



**St. Paul Hospital Millennium Medical College  
Department of Public Health  
Field Epidemiology Training Program (FETP)**

**Compiled Body of Work Submitted to the Department of Public Health**

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**Acronyms and abbreviations**

**A.A:** Addis Ababa

**A.funestus:** Anopheles funestus

**A.nili:** Anopheles nili

**A.pharoensis:** Anopheles pharoensis

**AAHB:** Addis Ababa Health Bureau

**AFI:** Acute Febrile Illness

**AFRO:** Africa Regional Office

**AGE:** Acute Gastro Enteritis

**AOR:** Adjusted Odds Ratio

**AURTI:** Acute Upper Respiratory Tract Infection

**AWD:** Acute Watery Diarrhea

**CFR:** Case fatality rate

**COR:** Crud Odds Ratio

**CTC:** Cholera Treatment Centre

**DRC:** Democratic Republic of Congo

**epiInfo:** Epidemiological Information

**FDRE:** Federal Democratic Republic of Ethiopia

**GDP:** Gross Domestic Product

**GIS:** Geographic information system

**HH:** Household

**HIV:** Human Immune Virus

**HPDP:** Health Promotion and Disease Prevention

**IDSR:** Integrated Disease Surveillance Report

**ILO:** International Labor Organization

**Kg:** Kindergarten

**MD:** Medical Doctor

**MDSR:** Maternal Death Surveillance and Response

**MM:** Meningococcal Meningitis

**mOR:** Matched Odds Ratio

**MPH:** Master of Public Health

**MS:** Microsoft

**MSE:** Small Scale Enterprises

**MSW:** Municipal Solid Waste

**NGO:** Non-Governmental Organization

**NSL:** Nifas Silk Lafto

**OR:** Odds Ratio

**ORS:** Oral Rehydration Salt

**OX-19:** A proteus Strain to diagnose epidemic typhus

**P.falciparum:** Plasmodium falciparum

**P.malaria:** Plasmodium malaria

**P.ovale:** Plasmodium ovale

**P.vivax:** Plasmodium vivax

**PHEM:** Public Health Emergency Management

**PPE:** Personal Protective Equipment

**PUD:** Peptic Ulcer Disease

**PVP:** Predictive Value Positive

**R. thyphi:** Rickettsia thyphi

**R.prowazekii:** Rickettsia prowazekii

**RDT:** Rapid Diagnostic Test

**RVI:** Retro Viral Infection

**SPHMMC:** Saint Paul Hospital Millennium Medical College

**SPSS:** Statistical Package for Social Science

**UHEP:** Urban Health Extension Professional

**UNICEF:** United Nations International Children's Emergency Fund.

**UTI:** Urinary Tract Infection

**V.Cholera:** Vibrio Cholera

**WHO:** World Health Organization

**WRI:** Work Related Injury

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**Chapter I: Cholera outbreak investigation (case-control study) in Nifas Silk Lafto Sub  
City, Addis Ababa, Ethiopia**

## Abstract

**Introduction:** The outbreak of cholera in Nifas Silk Lafto Sub City started on 8 June 2016 and was laboratory confirmed by culture on 10 June 2016. The index case was reported from Goh medium clinic by telephone to sub city PHEM officer, then PHEM officers to Addis Ababa Regional Health Bureau by phone. The outbreak was investigated to assess the magnitude of morbidity and mortality due to cholera and the factor(s) associated with risk of cholera infection.

**Methods:** An unmatched case control study design was conducted to assess the magnitude of morbidity and mortality due to cholera and the factor(s) associated with risk of cholera infection with the total number of 42 cases and 83 controls (1 case : 2 controls). The study area was Nifas Silk Lafto Sub City and the study period was from June 11/2016 to July 11/2016 G.C. The primary data was collected through structured questionnaire by the principal investigator. Descriptive and analytical analysis was done by using micro soft office excel and epi Info.

**Result:** Most affected age group was 15-44 year with total cases of 293 (55.18%) and most affected area was Woreda 6 with the number of 160 (30.13) total AWD cases. The identified mode of transmission was contaminated foods and water. Bivariate analysis showed that, AWD cases who ate any type of raw meat were with [Odds Ratio (OR) = 16.01; 95% CI (3.25, 78.81),  $P = 0.0006$ ]; have the chance than that of who did not eat any type of raw meat; individuals who ate vegetable salad were with [Odds Ratio (OR) = 18.11; 95% CI (4.18, 78.45),  $P = 0.000$ ]; were more likely to develop cholera than those who did not eat vegetable salad; those of individuals with poor hand washing practice have percentage of 78.57% among cases and water treatment before drinking for those of AWD cases was with [chi-square ( $\chi^2$ ) = 16.41,  $df = 2$ ,  $P = 0.0001$ ]; which shows that these factors have strong association with cholera infection.

**Conclusion:** Ingestion of any type of raw meat, poor solid waste management, fruits and vegetable salad consumption, poor hand washing practice and environmental sanitation, shortage of safe and adequate water supply, poor latrine contraction and utilization, etc. were the main identified sources of cholera infection. It is better Nifas Silk Lafto sub city administration to aware farmers around rivers of the sub city about contamination of vegetables by human waste (excreta) or not to irrigate by the existing river or if possible decontaminate vegetables before selling.

## **1. Introduction**

### **1.1. Background**

Cholera is an acute intestinal infection transmitted feco-orally by ingestion of food or water contaminated with the bacterium *Vibrio Cholerae* unless treated promptly; it quickly leads to severe dehydration and death. The typical presentation of cholera patients were with acute profuse watery diarrhea and acute vomiting. The entero toxin of *vibrio cholera* leads to secretion and loss of large volume isotonic fluid from intestine then unless treated or properly supplemented adequate fluid via intravenously or orally, it may lead to death within short period of time even within hours. *V. Cholera* is gram-negative, highly motile bacterium. Two main serogroups (O1 and O139) carry set of virulence genes necessary for pathogenesis. In Ethiopia one confirmed case of cholera is enough to declare an outbreak. Therefore, health workers at all levels have to clearly understand the case definitions of this disease and manage the outbreaks in a standardized manner.

The outbreak of cholera in Nifas Silk Lafto Sub City started on 8 June 2016 and was laboratory confirmed by culture on 10 June 2016. The index case of cholera in the sub city was reported from Goh private medium clinic of Woreda 09 administration on 08 June 2016 by telephone to sub city PHEM officers then the stool specimen was sent to Addis Ababa regional laboratory for confirmation of outbreak. Immediately after report has received by the sub city health office and PEHM officers started to respond to the outbreak according to national guide line of cholera treatment. Rapid response team establishment was started as soon as the confirmed cholera case was declared from kolfeKeranio sub city on 07 June 2016. Social mobilization, sensitization of health professionals, response activities like establishment of cholera treatment center, training of professionals how to manage cholera as per protocol of national guide line, establishment of isolation rooms at each health facilities (public and private), strengthening of community surveillance, doing active search of cases, supplementation of water treatment chemicals, provision of tankers for those of lack with safe and adequate water supply, disinfection of cases' households, clothing, and other materials that have contact cholera cases; solid waste collection by the sanitary administration agency, emptying of full latrines by Addis Ababa WASH authority, etc activities were done simultaneously. Contacts of cases were registered and

followed for 5 consecutive days about their health status, the investigation team (rapid response team) had assessed the risk factors of cholera infection; the hypothesized risk factors were poor hand washing practice after defecation and before meal, ingestion of raw foods with low protection like vegetable salad, raw meat, poor environmental sanitation, open defecation, storing water for long period of time in (tanker, roto, Jeri can), drinking spring water, drinking from holy water site, contamination of drinking water through breakage of pipe lines due to different reasons, etc were hypothesized risk factors why cholera outbreak had started. As of December 22, 2016, the cumulative number of cases reported from the 13 Woredas in the sub city were 1,375 from which 558 (40.58%) females and 817 (59.42%) were males with 1 death (CFR= 0.073) among these, 531 cases were from the 7 Woredas (5, 6, 7, 8, 9, 10 and 12) including 1 death (CFR 0.19 %). All the 13 Woredas in the sub-city have reported cases at the time of outbreak.

Acute watery diarrhea is a disease caused by many different groups of microorganisms like vibrio cholera, Cryptosporidium, Salmonella, Rotavirus and others. But studies showed that majority or more than 80% of pandemic and epidemic cases were caused by V.Cholera. Since 1817, there have been 7 cholera pandemics. The first 6 occurred from 1817-1923 and were caused by V. cholerae, the classical biotype. The seventh pandemic began in Indonesia in 1961 and affected more countries and continents than the previous 6 pandemics. It was caused by V. cholerae El Tor. Seventh pandemic began in Indonesia in 1961 and then reached Africa in 1970. By 1971 twenty five African countries reported cholera with more than 72,000 cases and 11,000 deaths. Three thousand forty three cases per year were reported since 1971. In 1991 large epidemic had occurred in 14 African countries with more than 100,000 cases and 10,000 deaths. When come to Ethiopian, the country had reported different number of cases at different time. Recently on March/2016 Federal Ministry of Health reported around 995 cases and 12 deaths in Oromia, Somalia, and Southern Nations and Nationality Regions. This study will be starting point for future studies about the risk factors of cholera transmission and infection in the sub city. Therefore, this study was conducted to assess the magnitude of morbidity and mortality due to cholera and the factor(s) associated with risk of cholera infection.

### **1.2.Literatures review**

Cholera remains a significant public health problem in many parts of the world. In 2015, 42 countries reported a total of 172,454 cases including 1304 deaths, resulting in an overall case fatality rate (CFR) of 0.8%. Cases were reported from all regions, including 16 countries in Africa, 13 in Asia, 6 in Europe, 6 in the America, and 1 in Oceania. Afghanistan, the Democratic Republic of the Congo (DRC), Haiti, Kenya, and the United Republic of Tanzania accounted for 80% of all cases. Of cases reported globally, 41% were from Africa, 37% from Asia and 21% from Hispaniola(1).

A total of 603 cross-border cholera cases with 5 deaths were recorded in Malawi and Uganda in 2015. Uganda recorded 118 cases with 2 deaths and CFR of 1.7%. The under-fives and school going children were the most affected age groups contributing 24.2% and 36.4% of all patients seen along Malawi-Mozambique and Uganda-DRC borders, respectively. These outbreaks lasted for over 3 months and spread to new areas leading to 60 cases with 3 deaths, CFR of 5%, and 102 cases 0 deaths in Malawi and Uganda, respectively. Factors contributing to these outbreaks were: poor sanitation and hygiene, use of contaminated water, floods and rampant cross-border movements. The outbreak control efforts mainly involved unilateral measures implemented by only one of the affected countries (2).

The review yielded eighteen studies and of the five studies reporting on health impact, four reported outcomes associated with water treatment at the point of use, and one with the provision of improved water and sanitation infrastructure. Furthermore, whilst the reporting of function and use of interventions has become more common in recent publications, the quality of studies remains low. The majority of papers (>60%) described water quality interventions, with those at the water source focusing on ineffective chlorination of wells, and the remaining being applied at the point of use. Interventions such as filtration, solar disinfection and distribution of chlorine products were implemented but their limitations regarding the need for adherence and correct use were not fully considered. Hand washing and hygiene interventions address several transmission routes but only 22% of the studies attempted to evaluate them and mainly focused on improving knowledge and uptake of messages but not necessarily translating this into safer practices. The use and maintenance of safe water storage containers was only evaluated once, under-estimating the considerable potential for contamination between collection and use. This problem was

confirmed in another study evaluating methods of container disinfection. One study investigated uptake of household disinfection kits which were accepted by the target population. A single study in an endemic setting compared a combination of interventions to improve water and sanitation infrastructure, and the resulting reductions in cholera incidence(3).

A house-to-house active search was conducted to identify cases of acute diarrhea and collect information on drinking water source. Drinking water samples were collected from common water sources and sampled households to test for bacteriological quality. Ten stool samples were collected for culture. A matched case-control study was conducted to identify the risk factors. A total of 138 case-patients of diarrhea (Attack rate: 11.5/100; Population: 15 1,200) and 1 death (Case Fatality Ratio: 0.72/100) were identified. Five of the 10 stool samples were culture positive for V.Cholera, serogroup O1 El Tor. Drinking water from the overhead tank [Adjusted OR (AOR): 31.94, 95 % CI: 7.3-139.5] was associated with risk of developing illness(4).

A total of 798 patients were admitted, of whom 443 (55.5%) were female. There were 18 deaths (2.3%). Assessment of dehydration status was recorded in 517 (64.8%) of clinical records. An alternative or additional diagnosis was made for 214 patients (26.8%). Intravenous (IV) fluids were prescribed to 767 patients (96.1%), including 95% of 141 patients who had documentation of being not severely dehydrated. A history of vomiting was documented in 92.1% of all patients. Oral rehydration solution (ORS) was given to 629 (78.8%) patients. Doxycycline was given to 380 (47.6%) patients, erythromycin to 34 (4.3%), and other antibiotics were used on 247 occasions. Zinc was given to 209 (26.2%)(5). Conditional logistic regression found that consuming unsafe water (matched odds ratio [mOR]: 3.4; 95% confidence interval [CI]: 1.1,11.0), street-vended water (mOR: 9.4; 95% CI: 2.0, 43.7), and crab (mOR: 3.3; 95% CI: 1.03, 10.6) were significant risk factors for cholera infection(6). A total of 1,171 cholera cases and 21 deaths were reported in the districts around the lake, with cases also being reported on the Mozambican side of the lake. The attack rate was highest among people living on or around the lake, particularly among fishermen. Samples of lake water had high turbidity conducive to the propagation of *Vibrio cholera*(7).

From 1998 to 2012, cholera outbreaks occurred every year in Malawi, with the highest number of cases and deaths reported in 2001/2002 (33,546 cases, 968 deaths; case fatality rate [CFR] 2.3%). In 2011/2012, cholera outbreak was widespread in the southern region, affecting 10 out of 13 districts, where 1,806 cases and 38 deaths (CFR 2.1%) were reported. Unsafe water sources, lack of maintenance of broken boreholes, frequent breakdown of piped water supply, low coverage of pit latrines (range 40%-60%), lack of hand washing facilities (< 5%), salty borehole water, fishermen staying on Lake Chilwa, cross-border Malawi-Mozambique disease spread, and sociocultural issues were some of the causes of the persistent cholera outbreaks in Malawi(8).

Cholera incidence was highest in the eastern provinces bordering lakes and epidemics primarily originated in this region. Along with a strong seasonal component, our data suggest a potential *Vibrio cholerae* reservoir in the Rift Valley lakes and the possible contribution of the lakes' fishing industry to the spread of cholera. The National Ministry of Health has committed to the elimination—rather than control—of cholera in DRC and has adopted a new national policy built on improved alert, response, case management, and prevention. To achieve this goal and implement all these measures it will require strong partners in the international community with a similar vision(9).

These outbreaks caused 1,827 suspected cholera cases and 43 deaths, with a Case-Fatality Ratio (CFR) of 2.4%. Though the communities in the fishing villages make up only 5±10% of the Ugandan population, they bear the biggest burden of cholera contributing 58% and 55% of all reported cases and deaths in Uganda during the study period. The CFR was significantly higher among males than females (3.2% vs. 1.3%,  $p = 0.02$ ). The outbreaks were seasonal with most cases occurring during the months of April-May. Male children under age of 5 years, and 5±9 years had increased risk. Cholera was endemic in some villages with well-defined "hotspots". Practices predisposing communities to cholera outbreaks included: the use of contaminated lake water, poor sanitation and hygiene. Additional factors were: ignorance, illiteracy, and poverty(10).

### **1.3.Objectives**

To assess the magnitude of morbidity and mortality due to cholera and the factor(s) associated with risk of cholera infection in Nifas Silk Lafto sub city, Addis Ababa, Ethiopia, 2016 G.C.

#### **1.3.1. Specific objectives**

- To describe the magnitude of morbidity and mortality of the outbreak in terms of person, place and time.
- To determine risk factors (sources) associated with cholera infection.
- To recommend appropriate control measures against cholera transmission.

## **1.4.Methodology**

### **1.4.1. Study area**

This study was conducted in Nifas Silk Lafto sub city of seven Woredas (5, 6, 7, 8, 9, 10 and 12) with their total population of 203,749 by the year 2016 G.C. these Woredas have 5 functional governmental health centers, 69 private health facilities, and 3 holy water sites. In these selected Woredas there are no NGO health institutions, and no any governmental and private hospital.

### **1.4.2. Study design and period**

An unmatched case control study design with ratio of (1case:2 controls) was conducted to assess the magnitude of morbidity and mortality and factor(s) associated with risk of cholera infection in Nifas Silk Lafto sub city, Addis Ababa, Ethiopia, from June 11/2016 to July 11/2016.

### **1.4.3. Target population**

Total populations of the selected Woredas (5, 6, 7, 8, 9, 10 and 12) in Nifas Silk Lafto sub city, 2016 G.C. These Woredas were selected since there were two field epidemiology residents in the sub city; we divided total 13 Woredas into two equal numbers based on their proximity to collect data.

### **1.4.4. Source (sampling) population**

The total populations of the selected Woredas age of 5 years or more (based on the national cholera treatment guideline) in Nifas Silk Lafto sub city, 2016 G.C.

### **1.4.5. Study populations**

The study populations were sampled 125 individuals or participants (42 cases and 83 controls) from the source population.

### **1.4.6. Inclusion criteria**

All patients 5 years of age or greater that fulfill national standard case definition of cholera as case and those who did not show sign and symptom of cholera with the age of 5 or more as control were included in the study.

### **1.4.7. Sample size determination**

**By using epi Info 7 StatCalc;**

Least extreme Odds ratio to be detected = 3; from previous studies (12)

Proportion of Exposed controls = 40%; from studies conducted previously (12).

Proportion of Exposed cases = 66.7%;this proportion is obtained from epi Info 7

StatCalc after entering other parameters

Confidence level = 95%

Power = 80%

Number of cases = 42

Number of controls = 83

Total sample size = 125 (Kelsey et al)

### **Case definition**

**Suspected case definition:** In a patient age 5 years or more, with severe dehydration or death from acute watery diarrhea (during routine surveillance).Any person age 5 years or more who develops profuse acute watery diarrhea, with or without vomiting (during epidemic).

**Confirmed case definition:**A suspected case in which *Vibrio cholerae* O1 or O139 has been isolated in the stool.

### **1.4.8. Sampling methods**

#### **Selection of cases**

**A case of AWD in this study was:** A patient aged 5 years or more who develops profuse acute watery diarrhea, with or without vomiting according to national cholera treatment guideline. The primary study subjects were newly confirmed cases of AWD either by national case definition or RDT admitted into the Cholera Treatment Centre (CTC) were included by using convenient type of sampling technique prospectively.

#### **Selection of controls**

Controls were randomly selected from the same community as cases prospectively who have not had AWD illness without conducting laboratory confirmation of the absence of cholera infection before selection by obtaining informed consent confirmation to participate in the study. They must also not meet the AWD standard case definition. To maximize the power, to show differences in exposures, at least two controls were recruited for each case (1 case, 2 controls).

In the same community as cases, two controls were selected directly through a random selection process. On selection of a home, the members of the household were enquired 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 multiple members of the household were qualified,

only one control was chosen by tossing a coin. This process had continued on to the next household until two controls were selected for each case. To make the selection representative or comparable, I have used urban health extension professionals' number to interview from their catchment areas of work and then I took one control from each catchment area of urban health extension professionals. To minimize recall bias, asking systematically associated with their day to day life activities was done even though it is not possible to avoid recall bias.

#### **1.4.9. Data collection**

Following the selection of cases and controls, and receipt of informed verbal consent, cases (or their care-giver where the case is too ill to speak) and control subjects were interviewed by using the structured questionnaire and data were collected on some identifying information, demographic information, date of onset, travel history, contact history of AWD case, and exposure to risk factors for infection including water and food sources, within five days prior to onset of disease. Line list (secondary data) was also used for descriptive analysis. For confirmatory purpose of the etiologic agent to those of first cases culture was used; for routine test during outbreak RDT was used from stool specimen. Estimated duration of data collection was one month since we had other response commitments as well.

#### **1.4.10. Variables**

**Dependent variables:** status of the participants, attack rate, morbidity and mortality

**Independent variables:** age, sex, residential address, date of hospitalization, occupational status, and date of onset.

#### **1.4.11. Data quality**

The principal investigator checked the collected data for completeness, accuracy, clarity and consistency throughout the data collection period to maintain quality of data. The questionnaire was developed in English and then translated to Amharic version during interview to make conversation easy with the respondents.

#### **1.4.12. Data analysis**

Data entry and analysis was conducted by using the Epi-INFO7. The associations between risk factors and infection among cases and controls was analyzed by using chi-square statistics and expressed as odds ratios with 95% confidence intervals. Multivariable analysis was used among

those of risk factors having association with AWD infection by bivariate analysis ( $P \leq 0.2$ ) to examine the various risk factors and to determine which best explains the resulting infection and the combination of risk factors associated with the odds of infection. The level of significance was determined based on OR, 95% CI, and P-value of  $<0.05$ .

#### **1.4.13. Operational Definition**

**A case of AWD in this study was:** A patient aged 5 years or more who develops profuse acute watery diarrhea, with or without vomiting.

**Laboratory confirmed case:** A suspected case confirmed by confirmed by culture by isolating O1 or O139 strains.

**Epidemiologically linked case:** Is a suspected case, which has contacts with laboratory confirmed case or another epidemiologically confirmed case

**Control:** Any person aged 5 years or more who had not developed sign and symptom of AWD or not recovered from AWD recently at the time of data collection.

#### **1.5. Informed consent**

During visit to both cases and controls, the purpose of the study was explained to all eligible subjects and their verbal consent was obtained.

#### **1.6. Prevention of cholera transmission among investigator**

The principal investigator was trained on infection control procedures including proper hand hygiene prior to data collection, to minimize risk of infection when in close contact with patients and during community visits.

#### **1.7. Ethical considerations**

The respondents/participants were informed about the objective and purpose of the study and verbal consent was obtained from each respondent. Confidentiality was assured; Maximum efforts were made to maintain privacy during data collection. To assure confidentiality of information; name of respondents was omitted from the questionnaire and information were recorded anonymously.

### **1.8. Reporting of findings**

The findings of the study were interpreted and shared with Nifas Silk Lafto sub city health office, Addis Ababa Regional Health Bureau and St. Paul's Hospital Millennium Medical College Department of Public Health Field Epidemiology program.

### **1.9. Results**

#### **1.9.1. Laboratory result**

Two stool samples were sent to Addis Ababa regional laboratory on June 10, 2016 and both specimens were positive for cholera by culture. Among 531 total AWD cases of the 7 Woredas in the sub city, 126 cases were tested by RDT and 111 were positive for V.Cholera. Specimens from 3 holy water sites, raw meat from around 10 butchery houses, and from around 5 food and drink establishments were taken to Addis Ababa Regional laboratory among these, two butchery house results were positive for V.Cholera but the rest were not told to the health office the time being.

#### **1.9.2. Descriptive Epidemiology**

Among the total of 531 AWD cases in 7 Woredas of the sub city, 1 death was happened with Case fatality rate of 0.073 from June 10/2016 to December 22/2016; Mean age of 37.79 year, median age 35 year and the range was from 5 years to 100 years among cases of 7 selected Woredas in the study. From the total of 531 cases, 297 (55.93%) were males. Most cases 293 (55.18%) among the total cases of the 7 Woredas were at the age of 15-44 year followed by age 45+ years of age 181 (34.09 %); as shown on the figure 1.

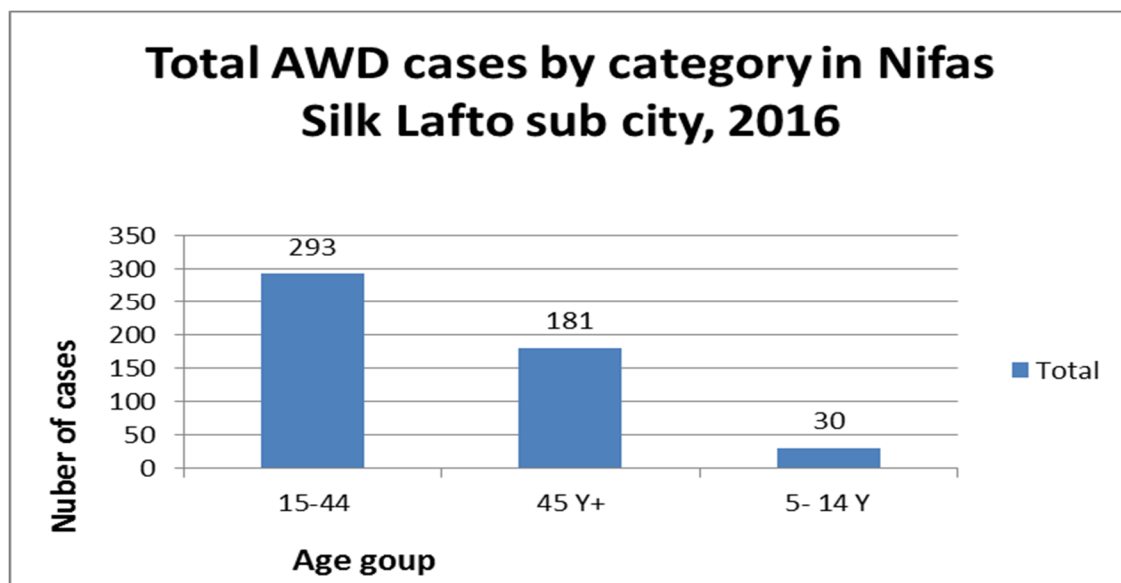


**Figure 1:** Number of AWD cases of 7 Woredas (5, 6, 7, 8, 9, 10, and 12) of Nifas silk Lafto sub city by age category, 2016.

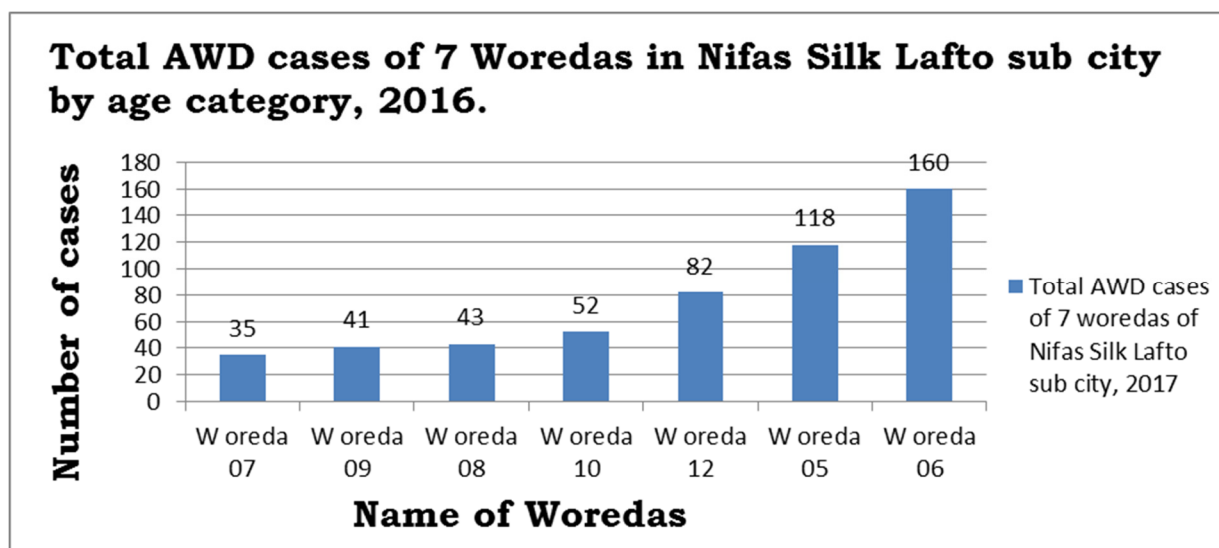


**Figure 2:** Number of AWD cases of 7 Woredas (5, 6, 7, 8, 9, 10, and 12) of Nifas silk Lafto sub city by Woreda, 2016.

Majority of cases were happened at Woreda 06 i.e. 160 (30.10%), and the least cases were reported from Woreda 07 i.e. 35 (6.60%) as shown on the figure 2.

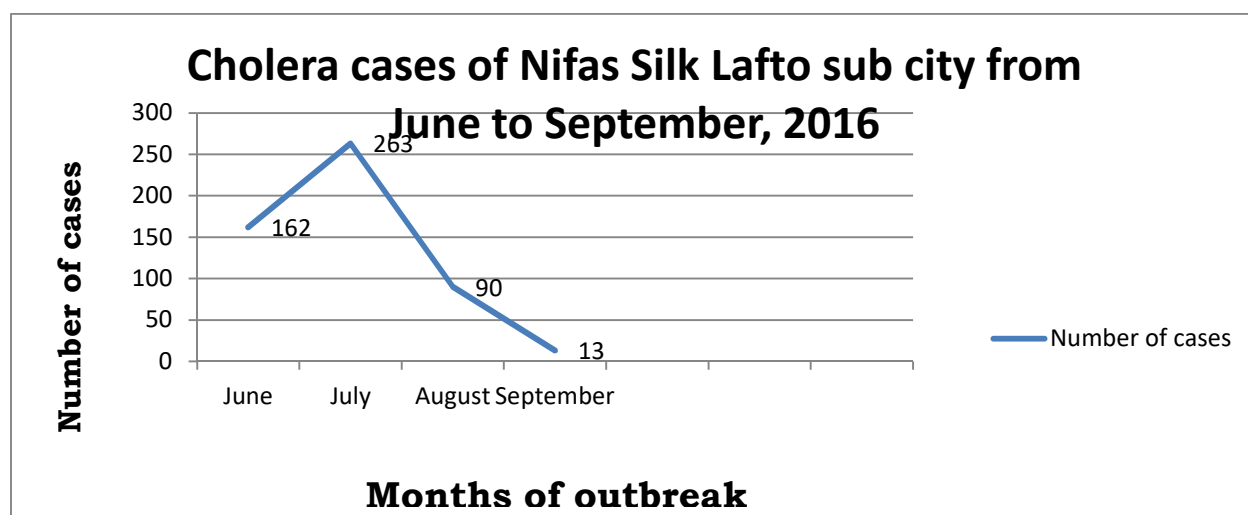


**Figure 3:** AWD cases of the 7 Woredas (5, 6, 7, 8, 9, 10, and 12) Nifas silk Lafto sub city from June to September, 2016.

As shown on the figure 3, the highest number of cases (263 (49.53%)) were reported on July and increased from June to July rapidly after that the numbers of cases become decreased dramatically from July to December 2016.

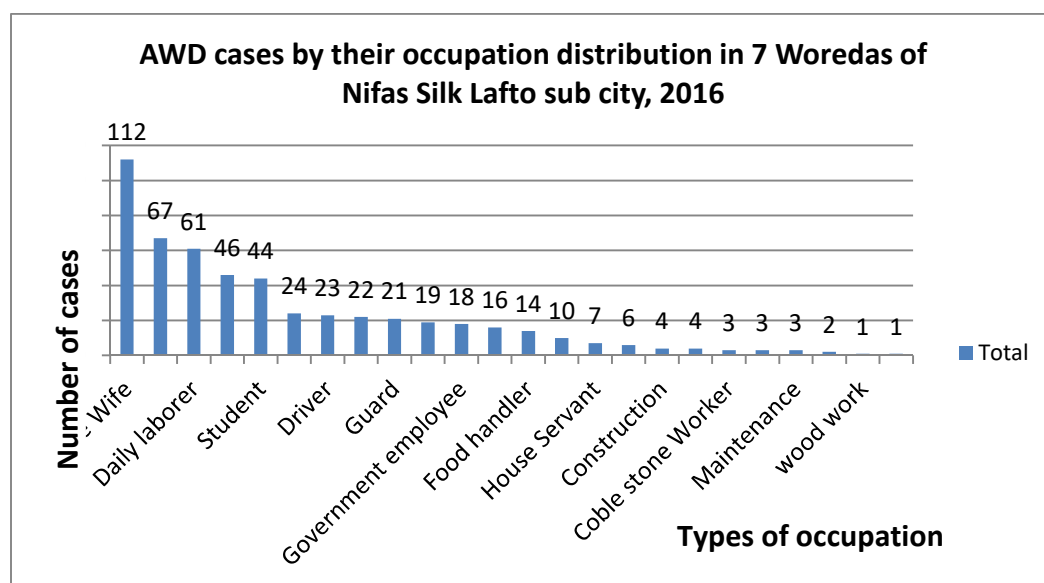


**Figure 4:** AWD cases by their occupation distribution in 7 Woredas of Nifas silk Lafto sub city, 2016.

Among 531 total cases, 112 (21.09%) were house wives and the second highest number of cases was among daily laborers.

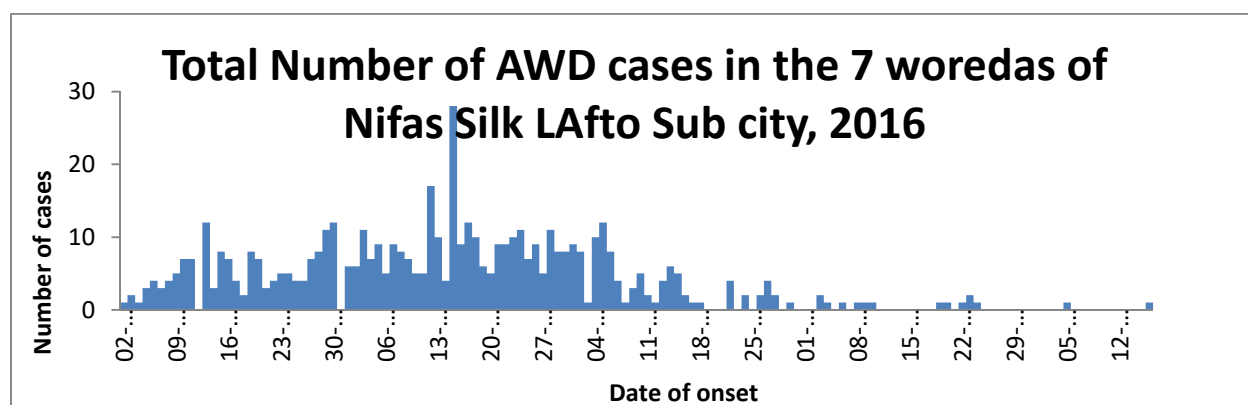


**Figure 5:** AWD cases by date of onset from 7 Woredas (5, 6, 7, 8, 9, 10, and 12) in Nifas silk Lafto sub city, 2016

As shown on the figure above, the number of cases increased from 02/10/2008 to 04/12/2008 propagative type of fashion with peak of at 15/11/2008 E.C.

**Table 1:** AWD attack rate of the 7 Woredas (5, 6, 7, 8, 9, 10, and 12) in Nifas silk Lafto sub city 2016

| S.N          | Name of Woredas  | Total population | AWD cases  | Attack rate (AR %) |
|--------------|------------------|------------------|------------|--------------------|
| 1            | Woreda 05        | 32,044           | 118        | 0.37               |
| 2            | Woreda 06        | 39,902           | 160        | 0.40               |
| 3            | Woreda 07        | 12,300           | 35         | 0.28               |
| 4            | Woreda 08        | 20,500           | 43         | 0.21               |
| 5            | Woreda 09        | 30,742           | 41         | 0.13               |
| 6            | Woreda 10        | 37,536           | 52         | 0.14               |
| 7            | Woreda 12        | 30,725           | 82         | 0.27               |
| <b>Total</b> | <b>7 Woredas</b> | <b>203,749</b>   | <b>531</b> | <b>0.26</b>        |

As shown on table 1 above, the highest attack rate was reported from Woreda 06, 160/39,902 (0.40%) followed by Woreda 05, 118/32,044 (0.37%) and the least attack rate was from Woreda 09, 41/30,742 (0.13%).

### 1.9.3. Analytic Epidemiology

A total of 42 AWD cases and 83 apparently healthy controls were included into this study. Participants were not matched by any parameter unless controls were from the same community as cases. The mean age of cases and controls were 36.69 and 37.58 years respectively. The median age of both cases and controls were 35 years (ranging from 5 years up to 80 years for

cases and 14 years to 75 years for controls). Among 42 cases interviewed 26 (61.90%) were females. Majority of 35 (83.33%) cases were presented with diarrhea and vomiting while the rest 7 (16.67%) cases were presented with only diarrhea. By their dehydration status, majority of 30 (71.43%) cases were no dehydration.

Bivariate analysis showed that, AWD cases of who ate vegetable salad were with [Odds Ratio (OR) = 14.80; 95% CI (5.80, 37.75), P = 0.000]; and any type of raw meat were with [Odds Ratio (OR) = 10.31; 95% CI (3.99, 26.60), P = 0.000]; these two risk factors have strong association with cholera infection. When we see hand washing practice of cholera patients before eating and after defecation, it showed that poor hand washing habit with percentage of 19/42 (45.24%) and 33/42 (78.57%) respectively. Water treatment before drinking for those of cholera cases was with [chi-square ( $\chi^2$ ) = 16.41, df = 2, P = 0.0001]; but the rest exposures of food and water have no significant association with the risk of cholera infection as shown on Table 1 below.

Multivariable analysis showed also that, those of individuals who ate raw meat were with [AOR = 16.01, 95% CI (3.25, 78.81), P-value = 0.0006]; and those of ate vegetable salad were with [AOR = 18.11, 95% CI (4.18, 78.45), P-value = 0.0001]; which indicates that these risk factors have strong association and significance with cholera infection. Those of individuals who ate any type of raw meat and vegetable salad have 16.01 times and 18.11 times more likely to develop AWD than those of who did not eat respectively.

