# ADDIS ABABA UNIVERSITY

# SCHOOL OF GRADUATE STUDIES

***HIV/AIDS-RELATED MORTALITY IN ADDIS ABABA CITY ADMINISTRATION***

**BY**

**Tekebash Araya, BSc.**

***A thesis submitted to the School of Graduate Studies of Addis Ababa University***

***in partial fulfilment of the requirements for the Degree of Master of Public Health***

**December, 2001**

**Addis Ababa, Ethiopia**.

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**Advisors:**

**Derege Kebede, MD, MSc, ScD.**

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**Abera Kumie, MD, MSc.**

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**Department of Community Health**
**Faculty of Medicine, Addis Ababa University**

**Approved by the Examining Board:**

| | |
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| **Examiner** | |

**Oh God**, **M**y **Lord** and **R**eal **Father,** and

**Y**our **S**on **Jesus Christ**, **M**y **Saviour**;

I have seen how strong your **love** is,

How supportive your **shoulders** are,

and how ***joyful*** is the **life** you revealed at every inch of my **step**!!

## Dedication

**T**his **P**aper is **D**edicated **T**o **Y**ou, **M**y **H**usband,

**A**to **Abera Alemayehu,**

**F**or **y**our **p**ersistent **l**ove, **s**upport, **e**ncouragement **a**nd **a**dmirable **a**dvices, **a**s **w**ell **a**s **t**he **b**asic **b**ack**g**round **e**ducation **t**hat **l**ied **s**tarting **f**rom **t**he **v**ery **e**arly **y**ears **o**f **m**y **l**ife, **a**ll **o**f **w**hich **h**ave **g**iven **t**he **s**tamina **t**o **t**his **w**ork.

So much of my love goes to my daughters **Ruth Abera, Fana Abera** and my son **Henok Abera**, whose patience and understanding love was kindling light of courage that helped me to uphold my work to the end of this tunnel.

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My immense and respect gratitude is also forwarded to Addis Ababa City Administration Labour and Social Affairs Bureau, Ethiopian Orthodox Tewahedo Patriarchate Head Office, The Ethiopian Catholic Church, Islamic Affairs Supreme Council of Addis Ababa, Ethiopia Orthodox Church Addis Ababa Diocese Secretariat, and all churches and cemeteries in Addis Ababa for the support and permission provided to register the deaths in their respective burial sites which were the main foundation for this study. All authorities in all Administrative Zones, Weredas and Kebeles of Addis Ababa with their entire population, who have been showing their cooperation starting from death registration place and time in the registries up to the verbal autopsy in their residences are also grateful. My deep appreciation is also forwarded to the MOH of Ethiopia, Addis Ababa City Administration Health Bureau, and hospitals in Addis Ababa: Tikur Anbessa Specialized Referral, Saint Paul's Specialized, Saint Peter's Tuberculosis

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Last but not least of my respect and appreciation also goes to my all relatives and friends, whose love and support has helped me in one way or the other to reach the end of this work.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| AAU | Addis Ababa University |
| AIDS | Acquired Immune Deficiency Syndrome |
| ALERT | All African Leprosy Rehabilitation and Training Centre |
| AMC | Academic Medical Centre of the University of Amsterdam |
| AMMP | Adult Morbidity and Mortality Project of the Tanzanian Ministry of Health |
| ANC | Antenatal care |
| CDR | Crude death rate |
| CSMR | Cause Specific Mortality Rate |
| CSA | Central Statistics Authority |
| CSW | Commercial Sex Workers |
| DCH | Department of Community Health |
| E.C | Ethiopian calendar |
| EHNR | Ethiopian Health and Nutrition Research Institute |
| ENARP | Ethiopian Netherlands AIDS Research Project |
| ERCS-NBTS | Ethiopian Red Cross Society, National Blood Transfusion Service |
| ETB | Ethiopian Birr |
| GGGD | Amsterdam Municipal Health Services |
| HIV | Human Immunodeficiency Virus |
| IMR | Infant Mortality Rate |
| ISAPSO | The Integrated Service for AIDS Research Prevention and Support Organization. |

| | |
|---|---|
| MOH | Ministry of Health |
| NGO | Non Governmental Organization |
| O R | Odds Ratio |
| STD | Sexually Transmitted Diseases |
| TB | Tuberculosis |
| UNAIDS | United Nations Programme on HIV/AIDS |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UNICEF | United Nations International Children's Education and Fund |
| VA | Verbal autopsy |
| WHO | World Health Organization |

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## ABSTRACT

Measurement of the impact of HIV/AIDS on mortality is of fundamental importance to develop programmes to mitigate the effects of the epidemic in Ethiopia, similar to other countries in sub-Saharan Africa. Little is known about the HIV/AIDS-related mortality in the general population of the country and especially in Addis Ababa. A prospective surveillance of deaths at burials in Addis Ababa is initiated, since information on vital events in Ethiopia, as in most of sub-Saharan Africa, is defective. In this study, verbal autopsy (VA) and clinician review techniques were used to assess the cause specific mortality (CSM) in general and HIV/AIDS-related mortality in particular, in the general population of Addis Ababa.

Since February 8, 2001 a prospective surveillance started at all the available and functioning burial sites (n=70) in the rural and urban localities of Addis Ababa, collecting information on name, sex, age, address, date of burial and presumed cause of death of the deceased. Burial sites included: all 51 orthodox churchyards, eight mosque-based, seven municipal-based, two community-based "Yesenbete mahber", one catholic-based, and one Jewish "Bete-Israel" cemetery. Verbal autopsy (VA) was conducted at 414 selected households, three to four months after death, involving 10 teams of two interviewers. Two independent clinicians reviewed and assessed the VA questionnaires and assigned causes of death. Hospital records for those who died in Addis Ababa hospitals were traced and assessed and compared with VA-derived causes of death.

In three months, 5,133 deaths were registered (45% females and 55% males). The CDR was estimated yielding to 8.23 per 1000 population per year. Neonatal mortality and infant mortality was 29/1000 and 42/1000 live births, respectively. For females, the peak percentage of deaths was 11% in the age group 25-29 years, whereas for males the peak percentage of deaths was 9.6% in the age group 35-39 years. A total of 414 deaths were selected for VA: 44, 108 and 262

for neonates, children and adults, respectively. Response rate for the three age strata ranged between 66-76%. The major cause of death was TB/HIV/AIDS-related disease in 127 deaths (41.4%) of which 96 deaths (48%) were adults and 31 deaths (29.0%) were under-12 year olds. Of the 96 (48%) adult deaths due to TB/HIV/AIDS, 48 (50%) were males and 48 (50%) females, with a male to female ratio of 1:1. Being single and age group of 60-69 years showed significantly higher risk of mortality due to TB/HIV/AIDS.

In the absence of vital events registration in Addis Ababa, surveillance for burials appeared to be a good method to estimate mortality. Through VA and physician review, the impact of TB/HIV/AIDS on mortality was estimated. Although epidemiological models revealed similar estimates, counting of deaths and providing numbers of the Addis Ababa population that die of TB/HIV/AIDS may stimulate better policy makers and public health workers to act immediately to this devastating epidemic.

It is recommended that the surveillance for burials should continue for long-term basis, as it may provide additional information on mortality (i.e. seasonal variation, and geographic differences within Addis Ababa), and may also allow for analysis of mortality trends.

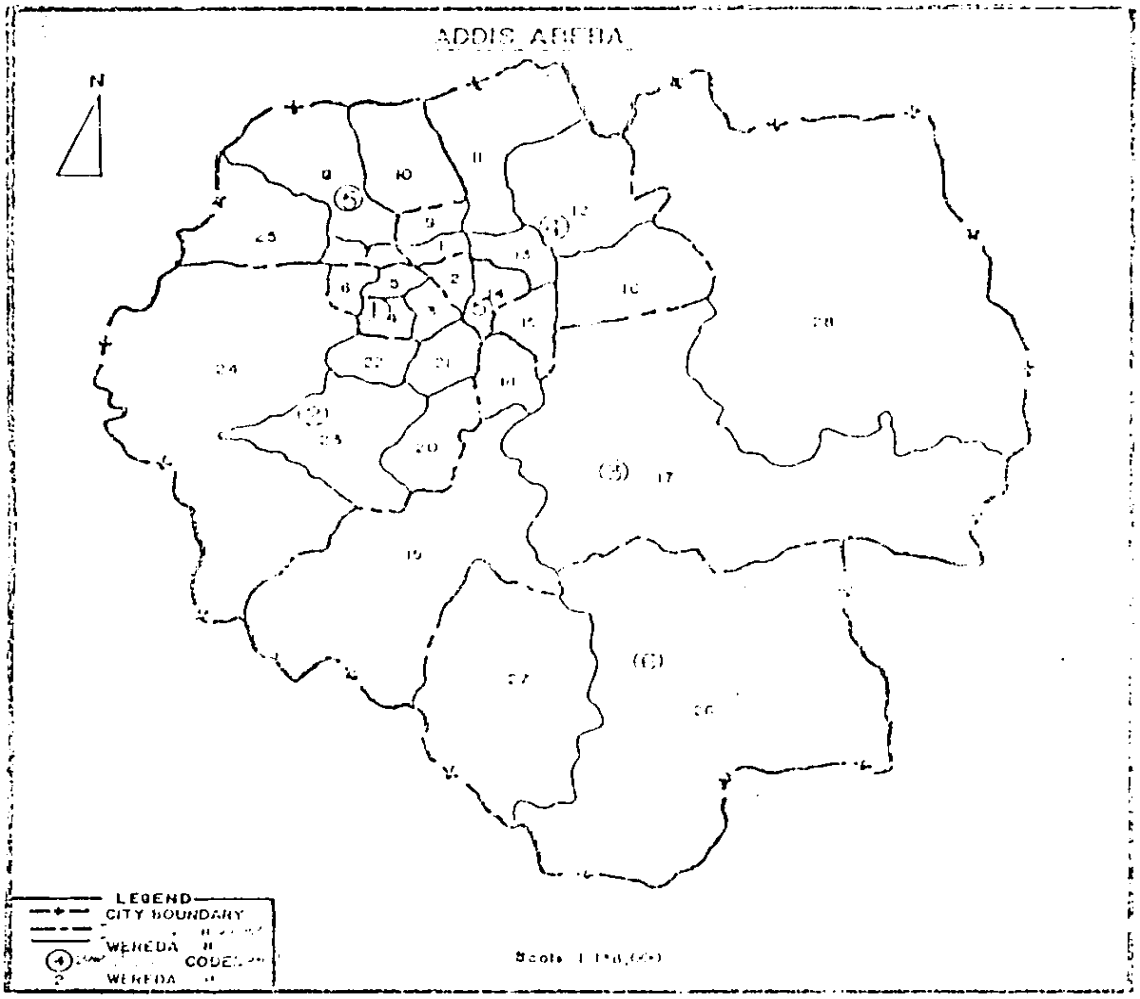



Fig.1 Map of Addis Ababa City Administration by Zone and Wereda. Addis Ababa, 2001.

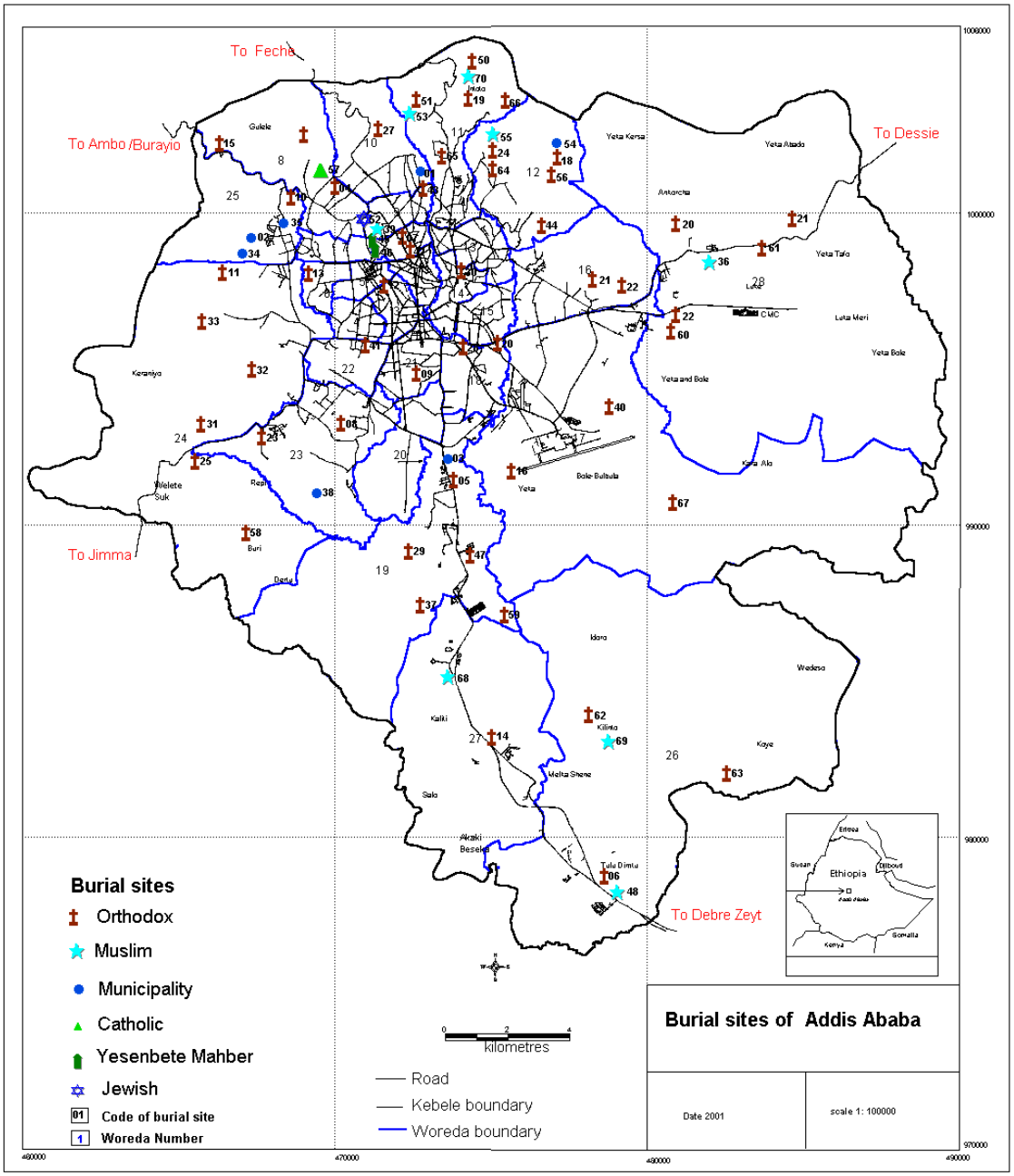



Fig.2. Cemeteries in Addis Ababa City Administration. Addis Ababa, 2001.

