Significant level at 0.05 P value

Discussion

This study aimed to identify level of IMNCI practice and factors influencing IMNCI practice of health workers in public health centers of Addis Ababa city. In this study attending of basic IMNCI training and attitude of the health workers towards IMNCI algorithm had significant association with the implementation of IMNCI strategy. Using the median score this study showed 62.5% of participants were knowledgeable and 63.2% of the respondents had positive attitude for IMNCI strategy. According to our study 75.7% of the study participants attended basic IMNCI training. But it is incomparable with the WHO standard (at least 60% of the health care workers in the facility should attend IMNCI training)(25), because the study participants of this study were not all health workers in the facility but only health workers who were assigned in under-five unit. The trained health workers in the facility might be less than the above mentioned percentage.

Discussion about associated factors of IMNCI practice

According to this study health workers who had basic IMNCI training (AOR = 4.302, 95% CI = (1.880, 9.843)) were at a greater odds of having good practice for the implementation of IMNCI strategy, that means health workers who have trained basic IMNCI training was 4 times more likely to implement IMNCI protocol than who didn't take the training, likewise according to a study done in WEST ARSI ZONE, ETHIOPIA, 2016, in multivariate analysis the implementation of IMNCI was higher among IMNCI trained nurses(25). Similar to this study in a study conducted in West Java province, Indonesia indirectly mentioned that lack of IMNCI trained health workers as a barrier for implementation(10). Again in our study finding health workers who had positive attitude towards IMNCI strategy (AOR = 2.458; 95% C.I = (1.182, 5.109)) had significant association with good practice or health workers who had positive attitude to IMNCI strategy implemented 2 times more likely than the health workers who scored negative attitude towards the IMNCI protocol.

Discussion concerning health workers attitude

In this study using median score, 63.2% of the respondents considered as having positive attitude to follow IMNCI protocol to manage childhood illnesses. Similarly in the study done at community health centers in West Java province, Indonesia, nearly all health workers acknowledged the importance of IMCI in their routine services and very few did not perceive its benefits(10). Also in the same study conducted in Zanzibar, health workers are found to have a

positive attitude toward the IMCI strategy and commented it is a better approach in managing common childhood illnesses(18). In the study conducted in Mwanza, Tanzania, 77% of the respondents had a positive attitude that IMCI approach was a better approach in managing common childhood illnesses especially with the reality of resource constraint in the health facilities(19). Study by Wafula and Mullei in Kenya revealed that nurses generally expressed positive attitudes about IMCI, while some clinical officers and doctors have not accepted the IMCI approach. They feel that the guidelines are simplistic and do not allow them to make full use of their clinical training(20). Since the strategy was developed for low level health workers and where there is no laboratory it might not allow for physicians to exercise full physical diagnosis procedures.

Discussion regarding practice of health workers

The study finding revealed that proportion of IMNCI practice based on median score was 57% as good practice which was the median and above median score. This is below the study conducted in West Java province, Indonesia health centers 64% applied it to all visiting children(10). It is nearly similar with the study done in WEST ARSI ZONE, ETHIOPIA, 2016, the overall IMNCI implementation 58.7% as high level implementation and 41.3% as low level implementation(25). The same study done at community health centers in West Java province, Indonesia showed Almost all ($N = 79$) health centers implemented the IMCI strategy; however, only 64% applied it to all visiting children(10). The difference might be due to the use of different cut off points in studies.

In this study 56.9% of health workers ask for general danger signs, 45.1% check for vaccination, 66.7% classify the child accordingly, 68.8% identify treatment, only 4.2% gave first dose treatment at facility, and 29.9% provide counseling. Again this study observation of the register in the log book showed 62.4% health workers prescribed according to IMNCI recommended drugs, 54.6% made referral accordingly and only in 2/141 observations they gave pre-referral treatments. While according to a study done in United Republic of Tanzania, of 240 children classified as having “very severe febrile disease”, none received all IMCI-recommended therapies, and only 25% of severely ill children were referred. Most (91%) health workers indicated that certain severe conditions can be managed without referral(14).