**Table 2:** Bivariate Analysis of Risk Factors for Cholera Infection in Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia, 2016

| Variables                                       | Condition | Cases (%)   | Controls (%) | COR (95% CI)               | Chi-square   | P-value       |
|-------------------------------------------------|-----------|-------------|--------------|----------------------------|--------------|---------------|
| Ate any type of raw meat                        | Yes       | 22 (52.38%) | 8 (9.64%)    | <b>10.31 (3.99, 26.60)</b> | <b>27.93</b> | <b>0.000*</b> |
|                                                 | No        | 20 (47.62%) | 75 (90.36%)  |                            |              |               |
| Ate at gatherings                               | Yes       | 6 (14.29%)  | 9 (10.84%)   | 1.37 (0.45, 4.15)          | 0.31         | 0.575         |
|                                                 | No        | 36 (85.71%) | 74 (89.16%)  |                            |              |               |
| Drink beso                                      | Yes       | 7 (16.67%)  | 7 (8.43%)    | 2.17 (0.71, 6.66)          | 1.90         | 0.168*        |
|                                                 | No        | 35 (83.33%) | 76 (91.57%)  |                            |              |               |
| Drink from communal water source                | Yes       | 26 (61.90%) | 49 (59.04%)  | 1.13 (0.53, 2.41)          | 0.09         | 0.757         |
|                                                 | No        | 16 (38.10%) | 34 (40.96%)  |                            |              |               |
| Ate any type of fruits                          | Yes       | 13 (30.95%) | 31 (37.35%)  | 1.33 (0.60, 2.93)          | 0.50         | 0.158*        |
|                                                 | No        | 29 (69.05%) | 52 (62.65%)  |                            |              |               |
| Ate vegetable salad                             | Yes       | 27 (64.29%) | 9 (10.84%)   | <b>14.80 (5.80, 37.75)</b> | <b>34.84</b> | <b>0.000*</b> |
|                                                 | No        | 15 (35.71%) | 74 (89.16%)  |                            |              |               |
| Open dumping of solid waste                     | Yes       | 10 (23.81%) | 8 (9.64%)    | <b>0.34 (0.12, 0.94)</b>   | <b>4.54</b>  | <b>0.033*</b> |
|                                                 | No        | 32 (76.19%) | 75 (90.36%)  |                            |              |               |
| Drinking water from holy water site             | Yes       | 8 (19.05%)  | 12 (14.46%)  | 0.72 (0.27, 1.92)          | 0.44         | 0.508         |
|                                                 | No        | 34 (80.95%) | 71 (85.54%)  |                            |              |               |
| Ate any cold leftover food                      | Yes       | 9 (21.43%)  | 12 (14.46%)  | 0.62 (0.24, 1.62)          | 0.97         | 0.325         |
|                                                 | No        | 33 (78.57%) | 71 (85.54%)  |                            |              |               |
| Ate food outside home                           | Yes       | 17 (40.48%) | 27 (32.53%)  | <b>2.76 (1.29, 5.94)</b>   | <b>6.99</b>  | <b>0.008*</b> |
|                                                 | No        | 25 (59.52%) | 56 (67.47%)  |                            |              |               |
| Hand washing regularly with soaps before eating | Yes       | 23 (54.76%) | 59 (71.08%)  | 2.03 (0.94, 4.39)          | 3.29         | 0.069*        |
|                                                 | No        | 19 (45.24%) | 24 (28.92%)  |                            |              |               |
| Treating water before drinking                  | Yes       | 17 (40.48%) | 64 (77.11%)  | <b>0.20 (0.09, 0.45)</b>   | <b>16.41</b> | <b>0.000*</b> |

|                                                           |     |             |             |                           |              |               |
|-----------------------------------------------------------|-----|-------------|-------------|---------------------------|--------------|---------------|
|                                                           | No  | 25 (59.52%) | 19 (22.89%) |                           |              |               |
| <b>Contact with AWD cases</b>                             | Yes | 4 (9.52%)   | 9 (10.84%)  | 1.15 (0.33, 3.99)         | 0.05         | 0.819         |
|                                                           | No  | 38 (90.48%) | 74 (89.16%) |                           |              |               |
| <b>Hand washing regularly with soaps after defecation</b> | Yes | 9(21.43%)   | 49 (59.04%) | <b>0.19 (0.08, 0.45)</b>  | <b>15.86</b> | <b>0.000*</b> |
|                                                           | No  | 33 (78.57%) | 34 (40.96%) |                           |              |               |
| <b>Treat water by aqua tab before drinking</b>            | Yes | 7 (16.67%)  | 36 (43.37%) | <b>3.83 (1.53, 9.61)</b>  | <b>8.81</b>  | <b>0.003*</b> |
|                                                           | No  | 35 (83.33%) | 47 (56.63%) |                           |              |               |
| <b>Boiling water before drinking</b>                      | Yes | 4 (9.52%)   | 24 (28.92%) | <b>3.86 (1.24, 12.01)</b> | <b>2.09</b>  | <b>0.148*</b> |
|                                                           | No  | 38 (90.48%) | 59 (71.08)  |                           |              |               |
| <b>Filter water before drinking</b>                       | Yes | 3 (7.14%)   | 2 (2.41%)   | 0.32 (0.05, 2.00)         | 1.63         | 0.202         |
|                                                           | No  | 39 (92.86%) | 81 (97.59%) |                           |              |               |
| <b>Ate cold left over food at home</b>                    | Yes | 8 (19.05%)  | 8 (9.64%)   | 0.45 (0.16, 1.31)         | 2.21         | 0.137*        |
|                                                           | No  | 34 (80.95%) | 75 (90.36%) |                           |              |               |
| <b>Ate cold left over food at hotel</b>                   | Yes | 4 (9.52%)   | 5 (6.02%)   | 0.61 (0.15, 2.39)         | 0.51         | 0.474         |
|                                                           | No  | 38 (90.48%) | 78 (93.98%) |                           |              |               |
| <b>Drink from house hold tap water</b>                    | Yes | 13 (30.95%) | 30 (36.14%) | 1.26 (0.57, 2.79)         | 0.33         | 0.564         |
|                                                           | No  | 29 (69.05%) | 53 (63.86%) |                           |              |               |
| <b>By vegetables fruits from street shops</b>             | Yes | 5 (11.90%)  | 12 (14.46%) | 1.25 (0.41, 3.82)         | 0.1547       | 0.694         |
|                                                           | No  | 37 (88.10)  | 71 (85.54%) |                           |              |               |

**Table 3:** Multi variable analysis result of risk factors for cholera infection in Nifas silk Lafto sub city, Addis Ababa, Ethiopia, 2016

| Variables                                            | AOR (95% CI)               | P-value       |
|------------------------------------------------------|----------------------------|---------------|
| Ate any type of raw meat                             | <b>16.01 (3.25, 78.81)</b> | <b>0.0006</b> |
| Drink besso                                          | 0.96 (0.13, 7.28)          | 0.9704        |
| Ate any type of fruits                               | 2.49 (0.66, 9.42)          | 0.1764        |
| Open dumping of solid wastes                         | 0.80 (0.15, 4.32)          | 0.8015        |
| Regularly Wash their hand with soap after defecation | 0.15 (0.04, 0.55)          | <b>0.0041</b> |
| Regularly Wash their hand with soap before eating    | 0.72 (0.21, 2.49)          | 0.6031        |
| Treat water before drinking                          | 0.24 (0.07, 0.77)          | 0.0168        |
| Ate food outside home                                | 0.89 (0.25, 3.21)          | 0.8648        |
| Ate any cold left over food at home                  | 0.87 (0.14, 5.21)          | 0.8779        |
| Ate vegetable salad                                  | <b>18.11 (4.18, 78.45)</b> | <b>0.0001</b> |

**1.10. Public health Interventions taken to control the outbreak**

The outbreak response task force and committee were established at the sub city level and made awareness creation about the outbreak to 13 Woredas of sub city in order to do the response activities at each Woreda according to their situation. After that each Woreda has established the RRT and did different activities related to outbreak response. Especially urban health extension professionals did the house to house visit with intensive health education how to prevent and report any cases with cholera. In addition to health education active searching of cases and contact tracing were other issues to control the outbreak. During their house to house visit water treatment chemical supplementation was also done by UHEPs. The sub city health office professionals were engaged by active search, contact tracing, material/logistics supplementation and technical support to their respective districts.

There were two cholera treatment centers (CTCs) at Woreda 01 health center and Woreda 07 youth center. Volunteer health care providers were selected from 9 sub city's health centers and deployed to the two CTCs as per national cholera treatment guideline. General practitioners were also deployed to these centers from Alert Referral Hospital 2 GPs per 24 hour service one at 12 hours shift. Twenty four hours service was there at each CTC with ambulance service. NGOs (WHO, UNICEF, MSF) were also involved at the response activities.

### **1.11. Discussion**

Prolonged cholera outbreak occurred in Woreda 05 which lasted from 11 June 2016 to 26 October 2016 with total cases of 118. This may be explained that the area is the most slum of the sub city and has many poor socioeconomic status populations in the area with the attack rate of 37 cases per 10,000 populations. An overall attack rate of the outbreak of the 7 Woredas was 26 cases per 10,000 populations. The most affected age group was 15-44 years of age this might be explained that this age group is really the country's working age group and mobile from place to place and they are exposed to outside home meal. This finding is consistent with other reports (*Cholera outbreak following a marriage ceremony* conducted in Ghana) (8). Cholera outbreak in the sub city was confirmed within one day difference of the outbreak in Addis Ababa and with 7 days difference cholera cases were reported in all Woredas of the sub city. Cholera outbreak remains the major public health importance even though the bacteriological and epidemiological situation of disease is known for centuries. The cholera outbreak had not reported for the past 5 years in the city, unless 2016 outbreak following heavy rain fall and poor solid and liquid waste management the city administration (5). As bivariate analysis showed, eating any raw meat, vegetable salad consumption, and poor hand washing practice before meal and after defecation have significant association with risk of cholera infection which can be explained that majority of farmers around the river do use this water for irrigation (cultivation) of vegetables contaminated with human waste (excreta) as Addis Ababa regional laboratory declared (all Rivers around Addis Ababa are contaminated by human waste or excreta). This result is similar to the study conducted in sub-Saharan African countries (4). Majority of cases compared to controls were males which can be explained as males are the income sources as Ethiopian country context and they might be exposed to unhygienic food consumption outside their home. Among total participants in the study (42 cases and 83 controls), for those of 39 (92.85%) cases and 79 (95.18%) controls their regular source of water for domestic consumption was piped tap water respectively. When we see water treatment status of the study participants, 17 (40.47%) cases and 70 (84.34%) controls were used different water treatment methods this can be explained around 60% of cases did not treat water before drinking that can imply since the area is expansion site and there are many construction activities around the area, water can be contaminated at pipe line breakage which may lead to exposure of cholera infection. The

availability of latrine assessment showed that around 39 cases (24 communal latrine and 15 were having private latrine); and 78 controls (52 communal latrine and 26 having private latrine) which implies around 7% of cases and 6% of controls practice open defecation that can be sources for drinking water contamination by flood.

#### **1.12. Limitations**

- ❖ Since the study design was case-control, selection and recall bias may be there.
- ❖ Due to unmatching, the result may be affected by confounding factors.
- ❖ Since the sub city is very wide, transportation access was not as per needed
- ❖ Incompleteness of data was another challenge.
- ❖ During outbreak response the ambulance service and the number of CTCs was not proportional to cholera cases.

#### **1.13. Conclusions**

The outbreak was confirmed based on laboratory diagnosis. Ingestion of any type of raw meat, poor solid and liquid waste management, fruits and vegetable consumption, poor personal hygiene environmental sanitation, shortage of safe and adequate water supply, poor latrine contraction and utilization, open defecation, some holy water site, contact with other cholera infected individuals etc. were the main identified sources of cholera infection during the outbreak. Because of prompt/early response the number of death due to cholera outbreak was very minimal as per national cholera guideline (CFR = <1%).

#### **1.14. Recommendations**

- ❖ Those of individuals who did not have safe water or drink water from spring have to be aware about water treatment and if possible water treatment chemicals have to be supplied for those of poor by sub city administration.
- ❖ The city administration municipality office should avail proper Solid and liquid waste management system (wastes after collected from home have to be disposed safely and regularly at sanitary landfill).
- ❖ The slaughter house of Addis Ababa should be followed or inspected regularly in order to maintain the safety of raw meat.
- ❖ Rivers around the sub city should be protected from contamination of human wastes (excreta) to prevent contamination vegetables cultivated around the river basin.

- ❖ It is better Nifas Silk Lafto sub city administration to aware farmers around rivers of the sub city about contamination of vegetables by human waste (excreta) or not to irrigate by the existing river or if possible decontaminate vegetables before selling.
- ❖ It is better to conduct additional studies on how to prevent recurrent occurrence of cholera outbreaks.

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**Annex:**

**Survey questionnaire**

This survey is going to be conducted by the Ethiopian Public Health Institute in collaboration with WHO as part of the ongoing response to the cholera outbreak in Addis Ababa. All personal information collected through this survey will be handled confidentially and your name is not required.

The Survey is being conducted to improve prevention and control measures against cholera 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-----
7. Sub-city-----
8. Telephone Number-----

**Clinical Information (for cases)**

1. Date of onset (dd/mm/yyyy) -----
2. Presenting symptoms  
Watery Diarrhea ☐ Vomiting ☐ Dehydration ☐ Others (specify) -----
3. Hospitalized? Yes ☐ No ☐
4. Date of hospitalization (dd/mm/yyyy) -----

**Part B: Exposures**

**Water**

1. What is your regular source of water for domestic use in the last 5days?  
Household Tap water ☐ Communal tap water ☐ River ☐ Well ☐  
Borehole ☐ Spring ☐ Street vended water ☐ Tanker water (Roto) ☐  
Bottled water ☐ others (specify) -----
2. What is your regular source of drinking water within the last five days?

Household Tap water ☐ Communal tap water ☐ River ☐ Well ☐  
Borehole ☐ Spring ☐ Street vended ☐  
Tanker water (Roto) ☐ Bottled water ☐ others (specify) \_\_\_\_\_

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

4. If yes, how did you treat it? Filter ☐ Boiling ☐ Aqua tab ☐ water  
guard ☐ Bishangare ☐ Pure ☐ Other(specify) \_\_\_\_\_

5. Did you drink water from a holy water site in the last five days? Yes ☐ No ☐

6. If yes, what is the source of the holy water site? Spring ☐ Piped water ☐  
Well ☐ others (specify) \_\_\_\_\_

### **Food and Beverages**

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

Vegetable salad ☐ Fruits ☐ Raw meat ☐ partially roasted meat ☐  
Fish ☐ Milk ☐ others (specify) \_\_\_\_\_

8. Where did you get (or buy) food for your household?

Local market ☐ Private garden/farm ☐ Street shops ☐ Supermarkets ☐  
Others (specify) \_\_\_\_\_

9. Did you eat food outside your home in the last 3days? Yes ☐ No ☐

10.If yes, where? Sold by street vendors ☐ Hotel ☐ Restaurant ☐ At  
a gathering ☐ School/work cafeteria ☐ Others (specify) \_\_\_\_\_

11.Did you eat any cold left-over food in the last 3days? Yes ☐ No ☐

12.If yes, where is the source of the food? Home ☐ Hotel ☐ Restaurant ☐  
University ☐ Others (specify) \_\_\_\_\_

13.Did you drink any of the following locally-made beverages in the last 3 days?

Shameta ☐ ☐ o ☐ s (specify) \_\_\_\_\_

### **Hygiene and sanitation**

14.Do you systematically wash your hands with soap before eating? Yes ☐ No ☐

15.Is there a latrine in your home? Yes ☐ No ☐

16.If yes, Communal or private? Communal ☐ Private ☐

17.If No to Q.15, where do you discharge human waste (faeces)?

Open defecation ☐ In the river ☐ bury in the soil ☐ Others (specify)  
☐

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

19. Where do you dispose of your refuse? Open dumping ☐ Open pit ☐

In the river ☐ Bury ☐ Burn ☐ Others (specify) \_\_\_\_\_

**Other exposures**

20. In the last one week, did anyone in your household have diarrhea or vomiting?

Yes ☐ No ☐

21. Did you visit anyone having diarrhea or vomiting? Yes ☐ No ☐

22. Did you attend a funeral within the last five days? Yes ☐ No ☐

23. Did you travel to a place affected with diarrhea and vomiting illness? Yes ☐

No ☐

24. If Yes, where? \_\_\_\_\_ (Name of Kebele/Ketena,  
Woredas,)

**Chapter II: Surveillance data analysis of Nifas Silk Lafto sub city, Addis Ababa**

## Abstract

**Introduction:** Epidemic typhus is caused by infection with *Rickettsia prowazekii*, which is carried and transmitted by body lice. Thus, it is a disease typically associated with war, famine, and other such events that cause personal hygiene to suffer and lice infestation to become prevalent. It is also one of the most significant historical diseases of humans, which is a category B bioterrorism agent that can cause persistent human infection. Besides its notoriety as the agent of the recurrent chronic disease, trench fever, *Bartonella Quintana* can cause endocarditis and is a common infection among the homeless (2).

**Objective:** To analyze the last 3 years (2012 -2014 G.C) surveillance data of epidemic typhus disease by time, person and place of Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia.

**Methods** □ A descriptive cross-sectional study was conducted to analyze last 3 years (2012 -2014 G.C) epidemic typhus surveillance data of Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia. The study area was Nifas Silk Lafto Sub City which is one of the ten administrative Sub Cities of Addis Ababa City administration since 1998 G.C. and the study period was April 11/2016 to June 17/2016 G.C. The secondary data was collected through document review by the principal investigator. Information from completed questionnaire was organized or descriptive analysis was done by using frequency distribution table, SPSS, epiInfo or excel.

**Result:** The epidemic typhus of Nifas Silk Lafto sub city from 2012 to 2014 in general was increasing in all age groups. Among the total of 3 years epidemic typhus 16,816 cases 7401 (44%) happened in 2014 G.C. The increment was 19% from 2012 and 30% from 2013 to 2014.

**Conclusion:** In general, almost all of epidemic typhus cases were treated at outpatient department and few cases were treated at inpatient department. When we see the reported cases by year, the highest number of epidemic typhus cases (7,401) reported in 2014. The surveillance report completeness rate was not to the expected range.

**Recommendations:** It is better to aware the health institutions to report regularly genuine number to the respective site; Better to educate the community on the transmission and prevention methods of the epidemic typhus; Better to avail basic infrastructures to the community people (e.g. Safe water, housing, income generating activities, etc).

## 2. Introduction

### 2.1. Background information

Epidemic typhus is caused by infection with *Rickettsia prowazekii*, which is carried and transmitted by body lice. Thus, it is a disease typically associated with war, famine, and other such events that cause personal hygiene to suffer and lice infestation to become prevalent. The disease is still responsible for modern outbreaks: it killed 100,000 people during the civil war in Burundi (1993-2005) (1).

Epidemic typhus, one of the most significant historical diseases of humans, is caused by *Rickettsia prowazekii*, a category B bioterrorism agent that can cause persistent human infection. Besides its notoriety as the agent of the recurrent chronic disease, trench fever, *Bartonella Quintana* can cause endocarditis and is a common infection among the homeless (2).

### **Typhus (Epidemic and Endemic)**

*Rickettsiae* are small intracellular bacteria that are spread to man by arthropod vectors, namely human body lice, fleas, ticks & larval mites. The rickettsioses are a zoonosis spread around various regions of the world, and the bacteria are transmitted by vectors such as mites, ticks, lice, and fleas. The organisms inhabit the gastrointestinal tract of these arthropods & spread to human host by the direct bite of the vector or the inoculation of the organism contained in the feces of the vector by bite induced body itching. These infections are characterized by persistence in the body, widespread vasculitis (invading endothelial cells of small blood vessels) & multi-system involvement. Except in louse borne typhus humans are accidental hosts in most rickettsial diseases (3).

**Epidemic Typhus (Louse born):** is caused by *R. prowazekii* and transmitted by human body louse (*Pediculus humanus corporis*). Lice typically live in the seams of the host's clothing and infestations are associated with wearing the same clothing for prolonged periods of time without washing (e.g., wartime, natural disasters or poor personal hygiene). They acquire the rickettsia while ingesting a blood meal from an infected patient, the rickettsia multiply in the mid gut epithelial cells of the louse and are excreted via louse feces. The infected louse defecates during a blood meal and the patient auto inoculates the organisms by scratching. It is commonly associated with poverty, cold weather, war and natural disasters. The disease is prevalent in mountainous areas of Africa, South America, and Asia.

**Endemic Typhus (Flea born) / Murine Typhus:** is caused by *R. typhi* which is transmitted by fleas. *R. typhi* is maintained in mammalian host/flea cycles, with rats. Fleas acquire *R. typhi* from rickettsial rats and carry the organism throughout the rest of their life span. Humans and rats are infected when rickettsia-laden fleas are scratched into pruritic bite lesions.

Typhus remains an important public health problem in many developing countries. To reduce the incidence of typhus some control and prevention measures should be undertaken like- Health education on personal hygiene and environmental sanitation, Community measures on sanitary disposal of human feces, Chlorinating or boiling of water, Milk and food hygiene, Fly control, Isolation (enteric precaution), Treatment of patients and Exclude carrier from handling food.

## **2.2. Statement of the problem**

Epidemic typhus disease is recognized for its high mortality rate throughout human history, particularly before modern sanitary practices and the availability of antimicrobial drugs and it spreads where conditions are crowded and unsanitary which is the typical feature of Nifas Silk Lafto sub city with its many areas of slums. Louse infestation, called pediculosis, is very contagious and easily transmitted by close body-to-body contact or contact with infested linen, brushes, or clothes, according to the species of louse. Louse-borne diseases are associated with a high prevalence of body louse infestation, and have recently re-emerged in jails and refugee camps in central and eastern Africa, in rural communities in the Peruvian Andes, in rural louse infested populations in Russia, and in homeless populations living in poor-hygiene conditions in developed countries (5).

Outbreaks of epidemic typhus have generally been associated with war, famine, refugee camps, cold weather, and gaps in public health management. No outbreaks of epidemic typhus have been recently identified in wealthy developed countries. Epidemic typhus remains a threat in the rural highlands of South America, Africa, and Asia. Areas of Russia, Burundi, Algeria, and Andean Peru have all experienced typhus outbreaks in the past 20 years and are currently

susceptible to outbreaks because of a high incidence of body lice, homelessness, or a large population of typhus survivors (5).

The permanent concentrations of the body louse occur in regions subject to cold weather, where inhabitants need to wear multiple layers of clothes, and in poverty-stricken communities whose inhabitants lack multiple sets of clothes. Such populations are most common in mountainous regions of countries in inter tropical zones, including Ethiopia, Burundi, and Rwanda in Africa, Peru in South America, and Nepal and Tibet in central Asia (5).

Among 5,029 patients of serologically examined for endemic febrile illness in the International clinical Laboratories Addis Ababa, Ethiopia, 4,781(95%) were tested for typhus fever with rapid slide agglutination method. Of these patients, approximately 3,665 (75.4%) of patients' sera responded negative, where nearly 1,121(23%) of patients' sera responded positive for typhus fever. The risk of attack by episodes of acute febrile illness was steadily rising in patients older than fifty years but significantly falling towards lower extreme age category. Many reports showed that rickettsial diseases are among the most covert re-emerging infections of the present times globally, especially in developing tropical and subtropical countries. A study conducted on acute febrile illnesses (AFI) in Ethiopia showed that the incidence of AFI is peaked on October and May but typhus fever peaks from May through August (6). An outbreak investigation of epidemic typhus in Awi Zone prison on March 2012 showed that among 178 reported cases 36 were tested for epidemic typhus and all of them were positive for OX-19 antibody using Weil-flex test (7).

This surveillance data analysis result will help for managers or decision makers of the institution to monitor the service provision or to check surveillance data management quality.

### **2.3. Significance of the study (surveillance data analysis)**

Analysis of surveillance data is important for detecting outbreaks and unexpected increases or decreases in disease occurrence, monitoring disease trends, and evaluating the effectiveness of disease control programs and policies. This information is also needed to determine the most appropriate and efficient allocation of public health resources and personnel.

When I observe surveillance data management in Nifas Silk Lafto Sub City, surveillance officers and managers of the health office did not do disease trends, magnitude, incidence, prevalence, distribution, and determinants of outbreak prone diseases in the area. Therefore, this data analysis will be entry for further investigation of other disease trends.

Analyses should be performed at regular intervals to identify changes in disease reporting. These analyses can be performed using standard approaches (e.g., running a standard computer program to generate a summary report). Findings of analyses should be reviewed regularly and provided as feedback to medical providers and others in the community who are asked to report cases. Often additional, special analyses are needed to answer specific questions that arise; these analyses may require additional customized approaches beyond what are routinely performed. So in Nifas Silk Lafto Sub City there are Surveillance officers who are assigned to report immediately and weekly reportable diseases and to do trend analysis but the trend of doing surveillance data analysis were not performed regularly and they do not use data for decision making purposes. Therefore, this surveillance data analysis session will help to identify the sub city's incidence and trends of epidemic typhus disease of the past 3 years (2012-2014 G.C)

## **2.4. Objective**

### **2.4.1. General objective**

- ❖ To analyze the last 3 years (2012 -2014 G.C) surveillance data of epidemic typhus disease by time, person and place of Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia.

### **2.4.2. Specific objectives**

- ❖ To analyze and interpret the last 3 years (2012-2014 G.C) epidemic typhus surveillance data by time, person and place.
- ❖ To describe magnitude of outpatient, inpatient epidemic typhus cases and deaths from epidemic typhus in the last 3 years (2012-2014 G.C) in Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia.
- ❖ To show the last 3 years (2012-2014 G.C) epidemic typhus disease trend in Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia.

## **2.5. Methods**

### **Case definitions**

#### **Suspected**

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

#### **Confirmed**

A suspected case with Weil-Felix reaction of the proteus strain OX-19 with fourfold rise in titer, or a single titer equal to or greater than 320 in the second week of illnesses.

#### **2.5.1. Study Area**

Nifas Silk Lafto Sub City is one of the ten administrative sub cities of Addis Ababa City administration since 1998 G.C. It has 13 Woredas with their authorized administration and the total population of 385,769. It is bounded or boundaries of the sub city are: North-with Kirkos sub city, East – with Bole Sub city, South – Oromia region and West – with Oromia. The administration of Nifas Silk Sub City covers 58.216 square kilometers. The Sub City has 9 functional governmental health centers, 120 private health facilities, and four holy water sites. Among 120 private health facilities, 29 lower clinics, 8 lower dental clinics, 56 medium clinics, 3 medium dental clinics, 13 higher clinics, 5 specialty dental clinics, 1 pediatric clinic, 1 pediatric and internal medicine clinic, 1 internal medicine clinic, 1 ophthalmic clinic, 1 gynecology and obstetrics clinic, and 1 physiotherapy clinic. In the sub city administration area there are no NGO health institutions, and has no any governmental and private hospital.

#### **2.5.2. Study Period**

The last 3 years (2012-2014 G.C) epidemic typhus surveillance data analysis was conducted from April 11/2016 to June 17/2016 G.C.

#### **2.5.3. Study design**

A descriptive cross-sectional study was conducted to assess last 3 years (2012-2014 G.C) surveillance data of epidemic typhus in Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia.

#### **2.5.4. Study subject**

All last 3 years (2012-2014 G.C) epidemic typhus surveillance data of Nifas Silk Lafto Sub City were included in the study.

#### **2.5.5. Inclusion criteria**

All last 3 years (2012-2014 G.C) epidemic typhus surveillance data of Nifas Silk Lafto Sub City were included in the analysis.

#### **2.5.6. Exclusion criteria**

None of surveillance data of epidemic typhus were excluded unless for those of incomplete data in the period of 2012-2014 G.C at Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia.

#### **2.5.7. Dependent variables**

The dependent variables measured in this surveillance data analysis were: outpatient cases of epidemic typhus, inpatient cases of epidemic typhus and deaths from epidemic typhus cases.

#### **2.5.8. Independent variables**

The independent variables measured in this surveillance data analysis were: age and sex.

#### **2.5.9. Data collection**

The secondary data were collected through last 3 years (2012 to 2014 G.C) weekly IDSR document review by the principal investigator.

#### **2.5.10. Data quality control**

The principal investigator checked the collected data for completeness, accuracy, clarity and consistency throughout the data collection period in order to maintain the quality of data.

#### **2.5.11. Method of Data Analysis**

The data collected through document review was edited, coded and cleaned before it entered to a computer. Information from completed questionnaire was organized or descriptive analysis was done by using frequency distribution table, SPSS, epiInfo or excel.

#### **2.5.12. Ethical consideration**

Ethical clearance was secured by writing formal letter from Saint Paul Hospital Millennium Medical College and Official permission was obtained from concerned authorities of the Nifas Silk Lafto Sub City Health Office. The surveillance officers and other health professionals were informed about the objective and purpose of the Surveillance data analysis in order to cooperate with me throughout the data collection and analysis.

#### **2.5.13. Operational Definitions of Terms**

- I. **Epidemic Typhus (Louse born):** is caused by *R. prowazekii* and transmitted by human body louse (*Pediculus humanus corporis*).
- II. **Endemic Typhus (Flea born) / Murine Typhus:** is caused by *R. thyphi* which is transmitted by fleas.

#### **2.5.14. Strength of the study**

The findings of this surveillance data analysis will be the bench mark for the health institution. 5.

#### **2.5.15. Dissemination of findings**

The result of epidemic typhus surveillance data trend analysis was communicated to Nifas Silk Lafto Sub City health office, Addis Ababa Regional Health bureau and St. Paul Hospital Millennium Medical College Department of Public Health Field Epidemiology Training Program.

## 2.6. Result

A total of 16,816 epidemic typhus cases were seen as outpatient and inpatient between 2012 and 2014. Epidemic typhus cases were more increased in month November and December of 2012 that was 741 (17.25%) and 557 (13%) respectively out of 4,294 overall cases. The highest proportion 14,260 (84.8%) of the cases were within the age of  $\geq 15$  years. Almost all 16,805 (99.93) of epidemic typhus case between the years 2012 to 2014 were seen at outpatient department. Eleven epidemic typhus inpatient cases were seen at 49<sup>th</sup> week of the year 2012. No epidemic typhus death had occurred in the years 2012 to 2014.

The male to female ratio of the district in the year 2015 was 0.52 : 0.48. The majority of epidemic typhus patients 9,866 (58.67%) were females and the rest 41.33% were males.

### 2. 6.1. Weekly epidemic typhus surveillance data trend analysis.

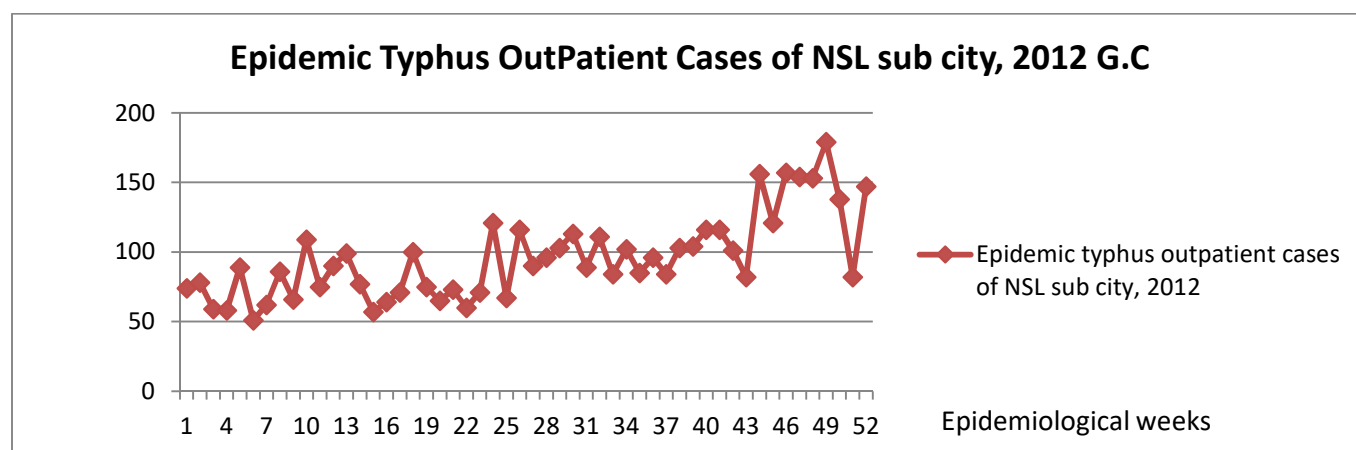


**Figure 6:** Epidemic typhus outpatient cases in Nifas silk Lafto sub city, 2012 G.C.

**Source:** Addis Ababa Regional Health Bureau (AARHB) 2012 G.C weekly surveillance report.

As shown on the figure above, epidemic typhus outpatient cases increased from week 1 to week 52 in the year 2012; even though the increasing rate varies in each week. The cases were peak at the 49<sup>th</sup> week of the reporting year i.e 179 out of 4,283.

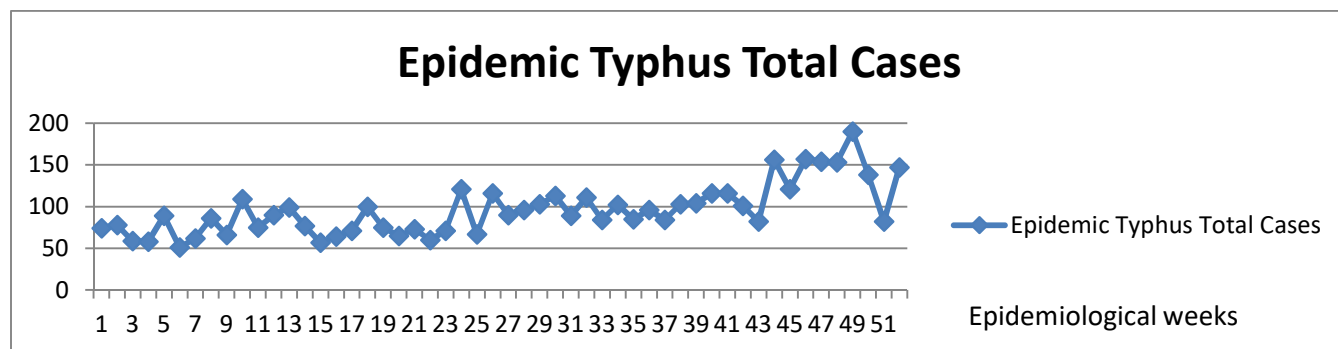


**Figure 7:** Total epidemic typhus cases of Nifas silk Lafto sub city, 2012.

**Source:** AARHB 2012 G.C weekly surveillance report.

2012 weekly surveillance report of AARHB shown on the above figure 4 indicates that from week 27 to week 42 number of epidemic typhus cases are slightly constant, but after week 43 it become increasing. Among the total of 4294 epidemic typhus cases 11 were in patient, the rest were outpatient visited. Epidemic typhus cases were more increased in month November and December of 2012 that was 741 (17.25%) and 557 (13%) out of 4,294 the year respectively.

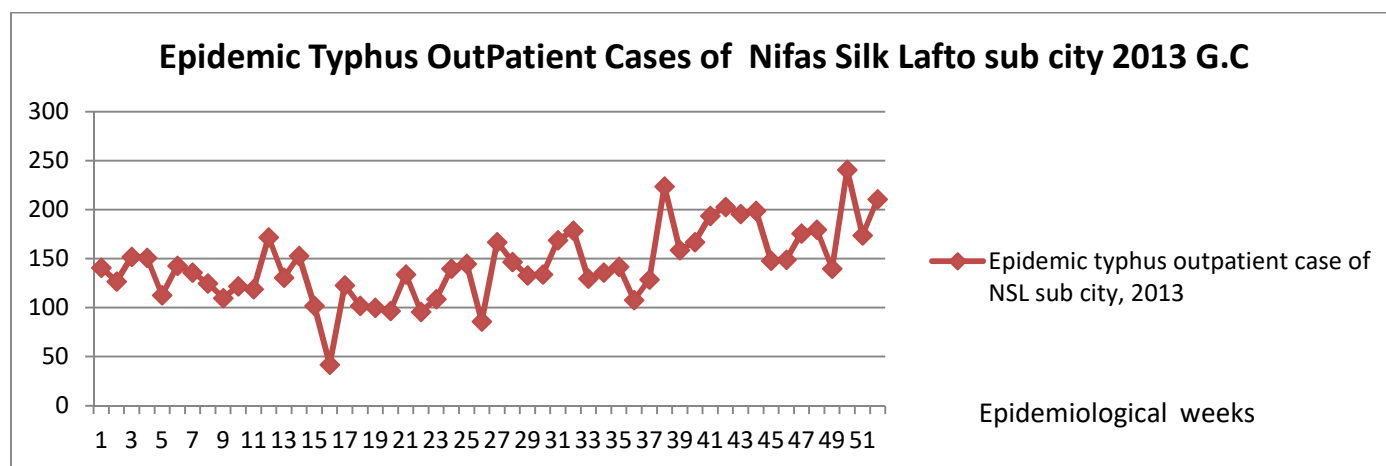


**Figure 8:** Epidemic typhus outpatient cases of Nifas silk Lafto sub city, 2013

**Source:** AARHB 2012 G.C weekly surveillance report.

The epidemic typhus outpatient cases of the sub city on the year 2013 were with the range of 42 to 241 which is wide range.

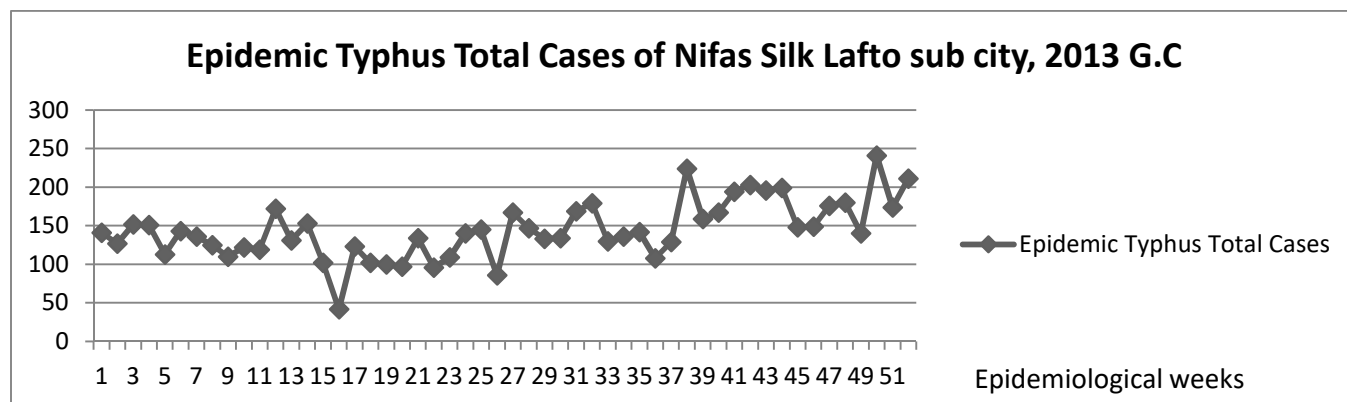


**Figure 9:** Epidemic typhus total cases of Nifas silk Lafto sub city, 2013.

**Source:** AARHB 2013 G.C weekly surveillance report.

Total epidemic typhus cases of the sub city by the year 2013 were the same to the outpatient cases since no inpatient and death cases occurred in the period.

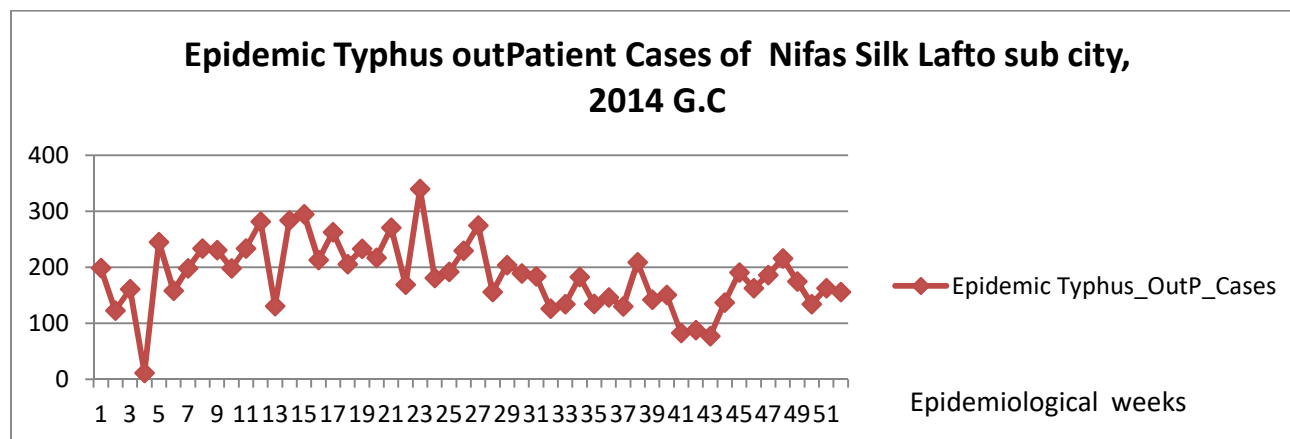


**Figure 10:** epidemic typhus outpatient cases of Nifas silk Lafto sub city, 2014

**Source:** AARHB 2014 G.C weekly surveillance report.

The outpatient cases of epidemic typhus in the year 2014 seems to decreases from week 28 to week 52 and has the minimum of 11 and maximum of 340 epidemic typhus cases at the 23<sup>rd</sup> week almost double of the 22<sup>nd</sup> week.

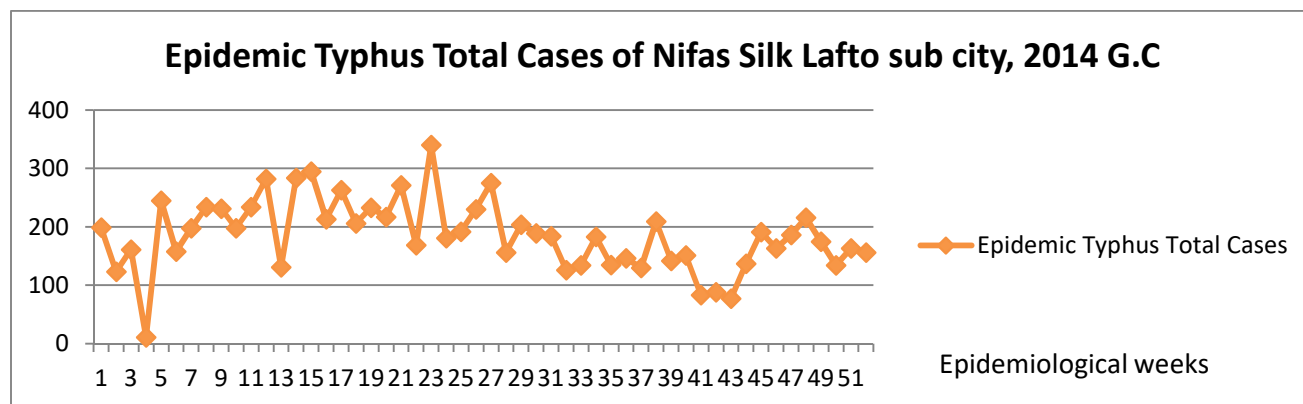


**Figure 11:** Epidemic typhus inpatient death cases of Nifas silk Lafto sub city, 2014

**Source:** AARHB 2014 G.C weekly surveillance report.

Total epidemic typhus cases in the year 2014 were the same to outpatient cases of the same year because there had no occurred inpatient and death cases during the reporting year.