## 1. INTRODUCTION

Similar to other parts of East and Southeast Africa, Ethiopia is heavily affected by HIV that was introduced in the early eighties[1] and spread rapidly along major traffic routes and in urban commercial sexual networks.[2, 3] The first patients with AIDS were documented in Addis Ababa, the capital city, in 1986,[4] but the impact of AIDS on adult and child mortality has not been documented systematically.[5]

A population-based survey in Addis Ababa, performed in 1994, reported on a baseline estimate of the age-and sex-specific HIV-1 prevalence of 6.0% in men and 6.9% in women, with peak values of more than 20% in the 25-29 year age group in certain areas.[6] Sentinel surveillances, performed among pregnant women reporting to antenatal clinics in Addis Ababa, resulted in substantially higher values that range 18-16% in the period 1996-2001.[7] HIV prevalence in pregnant women in Addis Ababa, however, appears to over-estimate HIV in the population of 15-49 years of age, most probably through a –for sub-Saharan African standard- low fertility and a substantial proportion of childless women in Addis Ababa.[8]

In Ethiopia, like in most of sub-Saharan Africa, births and deaths are predominantly unrecorded. In the absence of vital events records, health planning and practice rely on epidemiological models and surveys. The potential mortality impact of AIDS is usually estimated using models based on sero-prevalence data, patterns of transmission and probability of transitions from HIV infection to AIDS and from AIDS to death.[9] For Addis Ababa, the potential impact of AIDS on mortality has been estimated to cause 60% of adult deaths by the year 2000 and life expectancy is estimated to drop with 10 and 17 years for years 2000 and 2003, respectively, assuming a stabilisation of HIV prevalence of 10%. [10]

Two factors limit the understanding of the mortality impact of HIV in Africa: little is known about adult mortality in the decades before the start of the epidemic, [11] and mortality estimates derived from modelling can only be validated in population-based mortality studies that are rarely conducted in Africa.[12]

From February 08 to May 08, 2001 a prospective population-based surveillance for deaths at all burial sites in Addis Ababa City Administration was conducted, collecting information on the name, age, sex, address and presumed cause of death of the deceased. A house-to-house verbal autopsy (VA) of a sample of deaths and physician review of the VA questionnaires has been conducted.

The rational for this study conducting in Addis Ababa was two folds: First, it was envisaged to get an insight in the possible increase of HIV/AIDS-related mortality, and second, the applicability of the verbal autopsy (VA) technique to determine cause-specific mortality (CSM) and particularly, the HIV/AIDS-related mortality without having access to serological tests in the general population of Addis Ababa, the capital city of Ethiopia. The information obtained in this study can be used to implement cost-effective interventions and to identify further areas of research in all age-and sex-groups in urban and rural communities of the country.

# 2. REVIEW OF LITERATURE

## 2.1. SCOPE OF THE GLOBAL HIV/AIDS PROBLEM

The HIV/AIDS epidemic continues to be a global public health concern. UNAIDS revealed shocking global statistics that indicated the epidemic was underestimated in the past, while HIV disease is becoming the leading cause of death in adults.[13] The cumulative number of AIDS cases as at December 1997 was estimated at 30.6million. HIV/AIDS has spread with ferocious speed and nearly 34.6 million people in the world were living with HIV/AIDS, one-third of whom were young people between ages of 10 and 24 years. Of these, 19 million were men and 14 million were women.[14]The epidemic continues to grow, worldwide and AIDS already accounted for 9% of adult deaths from infectious disease in the development world. With that respect the global pandemic of AIDS and HIV infection continues to escalate in all countries in which the disease has been reported. On that line it was strongly emphasized that AIDS is today the greatest threat to the public health, social and economic in our life-time and has presented us with unique challenge.[15, 16]

According to UNAIDS estimate, worldwide, as of the end of 2000, there were 36.1 million people living with HIV/AIDS. Of these, 25.3 million (More than 70%) people were from Sub-Saharan Africa, the region worst affected by the epidemic. The high infection rate (15,000/day) is expected to have resulted in 5.3 million new HIV infections occurred in developing countries. Through 2000, cumulative HIV/AIDS-associated deaths numbered approximately 21.8 million of which 17.5 million were adults and 4.3 million children younger than 15 years. In 2000 alone, HIV/AIDS-associated illnesses caused the deaths of approximately three million children and adults. It is estimated that in some countries of this region, the average adult population HIV infection prevalence rates may be as high as 7.5% and has reached as high as 30 % in certain cities in East Africa.[17,18] HIV/AIDS infection doesn't recognize boarders, in that the epidemic

does not make any distinction in its reach. No social group, age category, gender, economic class etc., may be safe for the infection, all being equal with respect to precautions. It has now been confirmed that AIDS 'reaches across every corner of the world and touches people's lives everywhere.[19]

Mortality statistics can be used for evaluating the health situation of a given population. It even has several advantages when compared to other sources of health information such as morbidity data in that death is a unique event, and because of its finality, clearly defined. Statistics on cause of death are useful in explaining trends and differentials in overall mortality; guiding priorities for intervention programme as well as socio-medical and biomedical research; monitoring of public health programme; allocating and distributing resources within the health sector; and offering clues for epidemiological research.[20]

## 2.2. THE HIV/AIDS SITUATION IN ETHIOPIA

Ethiopia is heavily affected by HIV that was introduced in the early eighties.[1] In Ethiopia, the first patients with HIV/AIDS, an illness that is acquired through heterosexual transmission were documented in Addis Ababa, the capital city, in 1986.[1,2] The infection has become among the leading causes of premature deaths in the country but, up to date information on the extent of the epidemic has remained very limited [3,4]

A population-based survey in Addis Ababa, performed in 1994, indicated an overall HIV-1 prevalence of 6.0% in men and 6.9% in women, with a male to female ratio of 0.97:1. The peak HIV prevalence was in the age group 25-29 years at 16.3% in males and 11.8% in females. Females had higher HIV prevalence in younger age groups (15-19 years) compared to males. There was no infection between age of 6 & 13 years.[6] Followed this large survey, a number of studies were carried out between 1994 & 1998, updating the HIV prevalence estimates among

various population groups of Addis Ababa. Findings revealed that the prevalence figures ranged between 10% to 23% in adults of the general population, and 45% to 74% in sex workers, confirming the severity of the epidemic. For monitoring the changes in HIV prevalence over time, ENARP/EHNRI, in collaboration with Addis Ababa City Health Bureau, revitalized the former sentinel surveillance for HIV infection. Pregnant women from four health centres of Addis Ababa were tested for HIV antibodies every year. As a result, in 1997 HIV prevalence was ranging between 14% and 20% in the four health centres surveyed. These data have been used in the calculations of the total number of Ethiopians infected with HIV at regional and national level.[7] The potential mortality impact of AIDS is usually estimated using models based on sero-prevalence data, patterns of transmission and probability of transitions from HIV to AIDS and from AIDS to death.[9] For Addis Ababa, the potential impact of AIDS on mortality has been estimated to cause 60% of adult deaths by the year 2000 and life expectancy is estimated to drop with 10 and 17 years for years 2000 and 2003, respectively, assuming a stabilisation of HIV prevalence of 10%. [10]

Since the introduction of HIV infection, it has been spreading at an alarming rate in the country. The national HIV/AIDS control program had registered a cumulative total of 21,000 reported AIDS cases by 1996.[15, 16] It was acknowledged, however, that there was gross under reporting. For example, in 1996 and 1997 alone, six regions out of 11 reported a total of 51,781 AIDS cases and about 57,000 through April 1998.[18] It is claimed that these reported AIDS cases represented the visible part of the epidemic. Reasons for under-reporting patients with AIDS have been acknowledged by the MOH in Ethiopia: Some people never seek hospital care for AIDS, some doctors may not record a diagnosis of AIDS because of the social stigma attached to AIDS, some people with HIV infection may die of other diseases before they are ever diagnosed as having AIDS, some rural health care facilities do not have the capability to test for HIV infection, many people have poor access to health care service units, there is no complete report and good

registration of health statistics, etc. Hence, it was justified that, the true number of AIDS cases since the beginning of the epidemic in Ethiopia is not known, but probable numbered about 400,000 by the end of 1999.[16]

In Ethiopia, an estimated 60% to 80% of the health problems are due to infectious communicable disease and nutritional problems. Country-level mortality study was conducted only in 1984 population and housing census, reporting crude death rate of 8.7 per 1000 population per that year which was higher among males (9.7/1000 population) than females (7.7/1000 population). One-fourth of the total deaths by that time took place among infants and children accounted for 51.4% of all deaths with 63.2% and 15.0%, respectively. The share of deaths to persons aged greater than 50 years accounted for only 16.9% of all deaths while it was higher to persons at younger ages particularly less than one, one-four and five-fourteen years. In the same study, adult mortality increase started at 60-64 years age group.[21,22] According to the 1994 National population and housing census, the national average for IMR, CMR and CDR was 110 per 1000 live births, 161 per1000 alive children and 15 per 1000 population in that given year, respectively.[23, 24]

While starting this prospective surveillance, retrospective survey on the existed registered deaths at many burial sites was conducted in Addis Ababa, assessing information on age, sex, and presumed causes of death. Information on age-and sex-specific mortality was retrieved for a varying number of years at few burial sites prior to 2001. It was reported that a significant increase per year, that was found in number of persons buried between ages 25-49 years, relative to the number of persons buried between 5-14 years, at five cemeteries in Addis Ababa, in the period 1996-2000.[25]

It is claimed that the reported AIDS cases represented the visible part of the epidemic. Reasons for under-reporting patients with AIDS have been acknowledged by the MOH in Ethiopia: Some

people never seek hospital care for AIDS, some doctors may not record a diagnosis of AIDS because of the social stigma attached to AIDS, some people with HIV infection may die of other diseases before they are ever diagnosed as having AIDS, some rural health care facilities do not have the capability to test for HIV infection, many people have poor access to health care service units, there is no complete report and good registration of health statistics, etc. Hence, it was justified that, the true number of AIDS cases since the beginning of the epidemic in Ethiopia is not known, but probable numbered about 400,000 by the end of 1999. The cumulated age-and sex of reported AIDS cases between 1986-2000 showed that 91% AIDS cases occur to adults between ages of 15 and 49, there were roughly an equal number of male to female cases, the peak ages for AIDS cases were 20-29 for females and 25-34 for males. It also showed that the number of females infected in the 15-19 years age group is much higher than for males in the same age group. As explained, there has been a significant number of AIDS cases reported among young children.[26]

In Ethiopia, as in most of Sub-Saharan Africa, births and deaths go predominantly unrecorded. In the absence of vital event records, health planning and practice rely on epidemiological models and surveys. It has been reported that systematic vital registration do not exist in Ethiopia, like in most of Sub-Saharan Africa, posing another major difficulty to capture correct numbers of patients with AIDS. [27,28] During the HIV/AIDS era therefore, mortality rates were based on modelling estimates and were not explicitly inclusive. Hence, various studies emphasised on specific population groups, and focused on the new-emerged health, social and economic problems of the population, like HIV/AIDS. The estimated HIV prevalence was 25% in sex workers in Addis Ababa in 1989 and 7% among blood donors at Addis Ababa blood bank in 1994.[29] WHO/UNADIS report revealed that with an estimated 2.5 million HIV infected adults in 1997, Ethiopia is the country with the third largest population of HIV infected people in the world.[30] Many studies reported that there are various infections associated with HIV infection out

of which tuberculosis is the most opportunistic infection in Sub-Saharan Africa. This was supported that in 1999 among 28 tuberculosis cases in Addis Ababa, 11 (39%) patients were HIV positive confirming the known association.[31] Recently, a study on HIV/TB co-infection also reported that an HIV prevalence among TB patients was 52%. [32]

Many countries have established health service based HIV/AIDS information system.[33, 34] However in sub-Saharan Africa including Ethiopia the number of notified reported cases is only a fraction of the actual burden.[12,16,18,19,26,33,34] Where poor vital registration or notification system exists, surveys may be of use. In developing countries, where most deaths are neither attended by doctors nor medically certified, information on cause of death is usually incomplete and of poor quality.[34,35,36] In this respect, poor countries an indirect scheme, which makes use of lay interviewers, can be adopted to ascertain cause of death. This method that is used for estimating cause specific mortality is the Verbal autopsy (VA). [37] It uses information on the circumstances leading to death, symptoms and signs during the terminal illness, obtained from bereaved relatives and otherwise the caretaker, to assign cause of death through retrospective questioning in surveys or in demographic surveillance systems.[32-37] (will be reviewed in **section 2.3. below**).

While estimates of the prevalence of HIV are very high in Ethiopia, the strategies for reaching HIV infection and HIV/AIDS-related mortality are very low. In Ethiopia, even though studies of the HIV/AIDS-related morality have been done earlier, the age-and sex-specific HIV/AIDS-related morality study is scarce. This is because, as already stated in the previous literatures, of the difficultly of obtaining population based data on causes of deaths and almost all if not all AIDS cases remain at home and most of the AIDS deaths occur before reaching the health institutions.