In addition in the study conducted in Zanzibar, Also is observed that there is malpractice in assessment of IMCI indicators, poor adherence of the standard treatment guideline and

misuse/overuse of antibiotics. Also outlines lack of pre-referral treatment for urgent referral and poor counseling and advice to the caregivers(18).

Limitation

In this study it was impossible to compare proportion of trained health workers in IMNCI with the WHO standard (60% of facility health workers) because the study participants in this study represented only the under-five unit health workers.

There might be bias during observation of health workers using observation check list while they were managing childhood illness.

Moreover a study done in this area in our country was limited.

This study was limited to Addis Ababa and hence the findings cannot be generalized to the country as a whole.

Conclusion

In general, due to different factors, in all studies including this study there is a gap of full practice of IMNCI strategy by health workers. This study revealed that the proportion of IMNCI implementation in the study setting was (57%). In this study 75.7% of health workers respond who have attended IMNCI training as compared to WHO recommendation (60% of facility health workers).

This study identified lack of training and negative attitude of health workers had significant association towards low implementation of IMNCI strategy

Recommendation

As IMNCI training is an important factor for IMNCI implementation, policy makers and concerned stakeholders, MOH and health bureau child health departments should give great emphasis to training.

IMCI training facilitators from health bureau should give emphasis on IMNCI refresher/updated training and visits to IMNCI implementers.

MOH and health bureau child health departments need to consider mechanisms that brings positive attitude towards IMNCI strategy for health workers who are assigned in under-5 OPD.

Further study is recommended to be conducted in the area for the future.

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Annex 8: Thesis Information Sheet

Research Title: Assessment of integrated management of neonatal and child hood illness algorithm use and associated factors among health professionals assigned at under-five unit in governmental health centers in Addis Ababa, Ethiopia, 2017

Researcher: Asfawossen Solomon

Dear Respondent:

I am a Master's student at Saint Paul's Hospital Millennium Medical College, Department of Public Health.

I kindly request you to participate in a study that is aimed at exploring level of practice and the factors influencing the implementation of IMNCI strategy by health workers in public health institutions. The participation in this study is voluntary; you can also withdraw at any time from the study if you feel uncomfortable. Refusal to participate will not affect your work or care you shall seek at any of the health facilities in any way. Confidentiality will be ensured by not using your name or address on the questionnaire and final thesis report. There are no risks involved in participating in this study. The study has no immediate benefits to the respondents, but will have benefits later in improving the uptake of IMNCI service utilization among children and thereby help to reduce the burden of child morbidity and mortality. I welcome any question if you have any about the study and your participation. If you have any questions about the research or any related matters, please contact the researcher at +251912-02-91-97.

Email: assesol@yahoo.com and asesol2010@gmail.com

Annex 9: Thesis Consent sheet

I, the under signed, understand the nature of the study, benefits, my right to voluntary participation, confidentiality and withdrawal from the study without any victimization. I have had the opportunity to ask questions and answered to my satisfaction.

I hereby freely consent to take part in this study.

Signature of the participant_____

Date ____/____/____ E.C.

Supervisor Name_____ Signature _____

Date ____/____/____ E.C.

Name of interviewer _____ Signature_____

Date ____/____/____ E.C.

Your participation will be greatly appreciated.

Yours Faithfully,

Annex 10: Thesis Questionnaire

Section 1 Socio demographic data of health workers

All questionnaires are completed anonymously. We would appreciate if you answer all the questions and answer as honestly as possible.