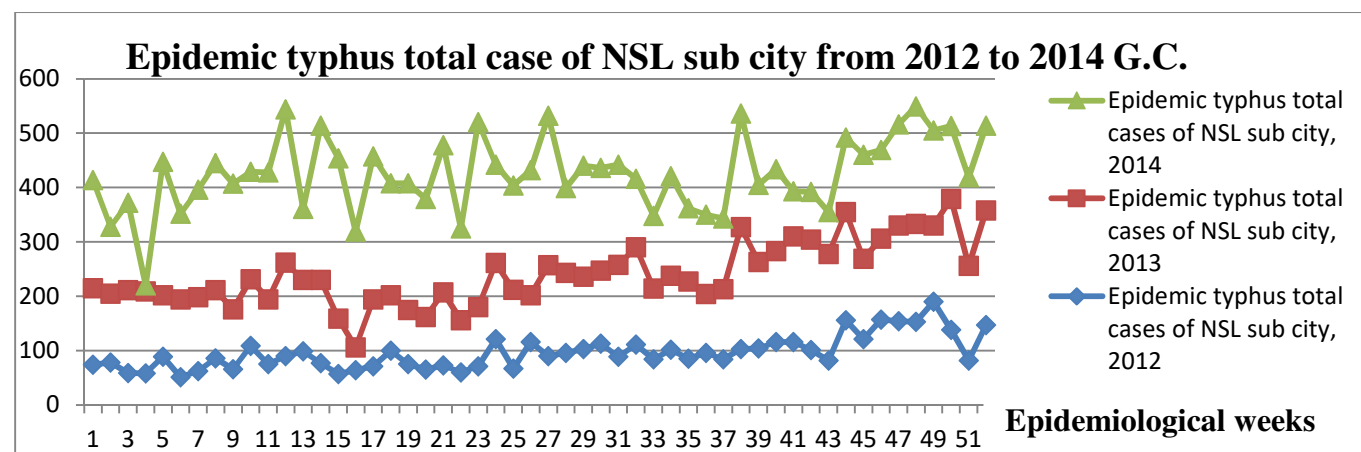


**Figure 12:** Epidemic typhus total cases from 2012 to 2014 at Nifas silk Lafto sub city.

**Source:** AARHB 2012 to 2014 G.C weekly surveillance report.

## 2.6.2. Monthly epidemic typhus surveillance data trend analysis by time and person.

**Table 4:** Nifas silk Lafto (NSL) sub city epidemic typhus cases in terms of age and sex classification, 2012.

| Months    | Epidemic typhus cases in terms of age and sex classification in NSL sub city, 2012 G.C |                 |              |       |               |                   |                |       | Grand Total |
|-----------|----------------------------------------------------------------------------------------|-----------------|--------------|-------|---------------|-------------------|----------------|-------|-------------|
|           | Male<br><=4                                                                            | Male<br>5 to 14 | Male<br>>=15 | Total | Female<br><=4 | Female<br>5 to 14 | Female<br>>=15 | Total |             |
| January   | 0                                                                                      | 12              | 66           | 78    | 0             | 23                | 119            | 142   | 220         |
| February  | 0                                                                                      | 11              | 34           | 45    | 0             | 4                 | 86             | 90    | 135         |
| March     | 0                                                                                      | 41              | 156          | 197   | 0             | 33                | 238            | 271   | 468         |
| April     | 0                                                                                      | 17              | 115          | 132   | 1             | 21                | 176            | 198   | 330         |
| May       | 0                                                                                      | 7               | 35           | 42    | 2             | 7                 | 79             | 88    | 130         |
| June      | 1                                                                                      | 42              | 197          | 240   | 3             | 53                | 265            | 321   | 561         |
| July      | 0                                                                                      | 2               | 52           | 54    | 0             | 11                | 75             | 86    | 140         |
| August    | 1                                                                                      | 5               | 65           | 71    | 0             | 3                 | 98             | 101   | 172         |
| September | 0                                                                                      | 48              | 328          | 376   | 0             | 55                | 423            | 478   | 854         |
| October   | 0                                                                                      | 2               | 35           | 37    | 0             | 9                 | 75             | 84    | 121         |
| November  | 0                                                                                      | 1               | 34           | 35    | 0             | 8                 | 85             | 93    | 128         |
| December  | 2                                                                                      | 78              | 367          | 447   | 6             | 82                | 500            | 588   | 1035        |
| Total     | 4                                                                                      | 266             | 1484         | 1754  | 12            | 309               | 2219           | 2540  | 4294        |

**Source:** Nifas Silk Lafto sub city health office HMIS 2012 report.

Among male and female epidemic typhus cases of the year 2012, the highest number of cases was occurred December which is 447 (25%), 588 (23%) of the year total cases respectively. Even among the total cases of the year December was the leading month 1,035 (24%). When we see sex category of epidemic typhus cases females were had more number, 2540 (59.15%).

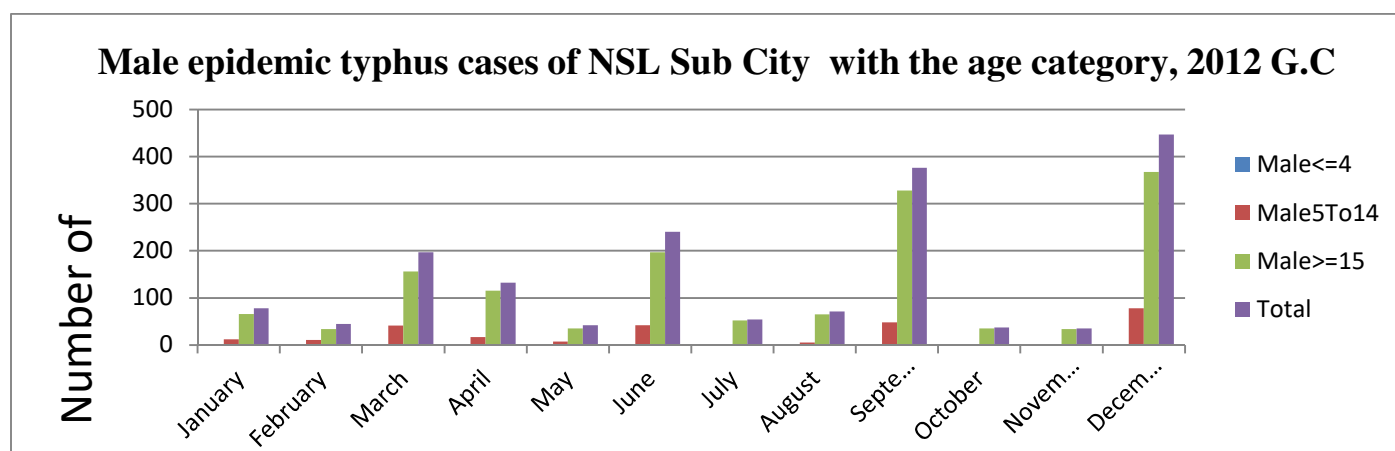


**Figure 13:** Male epidemic typhus cases of NSL sub city with the age category, 2012 G.C

**Source:** Nifas Silk Lafto sub city health office HMIS 2012 report.

Epidemic typhus case is highly prevalent with the age category of  $\geq 15$  years old followed by 5 to 15 year as shown on the above figure 15. The range of cases in the age range of  $\geq 15$  was 34 to 367 which is a very wide range. When we compare the reporting months, the high peak of cases was on month of December.

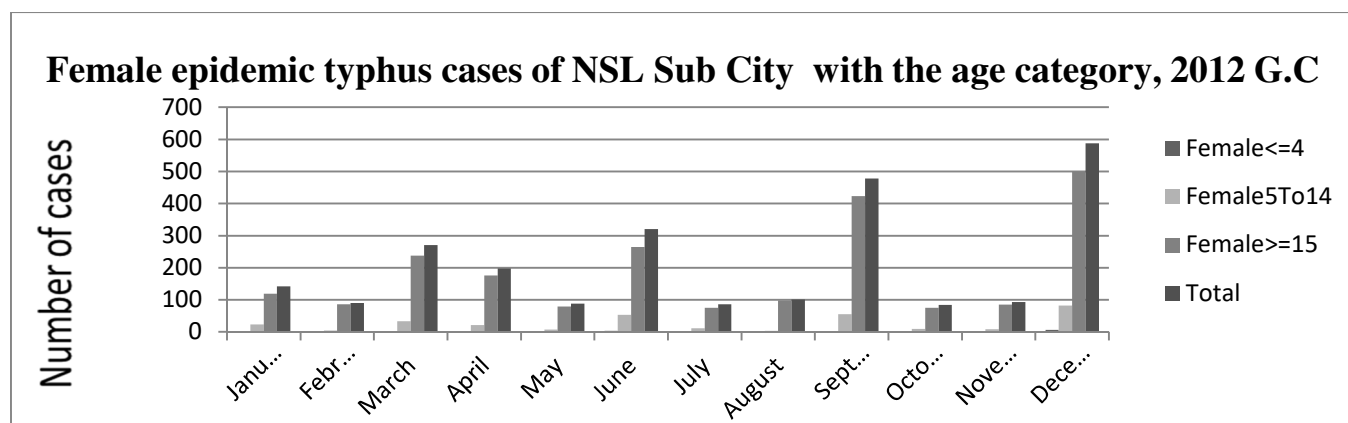


**Figure 14:** Female epidemic typhus cases of NSL sub city with the age category, 2012 G.C

**Source:** Nifas Silk Lafto sub city health office HMIS 2012 report.

The epidemic typhus cases in females was also highly prevalent with the age category of  $\geq 15$  years old followed by 5 to 14 as males.

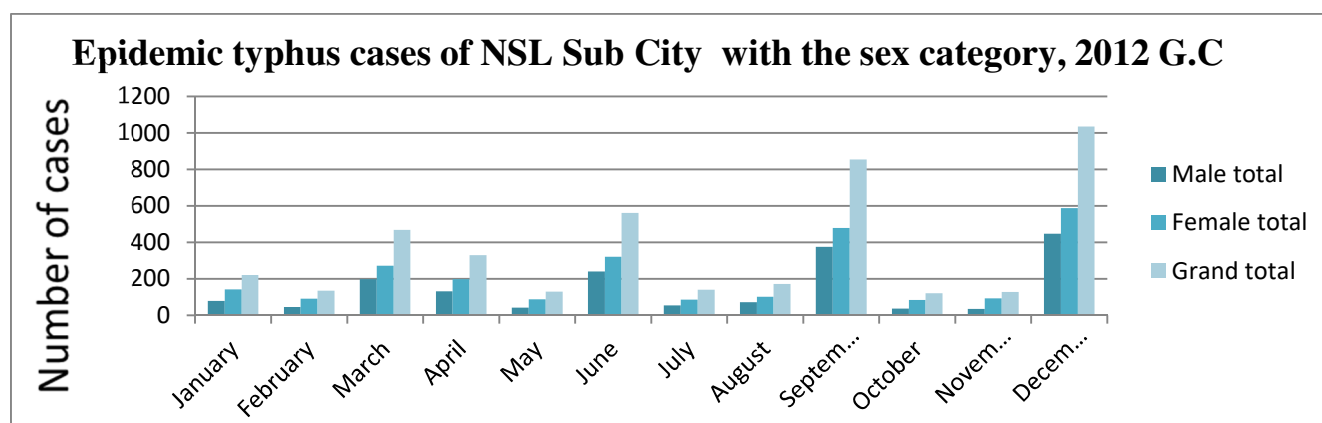


**Figure 15:** Total male and female epidemic typhus cases of NSL sub city, 2012 G.C.

**Source:** Nifas Silk Lafto sub city health office HMIS 2012 report.

Epidemic typhus cases in 2012 G.C of females was higher when compared to male epidemic typhus cases in the same year. September and December cases of the year 2012 were relatively higher than the others. Among the total epidemic typhus cases of 2012, 24% (1035) cases were seen on the month December.

**Table 5:** Nifas silk Lafto sub city epidemic typhus cases in terms of age and sex classification, 2013

| Months    | Epidemic typhus cases in terms of age and sex classification in NSL sub city, 2013 G.C |              |           |       |            |                |             |       | Grand Total |
|-----------|----------------------------------------------------------------------------------------|--------------|-----------|-------|------------|----------------|-------------|-------|-------------|
|           | Male <=4                                                                               | Male 5 to 14 | Male >=15 | Total | Female <=4 | Female 5 to 14 | Female >=15 | Total |             |
| January   | 4                                                                                      | 26           | 154       | 184   | 2          | 20             | 181         | 203   | 387         |
| February  | 9                                                                                      | 24           | 158       | 191   | 1          | 36             | 246         | 283   | 474         |
| March     | 6                                                                                      | 34           | 179       | 219   | 14         | 39             | 299         | 352   | 571         |
| April     | 0                                                                                      | 15           | 148       | 163   | 3          | 26             | 190         | 219   | 382         |
| May       | 4                                                                                      | 21           | 175       | 200   | 6          | 45             | 175         | 226   | 426         |
| June      | 4                                                                                      | 20           | 151       | 175   | 4          | 35             | 204         | 243   | 418         |
| July      | 5                                                                                      | 27           | 139       | 171   | 2          | 37             | 186         | 225   | 396         |
| August    | 1                                                                                      | 36           | 132       | 169   | 2          | 32             | 194         | 228   | 397         |
| September | 0                                                                                      | 22           | 164       | 186   | 0          | 20             | 211         | 231   | 417         |
| October   | 0                                                                                      | 27           | 140       | 167   | 0          | 29             | 167         | 196   | 363         |
| November  | 9                                                                                      | 20           | 140       | 169   | 9          | 39             | 201         | 249   | 418         |
| December  | 0                                                                                      | 49           | 174       | 223   | 1          | 56             | 192         | 249   | 472         |
| Total     | 42                                                                                     | 321          | 1854      | 2217  | 44         | 414            | 2446        | 2904  | 5121        |

**Source:** Nifas Silk Lafto sub city health office HMIS 2013 report.

Among male and female epidemic typhus cases of the year 2013, the highest number of cases was occurred December which is 223 (10%), 249 (8.6%) of the year total cases respectively. Even among the total cases of the year December was the leading month 472 (9.2%). When we see sex category of epidemic typhus cases females were had greater number, 2904 (56.7.15%).

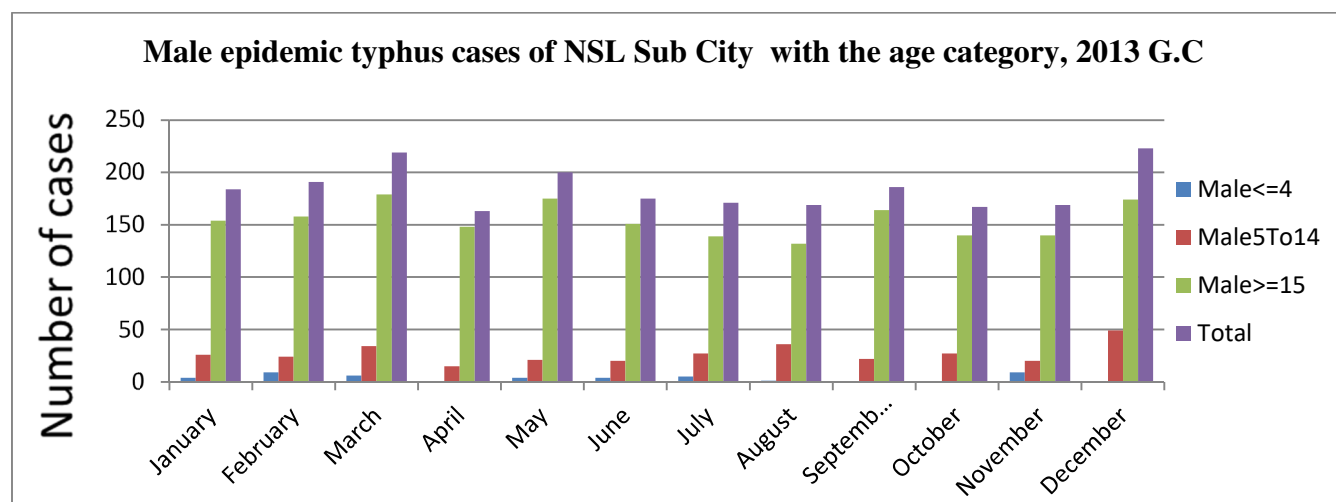


**Figure 16:** Male epidemic typhus cases of NSL sub city with the age category, 2013 G.C

**Source:** Nifas Silk Lafto sub city health office HMIS 2013 report.

The trend of the epidemic typhus cases in the year 2013 was relatively constant from January to December. The cases were still in the age category of  $\geq 15$  years old of male individuals.

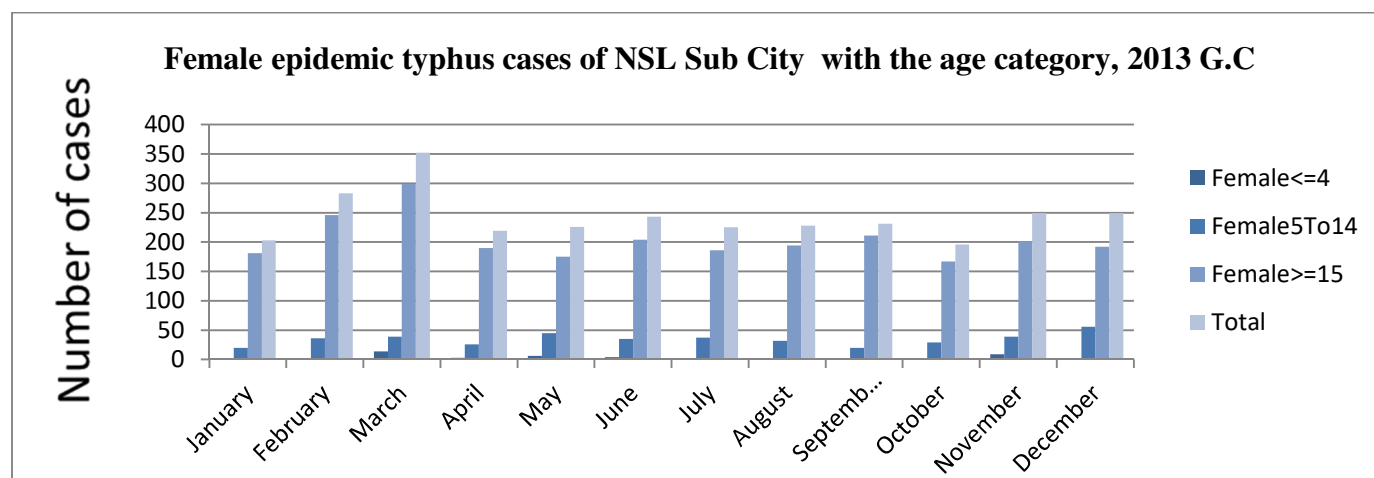


**Figure 17:** Female epidemic typhus cases of NSL sub city with the age category, 2013 G.C

**Source:** Nifas Silk Lafto sub city health office HMIS 2013 report.

Female epidemic typhus cases in the year 2013 were relatively no increasing from January to December with high prevalence of  $\geq 15$  years old followed by 5 to 14 years.

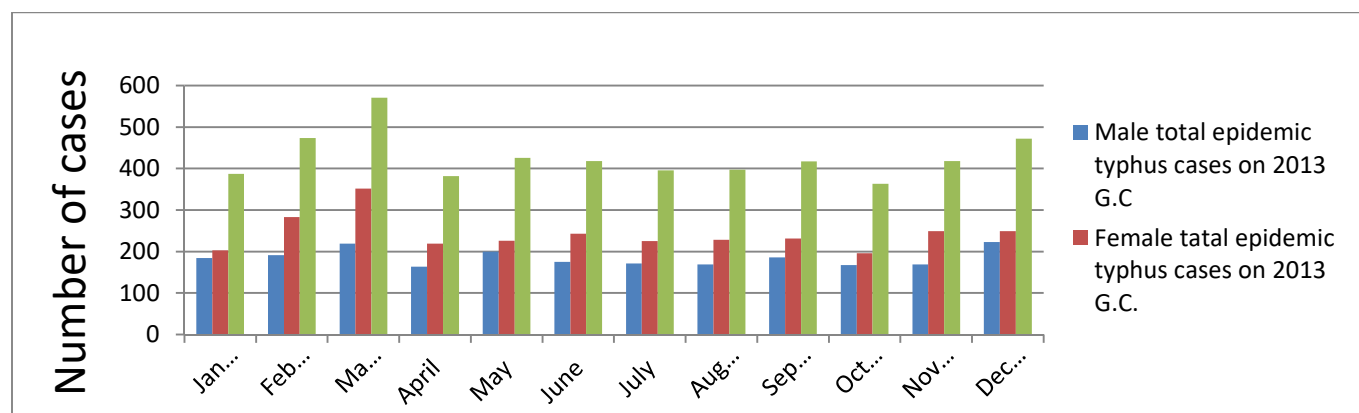


**Figure 20:** Total epidemic typhus cases of NSL sub city sex category, 2013 G.C.

**Source:** Nifas Silk Lafto sub city health office HMIS 2013 report.

Female epidemic typhus cases were higher than males in the reporting of 2013 G.C at Nifas Silk Lafto sub city. February, March, and December cases of epidemic typhus were higher than other months of the same year. 11% of cases occurred on month March of 2013 G.C.

**Table 6:** Nifas silk Lafto sub city epidemic typhus cases in terms of age and sex classification, 2014.

| Reporting Months | Epidemic typhus cases in terms of age and sex classification in NSL sub city, 2014 G.C |              |                |       |                 |                |                  |       | Grand Total |
|------------------|----------------------------------------------------------------------------------------|--------------|----------------|-------|-----------------|----------------|------------------|-------|-------------|
|                  | Male $\leq 4$                                                                          | Male 5 to 14 | Male $\geq 15$ | Total | Female $\leq 4$ | Female 5 to 14 | Female $\geq 15$ | Total |             |
| January          | 0                                                                                      | 38           | 117            | 155   | 16              | 33             | 191              | 240   | 395         |
| February         | 3                                                                                      | 37           | 215            | 255   | 7               | 52             | 250              | 309   | 564         |
| March            | 0                                                                                      | 41           | 181            | 222   | 0               | 58             | 268              | 326   | 548         |
| April            | 1                                                                                      | 27           | 199            | 227   | 2               | 51             | 315              | 368   | 595         |
| May              | 1                                                                                      | 20           | 230            | 251   | 0               | 39             | 371              | 410   | 661         |
| June             | 0                                                                                      | 30           | 155            | 185   | 2               | 28             | 220              | 250   | 435         |
| July             | 1                                                                                      | 46           | 205            | 252   | 3               | 45             | 255              | 303   | 555         |
| August           | 1                                                                                      | 34           | 184            | 219   | 0               | 60             | 263              | 323   | 542         |
| September        | 3                                                                                      | 44           | 226            | 273   | 2               | 69             | 339              | 410   | 683         |
| October          | 3                                                                                      | 36           | 270            | 309   | 7               | 39             | 336              | 382   | 691         |
| November         | 2                                                                                      | 66           | 300            | 368   | 4               | 106            | 537              | 647   | 1015        |
| December         | 1                                                                                      | 35           | 227            | 263   | 8               | 43             | 403              | 454   | 717         |
| Total            | 16                                                                                     | 454          | 2509           | 2979  | 51              | 623            | 3748             | 4422  | 7401        |

**Source:** Nifas Silk Lafto sub city health office HMIS 2014 report.

Among male and female epidemic typhus cases of the year 2012, the highest number of cases was occurred November which is 368 (12.35%), 537 (14.33%) of the year total cases respectively. Even among the total cases of the year November was the leading month 1015 (13.7%). When we see sex category of epidemic typhus cases females were had more number, 4422 (59.75%).

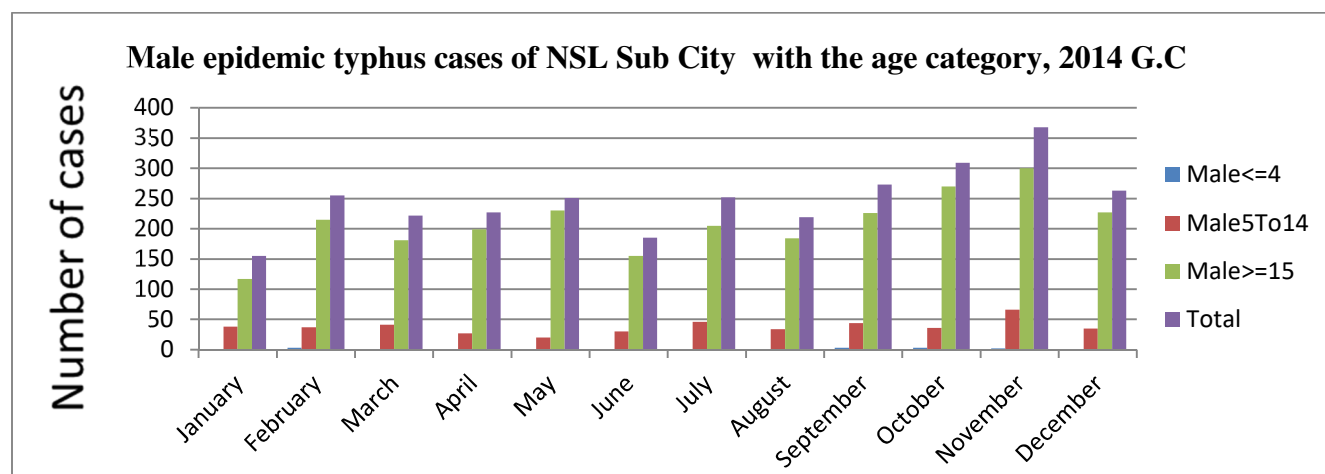


**Figure 21:** Male epidemic typhus cases of NSL Sub City with the age category, 2014 G.C

**Source:** Nifas Silk Lafto sub city health office HMIS 2014 report.

As shown on the figure 21 above, the epidemic typhus cases in the reporting year was increasing from January to December with the highest prevalence of  $\geq 15$  years old and peak of case by the month November.

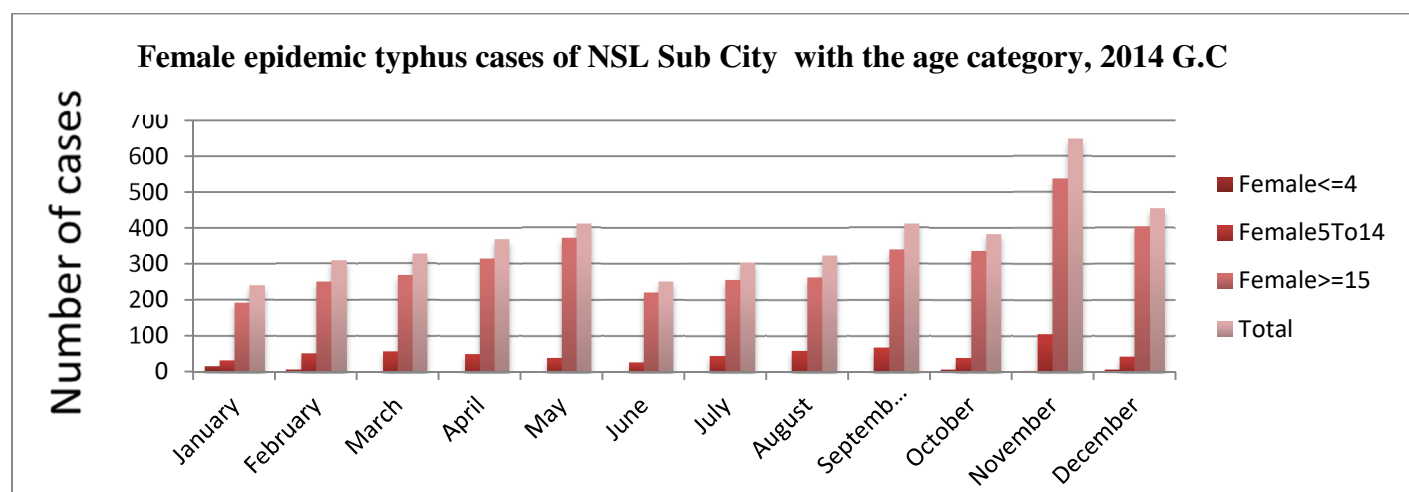


**Figure 22:** Male epidemic typhus cases of NSL Sub City with the age category, 2014 G.C

Source: Nifas Silk Lafto sub city health office HMIS 2014 report.

Female epidemic typhus cases in the year 2014 showed on the above figure 22 was still highly prevalent in the age category of  $\geq 15$  years old.

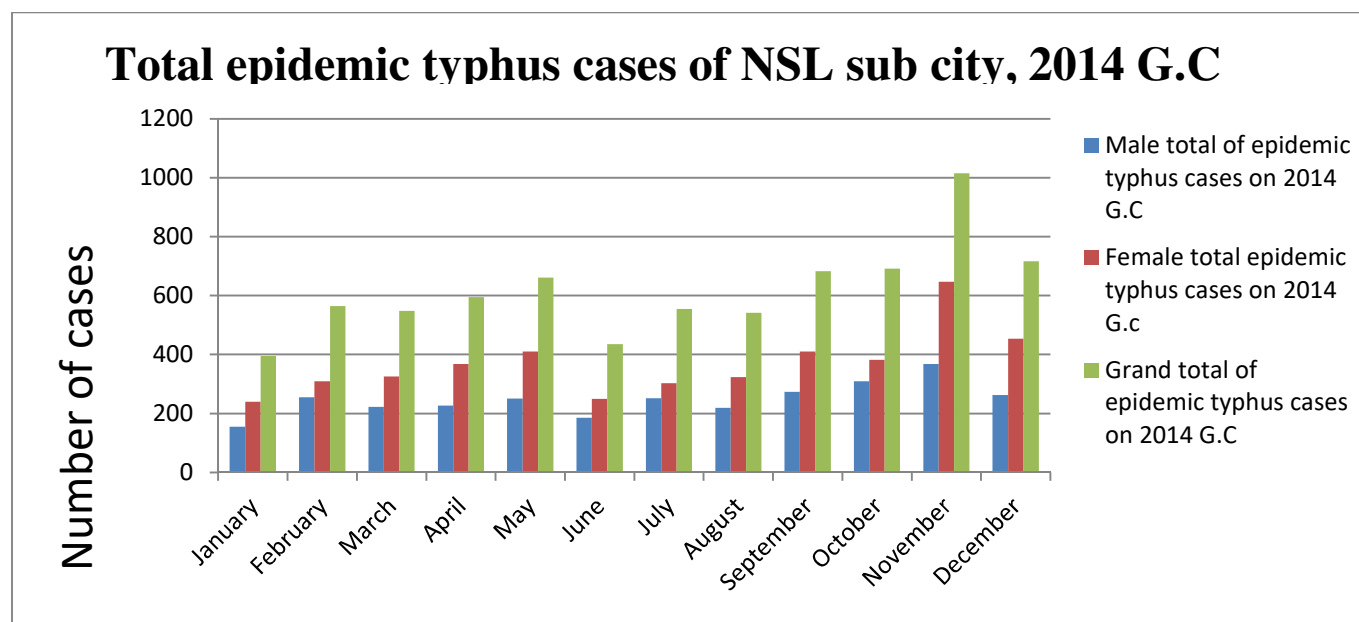


**Figure 23:** Male epidemic typhus cases of NSL Sub City with the age category, 2014 G.C

Source: Nifas Silk Lafto sub city health office HMIS 2014 report.

When comparing the female and male epidemic typhus cases in the 2014 G.C, female epidemic typhus cases were higher than male cases throughout the year.

**Table 6:** Total epidemic typhus cases of Nifas Silk Lafto Sub City with sex category from 2012 to 2014 G.C.

| Age category | Sex category according to reporting years |        |       |          |        |       |          |        |       | Grand Total |
|--------------|-------------------------------------------|--------|-------|----------|--------|-------|----------|--------|-------|-------------|
|              | 2012 G.C                                  |        |       | 2013 G.C |        |       | 2014 G.C |        |       |             |
|              | Male                                      | Female | Total | Male     | Female | Total | Male     | Female | Total |             |
| <=4          | 4                                         | 12     | 16    | 42       | 44     | 86    | 16       | 51     | 67    | 169         |
| 5 to 14      | 266                                       | 309    | 575   | 321      | 414    | 735   | 454      | 623    | 1077  | 2387        |
| >=15         | 1484                                      | 2219   | 3703  | 1854     | 2446   | 4300  | 2509     | 3748   | 6257  | 14260       |
| Total        | 1754                                      | 2540   | 4294  | 2217     | 2904   | 5121  | 2979     | 4422   | 7401  | 16816       |

Source: Nifas Silk Lafto sub city health office HMIS 2012 to 2014 report.

The total epidemic typhus cases in NSL sub city increased from 4294 in 2012 to 7401 in 2014 G.C of the reporting years.

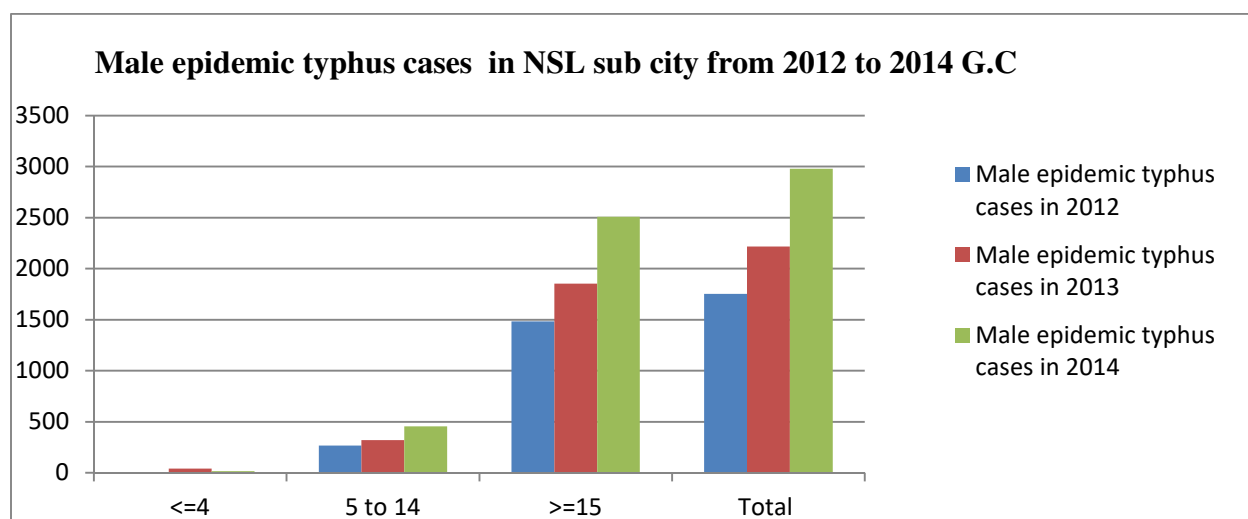


**Figure 24:**Male epidemic typhus cases in NSL sub city from 2012 to 2014 G.C.

**Source:** Nifas Silk Lafto sub city health office HMIS 2012 to 2014 report.

Male epidemic typhus cases of Nifas Silk Lafto sub city increased from 2012 to 2014 in all age categories which is the indication to give attention how to combat or prevent the transmission. Among 6,950 male epidemic typhus cases from 2012 to 2014, 2,979 (43%) were in the year 2014.

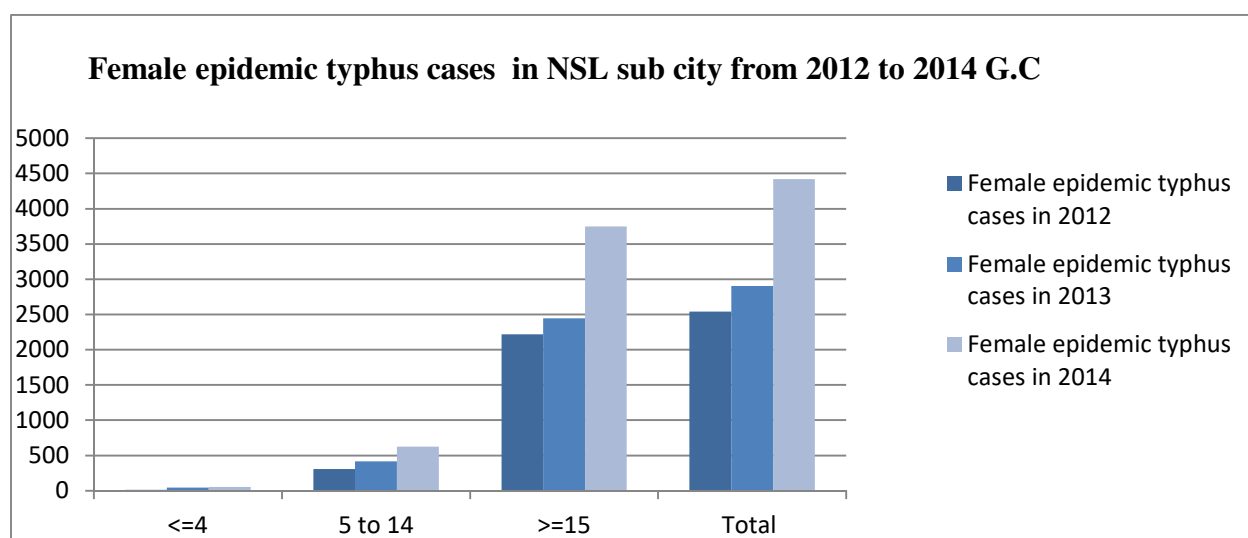


**Figure 25:**Male epidemic typhus cases in NSL sub city from 2012 to 2014 G.C.

**Source:** Nifas Silk Lafto sub city health office HMIS 2012 to 2014 report.

Female epidemic typhus cases of Nifas Silk Lafto sub city increased from 2012 to 2014 in all age categories which is the indication to give attention how to combat or prevent the transmission.

Among the total female epidemic typhus 9,866 cases of 3 years in Nifas Silk Lafto sub city 4,422 (45%) were happened in 2014

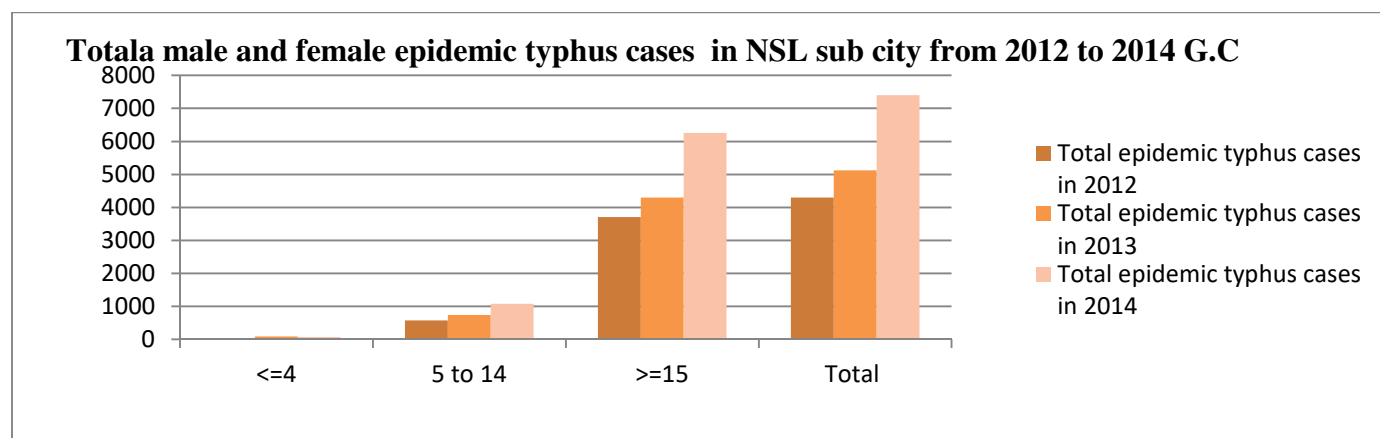


**Figure 26:** Total female and male epidemic typhus cases in NSL sub city from 2012 to 2014G.C.

**Source:** Nifas Silk Lafto sub city health office HMIS 2012 to 2014 report.

The epidemic typhus of Nifas Silk Lafto sub city from 2012 to 2014 in general was increasing in all age groups. 3703 out of 4294 case (86%) of the 2012 G.C epidemic typhus cases in Nifas Silk Lafto sub city was in the age group of  $\geq 15$  years old. Among the total of 3 years epidemic typhus 16,816 cases 7401 (44%) happened in 2014 G.C.

**Table 7:** Total epidemic typhus cases of NSL sub city from 2012 to 2014.

| Years | Epidemic typhus cases | Prevalence |
|-------|-----------------------|------------|
| 2012  | 4294                  | 1.20%      |
| 2013  | 5121                  | 1.38%      |
| 2014  | 7401                  | 1.96%      |

**Source:** Nifas Silk Lafto sub city health office HMIS 2012 to 2014 report.

The prevalence of epidemic typhus increased from 2012 (1.2%) to 2014 (1.96%) slightly.

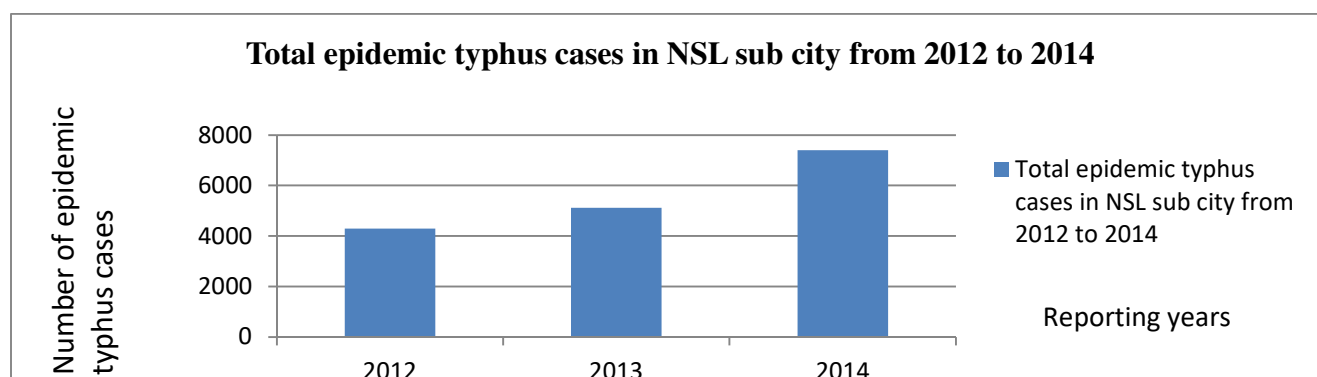


**Figure 27:** Total epidemic typhus cases of NSL sub city from 2012 to 2014.

**Source:** Nifas Silk Lafto sub city health office HMIS 2012 to 2014 report.

The number of epidemic typhus case increased in the past 3 years. The increment was 19% from 2012 and 30% from 2013 to 2014.