## 2.3. VERBAL AUTOPSY (VA)/LAY REPORTING

Health institutions based data on morbidity and mortality does not usually capture all cases either due low coverage, poor diagnostic services or incomplete record keeping or a combination of the factors. Due to the limitations of health institution based data that is a common occurrence in developing countries, a search for an alternative and complementary sources on the disease profile of a given population is made through community based surveys of diseases by using lay reporting and verbal autopsy (VA) techniques.[34,37,38] Many studies have acknowledged that the VA remains the only method of estimating cause-specific mortality in the absence of routinely and reliably collected mortality data and can successfully be used to distinguish, without serological data, between HIV and other causes of death, thus enabling the estimation of the HIV-associated mortality fraction in a population.[33-38] Studies in Tanzania and in Ethiopia at Butajira have substantiated the robustness of VA method in identifying causes of deaths in field set-ups using lay interviewers.[39,40,41] VA studies may assist in providing data on HIV-associated mortality in general populations and may be useful as surveillance system. Such VA studies may improve the availability of data on the magnitude of the burden of HIV and thus assist resource allocation for patient care, and the planning of intervention programmes.[42]

The validity of VA is influenced by the type of illness leading to death, characteristics of the deceased, and other factors related to the classification of causes of death, as well as the design and content of the questionnaire and field procedures. The approach to mortality classification influences the design of the questionnaire, the methods of deriving a diagnosis, and the number and combination of categories of causes of death assigned. The choice of categories of disease affects the complexity of diagnostic algorithms. A classification of fewer categories will group causes of death with closely related symptom complexes together and tends to increase the validity of the Verbal autopsy at the expense of less detailed information. The other advantage in broadly classifying mortality is that the classification can be used in different settings, with

modifications for site-specific causes of death [33,35,36] The VA technique is based on the assumption that most causes of death have distinct sign and symptom (S/S) complexes that are present in one particular terminal illness, but are not present in the same combination in other fatal illnesses. These signs and symptoms should be clearly recognized, remembered, and reported by lay respondents.[35,36] Validation studies for VA that was done for deaths in 239 children under the age of 5 years. Result showed that the diagnosis derived from VA was corroborated with hospital diagnosis in 39 cases. There was also concurrence of diagnosis in 72% of the cases and was found to have a sensitive predictive value of 85%.[37-40] Validation studies of VA in adults also reported that of the assessed adult deaths, half were HIV-positive. In all 47% deaths were classified as HIV-related. A study suggested that the VA method is an important tool for diagnosing causes of death, especially in developing countries.[41]

Studies done in African countries comparing the diagnostic accuracy of physician review, an expert algorithm, and data-derived algorithm had concluded that for settings where physician review is not feasible, expert and data-derived algorithms provide an alternative approach for assigning many causes of death. It was also recommended that further validation of the algorithms was necessary.[37-42] Studies in Tanzania and in Ethiopia at Butajira have substantiated the robustness of VA method in identifying cause of death in field set-ups using lay interviewers.[43, 44] A study conducted in Butajira, a rural part of Ethiopia, also have used VA technique and reported that the major causes of death in that particular study area were communicable diseases and has recommended for further researches to be done in the area of mortality to establish differences, if any in other parts of Ethiopia. The same study suggested that in a rural area of Ethiopia, vital events registration system could be established after retraining the existing community health workers and traditional birth attendants or training new ones on the VA method. It has also emphasized that regions can employ the VA method to find out causes of death in their locality.[45]

In a validation study for VA, it was acknowledged that VA was an important method for diagnosing causes of death, especially in developing countries. A multi-centre study conducted in Tanzania, Ethiopia and Ghana had compared deaths diagnosed by a panel of physicians and by a computerized algorithm. Hence, the study concluded that VA by a panel of physicians performed better than opinion-based algorithm resulting the validity of VA diagnosis was highest for most of the cases including TB/AIDS.[46]

A study stated that VA technique has severe limitations to reach a diagnosis as it uses the complaints of the patient or on the bereaved and trying to rule in and rule out possible diagnoses by questioning and in a very simplified field-geared manner. The same study also acknowledged the strengths of the VA technique in that it is the least expensive and the most convenient way of establishing causes of death in a community.[47]

Therefore, in this study a prospective surveillance system, registering deaths at burials was conducted. It attempted to apply VA technique and clinician review of the questionnaire and assess information on the cause specific mortality (CSM) in general, and age-and sex–specific HIV/AIDS-related mortality in particular, in the general population of Addis Ababa, the capital city of Ethiopia.

# 3. OBJECTIVES

## 3.1. GENERAL OBJECTIVES

To assess information on the causes of death in general and HIV/AIDS- related morality in particular in Addis Ababa, the capital city of Ethiopia.

## 3.2. SPECIFIC OBJECTIVES

1) To assess the overall magnitude of deaths (CDR) in Addis Ababa.
2) To estimate the HIV/AIDS- related deaths in all sex-and age- groups.
3) To compare the findings with the former estimates of age-and sex-specific morality.
4) To explore the main causes of death in the general population of Addis Ababa.
5) Provide a baseline information on the age-and sex-specific HIV/AIDS-related mortality in Addis Ababa.
6) To apply a verbal autopsy (VA) technique and see its effectiveness in providing estimates of causes of death in a large urban-based population.

# 4. SUBJECTS AND METHODS

This study was conducted in collaboration with ENARP/EHNRI and Department of Community Health, Addis Ababa University. ENARP is a bilateral project between the government of Ethiopia and the Netherlands, with a strong capacity building component, which is hosted in the EHNRI compound.

## 4.1. Study Area

The study was conducted in Addis Ababa, the Capital City of the Federal Democratic Republic of Ethiopia and the major urban centre in the country. The city is set up with 6 Zones, 28 Weredas and 328 Kebeles. Kebele being the smallest Administrative unit inhabits a population with a range of 7000-12000. Addis Ababa covers an area of 530.14 square kilometres (Fig.1). The projected population for the year 2000 of Addis Ababa is 2,623,972 out of which 1,271,104 (48.44%) are males and 1,352,868 (51.56%) are females with a male to female ratio of 1:1.06 favouring the female population by 6.4% over the males. The rural area is limited to the two remotest Zones: Zone 03 which includes three Weredas: 17, 19, 28 and Zone 06 that includes only two Weredas: 23 and 27. These rural-based Zones accommodate a total population of 28,149 (1.10 %) peasants' association of which 14,524 (51.60 %) are males and 13,625 (48.40%) are females with a ratio of 1.07:1 respectively. The majority of the population with a total of 2,595,823 (98.90 %) is urban and sub-urban based. The city has a population density of 4,982 per square kilometre.[23, 24] Much of the population growth in the city still stems from migration from the countryside and smaller urban areas. More than 40% of the population dwell in highly densely populated area of the city. There are about 20,000-40,000 CSWs. The presence of large numbers of commercial sex workers aggravates the spread of HIV and other Sexually transmitted diseases.[16,26,48] The City is inhabited by multi ethnicities namely the Amhara, Oromo, Gurage, Tigre, Dorze and other vast number of different ethnic groups. Although, the different ethnic groups are brought up with their own native languages, the most common and widely

spoken language is Amaharic. There are varieties of religions in which the majority (70.4%) of the population are Orthodox, (22.91%) are Muslims, (5.7%) are protestants, (0.7%) are Catholic and the rest of the people are with other Christian minorities and some without religion. About 43.9% of the population are married and 38.8% never married.[23,48,49]

Assessment revealed that the different religious people are worshipping their interest of religious beliefs in different churches and mosques found at different sites of the city. There are about 95 Orthodox churches [50] out of which 51 have graveyards, 82 Mosques with burial sites limited 08 separate areas, and 10 Catholic churches with one separate burial site. There are also eight Municipality-based cemeteries (one is not functioning at this moment) that are controlled by the Labour and Social Affairs Bureau of Addis Ababa City Administration. These cemeteries are burial areas composed of three sites where orthodox followers are buried, one for Moslems, two for all Christians except catholic followers, one for Moslems and all Christians except Catholics, and the last one is a burial site for those with no personal identification “Baytewar”. The Jewish “Bete-Israel” people who are living in the city are also having a separate burial site (Fig. 2 and Annex 1, A-F). As a rule/traditionally, all deaths are usually reported to their respected fellowship churches or mosques, and a burial place is permitted and prepared in order to accomplish the funeral ceremony.

Hence, it was based on this background that by attending the funerals at the burials, death registration started and obtaining information on the personal identification, address and presumed causes of death of the deceased was possible and effective. This was the base for using VA and have helped the researcher to assess and estimate the magnitude of death (CDR) in general and cause-specific mortality (CSM) in particular with special emphasis to HIV/AIDS-related mortality in the general population of Addis Ababa without having access to serological evidences of individuals.

### 4.2. Study Design

The first part of this research was an active prospective surveillance system, assessing deaths at all burial sites in Addis Ababa. The second part, which employed the verbal autopsy method for identifying causes of death, was a cross-sectional survey based on the active prospective surveillance system.

### 4.3. Study Population and Period

All population residing in Addis Ababa city Administration, regardless age, sex, ethnicity, religion and socio–economic statuses was the source population for the study. All deaths that occurred in the urban and rural residences of Addis Ababa, the capital city of Ethiopia were considered as study population. The research was conducted in three months period between February 08 and May 08, 2001 (Yekatit 01 to Miazia 30, 1993 E.C).

### 4.4. Sampling Technique and Sample Size

All registered (n=5,177) deaths in three months of prospective surveillance, at all rural and urban-based burial sites of Addis Ababa (Annex 1), at the time of their funeral ceremonies within the given period of study were the basis for sampling. Out of the registered deaths, 40 (0.8%) of them were identified as deaths that occurred outside of the city's population and were subsequently excluded. As a result 5,137deaths were captured as portion of the population of the study area. The raw data of all 5,137 registered deaths was entered into the computer software based on the date of burial, personal identification, address, presumed cause of death of the deceased. This initial entered data was used as a database for the study of mortality in Addis Ababa City Administration as well as a sample frame for the study. This sub-set was used to select households for verbal autopsy (VA). Exclusion criteria employed for the VA study were: mistakenly registered abortions (n=4), burials at "Baytewar" cemetery which are mostly unidentified deaths (n=675), date of burials with deaths (n=1,674) in first month of surveillance

(Table1 and Annex 3) as completeness of information improved after the first month of registration, and remote location of residences of deaths (n=24) due to the fact that disproportionate amount of time of investigators would be required to find locations, and deaths with incomplete addresses (n=17) were also excluded from the VA. As a result, a total of 2,494 subjects comprising all ages and sex were eligible for VA.

Based on the age classification of standard verbal autopsy questionnaire, designed by An International Network of Field Sites With Continuous Demographic Evaluation of Populations and Their Health in Developing Countries (INDEPTH),[51] the subjects (n=2,494) eligible for VA, were categorized into three age strata: Neonatal mortality (age=less than 29 days), infant and child mortality (age=29 days to 12 years) and adolescent and adult mortality (age=more than 12 years). There were only 44 (1.8%) neonatal deaths, 270 (10.8%) children and the 2,180 (87.4%) were adolescent and adult deaths (Table 3). Therefore, a selection was made according to the three age strata in the following way: All neonatal deaths 44 (100%) were enrolled into the verbal autopsy assessment because of their small number; whereas, a random selection technique was used to select candidates from the infant-child and adolescent-adult deaths. As a result, of 270 infant and child deaths every third person i.e. 90 (33%) were selected and from adolescent and adult deaths, the one-tenth-rule was applied and out of the 2,180 deaths every tenth number of the list was selected and 218 (10%) was obtained. In addition, a contingency of 20% was added for the infant-child and adolescent-adult deaths in order to compensate the anticipated high non-response rate of about 50% sharing the experience from a previous similar study of Uganda.[42] As a result, 414 deaths comprising 44 neonates, 108 infants and children and 262 adolescents and adults occurred in Addis Ababa City Administration within the specified period of study was considered to be representative for the general death population of the city. Therefore, a total of 414 households of deceased comprising all ages and sexes were included in the house-to-house verbal autopsy (Table 4).

### 4.5. Variables

HIV/AIDS – related mortality is the dependent variable in this study, whereas the independent variables on which data was collected are the age, sex, date of burial, presumed cause of death, and other socio-demographic characteristics of the deceased.

### 4.6. Data Collection Technique and Procedure

#### 4.6.1. System of Death Registration

The death registration process was put into effect after: a) obtaining an ethical clearance and permission from all concerned authorities of governmental and non-governmental institutions and organizations in Addis Ababa City Administration, b) identifying the existing churches with graveyards and cemeteries/burial sites for all religious and nonreligious population living at urban and rural areas of Addis Ababa City Administration, c) recruiting and training research assistants, supervisors, and death notification workers, d) considering ethical issues regarding the subjects under study and significant others. e) preparing the necessary different formats for registration of deaths, check-lists of attendances for supervisors, and other logistics necessary for the study. As a rule (Traditionally), before a dead body can be buried at a religion-based burial site, evidence must be obtained from the religious institution that the deceased adhered to that religion. Alternatively, upon request of the family, deceased persons may be buried at municipal-based cemeteries, after endorsement of the religious institution.

Registration of data on death events initiated on February 8, 2001 through temporary employment of church-or cemetery-based staff (e.g. clergymen and municipal officers) and were assigned to monitor and register deaths in each cemetery, churchyard or any other burial place by attending funeral ceremonies regularly. A surveillance form written in Amaharic and English languages (Annex 2), was introduced with a unique number for the burial site and variables to capture information on name, sex, age, residential address, telephone number, date of burial and

presumed cause of death (lay diagnosis) of the deceased by asking a relative/close care taker who was sent to accomplish the prerequisites for funeral ceremony. This variable was added in the course of the first month of registration. In addition to the employment of clergymen and municipal officers, 12 supervisors, comprising two females and 10 males, were recruited and trained, each supervising the registration of burials in 5-7 cemeteries, depending on the distance between and remoteness of the location of some cemeteries and churches. Each supervisor used to visit the death notification workers in each registry at least once a week to replenish registration forms, to check for the quality of registration: continuity, accuracy, completeness, and identify any problem regarding the death registration in each registry and to collect the filled and completed forms. Weekly meetings were held with supervisors during which problems if any were reported, and completed forms and proof of at least four supervisory visits per cemetery per month were submitted to the researcher.

A significant number of dead bodies “Baytewars”, lacking personal identification are found dead in town: on road/street, in dumps/lakes/rivers, hotels, and anywhere in the City or died in prisons or hospitals with out witness of their identity are usually reported to the police and social worker, respectively. Accordingly, these unidentified corpses are sent to the Medico-legal Department of the Menelik II Hospital, Addis Ababa, accompanied by description/report of death event of the deceased. After physical examination or when necessary/requested an autopsy is done and the unidentified body is kept in the hospital for some time according to the hospital’s regulation, awaiting identification by family members, or other contact presenting to the hospital/police. Bodies not identified by any means are accompanied by a written letter stating the condition of the deceased and are taken by Municipality workers to a separate burial site “B*aytewar cemetery”* that is controlled by the Labour and Social Affairs Bureau of Addis Ababa City Administration, for burial.

### 4.6.2. Completeness of reporting

Supervisors were instructed to compare cemetery-based registries (proof of burials) kept at the cemetery with the surveillance form. It appeared that stillborns and children who died shortly after birth were not consistently reported on the surveillance form for prevailing cultural reasons. In the course of the first month registration of these deaths were reinforced. Also, initially, information on the presumed cause of death was not requested, but added in the course of the first month.