S/n	Questions	Response
101	Sex?	1. Male 2. Female
102	Age?	_____ in years
103	Marital status	1. Married 2. Single 3. Divorced 4. Widowed 5. Separated

Section 1.1. Questions related to educational background, work experience and training of health workers

S/n	Questions	Response	Skip
104	What is the highest level of education you have Completed?	1. Diploma Nurse 2. B.Sc. Nurse 3. HO. 4. GP.	
105	How long have you been serving as health care provider?	_____ in years	
106	How long have you been working in IMNCI?	_____ in years	
107	Did you take IMCI/IMNCI basic training?	1. Yes 2. No, Go to question →	111
108	If yes to # 107, which IMCI training did you receive?	1. pre service training 2. in service	
109	If yes to # 107, Duration of the training	1. 6/7- days 2. 11-days	
110	When did you take the training?	_____ in years & months	
111	Did you take refresher training on updated module?	1. Yes 2. No, Go to question →	201
112	When did you take the refresher training?	_____ in years & months	

Section 2. Questions related to knowledge of health workers about IMNCI algorithm in management of childhood illnesses

S/n	Questions	Response	Skip
201	Which of the following is a general danger sign in sick children?	1. Vomiting frequently 2. Fast breathing 3. Unable to breastfeed, eat, or drink	
202	If a child has a severe (RED) classification and needs to be urgently referred, how do you determine the pre-referral treatment?	1. Send the child immediately to the hospital. 2. Give all pre-referral treatments for all classifications.	
203	Should every sick child be checked for general danger signs?	1. Yes 2. No	
204	In IMCI, the sick young infant refers to:	1. First month after birth 2. Aged up to 2 months 3. First 7 days after birth	
205	When using IMCI, what clinical signs help identify pneumonia?	1. Wheeze and wet cough 2. Fast breathing and chest in drawing 3. Chest in drawing and blood when coughing	
206	What is the respiratory rate cut-off point for 7 months old child?	1. 40 or more breaths per minute 2. 50 or more breaths per minute 3. 60 or more breaths per minute	
207	Can a child with chest in drawing be treated in the clinic?	1. Yes 2. No	
208	Does a child with PNEUMONIA should return to the clinic in 2 days for follow up?	1. Yes 2. No	
209	What signs do you assess for dehydration?	1. Blood in the stool or diarrhea that persists for 14 days 2. Sunken eyes, loose skin (turgor),	

		and lethargy 3. Swollen abdomen and sunken eyes	
210	Severe Persistent Diarrhea is: Persistent diarrhea and the child	1. Has diarrhea for 10 days or more 2. Is dehydrated 3. Has blood in the stool	
211	What antibiotic should be given for dysentery?	1. Ciprofloxacin 2. Co-trimoxazole 3. Amoxicillin	
212	A restless child who drinks eagerly when you give him/her water. How would you classify his/her dehydration?	1. Severe Dehydration 2. Some Dehydration 3. No Dehydration	
213	Does measles contribute to malnutrition?	1. Yes 2. No	
214	Signs of measles with complications include:	1. Clouding of cornea 2. Skin pustules 3. Scabies	
215	Which signs do you use when assessing for malnutrition?	1. The child is restless or irritable 2. Edema, or swelling, of both feet 3. Child looks pale	
216	Why do you check every child for ear problems?	1. Ear infections can become very serious 2. Ear infections usually clear up without any treatment.	
217	Does a child with an ear problem classified as MASTOIDITIS needs	1.Treatment at H.C 2.urgent referral 3.urgent pre-referral treatment and referral	
218	The first dose of deworming in under-fives should be given at the age of:	1. Six months 2. Three months up to 6 months 3. At the age of 12 months 4. At the age of 2 years	

Section 3.Attitude of health workers about IMNCI algorithm in management of childhood illnesses

The following statements refer to the attitude of health workers towards following IMNCI algorithm in management of childhood illnesses. The two columns provide spaces for the following responses: - YES, NO

Please put right mark (✓) the response which must closely reflects your feelings.
There is no right or wrong answers.