**Table 8:** Prevalence rate of the epidemic typhus cases in Nifas silk Lafto sub city from 2012 to 2014 G.C.

| Year     | Population at risk | Number cases | Number of inpatients | Number of deaths | Prevalence | Case fatality rate | Admission rate | Attack rate |
|----------|--------------------|--------------|----------------------|------------------|------------|--------------------|----------------|-------------|
| 2012 G.C | 361,973            | 4,294        | 11                   | 0                | 1.20%      | 0%                 | 25/10,000      | 1.20%       |
| 2013 G.C | 369,737            | 5,121        | 0                    | 0                | 1.38%      | 0%                 | 0/10,000       | 1.38%       |
| 2014 G.C | 377,668            | 7,401        | 0                    | 0                | 1.96%      | 0%                 | 0/10,000       | 1.96%       |

**Source:** Nifas Silk Lafto sub city 2012 to 2014 monthly HMIS report and AARHB weekly surveillance report.

The prevalence of epidemic typhus case increased from 2012 to 2014 in all age groups of the Nifas Silk Lafto sub city. The admission rate of epidemic typhus was almost none of the reporting years in the sub city.

**Table 9:** Completeness of Nifas silk Lafto sub city from 2012 to 2014 G.C

| Years | Number of sites expected to report | Number of site reported | Completeness |
|-------|------------------------------------|-------------------------|--------------|
| 2012  | 43                                 | 26                      | 60.47        |
| 2013  | 49                                 | 43                      | 87.76        |
| 2014  | 51                                 | 42                      | 82.35        |

**Source:** AARHB weekly surveillance data report from 2012 to 2014 G.C.

When we see completeness of reports, it increased from 2012 to 2013 but decreased in 2014. The overall completeness of reports in Nifas Silk Lafto sub city was not good.

## **2.7. 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. When we compare the three years (2012 to 2014) reports of epidemic typhus cases at Nifas Silk Lafto sub city, the number of case was increasing from time to time which needs the managerial discussion and decision how to reduce the case.

The incidence of epidemic typhus cases in outpatient departments increased through a year. The cases increased from 4294 in 2012 to 7401 in 2014. The increment might be occurred because of the increasing of reporting health facilities, which was a total of 43 health facilities in 2012 increased to 51 health facilities in 2014.

In 2012, the report completeness was 60.47%, improved to 87.76% in 2013 and then down to 82.35% in 2014 G.C. In Ethiopia, mostly used diagnostic method is Weil-Felix test at all health centers and hospitals. The classic Weil-Felix test measures antibodies against OX strain antigens of *R. prowazekii* and is more than 100 years old. Although robust and simple to perform, this test lacks sensitivity and specificity, and reliance on it alone in areas where typhus is endemic may lead to over diagnosis (2). Therefore, due to the lack of specificity and sensitivity, the identification of true cases is very difficult for diagnosis and the Positive cases for Weil-Felix test might not be positive for epidemic typhus. Therefore, the imperfection of the test makes very difficult for the diagnosis and treatment of epidemic typhus early and may affect the incidence rate.

According to the study done on the sero prevalence of typhus fever at kaliti prison, Addis Ababa, Ethiopia, prevalence of epidemic typhus is 26.3% while the three years (2012 to 2014) surveillance data analysis of Nifas Silk Lafto sub city showed that the prevalence of epidemic typhus is 1.96% (2) which is very low and the case fatality rate of the Nifas Silk Lafto sub city was 0%.

Seasonality of the occurrence of epidemic typhus is not strongly evidenced with the surveillance data analysis. However, the incidence of epidemic typhus rises at March, September and December with all three years among the three months the incidence is higher on November. The admission rate of epidemic typhus cases decreased through a year. When we see the admission

rate from the total population in each year was 11 cases on 2012, 0 cases on 2013, and 0 cases on 2014 cases admitted to inpatient services. This is because health facilities and service expanded throughout the nine Woredas of the sub city. The sub city is still working to achieve the HSDP of one health center for 40,000 people (5) and at this time 1 health center is serving for 42,863 people. On the other hand, health extension workers are giving health education for the community members on different health and health related topics during home-to-home visiting. In addition, health center's staffs are also giving health education in health center as routine activities. For this reason, the awareness of the community is increased and the health seeking behavior of the community also increased. Therefore, related to increasing of awareness and health seeking behavior, early detection of cases and appropriate diagnosis and treatment can minimize inpatient admission.

In order to express the findings in terms of place, person and time, the weekly surveillance data can capture only outpatient, inpatient and deaths from epidemic typhus case. To compensate this problem I have used HMIS monthly report. Due to this there may be data discrepancy between weekly surveillance data and HMIS monthly report data. Therefore, incomplete data of the reports may be the limitations of the analysis procedure.

## **2.8. Conclusion**

Louse-borne diseases like epidemic typhus infections particularly affect populations living in poor hygiene conditions where body louse infestations are prevalent, vulnerable populations in developing countries, especially in homeless individuals. Regular surveys of these populations and the implementation of efficient delousing strategies are necessary to prevent major epidemics of known louse-borne diseases or other potentially emerging louse-borne pathogens. Efficient delousing methods include regularly changing the clothing, boiling infested clothes and linens, and the use of insecticides and ivermectin for infected persons. In addition, in an epidemic typhus outbreak, a single 200-mg oral dose is also used.

In general, almost all of epidemic typhus cases were treated at outpatient department and few cases were treated at inpatient department. When we see the reported cases by year, the highest number of epidemic typhus cases (7,401) reported in 2014. The surveillance report completeness rate was not to the expected range.

### **2.9. Limitation**

The limitations of the study were:

- ❖ The data from Addis Ababa regional health bureau weekly surveillance report and from Nifas Silk Lafto sub city monthly HMIS report have different numbers (data discrepancy).
- ❖ There may be missed data that were not included in the analysis.
- ❖ The number of cases in the analysis may differ from the reality.

### **2.10. Recommendations**

- ❖ The Nifas Silk Lafto Sub City Health Office PHEM case team has to aware the health institutions to report regularly genuine number to the respective site.
- ❖ Health Extension Program officers of the Sub City have to order the Woreda Health office to educate the community on the transmission and prevention methods of the epidemic typhus.
- ❖ Addis Ababa City Administration has to avail basic infrastructures to the community (e.g. Safe water, housing, income generating activities, etc.)
- ❖ Regular surveillance data analysis should be done by sub city PHEM officers.
- ❖ Integrated evaluation of reports should be done by sub city and reporting health institutions.

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## Epidemic typhus surveillance data analysis questionnaire

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2. Number of epidemic typhus cases monthly in Nifas Silk Lafto Sub City in terms of sex and age from 2012 to 2014 G.C.

| Months of 2012 Ethiopian fiscal year | Sex    | Age  | Number of cases |
|--------------------------------------|--------|------|-----------------|
| January                              | Male   | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
|                                      | Female | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
| February                             | Male   | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
|                                      | Female | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
| March                                | Male   | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
|                                      | Female | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
| April                                | Male   | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
|                                      | Female | <=4  |                 |

|           |        |      |  |
|-----------|--------|------|--|
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           |        |      |  |
| May       | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
| June      | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
| July      | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
| August    | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
| September | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |

|          |        |      |  |
|----------|--------|------|--|
|          | Female | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
| October  | Male   | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
|          | Female | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
| November | Male   | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
|          | Female | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
| December | Male   | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
|          | Female | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |

| Months of 2013 Ethiopian fiscal year | Sex    | Age  | Number of cases |
|--------------------------------------|--------|------|-----------------|
| January                              | Male   | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
|                                      | Female | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |

|          |        |      |  |
|----------|--------|------|--|
| February | Male   | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
|          | Female | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
| March    | Male   | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
|          | Female | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
| April    | Male   | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
|          | Female | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
| May      | Male   | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
|          | Female | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
| June     | Male   | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
|          | Female | <=4  |  |
|          |        | 5-14 |  |

|           |        |      |  |
|-----------|--------|------|--|
|           |        | >=15 |  |
| July      | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
| August    | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
| September | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
| October   | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
| November  | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |

|          |        |      |  |
|----------|--------|------|--|
| December |        | 5-14 |  |
|          |        | >=15 |  |
|          |        |      |  |
|          | Male   | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |
|          | Female | <=4  |  |
|          |        | 5-14 |  |
|          |        | >=15 |  |

| Months of 2014 Ethiopian fiscal year | Sex    | Age  | Number of cases |
|--------------------------------------|--------|------|-----------------|
| January                              | Male   | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
|                                      | Female | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
| February                             | Male   | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
|                                      | Female | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
| March                                | Male   | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
|                                      | Female | <=4  |                 |
|                                      |        | 5-14 |                 |
|                                      |        | >=15 |                 |
| April                                | Male   | <=4  |                 |

|        |        |      |  |
|--------|--------|------|--|
|        |        | 5-14 |  |
|        |        | >=15 |  |
|        | Female | <=4  |  |
|        |        | 5-14 |  |
|        |        | >=15 |  |
| May    | Male   | <=4  |  |
|        |        | 5-14 |  |
|        |        | >=15 |  |
|        | Female | <=4  |  |
|        |        | 5-14 |  |
|        |        | >=15 |  |
| June   | Male   | <=4  |  |
|        |        | 5-14 |  |
|        |        | >=15 |  |
|        | Female | <=4  |  |
|        |        | 5-14 |  |
|        |        | >=15 |  |
| July   | Male   | <=4  |  |
|        |        | 5-14 |  |
|        |        | >=15 |  |
|        | Female | <=4  |  |
|        |        | 5-14 |  |
|        |        | >=15 |  |
| August | Male   | <=4  |  |
|        |        | 5-14 |  |
|        |        | >=15 |  |
|        | Female | <=4  |  |
|        |        | 5-14 |  |
|        |        | >=15 |  |

|           |        |      |  |
|-----------|--------|------|--|
| September | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
| October   | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
| November  | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
| December  | Male   | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |
|           | Female | <=4  |  |
|           |        | 5-14 |  |
|           |        | >=15 |  |

2.1. 2012 G.C

| <u>Sex</u> | <u>age</u> | <u>Number (cases)</u> |
|------------|------------|-----------------------|
| Male       | <=4        | _____                 |
|            | 5-14       | _____                 |
|            | >=15       | _____                 |
| Female     | <=4        | _____                 |
|            | 5-14       | _____                 |
|            | >=15       | _____                 |

2.2. 2013 G.C

| <u>Sex</u> | <u>age</u> | <u>Number (cases)</u> |
|------------|------------|-----------------------|
| Male       | <=4        | _____                 |
|            | 5-14       | _____                 |
|            | >=15       | _____                 |
| Female     | <=4        | _____                 |
|            | 5-14       | _____                 |
|            | >=15       | _____                 |

2.3. 2014 G.C

| <u>Sex</u> | <u>age</u> | <u>Number (cases)</u> |
|------------|------------|-----------------------|
| Male       | <=4        | _____                 |
|            | 5-14       | _____                 |
|            | >=15       | _____                 |
| Female     | <=4        | _____                 |
|            | 5-14       | _____                 |
|            | >=15       | _____                 |

**Chapter III: Malaria and Meningitis Surveillance System Evaluation of Nifas Silk Lafto  
Sub City, Addis Ababa, Ethiopia**

## Abstract

**Introduction:** Malaria and meningitis are two of 21 prioritized under surveillance diseases reported on the weekly basis. Malaria is significant disease burden to the public in Nifas Silk Lafto sub city. In 2015/2016 EFY, 828 total malaria cases were reported from private and government health facilities. Among which 328 (39.61%) cases *P.falciparum* and 500 (60.39%) cases were *P.vivax*. In this budget year a total of 4 meningitis cases were reported as well. No deaths were reported from the two diseases in year 2015/ 2016 EFY in the sub city. The surveillance system evaluation was done to assess the performance of major activities and attributes of surveillance system of malaria and meningitis in Nifas Silk Lafto sub city, Addis Ababa, Ethiopia, 2017.

**Methods** □ A descriptive cross-sectional study design was conducted to evaluate malaria and meningitis surveillance system. The study area was Nifas Silk Lafto Sub City and the study period was from January 13/2017 to March 13/2017 G.C. The data was collected through document review, interview of informant person and observation. Descriptive analysis was done by using MS office excel and data were presented by graphs and tables.

**Result:** Standard case definitions for all prioritized diseases including malaria and meningitis are available at sub city and visited health facilities. There was no shortage of reporting formats both at sub city and health facilities in the last 6 months. Data analysis was done at sub city partially but not at health facility levels. Action threshold level was available both at sub city and health facilities and there cholera and measles outbreaks in the past one year in the sub city and prompt response was conducted accordingly. Average timeliness and completeness of report of the year 2016 in Nifas Silk Lafto sub city was 88% from private health facilities and 100% from government health centers.

**Conclusion:** The overall activities of public health surveillance system in Nifas Silk Lafto sub city were satisfactory to achieve its targeted goals of prevention and control of malaria and meningitis. The existing surveillance system is simple, useful and flexible and well accepted by all assessed sites. Nifas Silk Lafto sub city health office has to set separated budget line and avail computer per officer for PHEM case team.

### **3.1.Introduction**

#### **3.1.1. Background**

Due to its newly organized structure to sub city and Woreda level, Public health emergency management activities may be prone to different faults at each level. The existing surveillance system was not evaluated yet in the sub city; hence periodic evaluation of the system is important to monitor whether the existing surveillance detects or not, simple for application or not, can catch newly emerging health problems and diseases or not. Evaluation is an important part of communicable disease surveillance. Systematic and objective evaluation of surveillance determines the relevance, effectiveness and impact of such systems. Surveillance needs to be linked to timely dissemination of the data, so that effective action can be taken to prevent disease. Surveillance mechanisms include compulsory notification regarding specific diseases, specific disease registries and continuous or repeated population surveys(1).

Data from a public health surveillance system can be used to guide immediate action for cases of public health importance, measure and monitor the burden and trends of a disease, guide the planning, implementation, and evaluation of programs to prevent and control disease, prioritize the allocation of health resources(2). In addition, a surveillance system should be simple, flexible, acceptable, situation specific and should be established at the beginning of public health activities set up in response to an emergency in a given functioning system(3). Efforts to establish disease surveillance system was initiated in Ethiopia in 1947 when the government issued quarantine rules. Subsequently several legal and administrative measures were taken to strengthen communicable disease surveillance. However, these efforts were not supported with appropriate resources thus; surveillance was limited in scope and usefulness. In the health sector, various institutional arrangements were implemented to strengthen surveillance services. In 1948, an anti-epidemic service was established that later in 1951 identified 35 priority diseases for surveillance; those diseases were classified into first class disease (Immediately Notifiable) and weekly reportable second-class diseases. These arrangements continued with several minor changes until the 1994 health system reform. The health reform taking into account the resource constraints and the need for strengthening functional surveillance system selected twentyone priority diseases (including those under vertical programs) for surveillance(4).

Lack of functional surveillance system that can guide timely and effective health intervention has been a common problem to the African region. Thus, the African States through the WHO Africa regional office (WHO/AFRO) made a resolution (resolution AFRO/RC48/R2) in September 1998 to develop an integrated disease surveillance and response (IDSR) initiative as a regional strategy to effectively control priority communicable diseases in the African region. IDSR emphasizes on capacity building at district level, integration and coordination of activities at all levels, timely feedback and use of information for action, improve laboratory capacity in support of surveillance, and community participation. Since 2009 by the evolution of business process re-engineering (BPR) integrated diseases surveillance and response (IDSR) is substituted by public health emergency management (PHEM) with the use multihazard approach concept to any unusual public health events(5).

In 2000, malaria caused an estimated 262 million cases and 839 000 deaths in the world. More than 80% of cases and 90% of deaths occurred in sub-Saharan Africa, where children aged less than 5 years are particularly prone to severe disease and death. It is estimated that, in 2000, malaria was responsible for 12% of all child deaths in the post-neonatal period and 22% in sub-Saharan Africa(6). In 2015, it is estimated that the top 15 countries, most of which are in sub-Saharan Africa, account for 80% of malaria cases and 78% of deaths(6). Human malaria is caused by five *Plasmodium* species, of which *P. falciparum* and *P. vivax* are the most predominant species in Ethiopia and *P. falciparum* causes a severe form of the disease. They are prevalent in all malarious areas in the country with *P. falciparum* representing about two-thirds to three-quarters of the cases, although their relative composition can be variable. *P. malariae* and *P. ovale* are rare and account for <1% of all confirmed malaria cases. The major malaria vector incriminated in Ethiopia is *Anopheles arabiensis*; in some areas *A. pharoensis*, *A. funestus* and *A. nili* also transmit malaria(7).

Meningococcal Meningitis (MM) is one of the health burdens in the Globe which is caused by *Neisseria Meningitidis*. The disease described on 1805 with the causative agent identification on 1807. The purpose of meningitis surveillance is to detect the emergence of an epidemic in order to institute control measures at the earliest possible time. Meningococcal disease incidence varies

widely according to season, geography, and age distribution. Annual incidence rates in areas where meningococcal meningitis is hyper endemic are greater than 10 per 100,000 population, and in sub-Saharan Africa these rates may be as high as 50 per 100,000. During epidemic years, however, annual incidence rates over 500 per 100,000(8). Africa specially the “Meningitis belt” region affected by the epidemic every some intervals of years. The highest case load in Africa was observed in 2009 since 1996. Countries, mainly starting Senegal to Ethiopia reported outbreaks in different times. Burkina Faso is one of the highly affected in the region every year. Since Ethiopia lies in the Meningitis belt of Africa, the epidemics of the disease occur in cyclical fashion. And, hence, Meningitis epidemics have hit the country in 1935, 1940, 1950, 1964, 1981 and 1989; with 50,000 cases and 990 deaths in 1981; and 45,806 cases and 1686 deaths in 1989(9).

The surveillance system evaluation to these selected priority disease and to the other diseases under surveillance was not done in the sub city till this work has done. Now a day's malaria is being reported weekly with significant number in the Nifas Silk Lafto sub city. This surveillance system evaluation was conducted in Nifas Silk Lafto sub city, Addis Ababa, Ethiopia. Malaria and meningitis are two of 21 prioritized under surveillance diseases reported on the weekly basis. Malaria is significant disease burden to the public in Nifas Silk Lafto sub city. In 2015/2016 EFY, 828 of the total of malaria cases were reported from private and government health facilities. Among which 328 (39.61%) cases *P.falciparum* and 500 (60.39%) cases were *P.vivax*. In this budget year a total of 4 meningitis cases were reported as well. No deaths were reported from the two diseases in year 2015/ 2016 EFY in the sub city.

Public health surveillance system should be evaluated periodically and include assessment of system attributes like simplicity, flexibility, data quality, accessibility, sensitivity, predictive value positive, representativeness, timeliness, stability, efficiency, usefulness and recommendations for further improvement. The evaluation was aimed at assessment of the performance of major activities and attributes of surveillance system of malaria and meningitis. The purpose of evaluating public health surveillance systems is to ensure that problems of health importance are being monitored efficiently and effectively. In Nifas Silk Lafto sub city there are

no documents that indicate use of the surveillance data at the local level as evidence for public health decision making. In addition to this, Surveillance system evaluation for malaria and meningitis is not done in the area before and no more is known about the effectiveness and efficiency of the system. Therefore with this surveillance evaluation, in addition to assessing the systems attributes, the attention given for reportable diseases on the sides of timely reporting, data recording and compiling and taking action according to the data that were assessed.

### **3.2.Objectives**

#### **3.2.1. General objective**

To assess the performance of major activities and attributes of surveillance system of malaria and meningitis in Nifas Silk Lafto sub city, Addis Ababa, Ethiopia, 2017.

#### **3.2.2. Specific objectives**

- ❖ To assess the core activities such as case detection, registration, confirmation, reporting, analysis and response of the surveillance system in Nifas Silk Lafto sub city.
- ❖ To evaluate the attributes of the surveillance system of the selected diseases in Nifas Silk Lafto sub city.
- ❖ To describe the linkage of the sub city PHEM case team with Woreda PHEM, government health centers and private health facilities on emergency and reporting timeliness and completeness.
- ❖ To recommend better solutions for improved performance in the future.

### 3.3. Methods and Materials

#### 3.3.1. Study area

Nifas Silk Lafto Sub City is one of the ten administrative sub cities of Addis Ababa City administration since 1998 G.C. It has 13 Woredas with their authorized administration and the total population of 385,769. It is bounded or boundaries of the sub city are: North-with Kirkos sub city, East – with Bole Sub city, South – Oromia region and West – with Oromia. The administration of Nifas Silk Sub City covers 58.216 square kilometers. The Sub City has 9 functional governmental health centers, 158 private health facilities, and four holy water sites. Among 158 private health facilities, 32 lower clinics, 17 dental clinics, 92 medium clinics, and 17 specialty clinics. In the sub city administration area there are no NGO health institutions, and has no any governmental and private hospital.

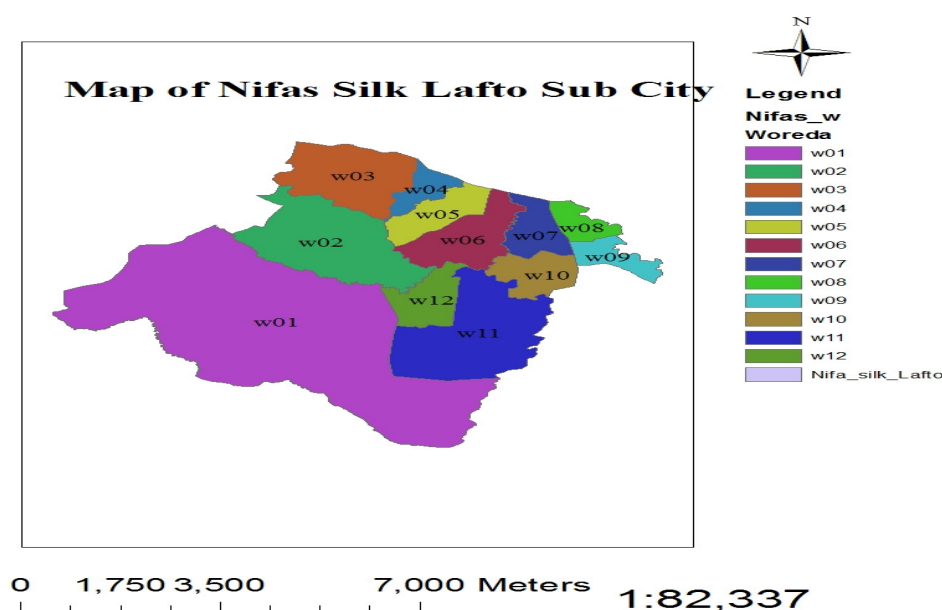


FIGURE 18: MAP OF NIFAS SILK LAFTO SUB CITY.

#### 3.3.2. Study period

The malaria and meningitis surveillance system evaluation was conducted from January 13/2017 to March 13/2017

#### 3.3.3. Study design

A descriptive cross-sectional study design was conducted to evaluate malaria and meningitis surveillance system of Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia.

#### **3.3.4. Study unit**

The study units were the 120(9 government health centers and 111 private health facilities) health facilities, their selection was done based on facilities under public health surveillance in Nifas Silk Lafto sub city administration.

#### **3.3.5. Inclusion criteria**

All under surveillance government and private health facilities i.e. 120 health facilities in Nifas Silk Lafto sub city were included in the surveillance system evaluation of meningitis and malaria.

#### **3.3.6. Data collection methods**

The secondary data were collected by document review with the help of structured standard questionnaire derived from WHO surveillance system evaluation guideline, interview of the responsible person at each level (sub city PHEM officers, health facility PHEM focal) and observation of infrastructures (materials used for PHEM activities).

#### **3.3.7. Data quality control**

The principal investigator checked the collected data for completeness, accuracy, clarity and consistency throughout the data collection period and cross checking was done from different sources of data like Addis Ababa Regional Health Bureau, Nifas Silk Lafto Sub City Health Office and reporting health facilities to maintain the quality of data.

#### **3.3.8. Data analysis**

The collected data was edited, coded, and cleaned before it entered to a computer then Simple descriptive analysis was done by using Microsoft excel and data was presented by graphs and tables.

#### **3.3.9. Ethical issues**

Ethical clearance was secured by writing formal letter from Saint Paul Hospital Millennium Medical College and Official permission was obtained from concerned authorities of the Regional Health Bureau of Addis Ababa City Administration and Nifas Silk Lafto Sub City Health Office. The surveillance officers and other health professionals were informed about the objective and purpose of the malaria and meningitis Surveillance system evaluation in order to cooperate with me throughout the data collection main body work parts.

### 3.3.10. Dissemination of findings

The result of malaria and meningitis surveillance system evaluation was communicated to Nifas Silk Lafto Sub City health office, Addis Ababa Regional Health bureau and St. Paul Hospital Millennium Medical College Department of Public Health Field Epidemiology Training Program.

### 3.3.11. Operational Definitions

**Acceptability:** Willingness of persons and organizations to participate in the surveillance system. And it could be measured quantitatively through reviewing completeness and timeliness of report forms.

**Accessibility:** Way by which statistical information can be obtained from the organization/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.

**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, with still meeting their objectives appropriately.

**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 considered flexible.

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

**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 events 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.

**Specificity:** Measure of how at times a system detects false positive health events, i.e., the

number of individuals recognized 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 concern.

**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, precisely describes the occurrence of a health-related incident over time and its spread in the population by place and person.

**Timeliness:** Interval between the occurrences of an unwanted health event, detection/identification of the event by the reporting source, reporting to responsible public health agency and the realization of control measures and response to the stakeholders.

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

**Usefulness:** A public health surveillance system is useful if it contributes to the prevention and control of unpleasant health-related events, including an improved understanding of the public health implications of such events. A public health surveillance system can also be useful if it helps to find out that an adverse health-related event previously thought to be unimportant is actually important.

**Validity:** The extent to which statistical information correctly describes the phenomena it was designed to measure.

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

**Data source:** Secondary data or surveillance reports, work plan and registration books and key informants interview will be among the lists.

### 3.4.Result

#### 3.4.1. Case Detection, Registration and Case definitions

Based on the national Public Health Emergency Management structure, Nifas Silk Lafto Sub city PHEM case team had doing core and supportive functions of surveillance with the respective governmental, private health facilities and Woreda health office.

##### Case definition

As per PHEM guideline there are two types of case definitions:

##### Standard Case Definition of:

**Malaria:** Any person with fever or fever with headache, rigor, back pain, chills, sweats, myalgia, nausea, and vomiting diagnosed clinically as malaria.

**Meningitis:** Any person with sudden onset of fever ( $>38.5^{\circ}\text{C}$  rectal or  $38^{\circ}\text{C}$  axillary) and one of the following signs: neck stiffness, altered consciousness or other meningeal signs.

##### Community Case Definition of:

**Malaria:** Any person with fever OR fever with headache, back pain, chills, rigor, sweating, muscle pain, nausea and vomiting OR suspected case confirmed by RDT.

**Meningitis:** Any person with fever, severe headache and neck stiffness.

Standard case definitions for all prioritized diseases including malaria and meningitis are available at sub city, visited Woredas and under surveillance health facilities of the sub city. In these health facilities, these case definitions were posted on the wall of each outlet (departments). At health facilities, no outbreak was detected from the two priority diseases (malaria and meningitis) clinical registration was also done as well.

##### Population under Surveillance

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

**Table 10:** Population under surveillance of Nifas silk Lafto sub city and visited health center catchments, april-2017

| S.N | Woreda              | Total Population of 2017 (projected from 2007 census) |
|-----|---------------------|-------------------------------------------------------|
| 1   | Woreda 01 catchment | 38,217                                                |
| 2   | Woreda 02 catchment | 44,249                                                |
| 3   | Woreda 03 catchment | 58,148                                                |
| 4   | Woreda 05 catchment | 32,044                                                |
| 5   | Woreda 06 catchment | 39,902                                                |
| 6   | Woreda 09 catchment | 51,242                                                |
| 7   | Woreda 10 catchment | 49,836                                                |
| 8   | Woreda 11 catchment | 50,843                                                |
| 9   | Woreda 12 catchment | 30,725                                                |
| 10  | Total (sub city)    | 395,206                                               |

These numbers of population are projected from before 10 years national census, but really the existing number of population could be much greater than this number. The newly structured system of PHEM to the Woreda level is currently addressing these numbers of population by their respective Woreda PHEM officers.

**Table 11:** List of immediately and weekly reportable diseases in Nifas Silk Lafto sub city, 2016 G.C

| S.N | Immediately reportable disease                  | Weekly reportable diseases |
|-----|-------------------------------------------------|----------------------------|
| 1   | Acute flaccid paralysis (AFP)                   | Dysentery                  |
| 2   | Anthrax                                         | Malaria                    |
| 3   | Avian human influenza (AHI)                     | Meningococcal meningitis   |
| 4   | Cholera                                         | Relapsing fever            |
| 5   | Dracunculiasis (guinea worm)                    | Severe malnutrition        |
| 6   | Measles                                         | Typhoid fever              |
| 7   | Neonatal tetanus                                | Epidemic typhus            |
| 8   | Pandemic influenza A                            |                            |
| 9   | Rabies                                          |                            |
| 10  | Small pox                                       |                            |
| 11  | Severe acute respiratory syndrome (SARS)        |                            |
| 12  | Viral hemorrhagic fever (VHF)                   |                            |
| 13  | Yellow fever                                    |                            |
| 14  | Maternal death surveillance and response (MDSR) |                            |

These are 14 diseases which have to be reported at the time of their occurrence to the nearest structure by any available reporting method if possible by phone within 30 minutes to the next level and by this definition within 2 hours to national (federal) level (EPHI), in order to take action accordingly and other 7 diseases to be reported weekly basis passively (routinely) by existing surveillance system according to their public health importance or communicability and potential to cause outbreaks.

**Table 12:** Lists of sites assessed in Nifas silk Lafto sub city, Addis Ababa, april-2017.

| S/N | Visited site             | No. of HC | No. of private HF | Woreda Health office | Total |
|-----|--------------------------|-----------|-------------------|----------------------|-------|
| 1   | Woreda 01 administration | 1         | 25                | 1                    | 27    |
| 2   | Woreda 02 administration | 1         | 10                | 1                    | 12    |
| 3   | Woreda 03 administration | 1         | 16                | 1                    | 18    |
| 4   | Woreda 05 administration | 1         | 8                 | 1                    | 10    |
| 5   | Woreda 06 administration | 1         | 11                | 1                    | 13    |
| 6   | Woreda 09 administration | 1         | 10                | 1                    | 12    |
| 7   | Woreda 10 administration | 1         | 14                | 1                    | 16    |
| 8   | Woreda 11 administration | 1         | 16                | 1                    | 18    |
| 9   | Woreda 12 administration | 1         | 10                | 1                    | 12    |

To address the existing surveillance system, private and public health facilities have to be involved in the active and passive surveillance system. A total of 120 health facilities are under current surveillance (PHEM) system, and they are reporting to the next level of organization (to their respective Woreda health office).

To Verify and evaluate the Performance of public health Emergency management system in the sub city, I took a quick look summary of the two selected nationally identified diseases (malaria and meningitis) as indicated below.

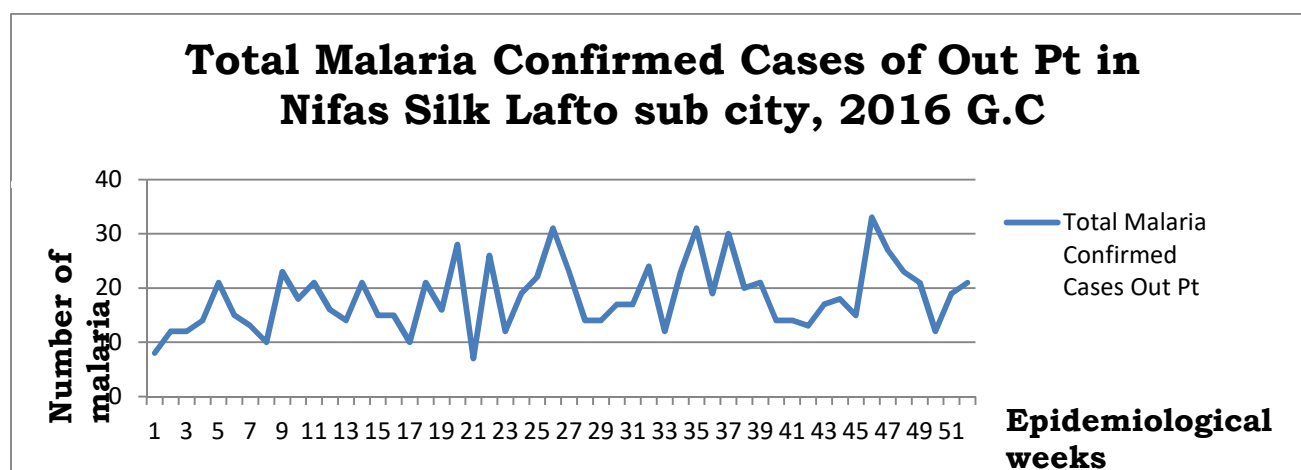


Figure 19: Trends of malaria cases reported in Nifas Silk Lafto sub city, Addis Ababa, 2016

**Meningitis:** From all reporting sites around 6meningitis cases were reported to Nifas Silk Lafto sub city PHEM case team in 2016 and among these cases, 2 were inpatient cases.

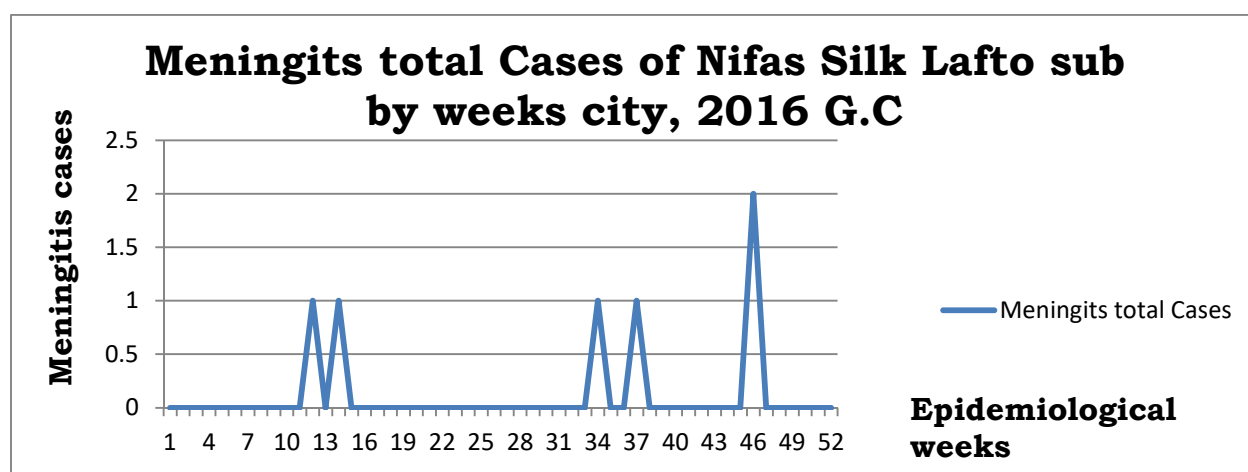


Figure 20: Trends of meningitis cases by week in Nifas Silk Lafto sub city, Addis Ababa, 2016 G.C.

### 3.4.2. Data reporting

Federal Ministry of Health and its stakeholders are responsible for designing and preparation of PHEM reporting formats. Sub city health office has provided these formats through Addis Ababa Regional Health Bureau. During the last six months, there was no shortage of weekly PHEM reporting formats. Nifas Silk Lafto sub city used both telephone and paper based methods to report weekly surveillance activities to next level. All visited health facilities were also using these methods to report for sub city health office.

#### **3.4.3. Data Analysis**

At the sub city level, malaria and meningitis data were analyzed weekly by time and place. At all visited health facilities (9 governmental and 111 private), analysis was not performed weekly for both malaria and meningitis diseases.

#### **3.4.4. Existence of Action Threshold Levels**

Action threshold level is available at sub city and all visited health facilities (9 governmental and 111 private), on National PHEM Guideline for all selected diseases including malaria and meningitis.

#### **3.4.5. Outbreak investigation**

There was confirmed outbreak of immediately reportable diseases i.e. AWD (cholera) and measles in the past one year (2016 G.C) in the sub city. By definition (according to National PHEM guideline) a single confirmed case of V.Cholera is consider as outbreak of cholera (AWD) and 3 IgM positive measles per month per district/facility also considered as outbreak of measles case. Based on this definition there were 1,375 AWD cases and 14 measles cases in the year 2016 for both of outbreaks appropriate investigation and response had done. But there were no outbreaks of malaria and meningitis in the year 2016 G.C.

#### **3.4.6. Epidemic Preparedness and Response**

There is written epidemic preparedness and response plan at the sub city level and no emergency drugs plan at the sub city and health center in the past one year. There was no written epidemic preparedness and response plan at all visited health facilities (0/9 governmental and 0/111 private).

Regarding existence and activities of rapid response team(RRT), there is established at sub city and allgovernment health centers and the team was conducting regularly meetings but 0/111 privatehealth facilities have RRT there was no also epidemic management committee at sub city and visited health facilities.

#### **3.4.7. Resources and availability of budget for Surveillance Activities**

There was no separated budget source allocated for public health emergency activities at sub city and all health facilities (9 government health centers and 111 private health facilities) of the sub city. Even though, all visited health centers had computers and its accessories, they did not have

for PHEM activities separately rather they use it for all activities. Stationery was not problem in the sub city and all health facilities.

**Table 13:** Availability of resources for PHEM activities in sub city and health centers, 2017 G.C

| S.N | Resource    | Sub city                 | Health centers           | Remarks |
|-----|-------------|--------------------------|--------------------------|---------|
| 1   | Electronics | Available                | Available                |         |
| 2   | Computer    | 1 for 2 officers         | Not separately available |         |
| 3   | Printer     | Not separately available | Not separately available |         |
| 4   | Stationery  | Available                | Available                |         |
| 5   | Vehicle     | Not available            | Not available            |         |
| 6   | Motor Cycle | Not available            | Not available            |         |
| 7   | Fax         | Not available            | Not available            |         |
| 8   | Telephone   | Not separately available | Not separately available |         |

Majority of resources are not available separately to the PHEM cases team both at the sub city and health facility level which may affect performance of surveillance activities with its quality.

### **3.4.8. Supportive Supervision**

In the past six months, Nifas Silk Lafto sub city health office PHEM case team had conducted 120 repeated supportive supervision visits for its respective governmental health centers and private health facilities. Even though there was shortage of vehicle, and budget the sub city PHEM officers had conducted regular supportive supervision.

### **3.4.9. Training of Surveillance Activities**

Provision of training on disease surveillance, outbreak investigation, Surveillance data analysis and response is the back bone for early detection and control of any health events. Two sub city PHEM officers were trained on basics of public health emergency management by regional health bureau and urban health extension professionals, Woreda PHEM officers, health center MDSR focal, health center health promotion and disease prevention core process owners and health center PHEM focal had given training on community based surveillance, introduction to basic surveillance, introduction to PHEM and selected immediately reportable diseases (cholera, rabies, AFP, NNT, measles, etc.) by sub city PHEM officers.

### **3.4.10. Attributes of the Surveillance System**

#### **3.4.10.1. Usefulness**

At sub city level and all visited health centers, it was obtained that the current surveillance system is helpful for early detection of outbreaks. Government and non-government organizations have used surveillance data to make decisions and take actions. There was surveillance guidelines distributed uniformly in all health facilities but there was poor utilization of guidelines at this all level. Respondents at sub city and all visited health centers believe that the system is good enough to estimate magnitude of morbidity and mortality of selected diseases, identify factors associated with these diseases and able to evaluate of prevention and control programs. However, late or no feedback from regional and EPHI laboratory on sent specimen for confirmatory test has being a challenge in early detection and management of outbreaks.

#### **3.4.10.2. Simplicity**

Respondents at Nifas Silk Lafto sub city, and health centers agreed that case definitions of selected diseases (malaria and meningitis) are easy and applicable for case detection by all level professionals. Respondents at each level were familiar with when and for whom report will be sent. PHEM officers at sub city and health center thought that additional data collection on cases are not time consuming rather it is important to deal with. Respondents at sub city and health center 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 centers agreed that it takes about 10-15 minutes to disseminate weekly reports through phone.

#### **3.4.10.3. Flexibility**

As the current reporting format contains additional spaces at the end for both weekly and immediately reportable diseases 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 2016 to include newly emerged diseases such as MDSR (maternal death surveillance and response). Respondents from sub city and health center agreed that implementation of National PHEM guideline may not pause difficulty with changes in existing procedure of case detection, case definition and report forms. However, respondents sub city and health center believe that changes in allocating funds will affect implementation of surveillance system.