Three churches were known to send most dead bodies for burial elsewhere, because of inadequate burial space. Referral of bodies by these churches was indicated on the surveillance form (n=284) and checked by the researcher for possible duplicate entry at the receiving site. In the course of the first three months cemetery-and churchyard-based workers were instructed not to register dead bodies that were transferred out. A special registry was kept for dead bodies requesting transportation outside of Addis Ababa (n=18). Also, non-residents of Addis Ababa (including persons from outside of Ethiopia) who died in town or deceased persons who came for burial in town were counted but excluded from entering to the base-data and further analyses (n=40). Obviously, movements of sick persons to outside of Addis Ababa could not be controlled.

### 4.6.3. Design and Development Of Verbal Autopsy (VA) Questionnaires.

A study method known as a verbal autopsy (VA) was used to obtain the necessary information about the causes of deaths. Three VA questionnaires that incorporate questions of the personal identification and information of relatively most signs and symptoms of the common causes of deaths written in Amaharic and English was adapted and used. For adolescents and adults, the format of the VA questionnaire that was designed and developed in England for validation and standardization in Tanzania, Ethiopia and Ghana.[46] was reviewed and modified according to the indigenous understandings. For neonates, infants and children, an already structured

questionnaire was obtained from the Department of Community Health (DCH), Addis Ababa University (AAU). After making some modifications and arrangements of the questions, the Amharic questionnaires were translated into English and retranslated into Amaharic, the indigenous common language. Then, they were developed and compiled into three age strata separately. In addition, an answer sheet was prepared in Amharic and English for each age stratum VA questionnaire.

The compiled verbal autopsy questionnaires were pre-tested for each age stratum among house holds not included in the VA by the principal investigator and a research assistant. The aim of pre-testing was primarily, to assess the community's reaction towards this sensitive issue, and secondly, to assess each question for its clarity, reasonability, coherence, acceptability, flow, reputability, and time required interviewing a household. Generally, the result of the pre-test was good, firstly, it helped the researcher learn on how to train the data collectors the way they should approach the respondents, and secondly, in relation to the developed questionnaires, it helped to identify some missed but relevant questions, some confusing terms, and others were redundant, on which additions, corrections and changes were made before the training and field practice of the data collectors. A five-day well trained lay-people, fieldworkers (data collectors) also suggested some corrections and changes on the questionnaires (Annex 4) after one-day field practice which was part of their training. Moreover, after significant corrections and modifications were made on the questionnaires and answer sheets, it was ready for use.

#### 4.6.4. Procedure For Conducting Verbal Autopsy

Before two weeks of the start of verbal autopsy, letters requesting permission and cooperation in conducting a house-to-house VA were written from the Department of Community Health, AAU to all 28 Administrative Weredas and 328 Kebeles of Addis Ababa. After securing a positive response, data collectors, who were laypeople but, twelve grade completed, have been recruited

from the nearby Weredas with identified households for VA, and trained for five days including one-day field practice. The 12 previously mentioned supervisors, who followed the death registration at the burial sites were also trained together with the data collectors in order to be familiar and be able to coordinate the activities of the interviewers.

VA assessment was started on 16 of July, 2001 by the trained field workers involving 10 pairs of interviewers. Households were visited after about three to four months of deaths of the deceased. Initially, the paired data collectors having the lists of addresses and personal identification of the randomly selected deceased, used to visit and contact the Kebele officials, seeking assistance to find the actual location of the house number of the deceased. When it was difficult to find the identified house number, Kebeles' authorities were cooperative in assigning a guide for the study field workers. When the actual address of the bereaved relative of the deceased was traced, the data collectors after greeting the family, explained the importance of the study to respondents in that household and consecutively, permission was requested for conducting the interview at that moment. After permission and acceptance and verbal consent as well was secured the study workers then, proceeded to interview close relative or a significant other caretaker of the deceased to elicit the signs and symptoms of the cause of death of the deceased. When a close caretaker was not available on the day of first visit an appointment was taken for another time or day. Supervisors coordinated, followed and strictly supervised the activities of data collectors in their field working. The completed VA answer sheets were submitted to the supervisors at the end of the same day of interview, and the supervisors checked and submitted to the researcher on the next day. The researcher rechecked and edited each responded answer sheet on its arrival and incomplete or non-responded VA forms were sent back to the field workers for reassessment. The house-to-house VA-interview took place from 16 to 30 of July, 2001.

### 4.6.5. Determination of Causes of Death

The house-to-house verbal autopsy (VA) completed forms were, coded and submitted to two clinicians for assessment. Each form was assessed by at least two clinicians in order to see the reliability, repeatability and consistency of the cause of death of each deceased. Each assessor was oriented on the overall objective of the study and was provided with all completed VA forms and the structured questionnaire formats. In addition, the clinician reviewers were provided with an outline of the ICD-10 standard working classification of causes of deaths of all age groups (Annex 5), and other necessary forms for marking the primary causes of death according to the three age categories. Prior to the assessment, the clinicians were not aware of the case histories of the deceased. They thoroughly reviewed the completed forms independently and were blind to each other's assessment in assigning an underlying cause of death of a deceased. Once the first two assessors assigned the same diagnosis to the same responded questionnaire it was accepted as final diagnosis. For any discordant, a third clinician reviewed the forms independently without knowledge of the first two clinicians' assessment. Panel discussion was made by the clinician assessors for the differences of diagnosis between them in order to reassess the forms together and narrow down the differences of diagnosis made by individual physician. In situations where the three physicians even after panel discussion failed to agree on a diagnosis, the cause of death was considered as undetermined. For those deaths, which have occurred in hospitals of Addis Ababa, case histories of the deceased were assessed from hospital records in order to use them as a gold standard, wherever this was possible.

## 4.7. Data Quality Control

Data quality control was mainly the responsibility of the researcher and was done at daily basis. It is believed that data quality was assured by various mechanisms. The preliminary death registration was checked, monitored and supervised continuously and regularly, Verbal autopsy questionnaires were properly redesigned, pre-tested and restructured. Intensive training,

supervision and retraining was provided to supervisors and field workers who were in charge of conducting the VA and filling out the questionnaires. Completeness of forms was checked on arrival and if not, were returned back soon for correction. Problems were handled and solved at daily basis. Each VA form was reviewed by at least two clinicians. Data entered by two data clerks, quality-control checks were done at daily basis for the completeness and accuracy of the data collected and entered.

### 4.8. Data Processing and Analysis

Initially, each burial site in accordance with its registered deaths was pre-coded and the raw data: name, sex, age, date of burial, presumed cause of death of the deceased; and complete address including telephone number if any of a close relative/care taker of the deceased at the time of his death was entered into the computer software. This was used as a base-data for the study. All the responded necessary variables were entered into the database. Soon after, the assessors' diagnoses were also entered into the database in the computer-software. Frequent computer printouts were used to check/countercheck outlines, and errors were checked after completing data entry. After the data was cleaned backup copies were made and stored in a safe place. The data then transported to SPSS 10-STATA statistical packages for analysis.

Rates were calculated based on the total number of registered deaths of the surveillance and the 'high-variant' population projection for the Addis Ababa population in 2000 as denominator (total population Addis Ababa = 2,629,972; net migration in period 1994-2000 is assumed to remain constant at 1.98%).[52] Age- and sex- specific mortality rates were compared with mortality rates available from the 1984 population and housing census,[22] and with the United States reference population.[53] Frequencies, proportions and summary statistics (percentage, mean, media, mode, range, standard deviation, etc. were used to describe the study population in relation to relevant variables for each response.

### 4.9. Operational Definition of Terms

| | |
|---|---|
| *Adult death | Deceased person whose age is above twelve years old at the time of his/her death. |
| " Baytewar" death | Mostly unidentified people found dead in different areas of the city and buried separately in the specified Municipal-based cemetery by the Municipality of Addis Ababa City Administration. |
| *Child death | Deceased person whose age is 29 days to 12 years at the time of his/her death. |
| *Neonatal death | Deceased person whose age is less than twenty nine days at the time of his/her death. |
| Rural | The remotest location of Addis Ababa City Administration that harbours peasants association as per the decision of the government of Ethiopia. |
| Urban | Central part of Addis Ababa City Administration which harbours the majority of the population. |

*** D**efinitions of age category are based on the INDEPTH NETWORK that is ongoing for application.[51]

### 4.10. Ethical Considerations

Ethical clearance for the study was obtained from Addis Ababa University during the planning phase after the research proposal was approved by the Department of Community Health. Consecutively, before the start of death registration, permission was obtained from higher authorities of the Labour and Social Affairs Bureau of Addis Ababa City Administration, Ethiopian Orthodox Tewahedo Patriarchate Head Office, Ethiopian Catholic Church, Islamic Affaires Supreme Council of Addis Ababa. Furthermore, leaders of each and every cemetery and church (burial site) in the city were informed and requested from their higher authorities for their permission and cooperation for death registration in their respective burial sites. Consecutively, before the process of VA was started, permission to conduct a house-to-house VA was obtained from all the 28 Administrative Weredas and their respective 328 Kebeles in the study area (Fig.1).

For the purpose of respecting individuals right and dignity the data collection process was made only when the bereaved were in a stable state. During the process of verbal autopsy, respondents (close relative/caretaker of the deceased) were greeted and were given an explanation about the purposes of the study, their good will in participating in the study was asked for and verbal consent was obtained from all respondents after confidentiality was assured. When there was time of resistance and unwillingness to participate, the interviewers when failed convincing them, usually thanked them for the time they have spent and hence, refusals were respected. Respondents were not subjected to any risk during the study, neither were they promised or given monetary or material benefits. Furthermore, the Ministry of Health, Addis Ababa City Administration Health Bureau and their respective hospitals were requested permitting and cooperating us to assess the patients' case histories from hospital records.

# 5. RESULTS

## 5.1. Registered Deaths

During the three months active prospective surveillance period 5,177 deaths were registered. Of the registered deaths 40 were in migrated for burial from other regions and outside of Ethiopia, and not entered to the database of the study. These deaths were captured from 70 burial sites in rural and urban localities in Addis Ababa, of which 51 were Orthodox churchyards, 07 Municipal–based, 08 Mosque-based, 02 Yesenbetie Mahber-based, 01 Catholic-based and 01 Jewish "Bete-Israel"-based cemetery. Two Moslem burial sites did not report death within this period of registration. (Annex 1, Figure 2 and Table 1).

There were 1,674, 1,706, and 1,753 registered deaths in the first, second and third months of registration, respectively with four abortions mistakenly registered that were later excluded from the analysis. As a result, in the three months 5,133 deaths (Table1and 2) were registered with a crude death rate (CDR) of 8.23/1000 population/year. Of the total registered deaths, 2,318 (45%) were females and 2,813 (55%) males (n=2, missed sex) with a male to female ratio of 1.2:1. Of the registered, 76 (1.5%) were neonatal deaths, 560 (11%) infant and child 189 (3.7%) deaths. The overall age mean, median, and mode at the time of death accounted for 38, 37, and 35 years, respectively (Table 3). The age distribution of deaths between 15 and 50 years show: for females the peak death rate (11%) was in the age group 25–29 years old, where as for males the peak death rate (9.6%) was in the age group 35-49 years old (Table 3 and fig.3). For neonatal deaths it was only 44, and is estimated to be 29/1000 population per year. Assessment also revealed that there were deaths (n=24) in rural residences, and the unidentified, "Baytewar"-cemetery registered deaths were 675 (13.2) of these 241 (43%) were infants, (Annex 2, F). Eighty three percent (83%) of deaths had a complete address.

Table 1. Distribution of registered deaths by type and ownership of burial site.

Addis Ababa, 2001.

| Sr. No. | Type of burial site | Number of burial sites | Registered deaths | |
|---|---|---|---|---|
| | | | Number | Percent |
| 1 | Orthodox churchyards | 51 | 3,031 | 59.02 |
| 2 | Mosque-based cemeteries | 08 | 111 | 2.18 |
| 3 | Labour and Social Affairs Bureau-based cemeteries | 07 | 1,954 | 38.08 |
| 4 | Yesenbete Mahber-based cemeteries | 02 | 09 | 0.18 |
| 5 | Catholic-based cemetery | 01 | 17 | 0.33 |
| 6 | Jewish-based cemetery | 01 | 11 | 0.21 |
| | **Total** | 70 | 5, 133 | 100.00 |

Table 2. Monthly distribution of registered deaths by five-years age category. Addis Ababa, 2001.

| | Months of burial in the year of 2001. | | | |
|---|---|---|---|---|
| | February | March | April | Total |
| Age/Year | Number (%) | Number (%) | Number (%) | Number (%) |
| 0-0.9 | 138 (8.24) | 239 (14.01) | 183 (10.44) | 560 (10.91) |
| 1-4 | 56 (3.35) | 69 (4.04) | 64 (3.65) | 189 (3.68) |
| 5-9 | 19 (1.14) | 20 (1.17) | 19 (1.08) | 58 (1.13) |
| 10-14 | 9 (0.54) | 10 (0.59) | 15 (0.86) | 34 (0.66) |
| 15-19 | 22 (1.31) | 39 (2.29) | 40 (2.28) | 101 (1.97) |
| 20-24 | 76 (4.54) | 84 (4.92) | 103 (5.88) | 263 (5.12) |
| 25-29 | 133 (7.95) | 133 (7.80) | 150 (8.56) | 416 (8.10) |
| 30-34 | 154 (9.20) | 138 (8.09) | 162 (9.24) | 454 (8.84) |
| 35-39 | 172 (10.27) | 157 (9.20) | 175 (9.98) | 504 (9.82) |
| 40-44 | 135 (8.06) | 139 (8.15) | 140 (7.99) | 414 (8.07) |
| 45-49 | 135 (8.06) | 106 (6.21) | 106 (6.05) | 347 (6.76) |
| 50-54 | 98 (5.85) | 101 (5.92) | 80 (4.56) | 279 (5.44) |
| 55-59 | 56 (3.35) | 48 (2.81) | 57 (3.25) | 161 (3.14) |
| 60-64 | 103 (6.15) | 86 (5.04) | 100 (5.70) | 289 (5.63) |
| 65-69 | 41 (2.45) | 51 (2.99) | 57 (3.25) | 149 (2.90) |
| 70-74 | 67 (4.00) | 70 (4.10) | 65 (3.71) | 202 (3.94) |
| 75-79 | 41 (2.45) | 34 (1.99) | 38 (2.17) | 113 (2.20) |
| >79 | 96 (5.73) | 100 (5.86) | 101 (5.76) | 297 (5.79) |
| Missing | 123 (7.35) | 82 (4.81) | 98 (5.59) | 303 (5.90) |
| **Total** | 1,674 (100.00) | 1,706 (100.00) | 1,753 (100.00) | 5,133 (100.00) |