S/n	The Attitude of health workers towards IMNCI algorithm in management of childhood illnesses	Response	
		Yes	No
301	Do you agree that, IMCI is the appropriate strategy of case management in Under- five children?		
302	Are you ready to use IMNCI algorithm if a child comes to you with childhood illnesses?		
303	Do you agree that, following IMCI strategy are too costly?		
304	Do you agree that, following steps of IMCI recording form is time taking?		
305	Do you agree that, It is appropriate to follow all steps on the IMNCI recording form if a child comes to you with a single problem cough?		
306	Do you agree with the assessment of a well-child?		
307	Do you agree that, It is appropriate not requesting laboratory for a child presented with diarrhea?		
308	Do you agree that, It is appropriate to assess for other classification/s for severely ill child and needs urgent referral?		
309	Do you agree that, It is appropriate to give pre-referral treatment for severely ill child and needs urgent referral?		
310	Do you agree that, It is appropriate to assess vaccination status for sick child?		
311	Do you agree that, It is appropriate growth monitoring for all sick child?		

Section 4 Practice of health workers on following of IMNCI algorithm in management of childhood illnesses (observation)

S/n	Questions	Response	Skip
401	Does the health worker, or another staff, weigh and record the weight of the child today?	1. Yes 2. No	
402	Does the health worker, or another staff, check the temperature of the child?	1. Yes 2. No	
403	Does the health worker ask the caretaker why she brings the child to the health facility?	1. Yes 2. No	
404	Does health worker ask whether the child has general danger signs?	1. Yes 2. No	
405	Is the child visibly awake (e.g., playing, smiling, and crying with energy)?	1. Yes → 2. No	407
406	If child not visibly awake, does health worker check for lethargy or unconsciousness (try to wake up the child)?	1. Yes 2. No	
407	Does health worker ask/check the 3 main problems (cough, diarrhea and fever)?	1. Yes 2. No	
408	Does health worker check for visible severe wasting?	1. Yes 2. No	
409	Does health worker check child's weight against a growth chart?	1. Yes 2. No	
410	Does the health worker ask for and check the child's vaccination card?	1. Yes 2. No	
411	Does health worker correctly classify according to IMNCI?	1. Yes 2. No	
412	Does health worker correctly treat according to IMNCI?	1. Yes 2. No	
413	Does health worker give 1 st dose of antibiotic or ORS accordingly?	1. Yes 2. No	
414	Is correct home advice on treatment and follow up given?	1. Yes 2. No	
415	In the last six months, have you treated children using steps of IMCI algorithm?	1. Yes 2. No, →	420

Section 4.1 Job aids & documents used on following of IMNCI algorithm in management of childhood illnesses

S/n	Questions	Response	Skip
416	Do You have Chart booklet and use during managing childhood illness? (observe the booklet)	1. Yes 2. No,	
417	Are drugs prescribed in the OPD register according to the classifications (observe the OPD register)?	1. Yes 2. No	
418	Are referrals made in the OPD register according to the classifications (observe the OPD register)?	1. Yes 2. No	
419	Does the child needing referral is given appropriate pre-referral treatment at the facility?	1. Yes 2. No	
420	If you didn't follow IMCI algorithm, what was your reason?		

Annex 11: Biography

My name is Asfawossen Solomon I was born in March, 1978 G.C in Addis Ababa, Ethiopia. I attended my primary education and high school at Medhanealem Elementary and Secondary Schools respectively. Then I joined Addis Ababa University centralized school of Nursing, Black Lion Hospital in 1997 and graduated with Diploma in Nursing in October, 1999 G.C, again graduated with B.Sc. in Nursing in 2010 G.C. by extension (Evening) program from A.A.U. Black Lion Specialized & teaching hospital.

After graduation I worked as a Nurse in 3 different public health centers in Gulele sub city, Addis Ababa in different departments. From 1999 to 2002 in 'kebena' health center in labor and delivery, curative and TB departments, from 2002 to 2007 in 'Semien Mezegaja' health center again in TB, curative, Antenatal and Family planning departments and starting from 2007, in Selam health center in emergency, labor and delivery, curative, IMNCI and as a leader of being curative service core process owner until 2015 G.C. Then I joined SPHMMC in 2015 G.C for a postgraduate studies in FETP Urban track.