#### **3.4.10.4. 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 regional and sub city level for PHEM officers on data quality management, some problems like regular feedback provision to the corresponding health facilities occurred regarding reporting system that resulted from lack of attention. Major problems identified at different levels on filling reporting format are: Date of sent and received, reporter and receiver information did not written on reporting formats; Blank spaces that should be filled with zero (0) number come with empty space.

#### **3.4.10.5. Acceptability**

Active participation of agents in reporting system of surveillance activities in regular pattern is a major attribute for system's acceptability. Different stakeholders like WHO, CDC and others are participating to strengthen surveillance system in collaboration with Regional health bureau and sub city health offices. Even though some private health facilities (19/111) did not send reports timely their average completeness and timeliness of reports was above the standard level and all health professionals at all level have willingness to report weekly and monthly surveillance reports.

#### **3.4.10.6. Representativeness**

Representativeness refers to the degree to which the reported cases reflect the occurrence and distribution of all the cases in the population under surveillance. Geographical representativeness and health service physical accessibility in the sub city has great importance in early warning system to ensure detection of outbreaks. According to the Addis Ababa city administration plan for health service, the coverage of health service by health facility availability is 90% that can make the surveillance of the sub city is representative even though nearly all data were from public health facilities.

#### **3.4.10.7. Timeliness and Completeness**

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 for health centers since date of sent and received were not filled properly. Average timeliness

and completeness of report of the year 2016 in Nifas Silk Lafto sub city was 88% from private health facilities and 100% from government health centers which is above the standard level (80%). Report completeness by week shows that 18% the least from private health facilities in week 32 and 100% highest in week 13. Completeness of government health centers was 100% throughout the year in the sub city. Timeliness of the report in the year 2016 was also similar to completeness both from government health centers and private health facilities.

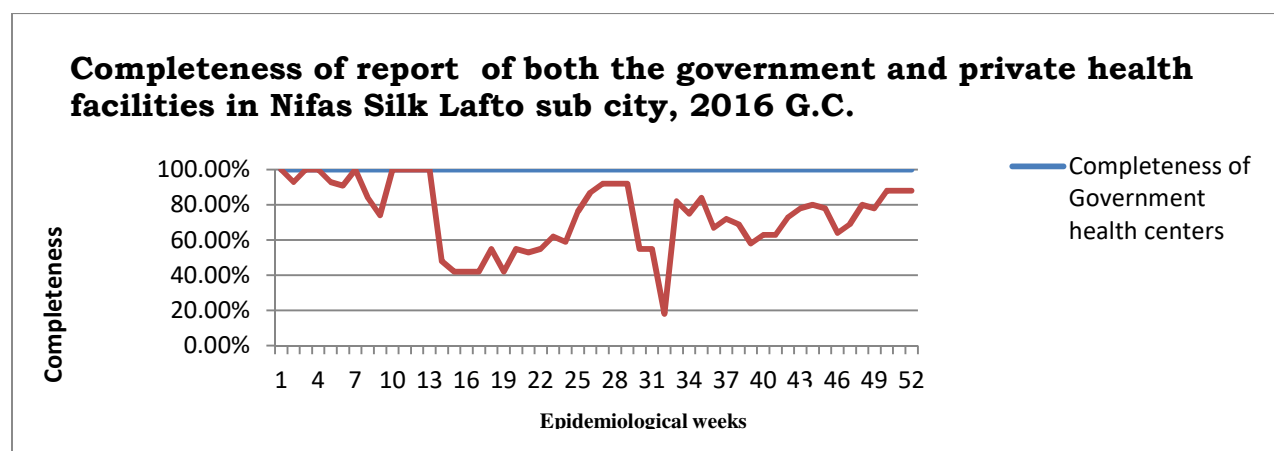


**Figure 21: Completeness and timeliness of report of government health centers and private health facilities in Nifas Silk Lafto sub city, 2016 G.C.**

#### 3.4.10.8. Stability

Stability is reliability and availability of the public health surveillance system without interruption. Even though there is no separated budget line for PHEM activities at sub city and all visited health centers, availability of PHEM officers at sub city and PHEM focal at health center is a good opportunity for running surveillance system with limited resources. Shortage of budget and logistics is hindering surveillance activities at sub city and health center.

#### 3.4.10.9. Positive predictive value

The ability of the case definitions to detect true positive cases was assessed. Because of the incompleteness of surveillance data, only malaria report was seen and attempted to measure the positive predictive value. In Nifas Silk Lafto sub city a total of 1867 cases were identified as suspected malaria by using case definition. Out of these 952 of them were positive for malaria parasite by microscopy and the positive predictive value was 50.99%, these all were the right (confirmed) cases of malaria.

### **3.5.Discussion**

The surveillance system evaluation is aimed at assessing the core activities such as case detection, registration, confirmation, reporting, analysis and response of the surveillance system in Nifas Silk Lafto sub city. The main aim of performing public health Surveillance is to assess the health status of the community, establish public health priorities and reduce the burden of disease in a community by making necessary public health actions. Preparedness refers to the existence of readiness for potential epidemics and availability of plans, stockpiling, preparation of isolation facilities and setting separate resources for outbreak response. Based on this definition, there was no written separated preparedness and response plan at sub city and all visited health centers which 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 assessment 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 (16).

Even though feedback is a key function of public health surveillance system, there was no strong written feedback at sub city and all visited health facilities which may cause loose system network with their respective health facilities and Woreda health office and it may also affect early case detection and correction of problems at their happening. There is recently started practice of weekly bulletin writing at sub city level that can be used as feedback partially. Absence of separated budget line either from government or non-governmental organizations for PHEM activities at sub city and health facility level remained as major problem to run tasks under PHEM. Additionally a shortage of resources like computer, internet service, printer, etc. is being a challenge for data management and to disseminate PHEM reports timely through maintaining their quality. All visited health facilities have a capacity to detect malaria by microscopic examination and meningitis by using standard case definition. There was no problem on the simplicity of the system regarding case definitions, reporting system and additional data collection on cases of selected diseases (malaria and meningitis) at all visited

facilities. 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 data collectors at sub city level however, some gaps were observed on quality of reporting system at health facility levels. Timeliness and completeness of report is important for timely public health interventions with the average 100% from government health centers and 88% from private health facilities in the year 2016 G.C. Since PHEM system in Woredas of Addis Ababa has been established recently (or it is started in 2017 G.C), no organized document to evaluate the system and therefore, no need of interview the newly hired officers in Woredas.

### **3.6.Conclusion**

The overall activities of public health surveillance system in Nifas Silk Lafto sub city were satisfactory to achieve its targeted goals of prevention and control of malaria and meningitis. Case definition was available for malaria and meningitis. There was no shortage of formats. The sub city's weekly surveillance reporting completeness rate was greater than the WHO target. The participation of private health facilities in surveillance activities was good and the reporting completeness rate was also as expected. On the other hand, in all assessed health facilities there were assigned responsible PHEM officers for report compilation and data analysis but routine surveillance data analysis was not exercised.

Periodic assessment of public health surveillance system is a key activity to identify strengths and weakness of the existing system. This will be more effective if it was done in collaboration with key stakeholders. In Nifas Silk Lafto sub city the existing surveillance (PHEM) system was satisfactory but efforts should be exerted to improve the newly established Woreda PHEM system. Finally, the surveillance system for selected diseases (malaria and meningitis) is useful to detect outbreaks, estimate magnitude of the morbidity and mortality of the disease in the area. The surveillance system is simple and flexible and well accepted by all assessed sites.

### **3.7.Limitations**

- Poor documentation of the reporting sites was also one of the challenges to obtain the expected information (data) timely. To overcome this problem, data from the sub city and regional health bureau were used.
- Some specialty private clinics were not included in the evaluation process. These health facilities are priority sites of surveillance by the sub city PHEM case team.

### **3.8.Recommendations**

- Nifas Silk Lafto sub city health office has to set separated budget line and computer per officer for PHEM case team.
- Data analysis for prioritized diseases at sub city and especially at health facility level should be performed regularly.
- Utilization of National PHEM guideline and different manuals for management of prioritized diseases should be optimized at all levels; mainly at health facilities.
- Laboratory result feedback from Addis Ababa Region and Ethiopian Public Health Institute should be delivered timely to Nifas Silk Lafto health office.

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**Annex**

**Questionnaire for surveillance system evaluation –Nifas Silk Lafto Sub city, Addis Ababa, Ethiopia 2017**

**Identifiers**

Date \_\_\_/\_\_\_/\_\_\_ Region \_\_\_\_\_ Respondent Name \_\_\_\_\_ Zone \_\_\_\_\_  
Interviewer \_\_\_\_\_

**General**

**I. Availability of a National Surveillance Manual;**

1. Is there a national manual for surveillance? a. Yes b. No c. Unknown

If yes, describe (last update, diseases included, case definitions, surveillance and control, integrated or different for each disease):  
\_\_\_\_\_  
\_\_\_\_\_

**II. Case Detection and Registration;**

2. Do you have standard case definitions for Malaria and meningitis?

a. Yes b. No c. Unknown d. Not applicable

If yes, observe the standard case definition \_\_\_\_\_

**III. Data reporting:**

3. Who is responsible for providing you reporting formats of surveillance?

a. Federal Ministry of Health PHEM unit b. NGOs c. Others \_\_\_\_\_

4. Have you encountered shortage of appropriate surveillance forms at any time during the last 6 months? a. Yes b. No c. Unknown

5. What are the reporting entities for the surveillance system?

a. Government health facilities

b. NGO health facilities

c. Military health facilities

d. Private health facilities

e. Others \_\_\_\_\_

6. Number of districts reported weekly and immediately report in the last 3 months compared to expected number? \_\_\_\_\_

7. Number of Health post, Health centers, Hospitals, NGO health facility, others (private) sent weekly report in the last three months? \_\_\_\_\_

**Weekly:** \_\_\_\_\_

**Immediately:** \_\_\_\_\_

8. Number of districts has sent weekly reports on time in the last 3 months:

\_\_\_\_\_

9. Was there any report of the immediately reportable diseases in the past 1 month? a. Yes  
b. No

If yes, with in what time is the report received after detection of the case/diseases?

- a. Less than 1 hour b. 2-24 hour c. 1- 2 days 3- 7 days d. After 1 week e.

Other \_\_\_\_\_

10. How do you report to the next level?

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

#### **IV. Data analysis**

11. Do you describe data by person (case based, outbreaks, and sentinel)?

- a. yes b. no c. don't know

If yes, observe analyzed data by person: \_\_\_\_\_

12. Do you describe data by place? a. yes b. no c. don't know

If yes, Observe description of data by district (tables, maps)

\_\_\_\_\_

13. Do you describe data by time? a. yes b. no c. don't know

If yes, observe description of data by time:

\_\_\_\_\_

14. Do you perform trend analysis? a. yes b. no c. don't know

If yes, observe line graph of cases by time

\_\_\_\_\_

List disease(s) for which line graph is observed

\_\_\_\_\_

\_\_\_\_\_

#### **V. Availability of defined threshold;**

15. Do you have defined threshold level for Malaria and meningitis? a. yes b. no c. don't know

If yes, observe \_\_\_\_\_

16. Who is responsible for the analysis of the collected data? \_\_\_\_\_

17. How often do you analyze the collected data?

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

18. Have you an appropriate denominator? a. Yes b. No c. don't know

If yes, observe presence of demographic data (E.g. population by district and hard to reach groups) \_\_\_\_\_

#### VI. Outbreak Investigation

19. Number of outbreaks suspected in the past 1 year: \_\_\_\_\_

20. List the diseases: \_\_\_\_\_

21. Of those suspected/detected, how many of them were investigated? \_\_\_\_\_

(Observe reports and take copies if possible) \_\_\_\_\_

22. Number and percentage of outbreaks in which risk factors were identified for: \_\_\_\_\_

23. Number and percentage of outbreaks in which findings were used for action: \_\_\_\_\_

24. Number of districts that looked for risk factors [observe in reports]

25. Number of districts/Woredas that used the data for action [observe in final report]

#### VII. Epidemic preparedness(relevant for epidemic prone diseases)

26. Is there sub city plan for epidemic preparedness and response?

a. Yes B. No c. Unknown

If yes, observe a written plan of epidemic preparedness and response

27. Did the sub city have emergency stocks of drugs, vaccines, and supplies at all times in past 1 year? a. Yes b. No c. Unknown

28. Has the sub city experienced shortage of drugs, vaccines or supplies during the most recent epidemic (or outbreak)?

a. Yes                      b. No                      c. Unknown

29. Are there standard case management protocols for malaria and meningitis? a. Yes

b. No                      c. Unknown

If yes, list the exists protocols, \_\_\_\_\_

Observe the existence of a written case management protocol for at least 1 priority disease

\_\_\_\_\_

**VIII. Presence of a budget line for epidemic response;**

30. Is there a budget line for epidemic response?

a. Yes                      b. No                      c. Unknown

If yes, describe total budget allocated and utilized in the past last year \_\_\_\_\_

**IX. Existence of the sub city epidemic management committee;**

31. Is there established sub city epidemic management committee?

a. Yes                      b. No                      c. Unknown

If yes, observe minutes (or report) of meetings of epidemic management committee

\_\_\_\_\_

32. Has epidemic management committee evaluated its preparedness and response activities during the past year? a. yes      b. no      c. don't know

If yes, observe written report to confirm \_\_\_\_\_

\_\_\_\_\_

**X. The sub city rapid response team for epidemics;**

33. Does the sub city have a rapid response team for epidemic?

a. Yes                      b. No                      c. Unknown

34. Is there any notification of recently reported outbreak to which you had response within 48 hrs? a. Yes                      b. No                      c. Unknown

If yes, observe that the zone responded within 48 hours of notification of most recently reported outbreak (from written reports with trend and intervention)

a. Yes                      b. No                      c. Unknown

**XI. Feedback;**

35. How many feedback bulletin or reports has the sub city produced in the last year?

\_\_\_\_\_

Observe the presence of a report or bulletin that is regularly produced to disseminate surveillance data \_\_\_\_\_

\_\_\_\_\_

**XII. Supervision;**

36. How many supervisory visits have you made in the last 6 months compared to expect?

\_\_\_\_\_ (%)

37. If no supervision was done in the past 6 months, please mention the reasons.

\_\_\_\_\_

**XIII. Training on surveillance activities;**

38. What percent of your subordinate personnel have been trained on surveillance?

\_\_\_\_\_

39. On what topics have you gave training in the last 6 months?

\_\_\_\_\_

\_\_\_\_\_

40. What are your stakeholders those supporting you in giving training?

\_\_\_\_\_

41. Major challenges during and after training activities

\_\_\_\_\_

\_\_\_\_\_

42. Strengths during and after training

\_\_\_\_\_

\_\_\_\_\_

**XIV. Resources**

**Do you have?**

**43. Data management equipment**

Computer \_\_\_\_\_

Printer \_\_\_\_\_

Photocopier \_\_\_\_\_

Data manager \_\_\_\_\_

Statistical package \_\_\_\_\_

Stationary \_\_\_\_\_

**44. Communications:**

Telephone service \_\_\_\_\_

Fax \_\_\_\_\_

Radio call \_\_\_\_\_

Mobile phone \_\_\_\_\_

Computers that have modems \_\_\_\_\_

**45. Budget line (from donors) \_\_\_\_\_**

**XV. Surveillance Networking**

46. Do you have functional computerized surveillance network at this level?

a. Yes      b. No      c. Unknown

**XVI. Budget for surveillance**

47. Is there a budget allocated for surveillance activities from the Regional Health Bureau(governmental source)? a. Yes      b. No      c. Unknown

If yes, what is the proportion of this budget from total allocated budget for other activities?

\_\_\_\_\_ ( %)

48. How could surveillance be improved?

\_\_\_\_\_  
\_\_\_\_\_

**XVII. Surveillance Co-ordination**

49. Are personnel adequate for sub city PHEM structure?

a. Yes      b. No      c. Unknown

If No, why? \_\_\_\_\_

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

\_\_\_\_\_  
\_\_\_\_\_

**Questionnaire for Attributes and level of Usefulness:**

- a. Total population under surveillance \_\_\_\_\_
- b. In 2016/17, what is the incidence / Prevalence of:
  - Malaria incidence \_\_\_\_\_ prevalence \_\_\_\_\_ Deaths \_\_\_\_\_
  - Meningitis incidence \_\_\_\_\_ prevalence \_\_\_\_\_ Deaths \_\_\_\_\_

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

Does the surveillance system helpful?

- a. To detect outbreaks of these selected priority diseases early? Yes/ No
- b. To estimate the magnitude of morbidity and mortality of these diseases, including identification of factors associated with these diseases? Yes/ No
- c. Permit assessment of the effect of prevention and control programs? Yes/ No

**Observe (confirmation):**

- interventions and diseases trends analyzed \_\_\_\_\_

**II. Description of Each System Attributes:**

**i. Simplicity:**

1. Is the case definition of Malaria and meningitis easy for case detection by all level health professionals? a. Yes b. No c. Unknown
2. What are the organizations which need to receive reports of the surveillance data?  
\_\_\_\_\_  
\_\_\_\_\_
3. Do you feel that additional data collected on cases are time consuming?  
a. Yes b. No c. Don't know
4. How long it takes to fill the reporting format?  
a. <5 minutes b. 10-15 minutes c. >15 minutes

Overall comments of on the above points \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**ii. Flexibility:**

1. Can the current reporting formats be used for other newly occurring health event (disease) without much difficulty? a. Yes b. No c. Don't know
2. Do you think that any change in the existing procedure of case detection, case definition, allocating funds, report forms, and formats will make difficult to implement? a. Yes b. No c. Don't know

Overall comments on the above points

: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

1. Are the data collection formats for these priority diseases clear and easy to fill for all the data collectors/ reporting sites? a. Yes b. No
2. Have you ever given training for data collectors on data quality management?  
a. yes b. no. c. don't know
3. Are the reporting site and data collectors supervised regularly? a. Yes b. No
4. **Observe:** Review the last month report of selected diseases

A. Average number of unknown or blank responses to variables in each of the reported forms

\_\_\_\_\_  
\_\_\_\_\_

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

\_\_\_\_\_  
\_\_\_\_\_

**iv. Acceptability:**

1. Do you think all the reporting agents accept and well engaged to the surveillance activities? a. Yes b. No

If yes, how many are active participants (of the expected)?\_\_\_\_\_

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. Cost of data reporting
  - F. Other:
- 
- 

2. Are all stakeholders fully participating in surveillance system strengthening?

- a. yes                      b. no                      c. don't know

If no, what are the reasons make them discomfort? \_\_\_\_\_

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**v. Representativeness:**

- 1. What is the health service coverage of the sub city? \_\_\_\_\_%
- 2. Do you think that the populations under surveillance have good health seeking behavior for these diseases? Yes / No
- 3. Whom do you think is well represented by the surveillance data?                      a. the urban  
b. the rural                      c. equal

**vi. Timeliness:**

- 1. Do you think that the existing surveillance system is timely detecting the outbreak? a. yes    b. no    c. don't know

Comment \_\_\_\_\_

---

- 2. During the most recent outbreak of malaria and meningitis within how many days these outbreaks were reported to the region after the first case/index case/

---

- 3. Was enough information available to control selected diseases during outbreak? a. yes    b. no    c. don't know

Comment \_\_\_\_\_

4. How long does it take to have laboratory confirmation of Malaria and meningitis? \_\_\_\_\_

**vii. Stability:**

1. Was there lack of resources that interrupt the surveillance system? Yes/No

**Chapter IV: Health profile of Woreda 12 Administration, Nifas Silk Lafto Sub City, Addis  
Ababa. Ethiopia**

## Executive Summary

**Background:** A health profile is a public health report that brings together key pieces of information on health and its determinants in the community and interprets and analyses the information. The main function of the profile is to stimulate action that will improve health [1]. A health profile is a collection of statistics that provide an overview of the health of a population which is important to identify and prioritize major problems at any level of health system to make decision for action and to prepare plan that have the ability to reach most in need with limited resources.

**Objective:** to describe the health profile of the Woreda 12 administration, Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia, 2016 G.C.

**Methods:** The study area was Woreda 12 which is one of the twelve administrative Woredas of Nifas Silk Lafto Sub City administration since 2011 G.C. and the study period was from May 04/2016 to June 17/2016 G.C. The secondary data was collected through document review by the principal investigator. Information from completed questionnaire was organized or a descriptive analysis was conducted by using frequency distribution table. A descriptive cross-sectional study was conducted to describe the health profile of Woreda 12 Administration, Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia.

**Result:** The overall Nifas Silk Lafto Woreda 12 administration's average immunization coverage is greater than 100%. In 2015 G.C the immunization coverage for measles was >100 %, DPT3 >100 %, BCG 99%, PCV3 >100%, and fully immunization was >100%.

**Conclusion:** According to the Addis Ababa city administration HSTP health institution target i.e. one health center to 40,000 people, Woreda 12 administration's status is 1:28,838 peoples; which is a very good achievement. The leading cause of outpatient visit and admission on the consecutive three years (2013 to 2015) in Woreda 12 administration was acute upper respiratory tract infection (AURTI) and acute febrile illness (AFI).

**Recommendations:** There should be documentation system on housing condition of the settlers in the Woreda. (Documents like homelessness, informal settlement, etc).Further profiling has to be done about the Woreda 12 administration.

## **4.1.Introduction**

### **4.1.1. Background information**

A health profile is a public health report that brings together key pieces of information on health and its determinants in the community and interprets and analyses the information. The main function of the profile is to stimulate action that will improve health [1]. A health profile is a collection of statistics that provide an overview of the health of a population which is important to identify and prioritize major problems at any level of health system to make decision for action and to prepare plan that have the ability to reach most in need with limited resources. Health Profiles are about the health of people and about the conditions in which they live. It is essential tool for change and thus must be an integral part of local decision-making and strategic planning processes.

Health profile description include scanning of health system, problem identification, prioritization of identified problems by using prioritization criteria; public health importance, magnitude of the problem, severity or seriousness of the problem, community and political concern and feasibility of the interventions. Health profile can then form the basis of a health plan that sets out strategies and programs of intervention to improve the health of population [1]. Data generated from health profile has very crucial role in priority setting, resource allocation, identifying gap of health event and future planning.

In the previous time in Woreda health office health profile description was not prepared according to definite standard and the health status of the Woreda was not documented and known well in compiled and organized way. In other word the planning and intervention program was not based on priority problem of the community. The preparation of profiles provides a lively, scientifically based account of health in the district; it can stimulate public interest and political commitment; and it can identify targets for the future and monitor progress towards them. Therefore, this study will be conducted to prepare health profile of Woreda 12 administration and to identify the major health problems of the Woreda.

#### **4.1.2. Significance of the study**

Describing health profile of Woreda 12 administration is helpful to address the current gap of community health, for stakeholder's priority setting, and it is important to understand the demographic, socio-economic status, morbidity, mortality and other data of the administration. Health profile generates data which can be used at community level. The finding from the health profile description project will help the administration and other stakeholders for public health decision making (2).

Health profile is designed to give an easily accessible snapshot picture of the community's health and describing health profile is helpful to understand the current health of population and of the many aspects of the community's life that influence it. Health profile description is important to identify and prioritize major problems at any level of health system to make decision for action and to prepare plan. Health profile description include scanning of health system, problem identification, prioritization of identified problems by using prioritization criteria; public health importance, magnitude of the problem, severity of the problem, community and political concern and feasibility of the interventions.

The health profile description highlights several important aspects of public health data. Data will be collected, analyzed and disseminated for decisions on the best information available. Demographic, Infrastructure of the district, socio-economic, vital statistics and other data will be collected and that will help us to address important public health problems and to facilitate effective public health action. District health data are important for advocacy, program planning, implementation and evaluation of health care including, most importantly, the district level (2).

The appropriate attention to the prevention of disease and injury, along with the provision of high quality health care are crucial for accessible and affordable health care service. Therefore, this health profile description will help to increase understanding of the current health care service quality. The health status description or profiling will provide a better understanding about population health characteristics and will contribute to Public Health planning and decision making.

## **4.2. Objective**

### **4.2.1. General Objective**

- ❖ To describe the health profile of the Woreda 12 administration, Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia, 2016 G.C.

### **4.2.2. Specific objective**

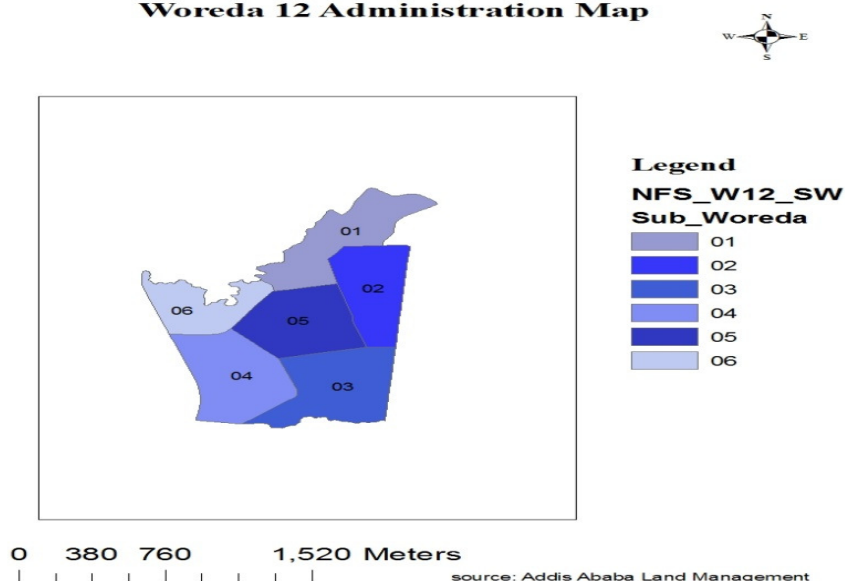
- ❖ To assess health status and indicators of health in Woreda 12 administration, Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia.
- ❖ To identify priority health problems of Woreda 12 administration, Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia.
- ❖ To produce a health profile of Woreda 12 administration, Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia with recommendations.

## 4.3. Methods

### 4.3.1. Study Area

Woreda 12 is one of the twelve administrative Woredas of Nifas Silk Lafto Sub City administration since 2011 G.C. It has 6 ketenas (gots) which are small divisions of the administration without their own administration with the total population of 28,838. It is bounded or boundaries of the area are: North-with Wereda 6, North East- with Wereda10, East – with wereda 10,South – wereda 11 and West – with Wereda 01.The administration of wereda 12 covers 421.222917 square meters. The woreda has one functional governmental health center, 10 private health facilities, and one holy water site. Among 10 private health facilities, 2 specialty clinics,6 medium clinics, and 2 are lower clinics. Woreda administration area has no NGO health institutions, and has no any governmental and private hospital.

**Woreda 12 Administration Map**



### 4.3.2. Study Period

The Woreda 12 health profile was conducted from May 04/2016 to June 17/2016 G.C.

### 4.3.3. Study design

A descriptive cross-sectional study was conducted to describe the health profile of the Woreda 12 administration, Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia.

#### **4.3.4. Study subject**

All available secondary data (documents) that have relevant information for health profile were used.

#### **4.3.5. Method of data collection**

The secondary data was collected through document review. The principal investigator collected additional information through interviewing the responsible authority and key informants using unstructured questionnaires and observation was used as required.

#### **4.3.6. Management of data**

The principal investigator checked the collected data for completeness, accuracy, clarity and consistency throughout the data collection period in order to maintain the quality of the data. The questionnaire was developed in English Prior to the actual data collection.

#### **4.3.7. Method of Data Analysis**

The data that was collected through document review was edited, coded and cleaned before it enters to a computer. Information from completed questionnaire was organized or analyzed using frequency distribution table, Arc GIS, or MS excel.

#### **4.3.8. Ethical clearance**

Ethical clearance was secured by writing formal letter from Saint Paul Hospital Millennium Medical College, Addis Ababa Regional Health Bureau Public Health Emergency Management Core process and Official permission was obtained from concerned authorities of the Nifas Silk Lafto sub city Health office and Woreda 12 administration. The surveillance officers and other health professionals were informed about the objective and purpose of the health profiling in order to cooperate with me throughout the data collection and analysis.<sup>6</sup>

#### **4.3.9. Dissemination of results**

The results of the community health profile was communicated to Woreda 12 Health Center, Woreda 12 health office, Nifas Silk Lafto Sub City health office, Addis Ababa Regional Health bureau and St. Paul Hospital Millennium Medical College Department of Public Health.

#### **4.4. Result**

Since 2010 G.C launching of urban health extension program in Addis Ababa, about 18 health extension professionals were employed at Woreda 12 and they are providing disease prevention

and health promotion activities i.e. promotion of healthful living and healthy environment; prevention of major infectious diseases; mobilizing and empowering the community in health matter. This makes the health coverage of the Woreda was >100%.

The Health center is mainly providing basic curative health care services but also supports Health Extension Program by acting as referral and technical assistance centers for Health Extension professionals. The minimum health facility structure in urban setting is private lower clinics which are acting as health post. According to this health system, there are 3 private lower clinics, 1 private specialty clinic, 6 private higher clinics, 2 holly water and 1 health center (Table 1 and 3).

The overall Nifas Silk Lafto Woreda 12 administration's average immunization coverage is greater than 100%. In 2015 G.C the immunization coverage for measles was >100 %, DPT3 >100 %, BCG 99%, PCV3 >100%, and fully immunization was >100%(Table 6).

Since measles vaccine was developed in 1958, it has saved the life of millions of children throughout the world. When 9-month old children receive 0.5 ml of potent live attenuated measles vaccine correctly administered subcutaneously, 85% will develop lifelong immunity. Hence, 100% immunization coverage for measles and other vaccine preventable is a very good progress to reduce under-five morbidity and mortality.

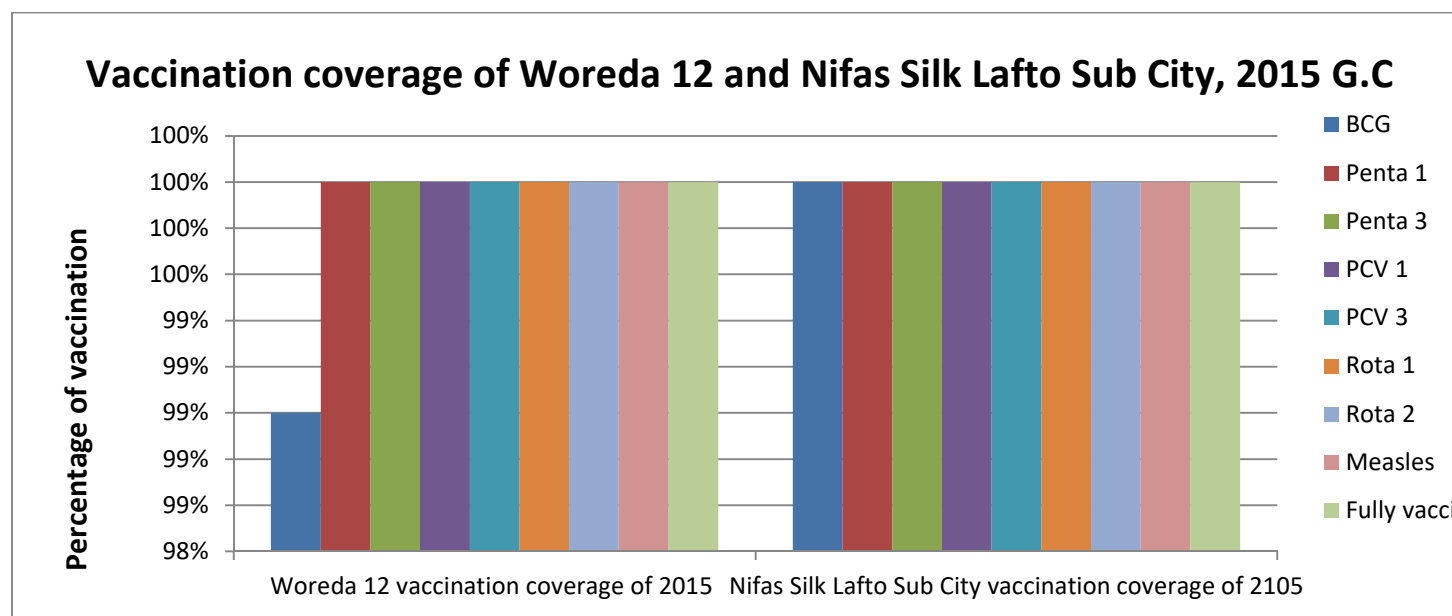


**Figure 1: vaccination coverage of Woreda 12 and Nifas Silk Lafto sub city, 2015 G.C**

In Woreda 12 of Nifas Silk Lafto sub city the expected number of pregnant women in 2015 were 519 G.C. Even though the expected number of pregnant women in the year 2015 was 519, 763 (>100%) received antenatal care service, 565 (74%) women delivered by skilled birth attendants and 326 (42.7%) received postnatal care service (Table 9 and Figure 2 & 3). Among 9,979 of the reproductive age group (15-49) women in Woreda 12 administration used different contraceptive methods: 216 (2.16%) used oral contraceptive methods, 712 (7.13%) use Depo-Provera and 740 (7.42%) use Norplant (table 7)

The goal of antenatal care is to prevent health problems in both infant and mother and to see that each newborn child has a good start. The Woreda 12 administration antenatal care coverage by itself could prevent both the infant and maternal mortality and morbidity before delivery since the coverage is high (94%). It should be followed by deliveries attended by skilled health personnel. All women should have access to skilled care during pregnancy and at delivery to ensure detection and management of complications. The Woreda's proportion of deliveries attended by skilled health personnel is very good (96%) which is sufficient to reduce maternal pregnancy related mortality and morbidity and neonatal death.

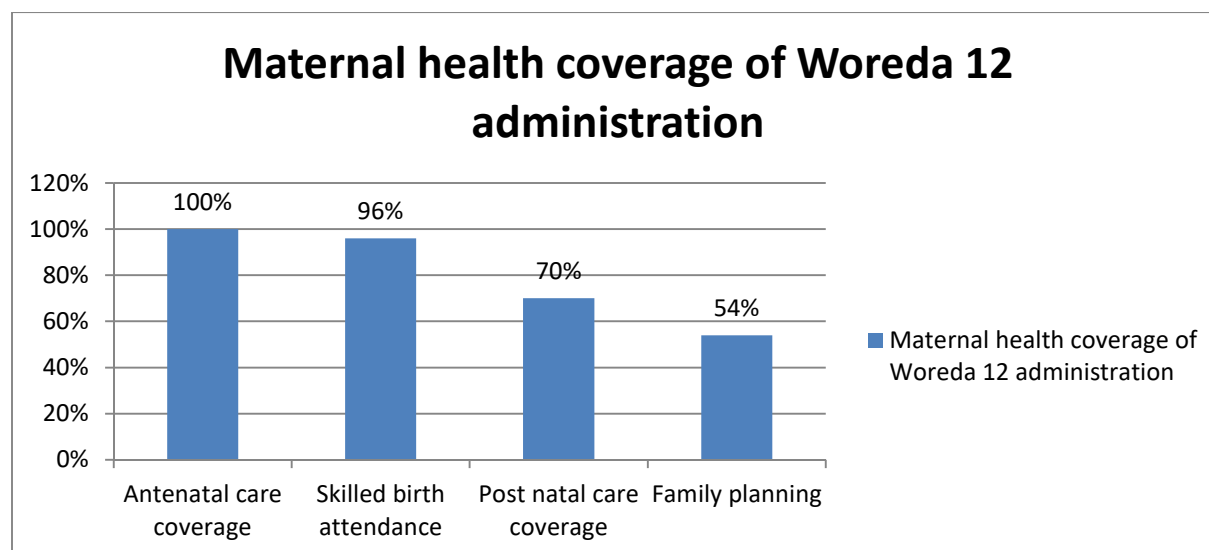


**Figure 2:** Maternal health coverage of Woreda 12 administration of Nifas Silk Lafto sub city, 2015 G.C.

**Source:** Woreda 12 health center 2015 annual report.

**Table 14:** Potential health service coverage in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia may 2016.

| Institution                                 | Total population | Number of health facilities |         |        | Potential health service coverage |          |
|---------------------------------------------|------------------|-----------------------------|---------|--------|-----------------------------------|----------|
|                                             |                  | HC                          | Clinics | Others | HC to population ratio            | Coverage |
| Woreda 12                                   | 28,838           | 1                           | 10      | 0      | 1:28,838                          | >100%    |
| Sub city                                    | 385,769          | 9                           | 120     | 0      | 1:42,863                          | 93.32%   |
| Source: NSL Sub City 2016 Woreda base plan. |                  |                             |         |        |                                   |          |

According to the Addis Ababa city administration health sector plan, the Woreda 12 administration's health service coverage is above the plan (>100%) which means one health center is designed to serve 40, 000 populations.

**Table 15:** Frequency distribution of educational institutions in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia may 2016.

| Institution                                                                                                  | Governmental |                     |           |            |             |                                 |         |            | Private |                     |           |            |             |                                 |         |            | Total |
|--------------------------------------------------------------------------------------------------------------|--------------|---------------------|-----------|------------|-------------|---------------------------------|---------|------------|---------|---------------------|-----------|------------|-------------|---------------------------------|---------|------------|-------|
|                                                                                                              | kg           | Primary (1-4 grade) | 1-8 Grade | 9-10 grade | Preparatory | Technical & vocational training | College | University | kg      | Primary (1-4 grade) | 1-8 Grade | 9-10 grade | Preparatory | Technical & vocational training | College | University |       |
| Woreda 12                                                                                                    | 2            | 1                   | 3         | 1          | 1           | 0                               | 0       | 0          | 16      | 2                   | 7         | 1          | 2           | 0                               | 2       | 0          |       |
| Sub city                                                                                                     | 17           | 1                   | 18        | 5          | 4           | 3                               | 0       | 0          | 190     | 53                  | 36        | 13         | 18          | 28                              | 2       | 1          |       |
| Source: Nifas Silk Lafto sub city finance and economic development annual magazine & NSL educational office. |              |                     |           |            |             |                                 |         |            |         |                     |           |            |             |                                 |         |            |       |

The private educational institutions of the Woreda are greater in number than governmental institutions. Especially Kgs of government are very small in number when compared to the number of children of the community.

**Table 16:** Frequency distribution of health facilities in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia may 2016.

| Institution                                                                                            | Governmental |               |                |                | Private       |           |                |             |                |               | NGO     |                | Holly water | Traditional healers | Total |
|--------------------------------------------------------------------------------------------------------|--------------|---------------|----------------|----------------|---------------|-----------|----------------|-------------|----------------|---------------|---------|----------------|-------------|---------------------|-------|
|                                                                                                        | Hospitals    | Health center | Higher clinics | Medium Clinics | Small clinics | Hospitals | Higher clinics | Specialties | Medium Clinics | Small clinics | Clinics | Health Centers |             |                     |       |
| Woreda 12                                                                                              | 0            | 1             | 0              | 0              | 0             | 0         | 0              | 1           | 6              | 3             | 0       | 0              | 3           | 0                   | 14    |
| Sub city                                                                                               | 0            | 9             | 0              | 0              | 0             | 0         | 13             | 11          | 59             | 37            | 0       | 0              | 31          | 2                   | 136   |
| Source: NSL sub city food, medicine health care administration and control authority office, 2016 G.C. |              |               |                |                |               |           |                |             |                |               |         |                |             |                     |       |

Majority 6 (50%) of private health facilities are medium clinics; there are no NGO health facilities in the administration; no traditional healers; 3 holy water sites and 12 health facilities in total are there in the administration. public `health importance of holy water should be assed every time.

**Table 17:** Number of health extension professionals in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia may 2016.

| Institution                                               | Health Extension workers |        |                 |                                 |
|-----------------------------------------------------------|--------------------------|--------|-----------------|---------------------------------|
|                                                           | Needed                   | On job | Total Household | Coverage in % (1 HEP to 500 HH) |
| Woreda 12                                                 | 21                       | 18     | 7,034           | 128%                            |
| Sub city                                                  | 192                      | 179    | 94,090          | 95.21%                          |
| Source: NSL sub city health office 2016 Woreda base plan. |                          |        |                 |                                 |

The number of health extension professionals in the Woreda administration is beyond to the population, but still 3 additional health extension professionals are required. These 18 urban health extension professionals primarily educate the community about communicable disease, non-communicable diseases, maternal and child health, accidental injuries and how to manage solid and liquid wastes since the Ethiopian current health policy is disease prevention health promotion.