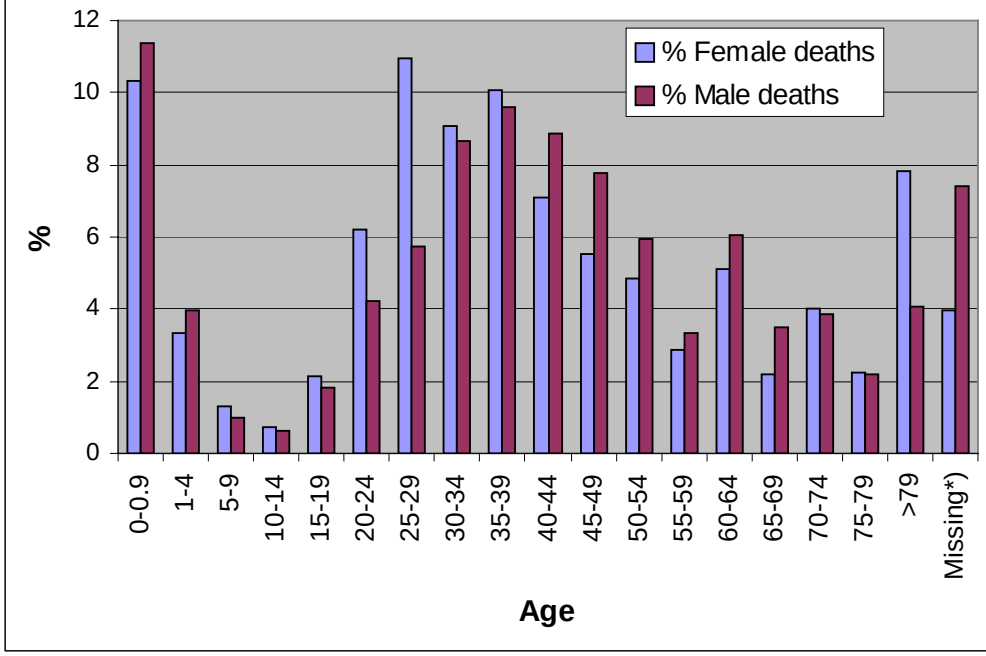
Table 3. Distribution of registered deaths by 5-years age-category

and sex. Addis Ababa 2001.

| | Sex | | |
|---|---|---|---|
| | Female | Male | Total |
| **Age/year** | **Number (%)** | **Number (%)** | **Number (%)** |
| 0-0.9 | 240 (10.35) | 320 (11.38) | 560 (10.91 |
| 1-4 | 78 (3.36) | 111 (3.95) | 189 (3.68 |
| 5-9 | 30 (1.29) | 28 (1.00) | 58 (1.13) |
| 10-14 | 17 (0.73) | 17 (0.60) | 34 (0.60) |
| 15-19 | 49 (2.11) | 52 (1.85) | 101 (1.97) |
| 20-24 | 144 (6.21) | 119 (4.23) | 263 (5.12) |
| 25-29 | 254 (10.96) | 162 (5.76) | 416 (8.10) |
| 30-34 | 211 (9.10) | 243 (8.64) | 454 (8.84) |
| 35-39 | 234 (10.09) | 270 (9.60) | 504 (9.82) |
| 40-44 | 165 (7.12) | 249 (8.85) | 414 (8.07) |
| 45-49 | 128 (5.52) | 219 (7.79) | 347 (6.76) |
| 50-54 | 112 (4.83) | 167 (5.94) | 279 (5.44) |
| 55-59 | 67 (2.89) | 94 (3.34) | 161 (3.14) |
| 60-64 | 119 (5.13) | 170 (6.04) | 289 (5.63) |
| 65-69 | 51 (2.20) | 98 (3.48) | 149 (2.90) |
| 70-74 | 93 (4.01) | 109 (3.87) | 202 (3.94) |
| 75-79 | 52 (2.24) | 61 (2.17) | 113 (2.20) |
| >79 | 182 (7.85) | 115 (4.09) | 297 (5.79) |
| Missing[*)] | 92 (3.97) | 209 (7.43) | 303 (5.90) |
| **Total** | 2,318 (100.0) | 2,813 (100.0) | 5,133 (100.0) |

[*)] 2 deaths no sex registered.

**Figure 3: Proportion of age- and sex- specific deaths, Addis Ababa, 2001**



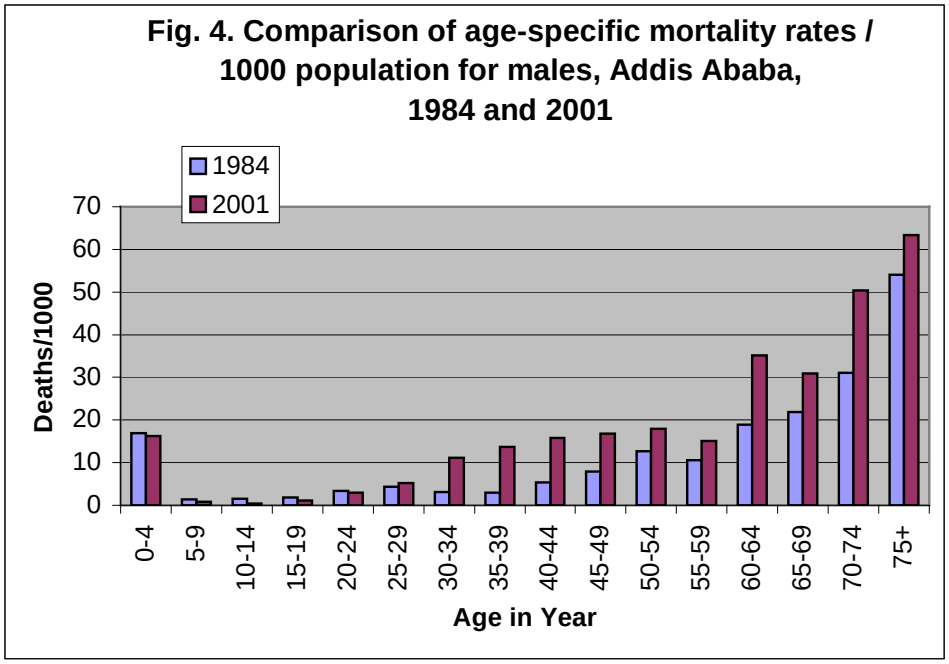


Fig. 4. Comparison of age-specific mortality rates / 1000 population for males, Addis Ababa, 1984 and 2001
1984
2001
Deaths/1000
70
60
50
40
30
20
10
0
0-4
5-9
10-14
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75+
Age in Year

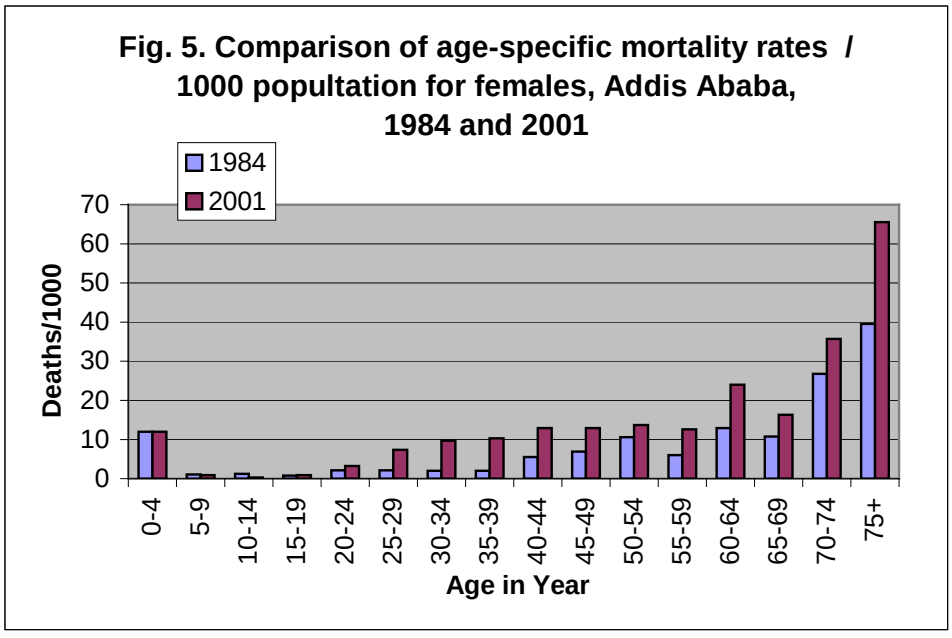


Fig. 5. Comparison of age-specific mortality rates / 1000 popultation for females, Addis Ababa, 1984 and 2001
1984
2001
Deaths/1000
70
60
50
40
30
20
10
0
0-4
5-9
10-14
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75+
Age in Year

**5. 2. Verbal Autopsies (VAs)**

Verbal autopsy (VA) forms were filled by making a house-to-house visit within three to four months of death of the deceased. The Amaharic version was used in data collection. Majority of the respondents were close relatives and who took care of the deceased during the terminal illness that lead her/him to death. Time taken for conducting VA by the interviewers was ranged from 40-90 minutes per household.

Table 4 illustrates the selected, responded and the non-responded VA questionnaires. From the selected 414 deaths, a total of 307 (74.1%) deaths subjected to VA accounted for 138 (45.0%) females and 169 (55.0%) males. Of the 74% VAs, 29 (9.5 %) were neonatal deaths, 78 (25.4%) were child deaths, and the 200 deaths (65.1%) were adult deaths. When the responded VAs were compared by the three pre-determined age strata, the 29 (66.0%), 78 (72.2%) and 200 (76.3%) were for neonatal, child, and adult deaths, respectively. Of the responded 200 (76%) adults, 110 (55%) were males and 90 (45%) females. The peak age groups were 30-39 years at 24 (7.8%) for female deaths and the same age group at 21 (6.8%) for male deaths (Table 5).

The non-responded VA questionnaires were107 (26%) of all age- groups out of which 61 (57%) were males and 46 (43%) were females. Of the non-responded deaths, (24%) were adults out of these 23 (37%) were females and 39 (63%) were males. The mean age in years was 45.6 and 42.8 for the responded and non-responded deceased adults, respectively. Both age and sex distribution did not differ significantly for responded and non-responded deceased adults. The reason for non-responses were mainly, 54 (50.5%) were due to loss of address of the close relative/caretaker of the deceased, refusal was 41 (38.3%), and the rest were transferred out 7 (6.5%) and 5 (4.7%) were not stated.

Table 4. Distribution of verbal autopsied deaths by age stratum and sex. Addis Ababa, 2001.

| Age Stratum | Sex | | |
|---|---|---|---|
| | Female | Male | Total |
| | Number (%) | Number (%) | Number (%) |
| **Neonate**: | | | |
| Selected | 14 (31.8) | 30 (68.2) | 44 (100.0) |
| Responded | 5 (17.2) | 24 (82.8) | 29 (66.0) |
| Non-responded | 9 (20.4) | 6 (13.6) | 15 (34.0) |
| **Child**: | | | |
| Selected | 50 (46.3) | 58 (53.7) | 108 (100.0) |
| Responded | 38 (48.7) | 40 (51.3) | 78 (72.0) |
| Non-responded | 12 (11.1) | 18 (16.7) | 30 (28.0) |
| **Adult**: | | | |
| Selected | 114 (43.5) | 148 (56.5) | 262 (100.0) |
| Responded | 90 (45.0) | 110 (55.0) | 200 (76.0) |
| Non-responded | 25 ( 9.5) | 37 (14.1) | 62 (24.0) |
| **Total** | 178 (43.0) | 236 (57.0) | 414 (100.0) |

Table 5. Distribution of verbal autopsied deaths by 10-years age category and sex. Addis Ababa, 2001.

| | SEX | | |
|---|---|---|---|
| | **Female** | **Male** | **Total** |
| **Age/Years** | **Number (%)** | **Number (%)** | **Number (%)** |
| 0-9 | 43 (14.0) | 60 (19.5) | 103 (33.6) |
| 10-19 | 5 (1.6) | 5 (1.6) | 10 (3.3) |
| 20-29 | 18 (5.9) | 19 (6.2) | 37 (12.1) |
| 30-39 | 24 (7.8) | 21 (6.8) | 45 (14.7) |
| 40-49 | 10 (3.3) | 19 (6.2) | 29 (9.4) |
| 50-59 | 10 (3.3) | 14 (4.6) | 24 (7.8) |
| 60-69 | 11 (3.6) | 9 (2.9) | 20 (6.5) |
| 70-79 | 9 (2.9) | 10 (3.3) | 19 (6.2) |
| 80-89 | 5 (1.6) | 11 (3.6) | 16 (5.2) |
| > 89 | 3 (1.0) | 1 (0.3) | 4 (1.3) |
| **Total** | 138 (45.0) | 169 (55.0) | 307 (100.0) |

### 5. 3. Causes of Death (diagnosis)

Out of the 307 verbal autopsies reviewed by clinicians, during their initial assessment, the first two clinicians had similarities in assigning the underlying causes of death of the deceased by 268 (87.3%) of which 164 (82.0%) were adult deaths, 63 (81.0%) child deaths and 26 (89.7%) neonatal deaths. They differed by assigning causes of death comprising 36 (18.0%), 15 (19.2%) and 03 (10.3%) for adult, child and neonatal deaths, respectively. The differences of the first two reviewers were reviewed by another third clinician, without the knowledge of the first two clinicians' assessment. To this extent, differences in assigning diagnoses also occurred between the three clinician assessors for 13 (4.2%) cases, which led them to panel discussion. At last, the assessors failed to agree with two cases and they were considered as undetermined. Time taken for reviewing and coding the causes of death by a clinician was an average of 40 minutes per death.