**Table 18:** Frequency distribution of health professionals in Woreda 12, Nifas silk Lafto sub city, Addis Ababa, Ethiopia may 2016.

| Institution                                                                                                                                        | Professional distribution |            |                |            |         |          |           |                |                  |                |                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------|----------------|------------|---------|----------|-----------|----------------|------------------|----------------|-----------------------------|
| Woreda 12                                                                                                                                          | GP                        | Specialist | Health officer | Pharmacist | Midwife | Druggist | BSC Nurse | Clinical nurse | Lab technologist | Lab technician | Environmental professionals |
| Woreda 12                                                                                                                                          | 6                         | 1          | 14             | 16         | 8       | 13       | 25        | 39             | 4                | 30             | 5                           |
| Sub city                                                                                                                                           | 34                        | 14         | 129            | 131        | 71      | 156      | 252       | 232            | 83               | 99             | 65                          |
| Source: Nifas Silk Lafto sub city finance and economic development office 2015 annual magazine, and NSL health office Human resource core process. |                           |            |                |            |         |          |           |                |                  |                |                             |

When we see the distribution of health professionals, the leading number is clinical nurses, followed by lab technicians with the scarce of specialists. Not only specialists, but also there are no GPs in governmental health center.

**Table 19:** Immunization coverage by type, in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia may 2016.

| Institution                                               | Year     | Total<br>Population | children<br><1yr | surviving<br>infants | BCG<br>% | Penta1<br>% | Penta3<br>% | PCV1<br>% | PCV3<br>% | Rota1<br>% | Rota2<br>% | Measles<br>% | Full<br>Vaccinated % |
|-----------------------------------------------------------|----------|---------------------|------------------|----------------------|----------|-------------|-------------|-----------|-----------|------------|------------|--------------|----------------------|
| Woreda 12                                                 | 2015 G.C | 28,838              | 785              | 646                  | 99%      | >100%       | >100%       | >100%     | >100      | >100       | >100       | >100         | >100                 |
| Sub city                                                  | 2015 G.C | 385,769             | 10,493           | 8,641                | 100      | 100%        | 100%        | 100%      | 100%      | 100%       | 100%       | 100%         | 100%                 |
| Source: NSL sub city health office 2014/2015 HMIS report. |          |                     |                  |                      |          |             |             |           |           |            |            |              |                      |

The overall Nifas Silk Lafto Woreda 12 administration's average immunization coverage is greater than 100% which is highly promising achievement. In 2015 G.C the immunization coverage for measles was >100 %, DPT3 >100 %, BCG 99%, PCV3 >100%, and fully immunization was >100%.

**Table 20:** Frequency distribution of contraceptive utilization in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia may 2016.

| Institution                                               | Year | Pills (COC) | Depo-Provera (%) | Norplant (%) | IUD (%) | Permanent (%) | Contraceptive Acceptance Rate |
|-----------------------------------------------------------|------|-------------|------------------|--------------|---------|---------------|-------------------------------|
| Woreda 12                                                 | 2015 | 216         | 712              | 740          | 192     | 0             | 54%                           |
| Sub city                                                  | 2015 | 7,707       | 11,565           | 3,130        | 1,012   | 0             | 69%                           |
| Source: NSL sub city health office 2014/2015 HMIS report. |      |             |                  |              |         |               |                               |

Among 9,979 of the reproductive age group (15-49) women in Woreda 12 administration used different contraceptive methods: 216 (2.16%) used oral contraceptive methods, 712 (7.13%) use Depo-Provera and 740 (7.42%) use Norplant.

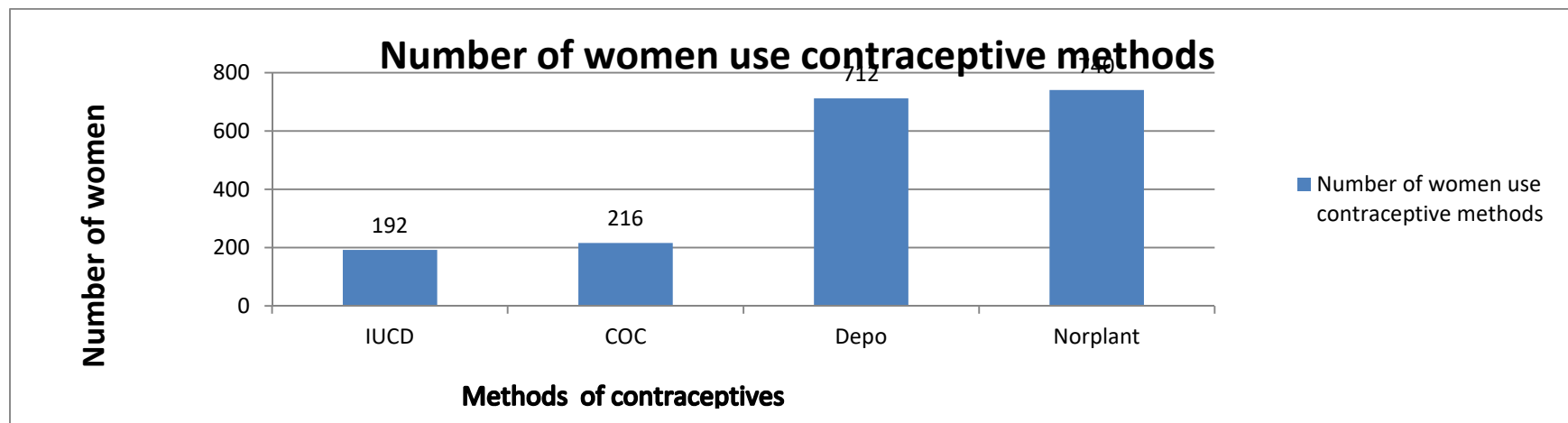


**Figure 3: Contraceptive methods utilization of Woreda 12 administration, Nifas Silk Lafto sub city, Addis Ababa, 2015 G.C.**

As shown on figure 3, among the total of 1860 women used contraceptives, the most used 740 (39.78%) contraceptive method is Norplant, whereas the least used method is IUCD on the other hand permanent method of contraceptive is not utilized.

**Table 21: Percentage of antenatal care, postnatal care and deliveries attended by skilled birth personnel, in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia may 2016.**

| Institution | year | Target<br>Eligible | Antenatal care<br>coverage | Proportion of Deliveries<br>by skilled personnel | Postnatal care<br>coverage | Family planning               |             |
|-------------|------|--------------------|----------------------------|--------------------------------------------------|----------------------------|-------------------------------|-------------|
|             |      |                    |                            |                                                  |                            | Non pregnant women, age 15-45 | Achievement |
| Woreda 12   | 2015 | 9,979              | >100%                      | 96%                                              | 70%                        | 4,163                         | 54%         |
| Sub city    | 2015 | 133,630            | 84.7%                      | 68%                                              | 53.3%                      | 75,125                        | 69%         |

Source: NSL sub city health office and Woreda 12 health center 2014/2015 HMIS report.

Post natal care seeking behavior of the women after delivery is not as high as antenatal care which is not good for better maternal and child health

**Table 22:** Outpatient visit per capita and admission rate per 1000, in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia, May 2016

| Institution | Population | Total Outpatient Visit | OPD Attendance Per Capita | Total inpatient admission | Admission rate per 1000 |
|-------------|------------|------------------------|---------------------------|---------------------------|-------------------------|
| Woreda 12   | 28,838     | 39,403                 | 137 per 100               | 134                       | 4.6                     |
| Sub city    | 385,769    | 319,335                | 83 per 100                | 1,155                     | 3                       |

**Source: NSL sub city health office 2015 G.C HMIS report.**

In a year 2015 G.C the admission rate per 1000 of people (4.6) is not as such big deal in Woreda 12 administration, Nifas Silk Lafto sub city, Addis Ababa.

**Table 23:** Top ten leading cause of morbidity in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia, may 2016.

| Rank | 2013 G.C                                                      |       |         | 2014 G.C                                                      |       |         | 2015 G.C                                              |       |         |
|------|---------------------------------------------------------------|-------|---------|---------------------------------------------------------------|-------|---------|-------------------------------------------------------|-------|---------|
|      | Disease                                                       | Cases | Percent | Disease                                                       | Cases | Percent | Disease                                               | Cases | Percent |
| 1    | AURTI                                                         | 5,213 | 30.90%  | AURTI                                                         | 7,258 | 30.45%  | AURTI                                                 | 7,994 | 31.18%  |
| 2    | Non-bloody diarrhea                                           | 1791  | 10.62%  | Non-bloody diarrhea                                           | 2,841 | 11.92%  | Non-bloody diarrhea                                   | 2841  | 11.08%  |
| 3    | Other or unspecified infectious and parasitic diseases.       | 1655  | 9.81%   | Other or unspecified infectious & parasitic diseases.         | 2338  | 9.81%   | Other or unspecified infectious & parasitic diseases. | 2743  | 10.70%  |
| 4    | UTI                                                           | 1526  | 9.05%   | UTI                                                           | 2301  | 9.65%   | AFI                                                   | 2619  | 10.21%  |
| 5    | AFI                                                           | 1457  | 8.64%   | AFI                                                           | 2130  | 8.94%   | UTI                                                   | 2445  | 9.54%   |
| 6    | Other unspecified diseases of the skin & subcutaneous tissue. | 1160  | 6.88%   | Dyspepsia                                                     | 1735  | 7.28%   | Dyspepsia                                             | 1728  | 6.74%   |
| 7    | Trauma (injury, fracture etc)                                 | 1051  | 6.23%   | Other unspecified diseases of the skin & subcutaneous tissue. | 1406  | 5.90%   | Infections of the skin and subcutaneous tissue        | 1457  | 5.67%   |
| 8    | Dyspepsia                                                     | 1026  | 6.08%   | Diseases of musculoskeletal system & connective tissue        | 1345  | 5.64%   | Diseases of musculoskeletal system                    | 1411  | 5.50%   |

|    |               |      |       |                                               |      |       |                                                                    |      |       |
|----|---------------|------|-------|-----------------------------------------------|------|-------|--------------------------------------------------------------------|------|-------|
|    |               |      |       |                                               |      |       | & connective tissue                                                |      |       |
| 9  | Helminthiasis | 1000 | 5.93% | Other or unspecified<br>obstetric conditions. | 1302 | 5.46% | Trauma (injury, fracture<br>etc)                                   | 1249 | 4.87% |
| 10 | Pneumonia     | 991  | 5.87% | Pneumonia                                     | 1182 | 4.96% | Other unspecified<br>diseases of the skin<br>&subcutaneous tissue. | 1155 | 4.50% |

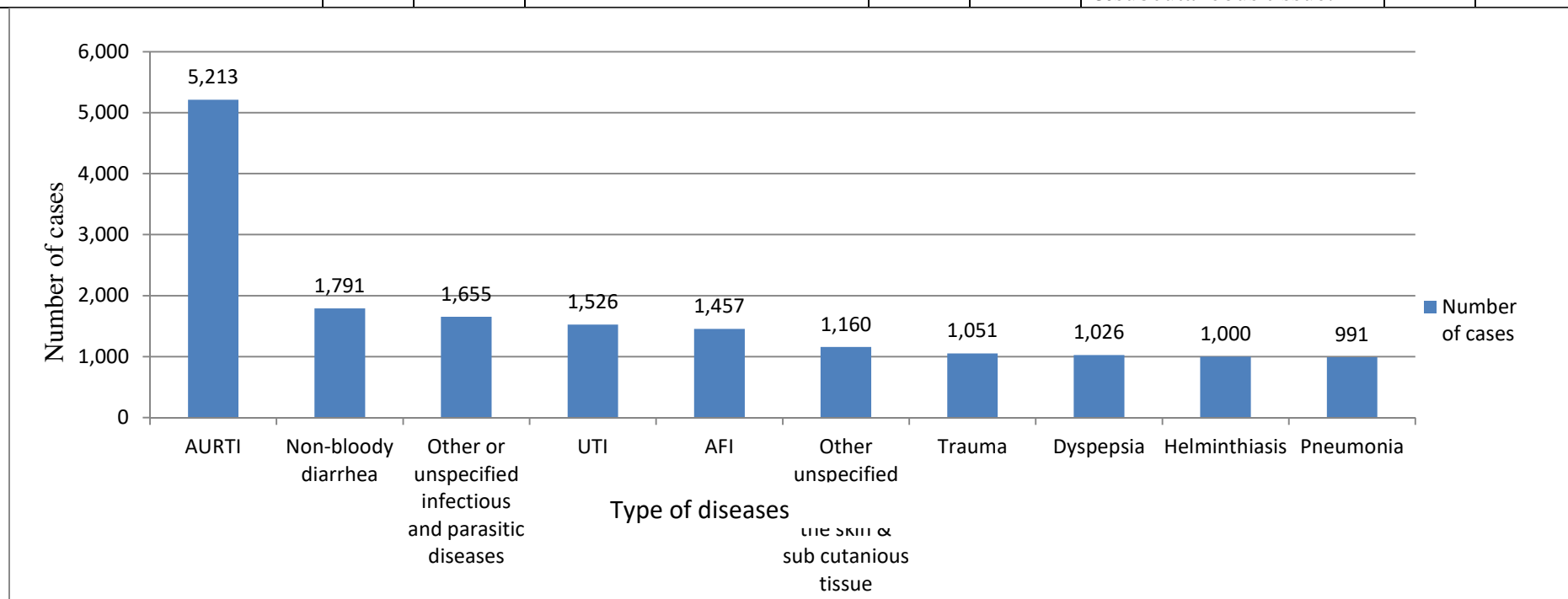


**Figure 4: Ten top diseases causing outpatient visit of Woreda 12 administration, Nifas Silk Lafto sub city, 2015 G.C.**

**Table 24:** Top ten leading causes of admission visit, in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia, may 2016.

**St. Paul's Hospital Millennium Medical College, Department Of  
Public Health, Compiled Body of Work**

2018

| Rank | 2013 G.C                |       |         | 2014 G.C                                          |       |         | 2015 G.C                                         |       |         |
|------|-------------------------|-------|---------|---------------------------------------------------|-------|---------|--------------------------------------------------|-------|---------|
|      | Disease                 | Cases | Percent | Disease                                           | Cases | Percent | Disease                                          | Cases | Percent |
| 1    | AFI                     | 40    | 35.7%   | AFI                                               | 9     | 10.84%  | Other obstetric conditions                       | 32    | 22.86%  |
| 2    | RVI (HIV) opportunistic | 7     | 6.25%   | Dyspepsia                                         | 9     | 10.84%  | None bloody diarrhea                             | 22    | 15.71%  |
| 3    | PUD                     | 6     | 5.36%   | TB                                                | 6     | 7.23%   | Typhoid fever                                    | 20    | 14.28%  |
| 4    | Hyperemesis             | 5     | 4.46%   | Hyperemesis                                       | 5     | 6.02%   | Dyspepsia                                        | 20    | 14.28%  |
| 5    | AGE                     | 3     | 2.67%   | Other lung diseases                               | 5     | 6.02%   | RVI (HIV) opportunistic                          | 16    | 11.43%  |
| 6    | Hypertension            | 3     | 2.67%   | RVI (HIV) opportunistic                           | 5     | 6.02%   | Other unspecified diseases of circulation system | 9     | 6.43%   |
| 7    | Obstetric conditions    | 3     | 2.67%   | Non bloody diarrhea.                              | 4     | 4.82%   | TB of all type                                   | 7     | 5%      |
| 8    | None bloody diarrhea    | 2     | 1.78%   | Typhus                                            | 4     | 4.82%   | Dysentery                                        | 6     | 4.28%   |
| 9    | Typhoid fever           | 2     | 1.78%   | Anemia                                            | 3     | 3.61%   | Epidemic typhus                                  | 4     | 2.86%   |
| 10   | Pneumonia               | 1     | 0.89%   | Other unspecified diseases of circulation system. | 3     | 3.61%   | Other parasitic infections                       | 4     | 2.86%   |

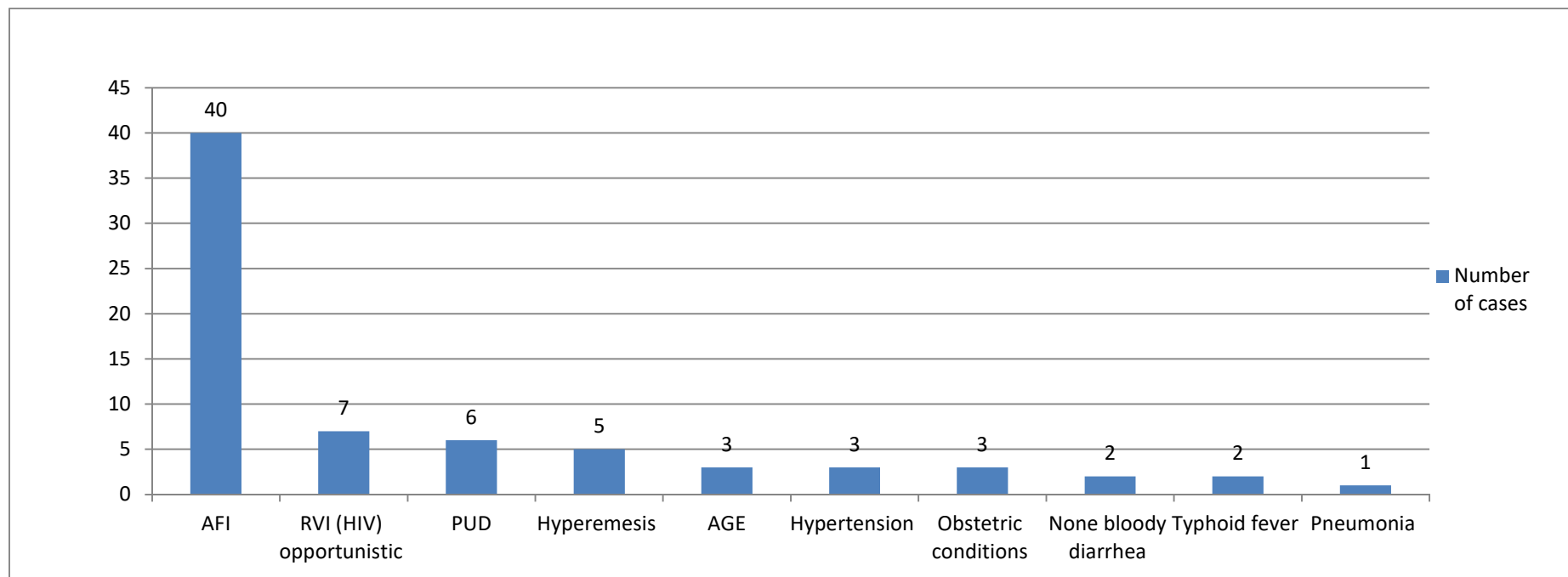


**Figure 5: Ten top or leading causes of admission of Woreda 12 administration, Nifas Silk Lafto sub city, Addis Ababa, 2015**  
G.C

**Table 25:** Chronic disease distribution by age and sex in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia may 2016.

| Woreda 12    | Recorded Diabetes |        |       | Asthma |        |       | Mental and behavior disorder |        |       | Hypertension |        |       | Total |        |       |
|--------------|-------------------|--------|-------|--------|--------|-------|------------------------------|--------|-------|--------------|--------|-------|-------|--------|-------|
|              | Male              | Female | Total | Male   | Female | Total | Male                         | Female | Total | Male         | Female | Total | Male  | Female | Total |
| <= 4         | 0                 | 0      | 0     | 1      | 1      | 2     | 1                            | 0      | 1     | 0            | 0      | 0     | 2     | 1      | 3     |
| 5-15         | 0                 | 1      | 1     | 0      | 2      | 2     | 1                            | 0      | 1     | 0            | 0      | 0     | 1     | 3      | 4     |
| >15          | 23                | 20     | 43    | 13     | 27     | 40    | 8                            | 3      | 11    | 25           | 39     | 64    | 69    | 89     | 158   |
| Total by sex | 23                | 21     | 44    | 14     | 30     | 44    | 10                           | 3      | 13    | 25           | 39     | 64    | 72    | 93     | 165   |
| Total        | 44                |        | 44    | 44     |        | 44    | 13                           |        | 13    | 64           |        | 64    | 165   |        | 165   |

**Source:** Nifas Silk Lafto sub city health office 2015 HMIS annual report.

As shown on the table 12 above, child hood non-communicable diseases distribution is not worrying, but hypertension in the age category of >15 years is 64 (38.78%) of the total case which is significant number according to Woreda's population.

#### **4.5. Discussion**

Health profile is used for identifying health and health related problems. The estimated population for the year 2015 G.C in Woreda 12 administration, Nifas Silk Lafto Sub city was 28,838 with male to female sex ratio of 0.48:0.52. Regarding to health professional with population ratio indicated that, Nurse and health officers to population ratio of the Woreda 12 administration, Nifas Silk Lafto sub city is around 9 professional nurses for 10,000 people and 5 health officers for 10,000 people in the administration respectively. When we see the midwives and health extension professionals to population ratio is that around 3 midwives for 10,000 people and 6 health extension professionals for 10,000 people respectively which is nearly similar to that of the national figures (8). ANC coverage of the Woreda 12 administration was 100%, which is greater than that of Nifas Silk Lafto sub city (84.7%) in 2015.

All deliveries of the year were attended by skilled health professionals which mean health extension professionals and skilled birth attendants had no role on conducting deliveries. Postnatal coverage of the Woreda was 70%, which is relatively greater than the Nifas Silk Lafto sub city i.e 53.3% in the year 2015. Acute Upper Respiratory Tract Infection (AURTI) was the first among top ten outpatient visit causing diseases of Woreda 12 administration through 2013 to 2015 and accounted 5,213 (30.9%), 7,258 (30.45%) and 7,994 (31.18%) respectively. AURTI cases were increasing through 2013 to 2015 from 5,213 on 2013 to 7,994 cases on 2015. Among the ten top leading causes of admission in Woreda 12 administration on 2013 and 2014 was AFI with the numbers of 40 (35.7%) and 9 (10.84%) and the leading cause of admission on 2015 was other obstetric conditions with the numbers of 32 (22.8%). Chronic illness distribution of the Woreda was 13, 44, 44 and 64 for mental and behavioral disorder, asthma, diabetic mellitus and hypertension respectively with the total of 165 chronic illness patients in the year 2015 G.C. Asthma (68%) and hypertension (61%) cases on the year 2015 were females. This could be because of females are working at home meaning care givers of the family that cause them susceptible for different allergens according to Ethiopian gender role. The limitations during profiling of the Woreda 12 administration's health, some data were not found easily that means documentation system of the sub city is poor.

#### **4.6. Conclusion**

According to the Addis Ababa city administration HSTP health institution target i.e. one health center to 40,000 people, Woreda 12 administration's status is 1:28,838 peoples; which is a very good achievement. The leading cause of outpatient visit and admission on the consecutive three years (2013 to 2015) in Woreda 12 administration was acute upper respiratory tract infection (AURTI) and acute febrile illness (AFI). Commonly used method of contraceptives was Norplant among reproductive age group women. When comparing private institutions of health (91%) and education (79%) with government institutions, private institutions significantly overweigh the government one.

In conclusion the overall health status and access to health service in the Woreda was very good.

#### **4.7. Limitations**

Limitations of the profiling were:

- ❖ Some health information missed due to lack of data.
- ❖ There was no previous document on the Woreda's health profile.

#### **4.8. Recommendation**

- ❖ There should be documentation system on housing condition of the settlers in the Woreda. (Documents like homelessness, informal settlement, etc).
- ❖ Further profiling has to be done about the Woreda 12 administration.

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**Annex I: Questionnaires**

**Informed Consent**

Dear Woreda 12 health office and health center officials, this is a questionnaire designed to collect information in order to produce a community health profile. The health profile that is going to be conducted on your Woreda and to be analyzed and interpreted for future use will have a profound significance in order to understand the community health and related issues. I am kindly requesting your genuine cooperation and permission to conduct the Woreda health profile.

**If agreed tick yes and then continue if not stop**

Yes ☐ No ☐

**Table One:** Potential Health service coverage in Woreda 12 Administration, Nifas Silk Lafto Sub City, A.A, Ethiopia May 2016.

| Institution | Total population | Number of health facilities |         |        | Potential health service coverage |          |
|-------------|------------------|-----------------------------|---------|--------|-----------------------------------|----------|
|             |                  | HC                          | Clinics | Others | HC to population ratio            | Coverage |
| Woreda 12   |                  |                             |         |        |                                   |          |
| Sub city    |                  |                             |         |        |                                   |          |
| Source:     |                  |                             |         |        |                                   |          |

**Table Two:** Frequency Distribution of educational institutions in Woreda 12 Administration, Nifas Silk Lafto Sub City, A.A, Ethiopia May 2016.

| Institution | Governmental |                     |           |            |             |                                 |         |            | Private |                     |           |            |             |                                 |         |            | Total |
|-------------|--------------|---------------------|-----------|------------|-------------|---------------------------------|---------|------------|---------|---------------------|-----------|------------|-------------|---------------------------------|---------|------------|-------|
|             | kg           | Primary (1-4 grade) | 1-8 Grade | 9-10 grade | Preparatory | Technical & vocational training | College | University | kg      | Primary (1-4 grade) | 1-8 Grade | 9-10 grade | Preparatory | Technical & vocational training | College | University |       |
| Woreda 12   |              |                     |           |            |             |                                 |         |            |         |                     |           |            |             |                                 |         |            |       |
| Sub city    |              |                     |           |            |             |                                 |         |            |         |                     |           |            |             |                                 |         |            |       |
| Source:     |              |                     |           |            |             |                                 |         |            |         |                     |           |            |             |                                 |         |            |       |

**Table Three:** Frequency distribution of Health Facilities in Woreda 12 Administration, Nifas Silk Lafto Sub City, A.A, Ethiopia May 2016.

| Institution | Governmental |               |                |                | Private       |           |                |             |                |               | NGO     |                | Holly water | Total |
|-------------|--------------|---------------|----------------|----------------|---------------|-----------|----------------|-------------|----------------|---------------|---------|----------------|-------------|-------|
|             | Hospitals    | Health center | Higher clinics | Medium Clinics | Small clinics | Hospitals | Higher clinics | Specialties | Medium Clinics | Small clinics | Clinics | Health Centers |             |       |
| Woreda 12   |              |               |                |                |               |           |                |             |                |               |         |                |             |       |
| Sub city    |              |               |                |                |               |           |                |             |                |               |         |                |             |       |
| Source      |              |               |                |                |               |           |                |             |                |               |         |                |             |       |

**Table Four:** - Number of Health Extension Professionals in Woreda 12 Administration, Nifas Silk Lafto Sub City, A.A, Ethiopia May 2016.

| Institution | Health Extension workers |        |                 |                                 |
|-------------|--------------------------|--------|-----------------|---------------------------------|
|             | Needed                   | On job | Total Household | Coverage in % (1 HEP to 500 HH) |
| Woreda 12   |                          |        |                 |                                 |
| Sub city    |                          |        |                 |                                 |
| Source:     |                          |        |                 |                                 |

**Table Five:** frequency distribution of health professionals in Woreda 12, Nifas Silk Lafto Sub City, Addis Ababa, Ethiopia May 2016.

| Institution | Professional distribution |            |                |            |          |           |                |                  |                |                             |
|-------------|---------------------------|------------|----------------|------------|----------|-----------|----------------|------------------|----------------|-----------------------------|
| Woreda 12   | GP                        | specialist | Health officer | Pharmacist | Druggist | BSC Nurse | Clinical nurse | Lab technologist | Lab technician | Environmental professionals |
| Woreda 12   |                           |            |                |            |          |           |                |                  |                |                             |
| Sub city    |                           |            |                |            |          |           |                |                  |                |                             |
| Source:     |                           |            |                |            |          |           |                |                  |                |                             |

**Table Six:** Immunization Coverage by Type, in Woreda 12 Administration, Nifas Silk Lafto Sub City, A.A, Ethiopia May 2016.

| Institution | Year | Total Population | children <1yr | surviving infants | BCG % | Penta1 % | Penta3 % | PCV1 % | PCV3 % | Rota1 % | Rota2 % | Measles % | Full Vaccinated % |
|-------------|------|------------------|---------------|-------------------|-------|----------|----------|--------|--------|---------|---------|-----------|-------------------|
| Woreda 12   |      |                  |               |                   |       |          |          |        |        |         |         |           |                   |
| Sub city    |      |                  |               |                   |       |          |          |        |        |         |         |           |                   |
| Source:     |      |                  |               |                   |       |          |          |        |        |         |         |           |                   |

**Table Seven:** Frequency distribution of Contraceptive Utilization in Woreda 12 Administration, Nifas Silk Lafto Sub City, A.A, Ethiopia May 2016.

| Institution | Year | Pills (%) | Depo-Provera (%) | Condom (%) | Norplant (%) | IUD (%) | Permanent (%) | Contraceptive Acceptance Rate |
|-------------|------|-----------|------------------|------------|--------------|---------|---------------|-------------------------------|
| Woreda 12   |      |           |                  |            |              |         |               |                               |
| Sub city    |      |           |                  |            |              |         |               |                               |
| Source:     |      |           |                  |            |              |         |               |                               |

**Table Eight:** Percentage of Antenatal care, postnatal care and Deliveries attended by skilled birth personnel, in Woreda 12 Administration, Nifas Silk Lafto Sub City, A.A, Ethiopia May 2016.

| Institution | year | Target Eligible | Antenatal care coverage | Proportion of Deliveries by skilled personnel | Postnatal care coverage | Family planning               |             |
|-------------|------|-----------------|-------------------------|-----------------------------------------------|-------------------------|-------------------------------|-------------|
|             |      |                 |                         |                                               |                         | Non pregnant women, age 15-45 | Achievement |
| Woreda 12   |      |                 |                         |                                               |                         |                               |             |
| Sub city    |      |                 |                         |                                               |                         |                               |             |
| Source:     |      |                 |                         |                                               |                         |                               |             |

**Table Nine:** Safe Water Access and Coverage in Woreda 12 Administration, Nifas Silk Lafto Sub City, A.A, Ethiopia, May 2016.

| Institution | year | Total Household | Water schemes |             | Total | Access to safe water from the total HH |
|-------------|------|-----------------|---------------|-------------|-------|----------------------------------------|
|             |      |                 | Protected     | Unprotected |       | Total (%)                              |
| Woreda 12   |      |                 |               |             |       |                                        |
| Sub city    |      |                 |               |             |       |                                        |
| Source:     |      |                 |               |             |       |                                        |

### Outpatient Visit and Admission data

**Table ten:** outpatient visit per capita and admission rate per 1000, in Woreda 12 administration, Nifas Silk Lafto Sub City, A.A, Ethiopia, may 2016.

| Institution | Population | Total Outpatient Visit | OPD Attendance Per Capita | Total inpatient admission | Admission rate per 1000 |
|-------------|------------|------------------------|---------------------------|---------------------------|-------------------------|
| Woreda 12   |            |                        |                           |                           |                         |
| Sub city    |            |                        |                           |                           |                         |

**Source:**

**Table Eleven:** Top Ten Leading Cause of Morbidity in Woreda 12 Administration, Nifas Silk Lafto Sub City, A.A, Ethiopia, May 2016.

| Rank | 2013 G.C |       |         | 2014 G.C |       |         | 2016 G.C |       |         |
|------|----------|-------|---------|----------|-------|---------|----------|-------|---------|
|      | Disease  | Cases | Percent | Disease  | Cases | Percent | Disease  | Cases | Percent |
| 1    |          |       |         |          |       |         |          |       |         |
| 2    |          |       |         |          |       |         |          |       |         |
| 3    |          |       |         |          |       |         |          |       |         |
| 4    |          |       |         |          |       |         |          |       |         |
| 5    |          |       |         |          |       |         |          |       |         |
| 6    |          |       |         |          |       |         |          |       |         |
| 7    |          |       |         |          |       |         |          |       |         |
| 8    |          |       |         |          |       |         |          |       |         |
| 9    |          |       |         |          |       |         |          |       |         |
| 10   |          |       |         |          |       |         |          |       |         |

**Table Twelve:** Top Ten Leading Causes of Admission Visit, in Woreda 12 Administration, Nifas Silk Lafto Sub City, A.A, Ethiopia, May 2016.

| Rank | 2013 G.C |       |         | 2014 G.C |       |         | 2015 G.C |       |         |
|------|----------|-------|---------|----------|-------|---------|----------|-------|---------|
|      | Disease  | Cases | Percent | Disease  | Cases | Percent | Disease  | Cases | Percent |
| 1    |          |       |         |          |       |         |          |       |         |
| 2    |          |       |         |          |       |         |          |       |         |
| 3    |          |       |         |          |       |         |          |       |         |
| 4    |          |       |         |          |       |         |          |       |         |
| 5    |          |       |         |          |       |         |          |       |         |
| 6    |          |       |         |          |       |         |          |       |         |
| 7    |          |       |         |          |       |         |          |       |         |
| 8    |          |       |         |          |       |         |          |       |         |
| 9    |          |       |         |          |       |         |          |       |         |
| 10   |          |       |         |          |       |         |          |       |         |

**Table Thirteen:** Chronic disease distribution by age and sex in Woreda 12 administration, Nifas silk Lafto sub city, A.A, Ethiopia may 2016.

| Woreda 12 | Recorded Diabetes |        | Asthma |        | Mental and behavior disorder |        | Hypertension |        | Total |        |
|-----------|-------------------|--------|--------|--------|------------------------------|--------|--------------|--------|-------|--------|
|           | Male              | Female | Male   | Female | Male                         | Female | Male         | Female | Male  | Female |

|                |  |  |  |  |  |  |  |  |  |  |
|----------------|--|--|--|--|--|--|--|--|--|--|
| <= 4           |  |  |  |  |  |  |  |  |  |  |
| 5-15           |  |  |  |  |  |  |  |  |  |  |
| >15            |  |  |  |  |  |  |  |  |  |  |
| Total by sex   |  |  |  |  |  |  |  |  |  |  |
| Total          |  |  |  |  |  |  |  |  |  |  |
| <b>Source:</b> |  |  |  |  |  |  |  |  |  |  |

**TableFourteen:** Describing the community in terms of selected social problemsin Woreda 12 Administration, Nifas Silk Lafto Sub City, A.A, Ethiopia May 2016.

| Institution | Statutory<br>Homelessness | Informal<br>Settlements | Violence and other<br>intentional injury | Unemployment rate | Traffic accident |        |  |       |  |       |  |
|-------------|---------------------------|-------------------------|------------------------------------------|-------------------|------------------|--------|--|-------|--|-------|--|
|             |                           |                         |                                          |                   | Wealth<br>crisis | Injury |  | Death |  | Total |  |
|             |                           |                         |                                          |                   |                  |        |  |       |  |       |  |
| Woreda 12   |                           |                         |                                          |                   |                  |        |  |       |  |       |  |
| Sub city    |                           |                         |                                          |                   |                  |        |  |       |  |       |  |
| Source:     |                           |                         |                                          |                   |                  |        |  |       |  |       |  |

**Chapter V: Research report on prevalence of occupational injury and associated factors  
among micro and small scale solid waste collection enterprises**

## Abstract

**Background:** Occupational injury is any physical injury conditions sustained on a worker in connection with the performance of his or her work. The collection of household waste is a hard job, which requires repeated heavy physical activity such as the manual lifting and handling of heavy bins. As developing countries continue to grow economically, urbanization and the challenge of solid waste management come to be headache to the government. Solid waste in Addis Ababa (AA) city is collected manually which requires repeated heavy physical activities such as lifting, carrying, pulling, and pushing. The aim of this study was to assess the magnitude of occupational injuries and associated factors among solid waste collectors.

**Methods:** A cross-sectional study design was conducted from October 22/2017 to December 8/2017 G.C. The data was collected through interview guided structured questionnaire and observation check list by trained data collectors from a total of 268 participants with the response rate of 98.2% after pretesting of 27 questionnaires by using simple random sampling technique. Descriptive statistics was done for most variables in the study using statistical parameters; bivariate and multivariable analysis was done by using SPSS. Based on AOR and P-value <0.05 strength of association and statistical significance was tested.

**Result:** In this study, the annual magnitude of at least one occupational injury among solid waste workers was 29.5%. Of these, 83.8% of them were visited health facility to receive health care. The independent predictors of at least one occupational injury were: working more than 8 hours per day(AOR: 8.345, 95%CI: (3.029,22.993), P-value=0.000), not trained on occupational health and safety (AOR: 14.093, 95%CI: (4.733,41.958), P-value=0.000), alcohol drinking (AOR: 55.917, 95%CI: (15.780,198.147), P-value=0.000), sleeping disturbance related to the job (AOR: 5.596, 95%CI: (1.851,16.916), P-value=0.002), and not satisfied on the level of payment (AOR: 2.877, 95%CI: (1.231,6.722), P-value=0.015)

**Conclusion:** The magnitude of occupational injuries among house to house solid waste collection workers in Nifas Silk Lafto sub city is lower than other similar studies conducted in Ethiopia. Minimizing working hours, providing job specific training regarding occupational health and safety and supplying quality personal protective equipment are interventions expected to cope with the problem.

**Key words:** Occupational injuries, house hold solid waste collectors

## 5.1. Introduction

### 5.1.1. Background

Occupational injury is any physical injury conditions sustained on a worker in connection with the performance of his or her work. It causes a major public health problem and is a source of substantial human and economic cost in both developed and developing countries. The International Labor Organization (ILO) estimates that 270 million occupational accidents and diseases occur each year globally(1). Municipal solid waste (MSW) handling and disposal is a growing environmental and public health concern. The collection of household waste is a hard job, which requires repeated heavy physical activity such as the manual lifting and handling of heavy bins. As developing countries continue to grow economically, urbanization and the challenge of solid waste management come to be headache to the government. Municipal solid waste is a recognized environmental and health challenge but also an economic resource on which thousands of individuals base (depend) a living through picking, re-using and recycling(2).

Solid waste collectors collect refuses in all climate conditions; they may have contact with sharp objects, pull and push heavy containers, and lift heavier loads, often to higher loading locations. Occupational accidents are very frequent among solid waste collection workers. Risk factor could be combination of technical factors (poor design of equipment), high working time, and muscle fatigue due to high work load. Musculoskeletal problems are also common among solid waste collection workers(3). A study conducted in India by *Chavan BL et al* showed that, due to lack of proper system and plan, solid waste collection workers are more vulnerable to inhale the accumulated refuse fumes, or develop infectious diseases due to direct contact with long accumulated refuses. They are also more prone to have vehicle accidents during transportation due to the long travel(4).

Solid waste collectors are exposed to occupational health related problems from waste materials and physical effort they exert in waste handling. Such occupational risks include contamination with toxic materials, bottles with chemical residues, metal containers with pesticide residues, sharps and other infectious wastes from hospitals and batteries containing heavy metals. The risk levels are still very high in developing countries because of poor public health practice. In low-income countries, solid waste collectors have low socio-economic status such as poverty, lack of education, poor housing conditions and poor nutrition. Commonly observed health problems among this working group include: respiratory

symptoms, irritation of the skin, nose and eyes, gastrointestinal problems, fatigue, headaches, psychological problems, allergies, musculoskeletal and dermal injuries(5).

Protection of workers from occupational hazards depends on availability and proper utilization of protective equipment, which in low and middle income countries is in short supply with very limited monitoring of their utilization. Protection of human health and the environment is one of the major challenges facing developing as well as developed countries of the world. The original aim of regulating waste disposal is to reduce the introduction of polluting substances into the atmosphere since protection of the environment is a major challenge facing developing countries such as Ethiopia. Solid waste in Addis Ababa (AA) city is collected manually which requires repeated heavy physical activities such as lifting, carrying, pulling, and pushing (6).

The impact of solid waste on health is varied and may depend on numerous factors including the nature of the waste, duration of exposure, the population exposed, and availability of prevention and mitigation interventions. The impacts may range from mild psychological effects to severe morbidity, disability or death(7). Waste collection is the most challenging work as Ethiopian working culture is concerned. Such house to house collection of solid wastes is the newly income generating activity formulated by some initiated groups of the community by support of Ethiopian government and as the sub set by Addis Ababa City Administration Government which is part of work opportunity creation policy.

#### **5.1.2. Statement of the problem**

According to World Health Organization/International Labor Organization (WHO/ILO) 2010 report 2.3 million deaths and 4% annual Gross Domestic Product (GDP) loss globally are related to occupation(8). Lung diseases, hearing loss, loss of body parts, heat exhaustion, and skin infection are among the common work related potential health risks. Solid waste generation and urbanization are intimately (closely) related and therefore it is important to briefly reflect on the urbanization phenomenon in the health effect on residents. In 1950, about 30% of the world's population lived in urban areas. It is currently estimated that by 2050, about 66% of the world's population will be living in urban areas(9).

The system of municipal solid waste collection in the developing countries continues to be mostly manual and involves a labor-intensive system. At source, the waste discharged for collection is rarely segregated in plastic or metal containers and covered with lid. The waste is left on unprotected containers even open grounds that require moving by hand, or left in an open cartons or baskets that

require to be picked up manually. In other case, the waste awaiting to be collected is open to insects, rodent vectors and scavenging animals. These unsegregated wastes may contain hazardous waste materials (defined as toxic, inflammatory, reactive, explosive or infectious and containing batteries, electronic sludge, paint and its solvent, pesticides and infectious medical waste) that predisposes waste collectors to be in direct contact with them and make them prone to significantly more adverse occupational injury and health risks than their equivalents in developed countries(10).

The leading type of injury reported by the workers was cut / punctures (38.6%). However, because of the nature of the job, higher numbers of workers were affected by a combination of two or more injuries (27.3%). The highest numbers of solid waste collectors (22.7%) were injured on their hand followed by leg (21.8%) injury. From workers who had hand injury, 50% were reported injury on two or more hand parts. The most common causes were sharp or slender pointed objects (23.7%), lifting/pushing/puling of heavy waste storage containers (12%), dust or particulate matters (10.4%). Age and educational status were the significant socio-demographic determinants of work related injury. The older workers were more injured than younger ones. Workers aged >30 years were 1.834 times more likely to be injured than workers aged < 30 years(14).