As illustrated in Table 6 and 7, the leading cause of death was TB/HIV/AIDS-related disease. It accounted for 127 (41.4%) of the overall assessed causes of death in all age groups. Of the 200 adult deaths, 96 (48%) caused due to TB/HIV/AIDS (Table 6 and Fig. 6) and 31 (29%) were under-12 year olds of which 27 deaths (34.6%) were children (Table 7). The major causes of neonatal death were birth injury/asphyxia (24.1%), neonatal sepsis (17.2%), and neonatal pneumonia (10.3%). Of the 96 (48%) adult deaths caused by TB/HIV/AIDS-related diseases, 48 (50%) and 48 (50%) were males and females, respectively, with the male-to-female ratio of 1:1. The peak age group for the epidemic was 30-39 years at 75% and 30-49 years at 72% for females and males, respectively (Table 8). Cardiovascular disease (CVD) stood as the second major cause of death for 37 (19 %) of adults.

Table 6. Distribution of the verbal autopsy-derived diagnosis of adult deaths by order of magnitude. Addis Ababa, 2001.

| **Diagnosis** | **Number** | **Percent** |
|---|---|---|
| TB/HIV/AIDS | 96 | 48.0 |
| Cardiovascular disorders (CVD) | 37 | 18.5 |
| Liver cirrhosis | 10 | 5.0 |
| Acute abdominal conditions | 8 | 4.0 |
| Unintentional injuries | 6 | 3.0 |
| Diabetes mellitus | 5 | 2.5 |
| Undetermined | 5 | 2.5 |
| Intentional injuries | 5 | 2.5 |
| Central nervous system disorder | 4 | 2.0 |
| Diarrhoeal diseases | 3 | 1.5 |
| Renal disorders | 3 | 1.5 |
| Pneumonia | 3 | 1.5 |
| Hepatoma | 3 | 1.5 |
| Unspecified acute febrile illness | 3 | 1.5 |
| Carcinoma of gastrointestinal tract | 2 | 1.0 |
| Carcinoma of cervix/uterus | 2 | 1.0 |
| Chronic obstructive pulmonary disease | 2 | 1.0 |
| Hepatitis | 1 | 0.5 |
| Carcinoma of breast | 1 | 0.5 |
| Anaemia | 1 | 0.5 |
| **Total** | 200 | 100.0 |

Fig. 6. Diagrammatic representation of the percentages of verbal autopsy derived diagnoses for adult deaths. Addis Ababa, 2001.

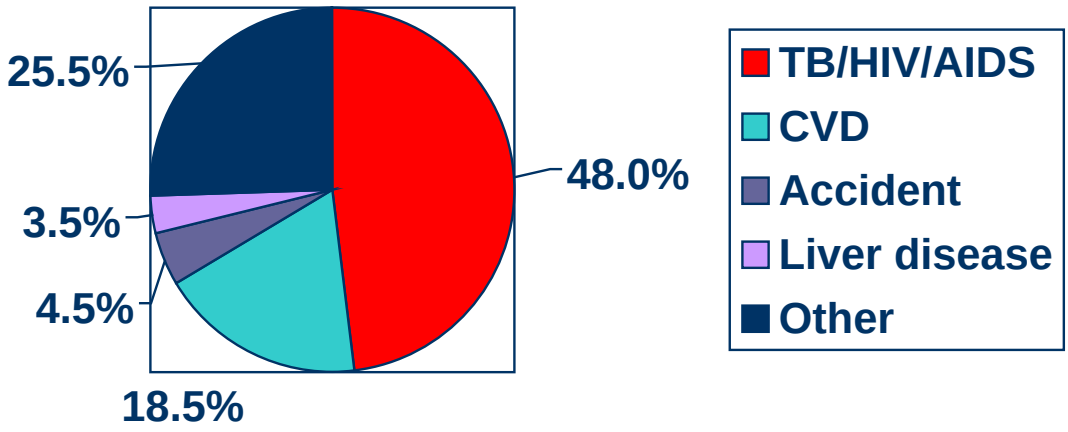


Table 7. Distribution of verbal autopsy-derived diagnosis of under-12 year olds by order of magnitude. Addis Ababa, 2001.

| Diagnosis | Number | Percent |
|---|---|---|
| TB/HIV/AIDS | 31 | 29.0 |
| Pneumonia | 19 | 17.8 |
| All other perinatal causes | 14 | 14.0 |
| Birth injury/asphyxia | 13 | 12.1 |
| Diarrhoeal diseases | 12 | 11.2 |
| Meningitis | 7 | 6.5 |
| Undetermined | 3 | 2.8 |
| Malnutrition | 2 | 1.9 |
| All other specified AFI | 1 | 0.9 |
| Central nervous system disorder | 1 | 0.9 |
| Congestive cardiac failure | 1 | 0.9 |
| Measles | 1 | 0.9 |
| Road traffic accident | 1 | 0.9 |
| **Total** | 107 | 100.0 |

Table 8. Distribution of verbal autopsy-derived TB/HIV/AIDS and Non-TB/HIV/AIDS cases of adult deaths by 10-years age category and sex. Addis Ababa, 2001.

| | | Verbal autopsy-derived diagnosis | | |
|---|---|---|---|---|
| **Sex** | **Age/years** | **TB/HIV/AIDS Number (%)** | **Non-TB/HIV/AIDS Number (%)** | **Total Number (%)** |
| **Females** | 10-19 | 0 (0) | 2 (100) | 2 (100) |
| | 20-29 | 16 (89) | 2 (11) | 18 (100) |
| | 30-39 | 18 (75) | 6 (25) | 24 (100) |
| | 40-49 | 5 (50) | 5 (50) | 10 (100) |
| | 50-59 | 5 (50) | 5 (50) | 10 (100) |
| | 60-69 | 3 (27) | 8 (73) | 11 (100) |
| | 70-79 | 1 (11) | 8 (89) | 9 (100) |
| | 80-89 | 0 (0) | 5 (100) | 5 (100) |
| | > 89 | 0 (0) | 3 (100) | 3 (100) |
| | **Total** | 48 (50) | 44 (48) | 92 (100) |
| **Males** | 10-19 | 0 (0) | 4 (100) | 4 (100) |
| | 20-29 | 10 (53) | 9 (47) | 19 (100) |
| | 30-39 | 15 (71) | 6 (29) | 21 (100) |
| | 40-49 | 14 (74) | 5 (26) | 19 (100) |
| | 50-59 | 6 (43) | 8 (57) | 14 (100) |
| | 60-69 | 0 (0) | 9 (100) | 9 (100) |
| | 70-79 | 2 (20) | 8 (80) | 10 (100) |
| | 80-89 | 1 (9) | 10 (91) | 11 (100) |
| | > 89 | 0 (0) | 1 (100) | 1 (100) |
| | **Total** | 48 (50) | 60 (56) | 108(100) |
| | **Grand Total** | 96 (48) | 104 (52) | 200 (100) |

Univariate and multivariate analysis for some socio demographic characteristics of the verbal autopsied adults was done step-wise. On the univariate analysis, there was no statistically significant in the risk of TB/HIV/AIDS mortality by sex and education. A significantly higher risk of TB/HIV/AIDS mortality in the age groups 50-59, 60-69 and greater than 69 years was observed compared to the youngest age groups. A higher risk of mortality due to TB/HIV/AIDS was observed in the unmarried than the married and divorced/widowed. On multivariate analysis, the age groups 60-69 and greater than 69 year olds still had a significantly higher risk of TB/HIV/AIDS mortality. However, the higher risk of mortality observed on the age group 50-59 years and the unmarried lost their significance. The two variables, gender and education still had no significant association with TB/HIV/AIDS mortality in this study (Table 9).

The verbal autopsy-derived Non-TB/HIV/AIDS was also corroborated with the ICD-10 standard classification of causes of death. There was concurrence in 12 (11.5%) congestive cardiac failure, 10 (9.6%) liver cirrhosis, 8 (7.7%) ischaemic heart disease, cerebrovascular disease and hypertension each accounted for 7 (6.7%), 6 (5.8%) homicide injuries, all other specified non-communicable diseases, diabetes and undetermined each of 5 (4.8%) etc. in descending order as stated in the indigenous terms (Table 10).

Of the307 VA, 80 said died in health facilities the two were residents outside of Addis Ababa. As a result, of the 78 (25%) deaths that occurred in health facilities of Addis Ababa, 40 (51%) were adults. Of the 40 adult hospitalised deaths, 13 (33%) died in private facilities and 27 (67%) in governmental hospitals. Of 27 (67%) deaths that occurred in governmental hospitals, only 11 hospital records were traced and assessed. Out of the 11 hospital records, eight cases concurred with the VA diagnoses, including six TB/HIV/AIDS-related diseases that were both diagnosed as such in the hospital and by physician reviewers.

Table 9. Socio-demographic characteristics of the verbal autopsied adult deaths.

Addis Ababa, 2001.

| Characteristic | Number of deceased (%) | TB/HIV/ AIDS | Non-TB/HIV/ AIDS | Unadjusted OR | Adjusted OR* |
|---|---|---|---|---|---|
| | | | | OR (95% CI) | OR (95% CI) |
| **All** | 200 (100) | 96 | 104 | | |
| **Sex** | | | | | |
| Male | 108 (54.0) | 48 | 60 | 1 | 1 |
| Female | 92 (46.0) | 48 | 44 | 1.36 (0.780, 2.383) | 1.43 (0.695, 2.922) |
| **Age** | | | | | |
| 30-39 | 45 (22.5) | 33 | 12 | 1 | 1 |
| 10-19 | 6 (3.0) | 0 | 6 | 0.00 (0.000, 1.5E+09) | 0.00 (0.000, 1.3E+09) |
| 20-29 | 37 (18.5) | 26 | 11 | 0.86 (0.327, 2.259) | 0.84 (0.312, 2.244) |
| 40-49 | 29 (14.5) | 19 | 10 | 0.69 (0.251, 1.900) | 0.77 (0.269, 2.225) |
| 50-59 | 24 (12.0) | 11 | 13 | 0.31 (0.109, 0.870)+ | 0.32 (0.099, 1.037) |
| 60-69 | 20 (10.0) | 3 | 17 | 0.06 (0.016, 0.259)+ | 0.07 (0.015, 0.303)+ |
| >69 | 39 (19.5) | 4 | 35 | 0.04 (0.012, 0.142)+ | 0.04 (0.011, 0.157)+ |
| **Education** | | | | | |
| Grade 7-12 | 81 (40.5) | 43 | 38 | 1 | 1 |
| <Grade 1 | 74 (37.0) | 28 | 46 | 0.54 (0.283, 1.021) | 1.18 (0.466, 2.992) |
| Grade 1-6 | 20 (10.0) | 10 | 10 | 0.88 (0.332, 2.353) | 0.98 (0.278, 3.475) |
| >Grade 12 | 25 (12.5) | 15 | 10 | 1.33 (0.533, 3.298) | 1.04 (0.365, 2.937) |
| **Marital Status** | | | | | |
| Married | 93 (46.5) | 34 | 59 | 1 | 1 |
| Single | 90 (45.0) | 53 | 37 | 2.49 (1.371, 4.508)+ | 1.54 (0.687, 3.433) |
| Divorced/ widowed | 17 (8.5) | 9 | 8 | 1.95 (0.689, 5.532) | 2.14 (0.600, 7.638) |

OR = Odds Ratio

* Adjusted for the rest of socio-demographic characteristics.

\+ Statistically, significant.

Table 10. Verbal autopsy-derived Non-TB/HIV/AIDS of adult deaths based on ICD-10 classification of causes of death. Addis Ababa, 2001.

| **Standard cause of death** | **Number** | **Percent** |
|---|---|---|
| Congestive Cardiac Failure | 12 | 11.5 |
| Liver cirrhosis | 10 | 9.6 |
| Ischaemic Heart Disease | 8 | 7.7 |
| Acute abdominal conditions | 8 | 4.0 |
| Cerebrovascular Disease | 7 | 6.7 |
| Hypertension | 7 | 6.7 |
| Intentional injuries (homicidal, suicidal) | 5 | 4.8 |
| Diabetes mellitus | 5 | 4.8 |
| Undetermined | 5 | 4.8 |
| All other specified neoplasms | 4 | 3.8 |
| Central Nervous System disorders | 4 | 3.8 |
| Unspecified acute febrile illness | 3 | 2.9 |
| Diarrhoeal diseases | 3 | 2.9 |
| All other specified cardiovascular disorders | 3 | 2.9 |
| Hepatoma | 3 | 2.9 |
| Pneumonia | 3 | 2.9 |
| Renal disorders | 3 | 2.9 |
| Road traffic accidents | 3 | 2.9 |
| All other specified unintentional injuries | 3 | 2.9 |
| Carcinoma cervix/uterus | 2 | 2.9 |
| Carcinoma of gastrointestinal tract | 2 | 2.9 |
| Chronic Obstructive Pulmonary Disease | 2 | 2.9 |
| Carcinoma of the breast | 1 | 1.0 |
| Hepatitis | 1 | 1.0 |
| Anaemia | 1 | 1.0 |
| **Total** | 104 | 100.0 |

### 5.4. Presumed causes (lay diagnoses) of adult deaths

Lay diagnosis were translated from Amharic into English and adhered as much as possible to the connotation given in Amharic. For instance, coughing ("sal") was translated as lung disease ("samba"), while the more specific diagnosis of tuberculosis ("sanba nekersa") and herpes zoster ("almaz balechira") were kept. As a result, the overall assessment of the perceived causes of death of the deceased at funeral time and place showed that out of the 48% verbal autopsy-derived TB/HIV/AIDS cases, that were descriptions of TB/HIV/AIDS-related diseases consisted of 32.3% and 21.9%, respectively, were the primary and secondary perceived causes of death. Unspecified sickness as "himem"10.4%, liver disease as "gubet" 5.2%, diabetes mellitus as "siquar" and mental problem as "aimero chinket" each of 2.1%, were the next orderly perceived causes of deaths. The perception for Tuberculosis (TB) as "sanba nekersa" and HIV/AIDS accounted for 2.1% and 1.0%, respectively, were the only perceived causes of death that corroborated with the clinicians' diagnosis.

Lay diagnosis of death as a proxy for HIV/AIDS-related mortality in deceased age between 15-49 years was also analysed. Of the 200 (76%) responded adult deaths, 117 were 15-49 years of age and of these 78 (67%) were diagnosed with TB/HIV/AIDS by the review of physicians, while 31 different lay diagnoses were registered. TB-only mortality was estimated at 3% (2/78). Six of the lay diagnosis included: lung disease (n=29), cold (n=16), unspecified sickness (n=8), TB (n=3), HIV/AIDS (n=2) and herpes zoster (n=1). The combination of lung disease, cold, TB and herpes zoster was 62% (48/78) sensitive and 87% (34/39) specific to capture persons with TB/HIV/AIDS. Specificity increased to 90% (35/39) in the combination of lung disease and cold. Predictive values of a lay diagnosis for the combination of four diseases (lung disease, cold, unspecified sickness and herpes zoster) was 90% (48/53) and of the combination lung disease and cold 92% (45/49) (data not shown).

## 6. DISCUSSION

This is the first study that used burial site registries to estimate population mortality in sub-Saharan Africa. In Ethiopia, as in most of sub-Sahara African countries, births and deaths go largely unrecorded. Unique for Addis Ababa, Ethiopia, however, is a country strict adherence to religious procedures before a person can be buried and the absence of cremation. Information on age, sex, and date of burial at three burial sites in the period 1987-2000revealed a significant increase per year found in number of person buried between ages 25-49 year olds, relative to the number of persons buried between 5-14 years. This increase suggested a severe impact of HIV on mortality as other explanations (e.g. change in fertility) seem implausible.[25]

This study has attempted to use a prospective citywide surveillance system to fill the gap of information by assessing the magnitude of mortality in general and age-and sex-specific mortality in particular. With the help of verbal autopsy (VA) technique and physician reviewers, it has also tried to find the age-and gender-specific HIV/AIDS-related mortality in the large urban-based population of Addis Ababa, the Capital City of Ethiopia. Such information is useful for health planning, programming and decision-making purposes.

During a three-month surveillance period, all deaths were registered at all 70 burial sites, a representative of the total population in Addis Ababa. In this study, it is believed that the surveillance of burials has been monitored appropriately, resulting accurate registration of all death events and 5133 deaths were recorded. Numbers of deaths were used to estimate (yearly) mortality rates, not taking possible seasonal influences on mortality into account. The estimated CDR was 8.23 per 1000 population per year. This result was corroborated by CSA estimation (8.30/1000) in the 1994 population and housing census.[23] However, the registered neonatal and infant deaths was low yielding to an estimated neonatal and infant mortality rate of 29/1000 and 42/1000 live births, respectively. Neonatal and infant deaths at burials appeared to have been

under reported, that might have been caused by cultural influences. Hence, underestimation of the reported neonatal and infant mortality, 43/1000 and 72/1000 live births, respectively by the CSA in 1994 [15, 23] is reflected. Furthermore, fluctuation in the registration of infant deaths per month was observed: 138, 239 and 183, respectively. Of 560 infant deaths, 241 (43%) were buried at "Baytewar" cemetery, where a total of 675 (13.2% of 5,133) corpses were buried. This suggests that infant-corpses were more easily abandoned and found unidentified in the town than corpses of other age. Non-recording of age could have contributed also to an under-estimate of the neonatal and infant mortality. It appeared that of 303 corpses with a missing age, 227 (75%) were buried at "Baytewar" cemetery. Therefore, most likely, not all infant deaths were buried at the official burial sites in Addis Ababa, or they were buried without the appropriate registration. This was justified by the 1984 population and housing census statistical report, the percentage share of deaths in each group among total deaths showed that close to one fourth of all deaths occurred to infants and children accounted for 35% of all deaths.[22]

In the study period, comparison of age-and sex-specific proportions of deaths showed the peak mortality for females and males lies between 25-29 years and 35-39 years, respectively. Although more males than females died (55% Vs 45%), more females than males died between 20-39 years old. Age-and sex-specific mortality in Addis Ababa has not been estimated recently. It was during the 1984 population and housing census of Ethiopia such study conducted. Though, the 1984 data is almost two decades back, it is the only available data and is used for comparison with the pres Therefore, figures 4 and 5 are graphs illustrating comparisons of the mortality rates for the years 1984 and 2001 of males and females, respectively. The infant and child (age=0-4 years) mortality rates in the two remote years were of about 15-18/1000. Whereas, there is great increase of mortality during the HIV/AIDS era in 2001 than the pre-HIV/AIDS era in 1984 in the age group starting from 20-24 years in both sex accounted for approximately 5-70/1000. This increase was increased as age increases in both sexes. In the

period 1984-2001, for females of 25-49 years of age, mortality rates increased most prominently between 25-39 years, for males of 25-49 years, mortality rates increased most prominently between 30-49 years. Comparing age-and sex-specific proportions of deaths in 2001, the peak mortality for females and males lies between 25-29 years and 35-39 years, respectively. Although more males than females died (55% Vs 45%) in the study period, more females than males died between 20-39 years. The observed shift in mortality to younger ages for both females and males in the period 1984-2001, and the difference in peak mortality of 10 years between females and males, supported by the fact that more females between 20-39 years died than males, strongly suggests the impact of HIV/AIDS on mortality in Addis Ababa. Ages 70 and above year olds showed high death rate especially in the recent study that can be explained that in the surveillance death registration might have been well coordinated and controlled and more deaths were captured.

There are, however, several limitations to the results presented. Firstly, the denominator, i.e. total population of Addis Ababa, is based on the population census of 1994 and varies with different projections and assumptions on migration; secondly, sick persons with terminal illnesses may have travelled to their home areas and could not be accounted for; thirdly, the age of the deceased mentioned to the burial site- based clerk upon fulfilling formalities to facilitate the burial could not be verified, and may have been biased due to digit preference for round numbers or older age; and finally, mortality and population data collected in the1984 population and housing census used for comparison with data of 2001 may have their own limitations due to social unrest and increased migration into Addis Ababa because of a severe drought in 1984 and government- sponsored resettlement programmes in 1984 and 1985.[54]

Verbal autopsy technique has been used to study mortality in children since 1931, though it did not gain wide recognition until the late 1960s. Subsequently, VA has been used widely in the study of causes of death among different age groups in several studies in different parts of the

world including Ethiopia.[33,35,42, 45] VA became important enough for WHO and UNICEF to hold a consultation on its use to measure overall and cause-specific mortality in infants and children. The objective of the consultation was to assess the potential of VA in different situations and the capacity of the technique to provide national estimates of cause of death.[34]

Therefore, in the present study, methodologies for measuring overall and cause-specific mortality, the development and validity issues of VA used in different settings in Africa were intensively reviewed and discussed in order to assess the overall-and cause-specific mortality in Addis Ababa. Although validation study on the VA questionnaire used in the study had not been done in this particular study area, it had been validated in a multi-centre study in three African countries including Ethiopia (in Jimma). Its result came out with a strong conclusion that VA by a panel of physicians performed better than an opinion-based algorithm. This had been evidenced by the fact that the validity of VA diagnosis was highest for most of the diseases, including TB/AIDS.[46]

Verbal autopsy (VA) technique in this study is proved its effectiveness and revealed that in the population, TB/HIV/AIDS has become the most common cause of death with almost 50% of the deceased died due to the epidemic. This is close to the computer modelling that showed 60% of deaths in Addis Ababa are due to the impact of HIV/AIDS in 2000.[10] This also suggests that lay interviewers, respondents and clinicians are familiar with the signs and symptoms of TB and HIV/AIDS-related diseases such as chronic fever, chronic cough, chronic diarrhoea, weight loss and herpes zoster. This is consistent with previous study results confirming that TB is the most opportunistic infection and there is close association between TB and HIV reported in a review article in 2000; [5,31] and the fact that the S/S for TB and HIV/AIDS are similar, lay people usually describe both as TB.[45] Hence, the likely of TB deaths due to HIV is also supported by this study. Since AIDS is so common, there is consequently a high degree of suspicion. This should in

principle contribute to a high response and diagnosis as HIV-related. However, a respondent closely related to a person who is believed to have died of AIDS may not be ready to report such manifestations out of fear of possible stigmatisation. This may particularly apply when a partner, spouse, parent, daughter or son of a deceased person is interviewed. This goes in line with the result studied in Uganda reported in 1996.[43] Result also showed that a large proportion of adolescent and adult deaths (48%) could be contributed to TB/HIV/AIDS-related diseases, with an estimated balanced male to female ratio of 1:1. This implies the main mode of HIV transmission is heterosexual in Addis Ababa, a setting where intravenous drug use contributes little to the epidemic. This finding goes in line with the result studied by ENARP on a study of the age-and sex-specific HIV-1 prevalence conducted in the same study area in 1998.[6] This is also supported by the recently (November 2000) study result reported by the Ministry of Health of Ethiopia.[26] The peak age group for TB/HIV/AIDS-related mortality occurred in 20-39 years for females and 30-49 years for males, suggests the peak ages for new HIV infection are at 12-24 for females and 15-34 for males. Since, AIDS cases result from HIV-infection acquired about 8-10 years and may die of AIDS within average of 10 years. Furthermore, younger females appeared to die of the epidemic than males due to earlier sexual activity by young females and the fact that they often have older partners. These all suggestions also support and go in line with most of earlier reports and studies.[4, 5, 6, 9, 26]

There is high percentage share of infants and children deaths caused by TB/HIV/AIDS-related. This implies this age group has also become victim of the epidemic, most probably acquired the infection from their mother during gestation, at the time of birth or through breast-feeding. Previous reports in the country has emphasized the similar mode of transmission of HIV infection in the same age group.[4, 16, 26] Cardiovascular disease (CVD) became the second major cause of death for adults followed by injuries and their adverse effects. Since, CVD is said to be the main cause of death in developed countries, this result in Addis Ababa reflects a pattern

similar to that in industrialized countries. This is similar to the study result reported in Jordan.[33] For the Non-TB/HIV/AIDS the secondary cause of death as perceived by lay people was cardiovascular disorder (16.4%) that makes it similar with the VA-derived cardiovascular disorder (37%) in order of their magnitude.

Generally, the outcome of the causes of death (diagnosis) is resulted due to the effectiveness of the VA technique used in this study in providing about 50% of the deaths were due to TB/HIV/AIDS-related. This is supported by the result found that about half of the adult deceased died of TB/HIV/AIDS-related diseases. This is supported by the previous study result for Addis Ababa, in that the potential impact of AIDS on mortality has been estimated to cause more than half (60%) of adult deaths by the year 2000.[10]

Registration of 4 of 31 lay diagnosis of death prior to burial appears to be a specific (but not so sensitive) tool to monitor HIV/AIDS-related mortality in persons 15-45 years of age in Addis Ababa. Of the 307 verbal autopsies, 78 (25%) died in different health facilities in Addis Ababa, suggesting that the majority of the deaths occurred outside hospitals. This is in line with many studies from different countries.[35-37, 42] Moreover, it supports the report of the MOH in 1988 and 2000,[16, 26] suggesting, most of the deaths in the country occur outside hospitals. Of the deaths that occurred in health facilities, 40 (51%) were adults, out of which 13 (33%) died in different levels of private health facilities and 27 (67%) in governmental hospitals. This is the first report quantifying health facility based deaths in Addis Ababa with the view on whether people die in private or government health facilities. Out of 27 deaths in governmental facilities, 15 (55.6%) hospital records were traced and assessed. The low number of medical records retrieved do not allow for a thorough comparison of VA derived diagnosis. It was a surprise to find just over half of the medical records lost. Although it is mentioned in Government publications that HIV/AIDS related deaths are under-reported, [16, 19, 24, 31] there does not appear to be reason to assume that

medical records from TB/HIV/AIDS patients were more difficult to locate or would be kept away from assessment. Interestingly, out of 15 hospital records, 11 (73%) concurred with the VA diagnoses, including eight TB/HIV/AIDS-related diseases that were both diagnosed in the hospital and by physician reviewers. Thus, with just over half of the medical records found it would be presumptive to validate the VA diagnosis with hospital-based diagnosis, as was initially planned.

Concerning the socio-demographic characteristics of the verbal autopsied adult deceased, male TB/HIV/AIDS mortality was in excess compared to female. But, this was not statistically significant. Being single has higher risk of TB/HIV/AIDS mortality than the married and divorced/widowed, which is consistent to a previous study in Butajira, a rural community of Ethiopia.[45] Different studies and the study in Butajira have shown that level of education was determinant factor for mortality. However, in this study no significant difference was observed between the different levels of education. This may be because, in the large urban-based community, all-levels education might have been vulnerable to the TB/HIV infection. Age groups of 60-69 years showed significantly higher risk of mortality due to the epidemic than the younger ones. Other studies indicate younger people as having higher risk of TB/HIV/AIDS mortality than the older ones.[6,16,19,26] The reason for the discrepancy here may be due to the fact that the respondents for the older ones were more accessible than the younger ones during the verbal autopsy interview. The more affected young ones may have been missed.

The non-response verbal autopsy (24%) of adult deaths is acceptable in view of results obtained from other studies in sub-Saharan Africa, for instance in Uganda, which had a much higher non-response rate (> 50%). [42] A possible reason for the good response in the Ethiopian VA study was that HIV/AIDS was not mentioned as the main reason for interview. Analysis also proved that, the non- response of 24% adult deaths did not affect the result of this study either to overestimate

or underestimate the TB/HIV/AIDS cases. Both in the mean age and sex distribution did not differ significantly between the responded and non-responded verbal autopsy deceased adults.

Clearly, the Addis Ababa population is heavily affected by the HIV/AIDS epidemic with more and younger females than the males as evidenced by this study. Surveillance for burials, comparisons to earlier collected mortality data and information obtained in VA and clinicians assessment provided insights in mortality in Addis Ababa. Therefore, efforts should be directed at planning and implementing interventions to decrease the HIV/AIDS-related mortality.

## 6. STRENGTHS AND LIMITATIONS OF THE STUDY

Being a first study in the study area and Ethiopia as a whole, the findings may have strengths and limitations that can be explained in the following ways:

### 7.1. Strengths

This surveillance is the first in its kind in registering death events at large urban-based population in Ethiopia, a country where systematic registration of vital events is not put in place. The study tried to employ VA technique assisted by clinician reviewers to assess specific information leading to deaths in all age and sex groups in Addis Ababa, the major-urban-centre of the country.

The study came out with strong findings in relation to HIV/AIDS-related mortality and therefore, it may be used as a baseline data for other researches of similar nature in the study area and other regions of the country as well.

### 7.2. Limitations

Seasonal variation (geographical climate) might have influenced the death number of the study, as death registration was conducted only for three months of the year. Underreporting of neonatal and infant deaths that could have occur due to cultural influence, might have also affected the study.