A study conducted by *Mesfin Kote et al* in Addis Ababa on health care waste showed that wastes either from public or private hospitals did not segregated (separated) according to their type (15) which implies that house to house solid waste collectors will be endangered at the time of collection. According to the study conducted on *Knowledge, Attitude and Practice among solid waste collectors in Addis Ababa* by *Gebremedhin et al* showed that, even though around 74% of solid waste collector had the knowledge on the importance of personal protective equipment (PPE), only around 37% were practice these materials (PPE) during their routine work(16) which may imply still occupational injury related to solid waste collection needs further investigation.

As my observation, in Nifas Silk Lafto sub city, the solid waste collectors are carrying the containers to long distance, they collect wastes by their bare hand, and they wear their routine shoes during waste collection time. Therefore, assessment of occupational injury and associated factors among micro and small scale solid waste collectors is expected to be conducted in Nifas Silk Lafto sub city.

### **5.1.3. Significance of the study**

Solid waste collection workers are less protected in all efforts of refuse collection. Neither pre-employment nor periodical medical checkups are inaccessible to this group of workers. A number of researches have been conducted on solid waste management related issues. These researches, however, have focused on the associated challenges of solid waste collection. To the knowledge of the researcher, researches so far done on solid waste collector's injuries and associated factors in the area were not sufficient. The fact that this segment of the society is doing the very difficult and risky task of the sub city, there is a need to conduct a research to assess the occupational related injuries and associated factors in doing their routine task. This would create a greater impact especially when these working groups are seen in the front position in the sub city's sanitation administration office. This study will have a meaningful significance for the researcher himself. As a beginner researcher, it enables to advance his knowledge, skill and value spectrum in conducting public health research, and also let him to know more in the area of the poorest community in which the researcher has much happy to conduct researches in the area by the future.

This study is also vital in terms of clearly showing the existing knowledge gaps in the area of solid waste collector unions. The study has also relevance for occupational health and safety practice in Addis Ababa since it clearly will highlight what will be expected and key public health intervention areas of occupational health and safety to upgrade the conditions of the solid waste collectors. Finally, the study can serve as the basis upon which various specific studies on solid waste collector issues can be made and functions as a foot step for further research. The results of this study contribute something in the effort to solid waste management related issues in the sub city.

## **5.2. Literature review**

### **5.2.1. Magnitude**

Cities are at the connection of a further threat to the environment, namely the production of an increasing quantity and complexity of wastes. The estimated quantity of Municipal Solid Waste (MSW) generated worldwide is 1.7 – 1.9 billion metric tons(17). Work-related injuries (WRIs) and illnesses are multifactorial and remain major problems of public health magnitude requiring the attention of all stakeholders(18). In many cases, municipal wastes are not well managed in developing countries, as cities and municipalities cannot cope with the accelerated pace of waste production. Waste collection rates are often lower than 70 percent in low-income countries. More than 50 per cent of the collected waste is often disposed of through uncontrolled landfilling and about 15 percent is processed through unsafe and informal recycling(19).

The International Labor Organization (ILO) estimates that 270 million occupational accidents and diseases occur each year. ILO estimates that each year, around 2.3 million workers die as a result of occupational accidents and work-related diseases and fatal occupational accidents are about 0.35 million every year and fatal work-related diseases are around 1.95 million per year(20). The number of occupational accidents and diseases are increasing in many developing countries. It has been estimated that over 120 million industrial accidents with over 200,000 fatalities occur each year in these nations. This is the area which has 80% of the world's labor force. Sub-Saharan Africa appears to have the greatest rate per worker of occupational injuries followed by Asia(21).

In Sub-Saharan Africa countries, slightly more than 54, 000 fatal occupational accidents happen annually. Approximately 42 million work-related accidents took place that causes at least 3 days absence from work. The fatality rate of the region is 21 per 100,000 workers and the accident rate per 100,000 workers is 160,000. In Ethiopia, over 5,596 fatal occupational accidents happen annually. Approximately 4,270,815 work-related accidents took place that causes at least 3 days absence from work. The accident rate per 100,000 workers is 16,426 and the fatality rate is 21.5 per 100,000 workers (22).

Severe, functionally limiting back pain is common; 70–85% of all people experience back pain at some point in their lives. Low-back disorders are more expensive for employers than any other type of injury. Workers involved in solid waste industry are constantly subjected to specific occupational injuries and the injury rate is higher than other industrial occupations. Thus, solid waste collection is considered as

the highest risk for injuries and illnesses among the occupations due to ergonomics risk factors. Specifically, lifting and dumping tasks can be thought to compound the risks from posture when it is also performed(23).

### **5.2.2. Factors**

#### **5.2.2.1.Socio-demographic factors**

Most Researchers showed that Socio-demographic factors like age, educational status, working hours and working experience were factors related to the occurrence, severity, and types of injury In many third world countries, municipal solid waste (MSW) collection is done manually and household waste removal is work that requires physical strength in lifting bulky waste containers, and common complaints among refuse collectors are increased risk of musculoskeletal disorders, the lower back the most affected body region. Other frequently affected areas are shoulders, knees, and neck(24). Refuse workers often lack training, tools and information in order to perform their work in the best healthy and safe manner. In addition to these, routine medical checkup program for all solid waste collectors should be mandatory to keep them in good health condition(25).

The exposure to certain physically related injuries and musculoskeletal disorders such as puncture wounds, laceration, serious cuts, dislocation, body pain and fatigue associated with the refuse collectors not using personal protective equipment and carrying heavy materials affects the health status of workers and consequently reduces the manpower, increases cost of collection and is a possible cause of death(26)

A study conducted by Çakit E. about the *physical demands of solid waste collection tasks*, suggested that municipal solid waste management is a risky and life-threatening activity for populations residing near landfills and waste incinerators, for municipal waste workers and for informal waste recyclers. Major health problems of populations residing near landfills and incinerators are cancer, low birth weight, congenital anomalies and Down's syndrome and for municipal waste workers and recyclers the health problems are musculoskeletal disorders, injuries, respiratory, gastro-intestinal and skin conditions(27).

A study done by Pieter M, *et al on Urban management and solid waste issues in Africa* have reported high levels of heavy metals in municipal waste disposal sites. Most waste disposal sites in developing countries are poorly sited, constructed and managed despite handling hazardous waste from industries and medical facilities. Doubtfully, at the heart of the problems of solid waste management are the

absence of adequate policies, enabling legislation and an environmentally stimulated and enlightened public(28).

#### **5.2.2.2.Behavioral factors**

Solid waste collectors with the behavior of alcohol drinking, satisfaction on the level of payment, satisfaction on their job and sleeping disorder were the behavioral factors related to occupational injury. Municipal solid waste management has been associated with various adverse health problems for waste workers which entail respiratory problems, musculoskeletal disorders, injuries, nail infection and inflammation. A study conducted in India on solid waste collection by rag pickers said that, they collect the waste from houses, shops, markets, hospitals, commercial establishments and industries. Sixty five percent (65%) of the rag pickers spent 5-8 hrs in a day for the collection of waste(29).

The study conducted by *Spaargaren G. et al* on urban settings of East Africa showed that centralized waste management system has evolved into the current management mixtures that include decentralized as well as the involvement of the private sector. The storage, collection, transportation and final treatment/disposal of wastes are reported to have become a major problem in urban centers. The composition of wastes generated by the East African urban centers is mainly decomposable organic materials based on the urban community consumption that generates much kitchen wastes, compound wastes and floor sweepings. This calls for efficient collection system to avoid health, aesthetics and environmental impacts. The global trend of increased use of electrical and electronic goods is also evident in East African urban centers where E-waste is becoming a significant threat to the environment and human health(30).

Waste sources are households` (residential), commercial premises, markets, institutions, industries and health care facilities. Residential areas or households are the major contributor of wastes followed by markets and commercial areas respectively. Waste quantity increases with population increase. Densely populated urban zones (e.g. Slums) have low income households with waste generation estimated between 0.22 and 0.3kg/cap/day. Solid waste generation by the higher income households is estimated between 0.66 and 0.9 kg/cap/day on average. Overall waste generation rate for East African urban centers vary on average between 0.26 (low income) and 0.78 (high income) kg/cap/day. Similar waste generation rates have been reported for developing countries of other regions of the world(30).

#### **5.2.2.3.Availability and utilization of personal protective equipment**

Workers prior to start of new assignments should receive adequate training and information enabling them to understand the hazards of work and to protect their health from ambient factors that may

present. The effectiveness and efficiency of solid waste management depends on the willingness and active participation of community members, since the waste is generated mainly from local community. Decaying organic materials pose great public health risks, serving as breeding grounds for disease vectors. Waste handlers and waste pickers are especially vulnerable and may also become vectors, contracting and transmitting diseases when human or animal excreta or medical wastes are in the waste stream. Risks of poisoning, cancer, birth defects, and other disorders are also high(31).

Ethiopia, like all developing nations in East Africa, currently faces waste management challenges related to over-accumulation on open land, water pollution, and overall public nuisances such as pests, diseases, and odors (32). A recent study on the history of municipal solid waste in Addis Ababa concluded that waste production has increased by 3.79% annually. In 2010, Addis Ababa generated an estimated 0.4kg/capita of waste per day, with more than 200,000 metric tons collected each year. Addis Ababa city started its solid waste management some four decades back but currently the service cannot meet the changing demands. The social waste collection service is unsatisfactory, and scenes of scattered waste are common in most part of the city(32).

According to the existing policy, solid wastes are collected by the government employees, private companies based on contractual agreements and Micro and Small Enterprise. However, the principle, stating that the waste producers are subject to put their wastes into different containers based on specific type of wastes, is not practiced in the city. Primary collection of solid waste is done by micro and small enterprises having formal agreement to collect from households and dump them in designated containers. There are about 750 micro and small enterprises organized to pre-collect waste from household. They use door-to-door method to collect and dumped in another container to be picked by secondary collectors, the sub-city and private companies, and then dumped at the City's landfill(33).

A study titled as *Private sector participation in solid waste collection in Addis Ababa* showed that Micro-enterprises took over waste collection from the public sector and the households, and improved primary waste collection coverage from about 89 tons per day in 2002 to 121 tons per day in 2008 (36% improvement)(34). Similar study conducted in Bahir Dar on solid waste management showed that the city's solid waste management system is not growing as the current urbanization activities which means it is not serving all residents of the city properly. Residents are suffering from different types of health problems like respiratory problems, diarrheal diseases, and aesthetically there are unpleasant areas due to improper solid waste collection and management(35).

### 5.2.3. Conceptual frame work

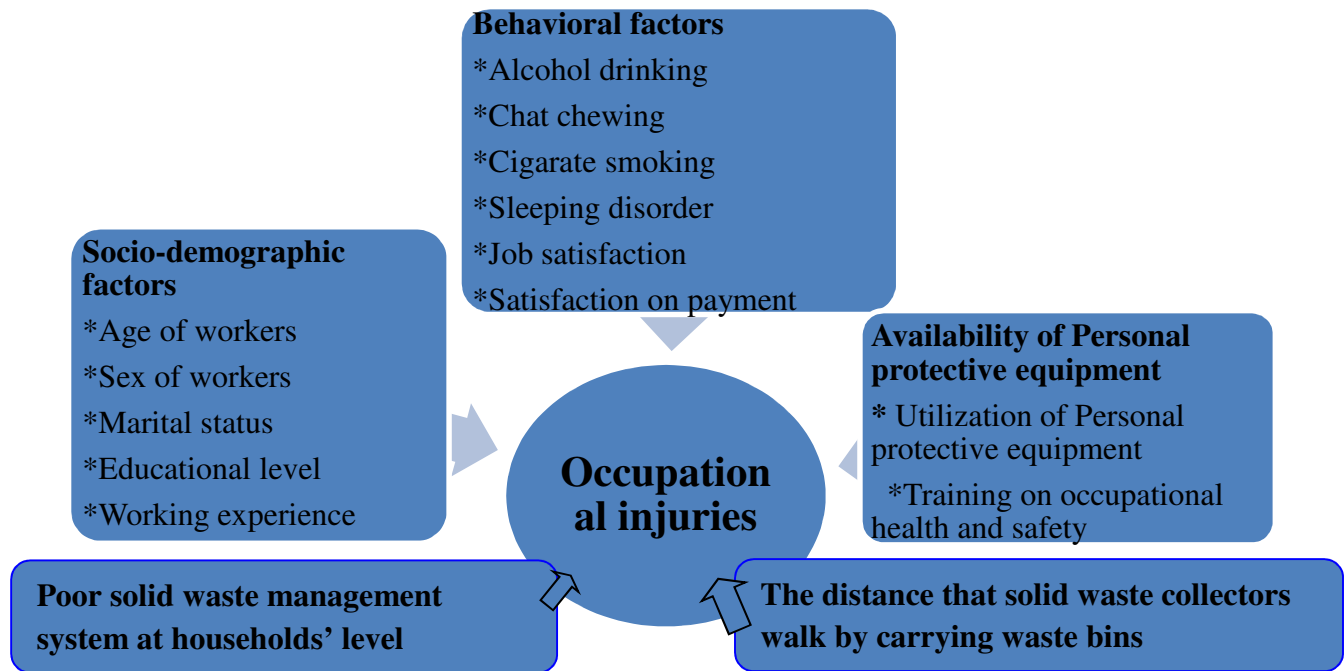


**Figure 22:** Conceptual frame work of the study of prevalence and associated factors of occupational injuries among micro & small scale enterprise solid waste collectors in Nifas Silk Lafto sub city, 2017  
(Adapted from Osman, 2007)

### **5.3. Objectives**

#### **5.3.1. General objective**

To assess the magnitude of occupational injuries and associated factors among micro and small scale enterprise solid waste collectors in Nifas Silk Lafto sub city, Addis Ababa, Ethiopia, 2017.

#### **5.3.2. Specific objectives**

- ❖ To assess magnitude of occupational injuries of solid waste collectors.
- ❖ To assess utilization of personal protective equipment of solid waste collectors.
- ❖ To assess the associated factors for occupational injuries of solid waste collectors

## **5.4. Methods**

### **5.4.1. Study area**

This study was conducted in Nifas Silk Lafto sub city, Addis Ababa; from October 22 2017 to December 8 2017 G.C. Addis Ababa is the capital of Ethiopia and Africa has been divided in to ten sub cities. Nifas Silk Lafto Sub City is one of the ten administrative sub cities of Addis Ababa City administration since 1998 G.C. It has 13 Woredas with their authorized administration and the total population of 395,206. Boundaries of the sub city are: North-with Kirkos sub city, East – with Bole Sub city, South – Oromia region and West – with Oromia. The administration of Nifas Silk Sub City covers 58.216 square kilometers. The Sub City has 9 functional governmental health centers, 158 private health facilities, and four holy water sites. Among 158 private health facilities, 32 lower clinics, 17 dental clinics, 92 medium clinics, and 17 specialty clinics. In the sub city administration area there are no NGO health institutions, and has no governmental and private hospital. In Nifas Silk Lafto sub city there are 90 micro and small enterprises in home to home solid waste collection with 921 their members (*Nifas Silk Lafto sub city Sanitation Administration office, 2017*). The number of enterprises and their members differs according to the size of Woreda.

### **5.4.2. Study period**

From October 22, 2017 to December 8, 2017 G.C

### **5.4.3. Study design**

A cross-sectional study design was conducted.

### **5.4.4. Source population**

Total populations of micro and small scale enterprise of solid waste collectors in Nifas Silk Lafto sub city.

### **5.4.5. Study population**

Those of the actual participants randomly selected from the source population.

### **5.4.6. Inclusion criteria**

Those of individuals volunteer to participate, present at the time of data collection, have a minimum of one year work experience on solid waste collection were included in the study.

### **5.4.7. Exclusion criteria**

Those of participants who can fulfill inclusion criteria were included in the study.

### **5.4.8. Sample size determination**

The actual sample size for the study was determined by using the formula for single population proportion by assuming 5% marginal error and 95% confidence interval ( $\alpha=0.05$ ) and:

- ❖ For the 1<sup>st</sup> specific objective = 63.90% (14),
- ❖ For the 2<sup>nd</sup> specific objective = 23.70% (14),
- ❖ For the 3<sup>rd</sup> specific objective = 31.90% (14), Then I took the largest sample size among the three calculations to increase the precision and power of the study.

#### **For the 1<sup>st</sup> specific objective**

$$n = \frac{z^2 p(p-1)}{d^2} = (1.96)^2 (0.639 \times 0.361) / (0.05)^2 = 354$$

None response rate = 10% = 354 × 0.1 = 35  35 + 354 = 389

Finite population formula if the total population is <10,000

$$nf = \frac{no}{1 + \frac{no}{N}} = nf = \frac{389}{1 + \frac{389}{921}} = 273, \text{ where:}$$

n = the required sample size

z = the value of the standard normal curve score corresponding to the given confidence interval = 1.96

P = prevalence of occupational injury among solid waste collectors from previous studies = 63.9%.

d = the permissible margin of error (the required precision) = 5%

no = initial sample size = 389

N = Total population for which to make inference = 921

nf = final sample size for population of <10,000 = 273

#### **For the 2<sup>nd</sup> objective**

$$n = \frac{z^2 p(p-1)}{d^2} = (1.96)^2 (0.237 \times 0.763) / (0.05)^2 = 278$$

None response rate = 10% = 278 × 0.1 = 28  28 + 278 = 306

$$nf = \frac{no}{1 + \frac{no}{N}} = nf = \frac{306}{1 + \frac{306}{921}} = 230$$

#### **For the 3<sup>rd</sup> objective**

$$n = \frac{z^2 p(p-1)}{d^2} = (1.96)^2 (0.386 \times 0.681) / (0.05)^2 = 334$$

None response rate = 10% = 334 × 0.1 = 33  33 + 334 = 367

$$nf = \frac{no}{1 + \frac{no}{N}} = nf = \frac{367}{1 + \frac{367}{921}} = 262$$

The largest sample size among the three calculations was 273. Therefore, I took the total sample size for the study as 273.

#### **5.4.9. Sampling method**

To get representative population for the survey, a simple random sampling technique was used. To make it representative, samples were taken from all Woredas of the sub city proportional to their size.

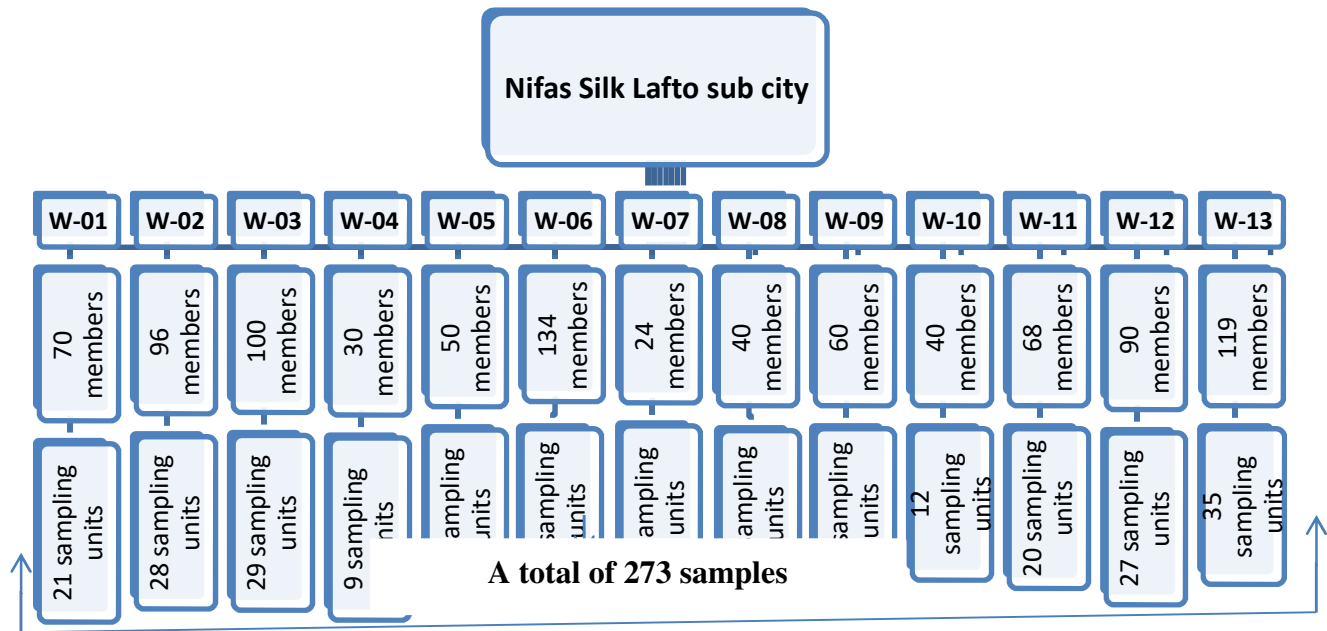


**Figure 23:** Flow of sampling procedures according to proportional to size.

#### 5.4.10. Study Variables

##### 5.4.10.1. Dependent variables

Occupational injuries

##### 5.4.10.2. Independent variables

Age, sex, educational status, marital status, utilization of personal protective equipment, behavioral/personal variables

#### 5.4.11. Data collection tools and procedures

Data was collected by face to face interview using pre-tested structured questionnaire developed based on the related published studies with certain modification and observation check list from October 22/2017 to December 8/2017. The questionnaire composed of four parts: socio demographic, injury characteristics, personal protective equipment availability and utilization and behavioral or personal variables.

#### 5.4.12. Operational definitions

**Injury:** The reported work related physical damage to body tissues caused by any type of solid waste, fall, or exhausting during their house to house solid waste collection in the last one year prior to this data collection(5).

**Job and payment satisfaction:** It is a subjective response of study participants about their job and payment as it is pleasurable for them(5).

**Micro and Small scale Enterprise (MSE):** Small scale unions that are organized by government to collect waste from households to specific site that is accessible for transportation to final disposal site(5).

**Well dressed:** If the workers are wearing protective devices properly on the right body parts for that particular PPE while they are on duty at the time of observation(5).

**Alcohol drinking, Cigarette smoking and Chat chewing:** The participants' subjective responses whether they do or not the action during interview of data collection(6)

**Sleeping disorder:** Participants' subjective response about their sleeping pattern during data collection(6)

#### **5.4.13. Data quality control**

The principal investigator checked the collected data for completeness, accuracy, clarity and consistency throughout the data collection period to maintain the quality of data. Four trained degree holder health professional data collectors and one supervisor were participated during data collection period. The questionnaire was developed in English Prior to the actual data collection and then translated to Amharic version to make conversation easy with the respondents and also re-translated to English to check for consistency. Twenty seven questionnaires were pre-tested at adjacent sub city (out of study area) and comments were added immediately after pre-test.

#### **5.4.14. Data Analysis**

Data entry was done by using EPI INFO7 and analysis was done by using SPSS statistical software. Descriptive statistics of the collected data was done for most variables in the study using statistical parameters: percentages, means and standard deviations. Bivariate analysis was used to check which variables were associated with the dependent variables individually. Variables found to have association with the dependent variables in bivariate analysis (P-value <0.2) were analyzed by multivariable logistic regression for controlling the possible effect of confounders and finally the variables which have significant association were identified based on the AOR, with 95%CI.

#### **5.4.15. Ethical consideration**

The study was carried out after getting permission from the Institutional Review Board (IRB) of St. Paul's Hospital Millennium Medical College and Addis Ababa Regional Health Bureau. Informed verbal consent was obtained from each waste collection enterprise and study participants to conduct the study. Confidentiality was granted for information collected from each waste collection enterprises and study participants. Participants' involvement in the study was on voluntary basis; participants who were unwilling to participate in the study and those who wish to quit their participation at any stage were

informed to do so without any restriction. Each respondent was informed about the objective of the study and privacy during interview was ensured.

**5.4.16. Dissemination of results**

A finding of the study was communicated to St. Paul's Hospital Millennium Medical College, Addis Ababa Regional Health Bureau and Nifas Silk Lafto sub city Sanitation Administration office.

## 5.5. Result

### 5.5.1. Socio-demographic characteristics of respondents

Two hundred sixty eight house to house solid waste collectors participated in the study with 98.2% response rate. The majority of respondents 171 (63.8%) were females. The median and mean age of respondents was 32 and 32.54 year respectively with the standard deviation of  $\pm 8.34$ . Minimum and maximum ages of the respondents were 19 and 68 respectively. The monthly income for the survey respondents ranges from 900 to 3,000 birr. Two hundred fifty (91.6%) of the respondents were working through six days per week. One hundred seventy one (63.8%) of study participants were working above 8 hours per a day (See Table 1)

**Table 26:** Socio\_demographic characteristics of respondents, Nifas Silk Lafto sub city solid waste collectors, January/2018

| Variables                      | Frequency | Percentage |
|--------------------------------|-----------|------------|
| <b>Sex</b>                     |           |            |
| Male                           | 97        | 36.2%      |
| Female                         | 171       | 63.8%      |
| <b>Marital status</b>          |           |            |
| Married                        | 201       | 75.0%      |
| Single                         | 39        | 14.6%      |
| Divorced /separated            | 17        | 6.3%       |
| Widowed                        | 11        | 4.1%       |
| <b>Educational status</b>      |           |            |
| Illiterate                     | 119       | 44.4%      |
| Primary school (1-8 grades)    | 126       | 47.0%      |
| Secondary school (9-12 grades) | 23        | 8.6%       |
| <b>Working hours per day</b>   |           |            |
| >8 hours                       | 97        | 36.2%      |
| $\geq 8$ hours                 | 171       | 63.8%      |
| <b>Working days per week</b>   |           |            |
| $\geq 5$ days                  | 22        | 8.2%       |
| $\geq 6$ days                  | 246       | 91.8%      |
| <b>Work experience</b>         |           |            |
| <3years                        | 123       | 45.9%      |
| 3-5years                       | 56        | 20.9%      |
| $\geq 6$ years                 | 89        | 33.2%      |
| <b>Family size</b>             |           |            |
| $\geq 2$                       | 32        | 11.9%      |
| 3 to 4                         | 154       | 57.5%      |
| $\geq 5$                       | 82        | 30.6%      |
| <b>Monthly income</b>          |           |            |
| 1,500-2,000                    | 11        | 4.1%       |
| >2000                          | 257       | 95.9%      |

## 5.5.2. Work related injury characteristics

### 5.5.2.1. Occurrence of injury in the last one year

Out of 268 house hold solid waste collectors who had direct waste contact, 79 (29.5%) of the respondents were injured in the last twelve months. Therefore, the overall magnitude of work related injury was 29.5 per year. Of the 79 workers who were injured in the last one year, 58(72.5%) workers experienced work related injury once, 19(23.8%) experienced twice and 3(3.8%) experienced greater than or equal to three times. Moreover, 17(6.3%) workers had injury in the last one month prior to the data collection.

### 5.5.2.2. Injury by type

The leading type of injury reported by the house hold solid waste collectors was sharp and needle injury 52(65.8%) followed by poison or acid splash 17(21.3%). Nineteen (23.8%) solid waste collectors were affected by more than one injury (See Figure 1).

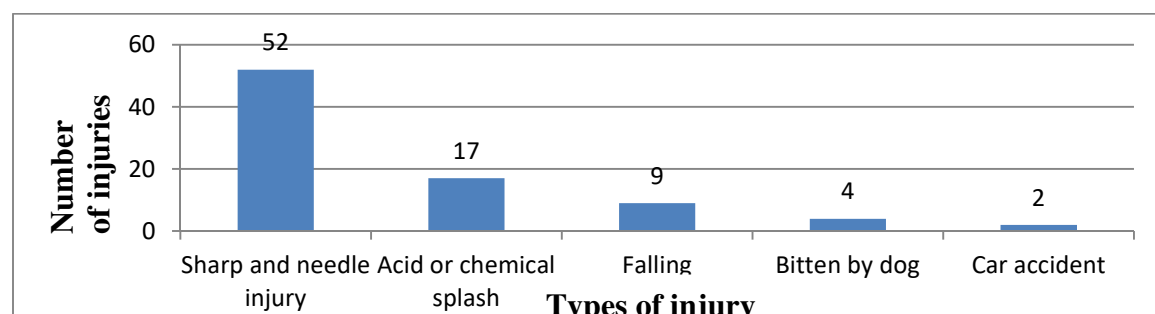


**Figure 24:** Types of injury to house hold solid waste collectors, Nifas Silk Lafto sub city, January/2018

### 5.5.2.3. Affected body parts

The highest number of workers 49 (62.0%) were injured on their hand followed by leg 33(41.7%) injury (See Figure 2). From workers who had hand injury, 35(71.4%) workers reported injury on two or more hand parts.

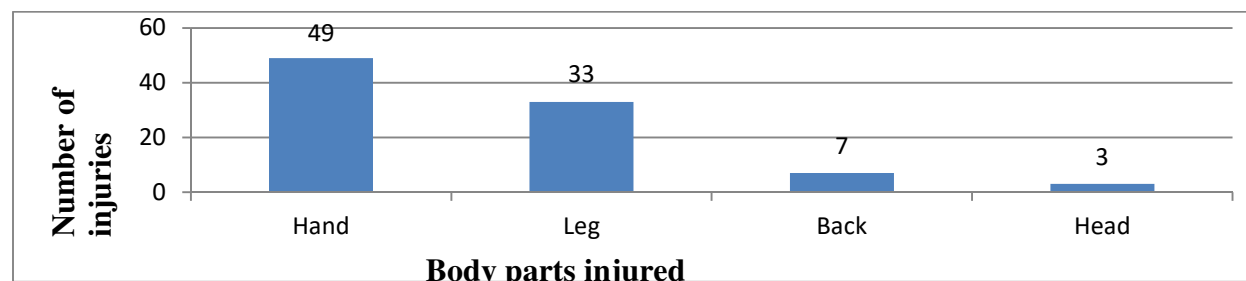


**Figure 25:** Body parts injured to house hold solid waste collectors, Nifas Silk Lafto sub city, January/2018

#### 5.5.2.4. Severity of injury

Of the 79 house hold solid waste collectors who had injury in the last one year, 42(53.2%) workers were lost from greater than or equal to ten working days due to injury. Similarly, 32(40.0%) workers lost less than ten working days. Only 73 (26.7%) study participants were vaccinated for infectious diseases like tetanus that are risk for solid waste collectors (See Table 2).

**Table 27:** Frequency distribution of occupational injuries among micro and small scale solid waste collectors in Nifas Silk Lafto sub city, January/2018

| Variables                                        | Frequency | Percentage |
|--------------------------------------------------|-----------|------------|
| <b>Injury in the last one year</b>               |           |            |
| Yes                                              | 79        | 29.5%      |
| No                                               | 189       | 70.5%      |
| <b>Injury in the last one month</b>              |           |            |
| Yes                                              | 17        | 6.3%       |
| No                                               | 251       | 93.7%      |
| <b>Seek medical care (among injured workers)</b> |           |            |
| Yes                                              | 64        | 81.1%      |
| No                                               | 15        | 18.9%      |
| <b>Body parts injured</b>                        |           |            |
| Hand injury                                      | 49        | 17.9%      |
| Leg injury                                       | 33        | 12.1%      |
| Head injury                                      | 3         | 1.1%       |
| Back injury                                      | 7         | 2.6%       |
| Fingers                                          | 39        | 14.3%      |
| Toe/feet                                         | 12        | 4.4%       |
| Lower arm/elbow                                  | 8         | 2.9%       |
| Lower leg                                        | 20        | 7.3%       |
| <b>Types of injury</b>                           |           |            |
| Car accident                                     | 2         | 0.7%       |
| Sharp and needle injury                          | 52        | 19.4%      |
| Dislocation                                      | 4         | 1.5%       |
| Poison or acid splash                            | 17        | 6.2%       |
| Bitten by dog                                    | 4         | 1.5%       |
| Falling injury/Collision                         | 9         | 3.3%       |
| <b>Number of injuries in the last one year</b>   |           |            |
| Once                                             | 57        | 21.3%      |
| Twice                                            | 18        | 6.7%       |
| ≥Three times                                     | 4         | 1.5%       |
| <b>Working days lost due to injury</b>           |           |            |
| None                                             | 6         | 7.6%       |
| < 10 days                                        | 31        | 39.2%      |
| ≥ 10 days                                        | 42        | 53.2%      |
| <b>Vaccinated for tetanus toxoid</b>             |           |            |
| Yes                                              | 72        | 26.9%      |
| No                                               | 196       | 73.1%      |

### 5.5.3. Utilization of personal protective equipment

Out of 268 respondents, 142 (53.0%) used some kinds of personal protective equipment (PPE) while they are on duty and the rest 126 (47.0%) were non users of PPE. The most used personal protective equipment was gown, 83 (58.5%) followed by hand glove 10 (7.0%). The main reasons for none users were no access, because they purchase these personal protective for themselves and discomfort during work time (See Table 3). Among injured workers, 58(73.4%) were exposed for injuries while they were on duty of transferring/emptying wastes from household's container to the large dust bin, 14(17.7%) were exposed during picking openly disposed wastes from the ground with bare hand and others 7(8.9%) were exposed during lifting/carrying dust bins.

### 5.5.4. Behavioral characteristics of respondents

Fifty three (19.4%) were not satisfied on their current job and 146 (53.5%) were not satisfied on the level of payment. Thirty two (11.7%) house hold solid waste collectors encountered sleeping disturbance. Twenty respondents (7.3%), 45 (16.5%) and 5 (1.8%) respondents practiced chat chewing, alcohol drinking and cigarette smoking respectively (See Table 3).

**Table 28:** Utilization of personal protective equipment and behavioral characteristics of respondents, in Nifas Silk Lafto sub city solid waste collectors, January/ 2018

| Variables                                                      | Frequency | Percentage |
|----------------------------------------------------------------|-----------|------------|
| <b>Availability of PPE</b>                                     |           |            |
| Yes                                                            | 154       | 57.5%      |
| No                                                             | 114       | 42.5%      |
| <b>Using PPE on duty</b>                                       |           |            |
| Yes                                                            | 142       | 53.0%      |
| No                                                             | 126       | 47.0%      |
| <b>Actual use of PPE during data collection on observation</b> |           |            |
| Yes                                                            | 112       | 41.8%      |
| No                                                             | 156       | 58.2%      |
| <b>Training on occupational health and safety before</b>       |           |            |
| Yes                                                            | 107       | 39.9%      |
| No                                                             | 161       | 60.1%      |
| <b>On job training on occupational health and safety</b>       |           |            |
| Yes                                                            | 144       | 53.7%      |
| No                                                             | 124       | 46.3%      |
| <b>Cigarette smoking</b>                                       |           |            |
| Yes                                                            | 6         | 2.2%       |
| No                                                             | 262       | 97.8%      |
| <b>Chat chewing</b>                                            |           |            |
| Yes                                                            | 21        | 7.8%       |
| No                                                             | 247       | 92.2%      |
| <b>Alcohol drinking</b>                                        |           |            |
| Yes                                                            | 44        | 16.4%      |
| No                                                             | 224       | 83.6%      |

|                                        |     |       |
|----------------------------------------|-----|-------|
| <b>Sleeping disorder</b>               |     |       |
| Yes                                    | 31  | 11.6% |
| No                                     | 237 | 88.4% |
| <b>Job satisfaction</b>                |     |       |
| Yes                                    | 216 | 80.6% |
| No                                     | 52  | 19.4% |
| <b>Satisfaction on current payment</b> |     |       |
| Yes                                    | 123 | 46.5% |
| No                                     | 145 | 53.5% |

#### 5.5.5. What was observed?

Out of 112 respondents wore personal protective equipment on observation, 82 (73.2%) wore only gown, 10 (8.9%) only hand glove, 7 (6.3%) gown, traditional hat and hand glove, 6 (5.4%) gown and traditional hat and 1 (0.9%) wore gown and hand glove (See Figure 3). None of respondents wore face mask and special shoes/boots at observation. Almost all house hold waste collectors walk long distance with heavy carry as long as 300m to 500m by estimation. All (100%) of dust bins or waste containers during data collection on observation had unsegregated wastes. All dust bins had plastics and plastic bottles. In addition broken glass, soil, ash, needle, blade, bad chemical containers and others were added to dust bins.

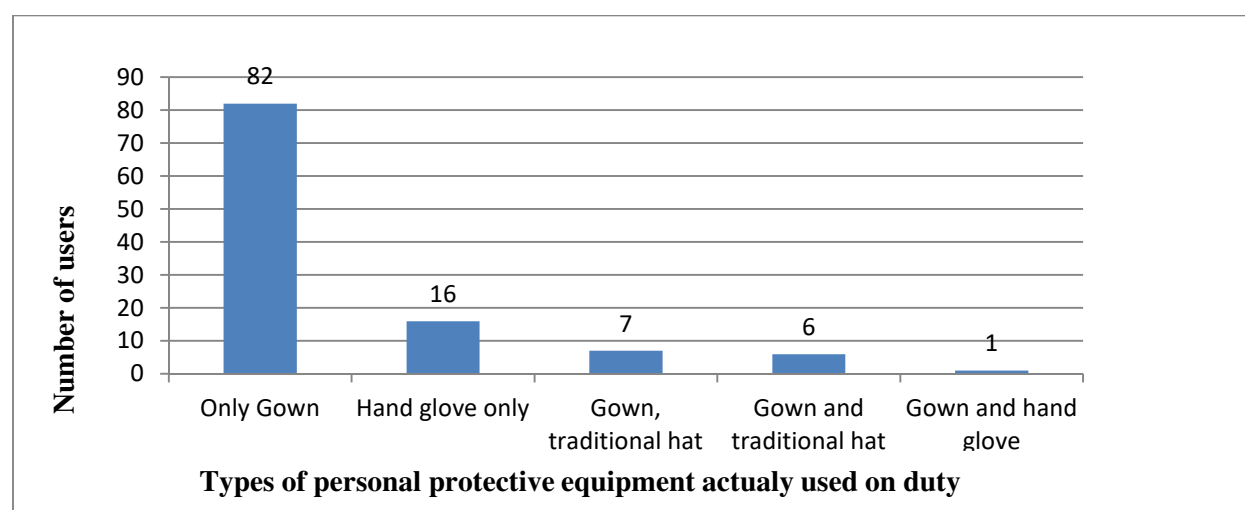


**Figure 26:** Types of personal protective equipment actually used by house hold solid waste collectors on observation during data collection, Nifas Silk Lafto sub city, January/2018



**Photo 1:** House hold solid waste collectors working by their bare hands, Nifas Silk Lafto sub city, January/2018



**Photo 2:** Unsegregated wastes, Nifas Silk Lafto sub city, January/2018



**Photo 3:** House hold Solid waste collectors carrying dust containers long distance from house to centrally collection point, Nifas Silk Lafto sub city, January/2018

### 5.5.6. Factors Associated with Occupational Injury

#### 5.5.6.1. Bivariate analysis

The bivariate logistic analysis of socio\_demographic characteristics with occupational injury shown that age, not being in marriage bond, being illiterates, having family size greater than or equal to three and working more than eight hours per day were significantly associated with physical injuries related to work. While sex and work experience were slightly significant. Monthly income and employment condition did not show significant association with occupational injury. Bivariate analysis result for personal protective equipment availability and utilization showed that training about solid waste collection and its side effects and how to protect themselves from occupational injury before the actual work and on operation were significantly associated while the rest were not associated with occupational injury. The bivariate analysis for personal and behavioral variables showed that job satisfaction, satisfaction on the level of payment, alcohol drinking and sleeping disorder were associated with occupational injury related to work. While the rest: cigarette smoking and chat chewing were not associated with occupational injury related to house hold solid waste collection (See Table 4).

**Table 29:** Bivariate analysis results on occupational injuries of house hold solid waste collectors, Nifas Silk Lafto sub city, January/2018

| Variables                             | Injury status in the last one year |           | X <sup>2</sup> | Significance | COR (95 % CI)        | P-value       |
|---------------------------------------|------------------------------------|-----------|----------------|--------------|----------------------|---------------|
|                                       | Yes N (%)                          | No N (%)  |                |              |                      |               |
| <b>Sex</b>                            |                                    |           | 1.871          | 0.171        | 1.511 (0.882,2.589)  | <b>0.133*</b> |
| Male                                  | 33(28.6)                           | 63(68.4)  |                |              |                      |               |
| Female <sup>RG</sup>                  | 45(26.3)                           | 126(73.7) |                |              |                      |               |
| <b>Age</b>                            | —                                  | —         | NA             | NA           | 1.036(1.004,1.068)   | <b>0.027*</b> |
| <b>Marital status</b>                 |                                    |           | 10.159         | 0.017        |                      | <b>0.030*</b> |
| Married <sup>RG</sup>                 | 68(33.8)                           | 133(66.2) |                |              |                      |               |
| Single                                | 4(10.3)                            | 35(89.7)  |                |              | 0.224(0.076,0.655)   | 0.006         |
| Divorced/separated/Widowed            | 7(17.6)                            | 21(82.4)  |                |              | 0.419(0.116,1.509)   | 0.183         |
| <b>Educational status</b>             |                                    |           | 12.151         | 0.002        |                      | <b>0.003*</b> |
| Illiterate                            | 48(40.3)                           | 71(59.7)  |                |              | 2.434(0.846,6.999)   | 0.099         |
| Primary school (1-8)                  | 26(20.6)                           | 100(79.4) |                |              | 0.936(0.318,2.758)   | 0.905         |
| Secondary school (9-12) <sup>RG</sup> | 5(21.7)                            | 18(78.3)  |                |              |                      |               |
| <b>Family size</b>                    |                                    |           | 13.622         | 0.001        |                      | <b>0.001*</b> |
| Two <sup>RG</sup>                     | 6(18.8)                            | 26(81.2)  |                |              |                      |               |
| Three to four                         | 59(38.3)                           | 95(61.7)  |                |              | 2.691(1.046,6.926)   | 0.040         |
| Five and above                        | 14(17.1)                           | 68(82.9)  |                |              | 0.892(0.310,2.569)   | 0.833         |
| <b>Work experience</b>                |                                    |           | 4.154          | 0.125        |                      | <b>0.129*</b> |
| <3years <sup>RG</sup>                 | 30(24.4)                           | 93(75.6)  |                |              |                      |               |
| 3-5years                              | 22(39.3)                           | 34(60.7)  |                |              | 2.006(0.1020,3.943)  | 0.044         |
| ≥6years                               | 27(30.3)                           | 62(69.7)  |                |              | 1.350(0.733,2.488)   | 0.336         |
| <b>Working hours per day</b>          |                                    |           | 31.380         | 0.000        |                      | <b>0.000*</b> |
| ≤8hrs <sup>RG</sup>                   | 8(8.2)                             | 89(91.8)  |                |              |                      |               |
| >8hrs                                 | 71(41.5)                           | 100(58.5) |                |              | 7.899 (3.604,17.313) |               |
| <b>Working days per week</b>          |                                    |           | 0.231          | 0.631        |                      | 0.471         |
| ≤5days <sup>RG</sup>                  | 5(22.7)                            | 17(77.3)  |                |              |                      |               |
| ≥6days                                | 74(30.1)                           | 172(69.9) |                |              | 1.463(0.520,0.4.113) |               |

|                                                        |                      |                       |        |       |                      |               |
|--------------------------------------------------------|----------------------|-----------------------|--------|-------|----------------------|---------------|
| <b>Get training before</b><br>Yes <sup>RG</sup><br>No  | 15(14.0)<br>64(39.8) | 92(86.0)<br>97(60.2)  | 19.256 | 0.000 | 4.047(2.154,7.602)   | <b>0.000*</b> |
| <b>Get on job training</b><br>Yes <sup>RG</sup><br>No  | 34(23.6)<br>45(36.3) | 110(76.4)<br>79(63.7) | 4.561  | 0.033 | 1.843(1.084,3.134)   | <b>0.024*</b> |
| <b>Cigarette smoking</b><br>Yes<br>No <sup>RG</sup>    | 1(16.7)<br>78(29.8)  | 5(83.3)<br>184(70.2)  | 0.540  | 0.463 | 0.472(0.054, 4.105)  | 0.496         |
| <b>Chat chewing</b><br>Yes<br>No <sup>RG</sup>         | 8(38.1)<br>71(28.7)  | 13(61.9)<br>176(71.3) | 0.426  | 0.514 | 0.656 (0.261,1.650)  | 0.370         |
| <b>Alcohol drinking</b><br>Yes<br>No <sup>RG</sup>     | 36(81.8)<br>43(19.2) | 8(18.2)<br>181(80.8)  | 66.394 | 0.000 | 18.942(8.217,43.663) | <b>0.000*</b> |
| <b>Sleeping disorder</b><br>Yes<br>No <sup>RG</sup>    | 16(51.6)<br>63(26.6) | 15(48.4)<br>174(73.4) | 7.102  | 0.008 | 2.946 (1.376,6.306)  | <b>0.005*</b> |
| <b>Payment satisfaction</b><br>Yes <sup>RG</sup><br>No | 23(18.1)<br>56(38.6) | 100(81.9)<br>89(61.4) | 11.764 | 0.001 | 2.736 (1.558,4.805)  | <b>0.000*</b> |
| <b>Job satisfaction</b><br>Yes <sup>RG</sup><br>No     | 57(26.4)<br>22(42.3) | 159(73.6)<br>30(57.7) | 4.372  | 0.037 | 2.046 (1.092, 3.833) | <b>0.025*</b> |

**Note:** NA=Not Applicable, \* = Significant variables on bivariate analysis

#### **5.5.6.2.Multivariable analysis**

In multivariable analysis, working more than 8 hours per day, training about occupational health and safety before actual work, alcohol drinking, sleeping disorder and satisfaction on the level of payment were significantly associated with occupational injury of house hold solid waste collection workers. The likelihood of occupational injury was found to be significantly higher (AOR = 8.345, 95 % CI (3.029, 22.993), P-value = 0.000)) among respondents of working more than 8hrs per day. Those of respondents drank to alcohol (AOR = 55.917, 95%CI: (15.780, 198.147), P-value = 0.000)) was significantly associated with occupational injury. The odds of occupational injury was 14.093 times (95%CI (4.733, 41.958), P-value=0.000) higher among those who reported no training about occupational health and safety before actual work as compared to having training. The odds of occupational injury was 5.596 times (95% CI, (1.851, 16.916), P-value = 0.002) higher among those who had sleeping disorder compared to normal sleeping pattern. Satisfaction on the level of payment (AOR = 2.877 (1.231, 6.722), P-value = 0.015) was also another variable that showed significant and positive association with work related occupational injuries to house hold solid waste collectors compared to those of satisfied individuals(See Table 5).

**Table 30:** Multivariable logistic regression analysis result on occupational injuries among micro and small scale enterprise solid waste collectors, Nifas Silk Lafto sub city, January/2018

| Variables                                                          | Injury status in the last one year |                       | AOR(95% CI)            | P-value |
|--------------------------------------------------------------------|------------------------------------|-----------------------|------------------------|---------|
|                                                                    | Yes N (%)                          | No N (%)              |                        |         |
| <b>Working hours per day</b><br>≤8hrs <sup>RG</sup><br>>8hrs       | 8(8.2)<br>71(41.5)                 | 89(91.8)<br>100(58.5) | 8.345(3.029,22.993)    | 0.000   |
| <b>Training before actual work</b><br>Yes <sup>RG</sup><br>No      | 15(14.0)<br>64(39.8)               | 92(86.0)<br>97(60.2)  | 14.093(4.733,41.958)   | 0.000   |
| <b>Alcohol drinking</b><br>Yes<br>No <sup>RG</sup>                 | 36(81.8)<br>43(19.2)               | 8(18.2)<br>181(80.8)  | 55.917(15.780,198.147) | 0.000   |
| <b>Sleeping disorder</b><br>Yes<br>No <sup>RG</sup>                | 16(51.6)<br>63(26.6)               | 15(48.4)<br>174(73.4) | 5.596(1.851,16.916)    | 0.002   |
| <b>Satisfaction on level of payment</b><br>Yes <sup>RG</sup><br>No | 23(18.1)<br>56(38.6)               | 100(81.9)<br>89(61.4) | 2.877(1.231,6.722)     | 0.015   |

### **5.6. Discussion**

This study was done to assess the magnitude of work related injury and associated factors in the last one year among house hold solid waste collection workers in Nifas Silk Lafto sub city, Addis Ababa.

In this study, the overall annual magnitude of work related injury was 29.5%. The one month cumulative incidence was 6.3%. A study conducted in Egypt during 2012 reported that 60.8% prevalence rate of one or more work related musculo-skeletal injuries (13). This may be justified as: no suitable and complete protective equipment given; their protective equipment could not serve to the intended purpose because they were not of good quality and most workers were not using them at work always; it was rare to find workers in their complete clothing at work opposing to the ideal situation; the type of waste and management systems.

This study has showed that hands 18%, fingers 14.3%, legs 12.1%, toe/feet 4.4%, and back 2.6% as the most commonly injured area of the body. A study conducted in Zimbabwe among solid waste management workers had showed that hands, fingers or foot 40%, legs 5%, back 5%. The discrepancy between hand, fingers and leg injury may be due to the utilization of personal protective equipment. In Zimbabwe, sharp objects and broken glasses were disposed haphazardly to dust bins and risk to cause occupational injury easily(36).

In this study, the most frequent causes of work related injury were sharp and needle objects (19.4%), poison or chemical splash (6.2%), and fall (2.6%). A study conducted in Gujarat, India during 2009 on occupational injury of door to door solid waste collectors showed that cutting injury was the leading (42%) cause of injury followed by repetitive motion (6.4%), puncture (4.3%) and fracture (2.6%) (10). Recycling sector injuries and worker safety bulletin, 2015 identified that lifting, pushing and pulling of waste bins were major causes for occupational injuries. The possible reasons in which sharps and needle objects were the common cause of injury for this study population are: The absence of safety training, especially on job training, limited use of personal protective devices while on duty and prolonged duration of working hours were major factors that contribute to the occurrence of injury (5). Sharps and broken objects were disposed together with the general waste (mixed waste/unsegregated waste); Even, workers that used hand gloves at the time of data collection were of poor quality; No continuous and frequent use of the personal protective equipment; The community used bag/bin is not puncture proved to store wastes so that the collectors became easily injured during handling.

This study showed that Workers who reported higher working hours per day (>8 hours) were more likely to report work related injury than their counterparts. A study conducted on occupational injury among industry workers in Ethiopia stated that workers who were engaged for more than 48 hours per week were more likely to develop injuries than who engaged for less than 48 hours. Fatal accidents usually occur to workers who could have had a long working time; the routine type of daily work may not require special experience or skill and those engaged in such routine activities for long period of time with poor working environment may sustain job dissatisfaction; workers stayed for long period of time may had increased vulnerability of different injuries (37).

The occurrence of work related injury was also associated with health and safety training. Those workers who had not health and safety training were more likely to report work related injury than trained one. Because of lack of health and safety training towards danger of their occupation, 47.0% of workers did not use the personal protective equipment frequently at work. A study conducted in Northern parts of Ethiopia stated that those workers who had not health and safety training were 2.569 times more likely to report work related injury than trained one. The absence of safety training, especially on job training, limited use of personal protective devices while on duty and prolonged duration of working hours were major factors that contribute to the occurrence of injury. This is due to un-trained workers were not aware of the cause of injuries and their reduction and prevention methods, un-trained workers did not use the personal protective equipment frequently and correctly at work(14).

In this study Alcohol consumption was strongly and significantly associated variable with work related injury. A study conducted in Mumbai, India stated that heavy drinkers were more likely to be injured than non-drinkers(29). This was due to alcohol can impair judgmental and psychomotor skills, alcohol took before work begins cause spillover effects, such as fatigue and hangovers, alcohol may be more likely to be engaged in other behaviors that increase the risk of injury.

The result of the study has shown that the occurrence of work-related injury is significantly and positively associated to sleeping disorder. Respondents with sleeping disorder had 5.633 times higher injury than who had normal sleeping pattern. This could explain that sleeping disorders affect the ability to maintain wakefulness, concentration, ability in assessing or watching the work environment and working conditions (25).

Satisfaction on the level of payment was also another statistically associated variable with work related injury of house hold solid waste collectors. In this study, those of respondents who were not satisfied on the level of payment had 2.877 times more likely to develop than to their counterparts. A study conducted during 2016 in Ethiopia stated that those of individuals not satisfied on their level of payment were more likely to be injured than the satisfied ones. Not being satisfied on the level of payment may cause the emotional instability and may decrease motivational energy on work and became ignorant to protect themselves from injury(6).

### **5.7. Strengths and limitations**

#### **5.7.1. Limitations**

- ❖ It did not identify the cause and effect relation sheep between the dependent and independent variables.
- ❖ There could be possibility of recall bias resulting in under or over reporting and misreporting of events.

### **5.8. Conclusion**

Compared to other similar studies conducted in developed and developing countries, the magnitude of work related injury was 29.5% in the study area. Of the 79 house hold solid waste collectors who had injury in the last one year, 42(53.2%) workers were lost  $\geq 10$  working days due to injury. The commonest causes of injury were sharp and needle objects, poison or chemical splash and fall. Factors related to injury were working more than 8 hours per day, alcohol consumption, not having health and safety training, sleeping disorder and being not satisfied on the level of current payment. However, some factors proved to be more significant and more influential than others. Workers who worked more than 8 hours per day, alcohol drinkers, not trained about occupational health and safety before actual work, respondents who had sleeping disorder and not satisfied on their payment had significantly higher risks of Work-related injury compared to their counterparts.

### **5.9. Recommendations**

- Nifas Silk Lafto sub city sanitation administration office: better to give occupational health and safety training to house hold solid waste collectors
- Better to support on personal protective equipment supply: Nifas Silk Lafto sub city sanitation administration office
- Better to minimize alcohol consumption: micro and small scale enterprise solid waste collectors
- Better to minimize working hours: micro and small scale enterprise solid waste collectors

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**Annex 1: English Version questionnaire**

**Survey Questionnaire for micro and small scale enterprise solid waste collectors (MSE)**

**St. Paul's Hospital Millennium Medical College**

**Department of Public Health**

**Consent form**

**Introduction:** Hello! My name is **Lijalem Getie**, a resident of the Department of Public Health Field Epidemiology Training Program at St. Paul's Hospital Millennium Medical College. I am now doing my master's thesis on the title "*Assessment of prevalence of occupational injury and associated factors among micro and small scale enterprise solid waste collectors in Nifas Silk Lafto sub city.*" The purpose of this research is that to investigate the occupational injuries associated with micro and small scale enterprise solid waste collectors in Nifas Silk Lafto sub city, by identifying the gaps in the working environment, it is intended to suggest best possible recommendation for concerned bodies. You are randomly selected from those your union members, who were working under Nifas Silk Lafto sub-city's sanitation administration office. For questions that can be asked by the interviewer, you can give your answer according to your understanding.

**Confidentiality and Consent:** "I am going to ask you some very personal questions that some people find difficult to answer. Your answers are completely confidential. Your name and household members will not be written on this form, and will never be used in connection with any of the information you tell me. You do not have to answer any questions that you do not want to answer, and you may end this interview at any time you want to. However, your honest answers to these questions will help me for better understanding in the situations of the occupational injuries associated with solid waste collection to micro and small scale enterprises in Nifas Silk Lafto sub city. I pledge ethically to keep your response with the rules of confidentiality. Therefore, I would like to request for your cooperation to respond as per the demand of the question honestly & objectively. I would be thankful for your response.

| S.N       | Variables                                          | Response options                                                                                                                                                                         | Remark |
|-----------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| <b>1.</b> | <b>Socio-demographic information</b>               |                                                                                                                                                                                          |        |
| 1.1.      | Sex                                                | <ul style="list-style-type: none"> <li>• Male</li> <li>• Female</li> </ul>                                                                                                               |        |
| 1.2.      | Age                                                | _____ (in years)                                                                                                                                                                         |        |
| 1.3.      | Marital status?                                    | <ul style="list-style-type: none"> <li>• Married</li> <li>• Single</li> <li>• Divorced</li> <li>• Separated</li> <li>• Widowed</li> </ul>                                                |        |
| 1.4.      | Educational status?                                | <ul style="list-style-type: none"> <li>• Illiterate</li> <li>• Primary school (1-8 grades)</li> <li>• Secondary school (9-12 grades)</li> <li>• College certificate and above</li> </ul> |        |
| 1.5.      | Employment condition?                              | <ul style="list-style-type: none"> <li>• Self-employment in association</li> <li>• Permanent</li> <li>• Contract</li> </ul>                                                              |        |
| 1.6.      | Do you have other job than solid waste collection? | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>                                                                                                                    |        |
| 1.7.      | Family size?                                       | <ul style="list-style-type: none"> <li>• An individual alone</li> <li>• Two</li> <li>• Three to four</li> <li>• Five and above</li> </ul>                                                |        |
| 1.8.      | Work experience as waste collector?                | <ul style="list-style-type: none"> <li>• &lt;3 years</li> <li>• 3-5 years</li> <li>• &gt;=6years</li> </ul>                                                                              |        |

|           |                                                                                         |                                                                                                                                                                                                                                |  |
|-----------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 1.9.      | Working hours per day?                                                                  | <ul style="list-style-type: none"> <li>• ≤ 8hrs</li> <li>• &gt;8hrs</li> </ul>                                                                                                                                                 |  |
| 1.10.     | Working days per week?                                                                  | <ul style="list-style-type: none"> <li>• ≤5 days per week</li> <li>• 6 days per week</li> <li>• 7 days per week</li> </ul>                                                                                                     |  |
| 1.11.     | What is your monthly income in Ethiopian birr?                                          | <ul style="list-style-type: none"> <li>• 500-1000 birr</li> <li>• 1000-1500 birr</li> <li>• 1500-2000 birr</li> <li>• &gt; 2000 birr</li> </ul>                                                                                |  |
| <b>2.</b> | <b>Work related injury characteristics</b>                                              |                                                                                                                                                                                                                                |  |
| 2.1.      | Did you face any type of injury in the past one year related to solid waste collection? | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>                                                                                                                                                          |  |
| 2.2.      | If you say “yes” to Q 2.1., what type of injury was that?                               | <ul style="list-style-type: none"> <li>• Bitten by dog</li> <li>• Sharp and needle injury</li> <li>• Poison or acid splash</li> <li>• Falling injury</li> <li>• Car accident</li> <li>• Burn</li> <li>• Dislocation</li> </ul> |  |
| 2.3.      | What was the cause of injury?                                                           | <ul style="list-style-type: none"> <li>• Hit by falling objects</li> <li>• Falls</li> <li>• Lifting heavy objects</li> <li>• Splintering objects</li> <li>• Collision</li> </ul>                                               |  |
| 2.4.      | If yes to Q2.1, when did face you injury?                                               | <ul style="list-style-type: none"> <li>• During emptying house hold's dust bin</li> <li>• During picking openly distributed wastes</li> <li>• During carrying dust bins to the nearby</li> </ul>                               |  |

|       |                                                                                          |                                                                                                                                                                                                                                |  |
|-------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|       |                                                                                          | large dust bin                                                                                                                                                                                                                 |  |
| 2.5.  | Did you face any type of injury in the past one month related to solid waste collection? | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>                                                                                                                                                          |  |
| 2.6.  | If you say “yes” to Q 2.4., what type of injury was that?                                | <ul style="list-style-type: none"> <li>• Bitten by dog</li> <li>• Sharp and needle injury</li> <li>• Poison or acid splash</li> <li>• Falling injury</li> <li>• Car accident</li> <li>• Burn</li> <li>• Dislocation</li> </ul> |  |
| 2.7.  | How many times were you injured in the past one year?                                    | <ul style="list-style-type: none"> <li>• Not at all</li> <li>• Once</li> <li>• Twice</li> <li>• More than two times</li> </ul>                                                                                                 |  |
| 2.8.  | Which part (s) of your body was/were injured?                                            | <ul style="list-style-type: none"> <li>• Hand</li> <li>• Leg</li> <li>• Back</li> <li>• Head</li> <li>• Eye</li> <li>• Tooth</li> </ul>                                                                                        |  |
| 2.9.  | If you answered as “hand”, which part of your hand was injured?                          | <ul style="list-style-type: none"> <li>• Elbow</li> <li>• Finger</li> <li>• Upper arm</li> <li>• Lower arm</li> </ul>                                                                                                          |  |
| 2.10. | If you answered as “leg”, which part of your leg was injured?                            | <ul style="list-style-type: none"> <li>• Knee</li> <li>• Toe/feet</li> <li>• Upper leg</li> <li>• Lower leg</li> </ul>                                                                                                         |  |

|           |                                                                                         |                                                                                                                                                                                                       |  |
|-----------|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 2.11.     | Working time lost due to injury in the past one year?                                   | <ul style="list-style-type: none"> <li>• &lt;10days</li> <li>• &gt;=10days</li> </ul>                                                                                                                 |  |
| 2.12.     | Did you seek medical care for those of injuries?                                        | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>                                                                                                                                 |  |
| 2.13.     | If you say “yes” to Q 2.11., from where did you get medical care?                       | <ul style="list-style-type: none"> <li>• Government health facilities</li> <li>• Private health facilities</li> <li>• Traditional healers</li> <li>• Religious remedies</li> </ul>                    |  |
| 2.14.     | Did you get admitted because of injuries?                                               | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>                                                                                                                                 |  |
| 2.15.     | Did you get vaccinated for tetanus toxoid before your job?                              | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>                                                                                                                                 |  |
| <b>3.</b> | <b>Personal protective equipment availability and utilization</b>                       |                                                                                                                                                                                                       |  |
| 3.1.      | Do you have personal protective equipment?                                              | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>                                                                                                                                 |  |
| 3.2.      | If you say “yes” to Q 3.1., which type of equipment do you have?                        | <ul style="list-style-type: none"> <li>• Hand glove</li> <li>• Eye goggle</li> <li>• Helmet</li> <li>• Traditional hat</li> <li>• Special shoe/boots</li> <li>• Face mask</li> <li>• Gowns</li> </ul> |  |
| 3.3.      | Did you use your personal protective equipment regularly during solid waste collection? | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>                                                                                                                                 |  |
| 3.4.      | If No to Q3.3, what is your reason?                                                     | <ul style="list-style-type: none"> <li>• No PPE</li> <li>• Discomfort during work</li> <li>• I did not know the importance of PPE</li> </ul>                                                          |  |

|           |                                                                                                      |                                                                                                                                                                                                       |  |
|-----------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 3.5.      | If you say “yes” to Q 3.3., which types do you use regularly?                                        | <ul style="list-style-type: none"> <li>• Hand glove</li> <li>• Eye goggle</li> <li>• Helmet</li> <li>• Traditional hat</li> <li>• Special shoe/butts</li> <li>• Face mask</li> <li>• Gowns</li> </ul> |  |
| 3.6.      | Did you get training on occupational health and safety before actual work on solid waste collection? | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>                                                                                                                                 |  |
| 3.7.      | Did you get on job training about occupational health and safety?                                    | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>                                                                                                                                 |  |
| <b>4.</b> | <b>Personal and behavioral variables</b>                                                             |                                                                                                                                                                                                       |  |
| 4.1.      | Did you smoke cigarette?                                                                             | <ul style="list-style-type: none"> <li>• Not at all</li> <li>• Irregularly</li> <li>• Frequently</li> </ul>                                                                                           |  |
| 4.2.      | Did you chew chat?                                                                                   | <ul style="list-style-type: none"> <li>• Not at all</li> <li>• Irregularly</li> <li>• Frequently</li> </ul>                                                                                           |  |
| 4.3.      | Did you drink alcohol?                                                                               | <ul style="list-style-type: none"> <li>• Not at all</li> <li>• Irregularly</li> <li>• Frequently</li> </ul>                                                                                           |  |
| 4.4.      | Have you encountered sleeping disorder?                                                              | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>                                                                                                                                 |  |
| 4.5.      | Are you satisfied with your current job?                                                             | <ul style="list-style-type: none"> <li>• Strongly agree</li> <li>• Agree</li> <li>• Disagree</li> <li>• Strongly disagree</li> </ul>                                                                  |  |

|      |                                                                                  |                                                                       |  |
|------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------|--|
| 4.6. | Are you satisfied with your level of payment currently on this job?              | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul> |  |
| 4.7. | Did you practice eating or drinking at work place during solid waste collection? | <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul> |  |

**Observation checklist for solid waste collectors**

| S.N | Questions                                                       | Yes | No |
|-----|-----------------------------------------------------------------|-----|----|
| 1   | Do the waste collectors wear personal protective equipment?     |     |    |
| 2   | Which type of personal protective equipment do they wear?       |     |    |
| 3   | Is there any observable physical injury?                        |     |    |
| 4   | Do the waste container bags (bins) have unsegregated wastes?    |     |    |
| 5   | Do the waste collectors walking long distance with heavy carry? |     |    |

Annex 2: Amharic version questionnaire

በቤት ለቤት የደረቅ ቆሻሻ ስብሰባ ላይ በጥቃቅንና አነስተኛ ለተደራጁ ሰራተኞች የተዘጋጀ

የጥናት መጠይቅ

በቅዱስ ጳውሎስ ሆስፒታል ሚሊኒየም ሜዲካል ኮሌጅ

የህብረተሰብ ጤና ትምህርት ክፍል

መግቢያ: ጤና ይስጥልኝ ልጅዓለም ጌቱ እባላለሁ በቅዱስ ጳውሎስ ሆስፒታል ሚሊኒየም ሜዲካል ኮሌጅ የህብረተሰብ ጤና ትምህርት ክፍል የፊልድ ኢፒዲዮሎጂ ፊዚደንት ነኝ። በአሁን ሰዓት የመመረቂያ ዕሉፌን “Assessment of prevalence of occupational injury and associated factors among micro and small scale enterprise solid waste collectors in Nifas Silk Lafto sub city.” በሚል ርዕስ በንፋስ ስልክ ላፍቶ ክፍለ ከተማ ውስጥ በሚገኙና በቤት ለቤት ደረቅ ቆሻሻ አሰባሰብ በጥቃቅንና አነስተኛ ኢንተርፕራይዞች ልማት በተደራጁ ሰራተኞች ላይ ትኩረት አድርጌ ጥናቴን በመስራት ላይ እገኛለሁ። የጥናቴም ዋና አላማ በክፍለ ከተማው ውስጥ በማህበራት ተደራጅተው ደረቅ ቆሻሻ በመሰብሰብ የሚተዳደሩ ግለሰቦች በስራቸው ምክንያት ሊከሰቱ የሚችሉ የሥራ ላይ ጉዳቶችን እና ከስራው ጋር ተያይዞ የሚያጋጥሙትን ችግሮች ለመዳሰስና ለሚመለከታቸው አካላትም በጥናቴ መሰረት የጥናቴን ውጤት በማሳየት ለችግሮቹ የመፍትሄ ሀሳብ ማቅረብ ነው። እርስዎ ከተደራጁበት ማህበር ውስጥ ይህን መረጃ እንዲሰጡኝ ተመርጠዋል። ስለሆነም ከዚህ ቀጥሎ ለተቀመጡት ጥያቄዎች በተረዱት ልክ ስምዎትን መግለፅ ሳያስፈልግ የመሰለዎትን ምላሽ እንዲሰጡኝ እጠይቃለሁ። የሚሰጡኝ ምላሽ ምስጢራዊነቱ የተጠበቀ መሆኑን እየገለፅኩ ለምጠይቀዎት ጥያቄ ለሚሰጡኝ ምላሽ እና ትብብር በቅድሚያ ምስጋናየን አቀርባለሁ።

| ተ.ቁ  | ጥያቄዎች         | አማራጭ ምላሾች                                                               | ምርመራ |
|------|---------------|-------------------------------------------------------------------------|------|
| 1.   | ሥነ-ህዝባዊ መረጃዎች |                                                                         |      |
| 1.1. | ፆታ            | <ul style="list-style-type: none"> <li>ወንድ</li> <li>ሴት</li> </ul>       |      |
| 1.2. | እድሜ           | _____ (በቁጥር)                                                            |      |
| 1.3. | የጋብቻ ሁኔታ      | <ul style="list-style-type: none"> <li>ያገባ/ች</li> <li>ያላገባ/ች</li> </ul> |      |

|       |                                    |                                                                                                                                                               |  |
|-------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|       |                                    | <ul style="list-style-type: none"> <li>• የፈታ/ች</li> <li>• የተለያዩ</li> <li>• የሞተችበት/ባት</li> </ul>                                                               |  |
| 1.4.  | የትምህርት ደረጃ                         | <ul style="list-style-type: none"> <li>• ያልተማረ/ች</li> <li>• የመጀመሪያ ደረጃ ትምህርት (1-8ኛ)</li> <li>• ሁለተኛ ደረጃ (9-12ኛ)</li> <li>• የኮሌጅ ምስክር ወረቀትና ከዚያ በላይ</li> </ul> |  |
| 1.5.  | የቅጥር ሁኔታ                           | <ul style="list-style-type: none"> <li>• በግል በማህራት የተደራጁ</li> <li>• ቋሚ</li> <li>• ኮንትራት/ጊዜያዊ</li> </ul>                                                       |  |
| 1.6.  | ከዚህ ሥራ ውጭ ተጨማሪ ሥራ አለዎት?            | <ul style="list-style-type: none"> <li>• አለኝ</li> <li>• የለኝም</li> </ul>                                                                                       |  |
| 1.7.  | የቤተሰብዎ ብዛት ምን ያክል ነው?              | <ul style="list-style-type: none"> <li>• አንድ ግለሰብ ብቻ</li> <li>• ሁለትና ከዚያ በታች</li> <li>• ከሶስት እስከ አራት</li> <li>• አምስትና ከዚያ በላይ</li> </ul>                      |  |
| 1.8.  | ደረቅ ቆሻሻ በመሰብሰብ ሥራ ምን ያክል ጊዜ ሆነዎታል? | <ul style="list-style-type: none"> <li>• ከሶስት ዓመት በታች</li> <li>• ከሶስት እስከ አምስት</li> <li>• ስድስትና ከዚያ በላይ</li> </ul>                                            |  |
| 1.9.  | በቀን ምን ያክል ሰዓት ይሰራሉ?               | <ul style="list-style-type: none"> <li>• 8ሰዓትና ከዚያ በታች</li> <li>• ከ8ሰዓት በላይ</li> </ul>                                                                        |  |
| 1.10. | በሳምንት ምን ያክል ቀናት ይሰራሉ?             | <ul style="list-style-type: none"> <li>• 5ቀናትና ከዚያ በታች</li> <li>• 6ቀናት</li> <li>• 7ቀናት</li> </ul>                                                             |  |
| 1.11. | ለዚህ ሥራ የሚከፈለዎት ወርሃዊ ገቢ ምን ያክል ነው?  | <ul style="list-style-type: none"> <li>• ከ500 እስከ 1000 ብር</li> <li>• ከ1000 እስከ 1500 ብር</li> <li>• ከ1500 እስከ 2000 ብር</li> </ul>                                |  |

|      |                                                  |                                                                                                                                                                                                   |  |
|------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|      |                                                  | <ul style="list-style-type: none"> <li>• ከ2000 ብር በላይ</li> </ul>                                                                                                                                  |  |
| 2.   | ከሥራው ጋር ተያያዥነት ያላቸው ጉዳዮችና ፀባያቸው                  |                                                                                                                                                                                                   |  |
| 2.1. | ባለፈው አንድ ዓመት ውስጥ ማንኛውም አይነት የአካል ጉዳት ገጥመዎት ያውቃል? | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• አልገጠመኝም</li> </ul>                                                                                                                         |  |
| 2.2. | መልስዎ “አዎ” ከሆነ ምን አይነት የአካል ጉዳት ነበር ያጋጠመዎት?       | <ul style="list-style-type: none"> <li>• የውሻ ንክሻ</li> <li>• በስለታማና መርፌ መጎዳት</li> <li>• በአሲድና መሰል መርዛማ ነገሮች መጎዳት</li> <li>• መውደቅ አደጋ</li> <li>• የመኪና አደጋ</li> <li>• ቃጠሎ</li> <li>• ወለምታ</li> </ul> |  |
| 2.3. | ለአካል ጉዳቱ መንስኤው ምን ነበር?                           | <ul style="list-style-type: none"> <li>• ከላይ የወደቀ እቃ</li> <li>• መውደቅ</li> <li>• ከባድ እቃ ማንሳት</li> <li>• የተሰባበሩ ቁሳቁሶች</li> <li>• ግጭት</li> </ul>                                                     |  |
| 2.4. | ለተራቁጥር 2.1. ምስዎ “አዎ” ከሆነ በምን ወቅት ነው ጉዳቱ የሚከሰተው?  | <ul style="list-style-type: none"> <li>• ከእቃ ወደ እቃ ለመገልበጥ በሚደረግ ሥራ</li> <li>• የወዳደቁ ቆሻሻዎችን በባዶ እጅ ለማንሳት በሚደረግ ሥራ</li> <li>• ቆሻሻውን ተሽክሞ ወደ ትልቁ ማጠራቀሚያ ሲኬድ በሚደረግ ሥራ</li> </ul>                      |  |
| 2.5. | ባለፈው አንድ ወር ውስጥ ማንኛውም አይነት የአካል ጉዳት ገጥመዎት ያውቃል?  | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• አልገጠመኝም</li> </ul>                                                                                                                         |  |
| 2.6. | መልስዎ “አዎ” ከሆነ ምን አይነት የአካል ጉዳት ነበር ያጋጠመዎት?       | <ul style="list-style-type: none"> <li>• የውሻ ንክሻ</li> <li>• በስለታማና መርፌ መጎዳት</li> </ul>                                                                                                            |  |

|       |                                           |                                                                                                                                                     |  |
|-------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--|
|       |                                           | <ul style="list-style-type: none"> <li>• በአሲድና መሰል መርዛማ ነገሮች መጎዳት</li> <li>• መውደቅ አደጋ</li> <li>• የመኪና አደጋ</li> <li>• ቃጠሎ</li> <li>• ወለምታ</li> </ul> |  |
| 2.7.  | ባለፈው አንድ ዓመት ውስጥ ስንት ጊዜ ጉዳት አጋጥመዎት ያውቃል?  | <ul style="list-style-type: none"> <li>• ምንም ጉዳት አላጋጠመኝም</li> <li>• አንድ ጊዜ</li> <li>• ሁለት ጊዜ</li> <li>• ከሁለት ጊዜ በላይ</li> </ul>                      |  |
| 2.8.  | የትኛው የአካል ክፍል ነበር ጉዳት የደረሰበት?             | <ul style="list-style-type: none"> <li>• እጅ</li> <li>• እግር</li> <li>• ጀርባ</li> <li>• እራስ</li> <li>• ዐይን</li> <li>• ጥርስ</li> </ul>                   |  |
| 2.9.  | መልስዎ “እጅ” ከሆነ የትኛው የእጅ ክፍል ነበር የተጎዳው?     | <ul style="list-style-type: none"> <li>• ክርን</li> <li>• ጣት</li> <li>• የላይኛው ክንድ</li> <li>• የታችኛው ክንድ</li> </ul>                                     |  |
| 2.10. | መልስዎ “እግር” ከሆነ የትኛው የእግር ክፍል ነበር የተጎዳው?   | <ul style="list-style-type: none"> <li>• ጉልበት</li> <li>• የእግር ጣት/ጫማ</li> <li>• የላይኛው የእግር ክፍል</li> <li>• የታችኛው የእግር ክፍል</li> </ul>                  |  |
| 2.11. | በአካል ጉዳት ምክንያት የባከነው የሥራ ቀናት ምን ያክል ይሆናሉ? | <ul style="list-style-type: none"> <li>• ከ10ቀናት በታች</li> <li>• 10ቀናትና ከዚያ በላይ</li> </ul>                                                            |  |
| 2.12. | ለነዚህ የአካል ጉዳቶች ህክምና አግኝተዋል?               | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• አላገኘሁም</li> </ul>                                                                            |  |

|       |                                                    |                                                                                                                                                                                                                                            |  |
|-------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 2.13. | መልስዎ “አዎ” ከሆነ ከየት ነበር ህክምናውን ያገኙት?                 | <ul style="list-style-type: none"> <li>• ከመንግስት ጤና ተቋማት</li> <li>• ከግል ጤና ተቋማት</li> <li>• ከባህላዊ መድኃኒት ቤት</li> <li>• ከሐይማኖት ተቋማት</li> </ul>                                                                                                 |  |
| 2.14. | በአካል ጉዳት ምክንያት በሆስፒታል ተኝተው ያውቃሉ?                   | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• አላውቅም</li> </ul>                                                                                                                                                                    |  |
| 2.15. | ለቴታነስ አምጭ ተህዋስ መከላከያ ክትባት ወስደው ያውቃሉ?               | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• አላውቅም</li> </ul>                                                                                                                                                                    |  |
| 3.    | የደህንነት መከላከያ መሳሪያዎችን በተመለከተ የሚጠየቁ ጥያቄዎች            |                                                                                                                                                                                                                                            |  |
| 3.1.  | የደህንነት መጠበቂያ መሳሪያዎች አለዎት?                          | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• የለኝም</li> </ul>                                                                                                                                                                     |  |
| 3.2.  | መልስዎ “አዎ” ከሆነ ምን አይነት መሳሪያዎች/ቁሳቁሶች አለዎት?           | <ul style="list-style-type: none"> <li>• የእጅ ቅንት</li> <li>• የአይን ከላከያ ጉግል</li> <li>• የጭንቅላት መከላከያ ሄልሜት</li> <li>• ከሰሌን የተሰራ ባርኔጣ</li> <li>• የእግር መከላከያ ጫማ (ቡት)</li> <li>• የአፍና የአፍንጫ (የፊት ) መከላከያ ማስክ</li> <li>• የደምብ ልብስ (ጋወን)</li> </ul> |  |
| 3.3.  | እነዚህን የደህንነት መከላከያ/መጠበቂያ ቁሳቁሶችን ሁልጊዜና በአግባቡ ይጠቀማሉ? | <ul style="list-style-type: none"> <li>• እጠቀማለሁ</li> <li>• አልጠቀምም</li> </ul>                                                                                                                                                               |  |
| 3.4.  | መልስዎ “እጠቀማለሁ” ከሆነ የትኛውን አዘውትረው ይጠቀማሉ?              | <ul style="list-style-type: none"> <li>• የእጅ ቅንት</li> <li>• የአይን ከላከያ ጉግል</li> <li>• የጭንቅላት መከላከያ ሄልሜት</li> <li>• ከሰሌን የተሰራ ባርኔጣ</li> <li>• የእግር መከላከያ ጫማ (ቡት)</li> <li>• የአፍና የአፍንጫ (የፊት ) መከላከያ ማስክ</li> </ul>                           |  |

|      |                                                           |                                                                                                                |  |
|------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|--|
|      |                                                           | <ul style="list-style-type: none"> <li>• የደምብ ልብስ (ጋወን)</li> </ul>                                             |  |
| 3.5. | የደረቅ ቆሻሻ መሰብሰብ ሥራ ከመጀመሪያ ስለሥራው ደህንነትና ጤና ስልጠና አግኝተው ያውቃሉ? | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• አላገኘሁም</li> </ul>                                       |  |
| 3.6. | በሥራ ላይ እያሉ ስለሥራው ደህንነትና ጤና ስልጠና አግኝተው ያውቃሉ?               | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• አላገኘሁም</li> </ul>                                       |  |
| 4.   | ግላዊና ከግለሰብ ፀባይ ጋር የተገናኙ መጠይቆች                             |                                                                                                                |  |
| 4.1. | ሲጋራ ያጨሳሉ?                                                 | <ul style="list-style-type: none"> <li>• በጭራሽ አላጨሰም</li> <li>• አልፎ አልፎ አጨሳለሁ</li> <li>• በቋሚነት አጨሳለሁ</li> </ul> |  |
| 4.2. | ጫት ይቅማሉ (ይበላሉ)?                                           | <ul style="list-style-type: none"> <li>• በጭራሽ አልቅምም</li> <li>• አልፎ አልፎ እቅማለሁ</li> <li>• በቋሚነት እቅማለሁ</li> </ul> |  |
| 4.3. | የአልኮል መጠጥ ይጠጣሉ?                                           | <ul style="list-style-type: none"> <li>• በጭራሽ አልጠጣም</li> <li>• አልፎ አልፎ እጠጣለሁ</li> <li>• በቋሚነት እጠጣለሁ</li> </ul> |  |
| 4.4. | የእንቅልፍ ችግር አጋጥመዎት ያውቃል?                                   | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• አጋጥሞኝ አያውቅም</li> </ul>                                  |  |
| 4.5. | በሥራዎት ላይ ደስተኛ ነዎት?                                        | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• አይደለሁም</li> </ul>                                       |  |
| 4.6. | ለአሁን ሥራ በሚከፈለዎት ክፍያ ደስተኛ ነዎት?                             | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• አይደለሁም</li> </ul>                                       |  |
| 4.7. | በሥራ በታዎ ላይ ሆነው ምግብ ወይም መጠጥ ይጠቀማሉ?                         | <ul style="list-style-type: none"> <li>• አዎ</li> <li>• አልጠቀምም</li> </ul>                                       |  |

**በምልከታ የሚሞሉ መጠይቆች**

| ተ.ቁ | ጥያቄዎች                                             | አዎ | የለም |
|-----|---------------------------------------------------|----|-----|
| 1   | ደረቅ ቆሻሻ ሰብሳቢዎች በሥራ ሰዓት የደህንነት መከላከያ ቁሳቁሶችን ለብሰዋል? |    |     |

|   |                                                     |  |  |
|---|-----------------------------------------------------|--|--|
| 2 | የትኛውን አይነት የደህንነት መጠበቂያ ቁሳቁስ ለብሰዋል?                 |  |  |
| 3 | በአይን የሚታይ የአካል ጉዳት አለ?                              |  |  |
| 4 | የደረቅ ቆሻሻ ማጠራቀሚያ ቁሳቁሶች ውስጥ የተለያዩ አይነት ቆሻሻዎች ተቀላቅለዋል? |  |  |
| 5 | ደረቅ ቆሻሻውን ተሽክመው ረጅም ርቀት ይጓዛሉ?                       |  |  |