The sample size for VA issue in relation to the number of the total registered deaths may make generalization impossible. The non-responded VA, mainly due to losses of addresses and refusals might have also affected the study. There could be some verbal autopsy questioning-bias as the interviewers were medically not oriented, response, interpretation biases considering the sensitiveness of the issue. There could also be VA assessment bias with regard to assessors due to the nature of the combinations of disease classifications.

# 8. CONCLUSION AND RECOMMENDATIONS

## 8.1. Conclusion

This study has been employed a city-wide prospective surveillance of deaths, based at all burial sites registered deaths and estimated the overall mortality and impact of HIV/AIDS on mortality. It provided evidence of HIV/AIDS-mortality that using: lay interviewers interviewing close relative/close care taker of the deceased; a house-to-house verbal autopsy (VA) technique and physician review to assess causes of death in the population of Addis Ababa, where a vital events registration system is not in place.

Prospective death registration based on burial sites is feasible and advisable. Findings revealed that almost 50% of the adult deaths were classified in the TB/HIV/AIDS-related category. This finding supports our initial conclusion and is in line with results from computer modelling showing that 60% of deaths in Addis Ababa in 2000 are due to the impact of HIV/AIDS. Further analysis of causes of death will be necessary.

## 8.2. Recommendations

Based on the research findings the followings recommendations are recommended:

1. Monitoring of burials in Addis Ababa through the surveillance system presented in this thesis should continue on a long-term basis to assess geographical differences on mortality as deaths may vary in different seasons.

2. Establishment of a continuous surveillance system based on death registration and using a verbal autopsy technique and physician review on a sample of death to assess the causes of death is mandatory. Counting of deaths at burial sites in Addis Ababa assisted

by verbal autopsy technique appears to be unique tool that may help policy makers understand better the impact of HIV/AIDS on mortality.

3. Further studies are needed in order to distinguish whether the patterns of causes of death of the deceased buried at “Baytewar” cemetery are similar or not to the causes of death buried at other sites.

4. The success of this study calls for a continued support to maintain the surveillance system. The co-ordination should be assigned to governmental office and may be supported by a non-governmental office, or research body to ensure the quality of the collected data. Therefore, joint effort between governmental and nongovernmental organizations should be initiated on training, planning, progress reporting, evaluating and formulating organizational structure to continue the surveillance of death and hence, vital events registration system could be sustained in Addis Ababa City Administration.

5. Lay diagnosis of death should be further validated given possible seasonal influence of mortality and the portion of TB-only mortality, but may potentially become a public health tool that can be transferred to health authorities to monitor the impact of HIV on mortality by proxy.

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**Annex 1. List of churches and cemeteries (burial sites) by name, address and local place.**

**Addis Ababa, 2001.**

**A. Orthodox churches with grave yards (n=51)** :

| Sr.No. | Name of church | Zone | Woreda | Kebele | Local place |
|---|---|---|---|---|---|
| 1 | Genete Tsige Kidus Giorgis | 4 | 1 | 08 | Piassa/Arada |
| 2 | Debrenegodguad Kidus Yohannes | 4 | 1 | 03 | Aba Koran |
| 3 | Debre Amin Teklehaimanot | 1 | 3 | 31 | Sumale Tera |
| 4 | Debregelila Kidus Amanuel | 1 | 6 | 08 | Ehel berenda/Mesalemia |
| 5 | Tserha Ariam Kidus Rufael | 5 | 8 | 05 | Rufael |
| 6 | Debregenet Kidus Gebriel | 5 | 8 | 22 | Asko |
| 7 | Debre Selam Kechene Medhanealem | 4 | 9 | 20 | Kechene |
| 8 | Debre Sina Egziabher Ab | 5 | 10 | 22 | Addisu Gebeya |
| 9 | Reseadbarat Menbere Tsebaot Mariam | 4 | 11 | 02 | Entoto Gara |
| 10 | Debre Hail Kidus Raguel/Woelias | 4 | 11 | 23 | Entoto |
| 11 | Hamere Noah Kidane Mehret | 4 | 11 | 04 | Entoto |
| 12 | Menbere Mengist Kusquam Mariam | 4 | 11 | 01 | Shiro Meda |
| 13 | Menbere Sebhat Kidiste Selassie | 4 | 11 | 02 | Entoto |
| 14 | MekaneHiwotAbuneGebremenfeskidu | 4 | 12 | 12 | Ferensai |
| 15 | Genete Eyesu Gebremariam | 4 | 12 | 07 | Ferensai |
| 16 | Anketse Mehret Kidus Michael | 4 | 12 | 07 | Ferensai |
| 17 | Debre Tsehay Kidus Giorgis | 4 | 12 | 12 | Ferensai |
| 18 | Debre Enquie Lideta Lemariam | 4 | 12 | 21 | Russian Embassy |
| 19 | Menbere Tsebaot Kidiste Selassie WoBealewold | 5 | 14 | 13 | Arat–Kilo |
| 20 | Debre Tsige Kidus Urael | 4 | 15 | 35 | Kasanchis |
| 21 | Debre Sahel Kidus Michael | 4 | 16 | 07 | Yeka |
| 22 | Debre Mehret Kidane Mehret | 4 | 16 | 22 | Yeka |
| 23 | Debre Mehret Kidus Michael | 3 | 17 | 20 | Bole/Rewanda |
| 24 | Debre Genet Kidus Giorgis | 3 | 17 | 25 | Gerge/Bole |
| 25 | Debre Selam Kidus Estifanos | 3 | 18 | 07 | Meskel- Adebabay |
| 26 | Debre Nazareth Kidus Yosef | 3 | 19 | 54 | Gotera |
| 27 | Tserha Nigist Kidiste Hanna | 3 | 19 | 60 | Saris |
| 28 | Merafe Kidusan Felegehiwot G/Menfes Kidus. | 3 | 19 | 55 | Saris |
| 29 | Debre Tiguhan Kidus Michael | 3 | 19 | 58 | Bihere Tsige/Lafto |
| 30 | Hamere Werk Mariam | 3 | 19 | 59 | Saris/WerkSefer |
| 31 | Mekane Semait Kidus Kirkos | 2 | 21 | 24 | Legahar |
| 32 | Mahdere Sebhat Lideta | 2 | 22 | 04 | Lideta |
| 33 | Debre Kewakbt GebreKiristos Weabune Aregawi | 2 | 23 | 16 | Jimma- Road |
| 34 | Debre Beserat Kidus Gebriel Gebre Menfes Kidus | 2 | 23 | 13 | Mekanissa |
| 35 | Debre Keranio Medhanealem | 2 | 24 | 17 | Keranio |
| 36 | Reppi Golgota Medhanealem | 2 | 24 | 16 | Kara Kore |
| 37 | Debre Yidras Kidus Giorgis. | 2 | 24 | 14 | Weira Sefer |
| 38 | Anketse Mehret Kidane Mehret | 2 | 24 | 15 | Ayer Tena |
| 39 | Woibela Mariam | 2 | 24 | 17 | Keranio |
| 40 | Debre Genet Inqui Kidus Gebriel | 2 | 24 | 18 | Furi Peasant Association |
| 41 | Berhanate Alem Petros Wopaulos | 5 | 25 | 02 | Wingate |
| 42 | Tulu Dimtu Kidus Giorgis | 6 | 26 | 07 | Akaki |
| 43 | Koye Gebre Menfes Kidus | 6 | 26 | P/Ass. | Koye |
| 44 | Kilinto and Gelan Gura Kidiste Selassie | 6 | 26 | P/Ass. | Kilinto/Gelan-Gura |
| 45 | Salo Debre Tsehay Kidus Giorgis | 6 | 27 | 10 | Kaliti |
| 46 | DebreKermelosMedhanealem WoAbune/Gerima | 3 | 28 | 03 | Kara Alu |
| 47 | Debrelul Kidus Gebriel | 3 | 28 | 03 | Kotebe |
| 48 | Mekane Kidusan Iyakem Wohanna | 3 | 28 | 02 | Kotebe |
| 49 | Debre Mitimak Sealite Mehret | 3 | 28 | 04 | Lam Beret |
| 50 | Debre Mehret Kidus Gebriel | 3 | 28 | 04 | Yerer Guro |
| 51 | Bole Bulbula DebreGenet Medhanealem | 3 | 17 | P/Ass. | Bole bulbula |
| 52 | Kidus Fanuel | 2 | 24 | 16 | Kara Kore |
| 53 | Kidus Giorgis | 3 | 17 | P/Ass. | Bole Bulbula |

**N.B. No. 52 and 53 cemeteries are newly established and added ones.**

*Continuation of Annex 1.*

**B. Mosque-Based cemeteries (n=8):**

| Sr.No. | Cemetery | Zone | Woreda | Kebele | Local Place |
|---|---|---|---|---|---|
| 1 | Gulele | 4 | 9 | 07 | Gulele |
| 2 | Kechene ( Meketeya ) | 4 | 11 | 23 | Kechene |
| 3 | Entoto | 4 | 11 | 02 | Entoto |
| 4 | Ferensai | 4 | 12 | 07 | Ferensai |
| 5 | Gelan Gura/Klinto | 6 | 26 | P/Ass. | Kilinto/Gelan |
| 6 | Akaki | 6 | 26 | 07 | Akaki |
| 7 | Kaliti | 6 | 27 | 11 | Kaliti |
| 8 | Kotebe | 3 | 28 | 01 | Kotebe |
| 9 | Korke Welette Suk | 2 | 24 | P/Ass. | Kara Kore |

N.B. No. 9 cemetery is included in the study on 2001 (1994 E.C.)

**C. Catholic church-based cemetery (n=01):**

| Sr.No. | Cemetery | Zone | Woreda | Kebele | Local Place |
|---|---|---|---|---|---|
| 1 | Petros Wopaulos | 5 | 8 | 01 | Wingate |

**D. Jewish ( Bete-Esrael)-based cemetery (n=01):**

| Sr.No. | Cemetery | Zone | Woreda | Kebele | Local Place |
|---|---|---|---|---|---|
| 1 | Bete-Esrael | 4 | 9 | 07 | Chew Berenda |

**E. Yesenbete Mahber–based cemeteries (n= 02) :**

| Sr.No. | Cemeteries | Zone | Woreda | Kebele | Local Place |
|---|---|---|---|---|---|
| 1 | Giorgis Mahbere Bekur | 4 | 1 | 01 | Piassa/Arada |
| 2 | Giorgis Anketse Abagei | 4 | 1 | 01 | Piassa/Arada |

**F.* Labour and Social Affairs Bureau (Municipal)-based cemeteries (n=7):**

| Sr.No. | Cemetery | Zone | Woreda | Kebele | Local Place |
|---|---|---|---|---|---|
| 1 | Kechene | 5 | 10 | 18 | Kechene |
| 2 | Abo Gurara | 4 | 12 | 12 | Ferensai |
| 3 | Yosef | 3 | 19 | 54 | Gotera |
| 4 | Mechanissa | 2 | 23 | 14 | Mechanissa |
| 5 | Philipos | 5 | 25 | 24 | Kolfe |
| 6 | Kolfe Muslim | 5 | 25 | 04 | Kolfe |
| 7 | Baytewar | 5 | 25 | 02 | G/Wingate |
| 8 | Rufael | 5 | 08 | 35 | Rufael |

**S U M M A R Y** : -

| **BURIAL SITES** | **TOTAL SITES** |
|---|---|
| 1. Orthodox – Churchyards | = 53 |
| 2. Mosque - Based | = 09 |
| 3. Municipality - Cemeteries | = 08 |
| 4. Yesenbete Mahber | = 02 |
| 5. Catholic-Cemetery | = 01 |
| 6. Jewish Cemetery | = 01 |
| **TOTAL** | **= 74** |

ANNEX –2 **የመመዝገቢያ ቅጽ**
Registration form

**ቀን**_____

_____

Date_____

_____

**የመቃብሩ ቦታ**

**ቤተክርስቲያን ስም**_____

Name of Burial

Place/Church_____

**አድራሻ ዞን**___

_____ **ወረዳ**_____**ቀበሌ**_____

Address Zone_

_____Woreda_____Kebele_____

**የተቀበሩ የሙታን የስም ዝርዝርና አድራሻ**

## Identification of the Deceased

| **ተራ ቁ.** S.No. | **የሟች ሙሉ ስም** Full Name of the Deceased | **ጾታ** Sex | **እድሜ** Age | **አድራሻ**/Address | | | | **የ** D |
|---|---|---|---|---|---|---|---|---|
| | | | | **ወረዳ** Woreda | **ቀበሌ** Kebele | **ቤ/ቁ.** Hose No. | **ስልክ ቁ.** Tel.No. | |
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**የመዝጋቢው ስምና ፊርማ**_____

_____**ቀን**_____

Registrar's Name & Signature_____

_____Date_____

**Annex 3. Burial sites (A-F) by code number and total number of registered deaths.**

**Addis Ababa, 2001.**

**A. Orthodox churches with grave yards (n=51)**:

| *Cod No.* | *Name of the church* | **Total deaths** |
|---|---|---|
| *42* | *Genete Tsige Kidus Giorgis* | *18* |
| *07* | *Debrenegodguad Kidus Yohannes* | *114* |
| *12* | *Debre Amin Teklehaimanot* | *239* |
| *13* | *Debregelila Amanuel* | *137* |
| *04* | *Tserha Ariam Kidus Rufael* | *121* |
| *15* | *Debregenet Kidus Gebriel* | *67* |
| *43* | *Debre Selam Kechene Medhanealem* | *65* |
| *27* | *Debre Sina Egziabher Ab* | *46* |
| *50* | *Reseadbarat Menbere Tsebaot Mariam* | *11* |
| *51* | *Debre Hail Kidus Raguel/Woelias* | *04* |
| *66* | *Hamere Noah Kidane Mehret* | *14* |
| *65* | *Menbere Mengist Kusquam Mariam* | *19* |
| *19* | *Menbere Sebhat Kidiste Selassie* | *53* |
| *18* | *MekaneHiwotAbune GebremenfesKidus* | *87* |
| *24* | *Genete Eyesu Gebremariam* | *61* |
| *64* | *Anketse Mehret Kidus Michael* | *06* |
| *56* | *Debre Tsehay Kidus Giorgis* | *12* |
| *44* | *Debre Enquie Lideta Lemariam* | *23* |
| *30* | *Menbere Tsebaot Kidiste Selassie WoBealewold* | *30* |
| *17* | *Debre Tsige Kidus Urael* | *87* |
| *26* | *Debre Sahel Kidus Michael* | *184* |
| *49* | *Debre Mehret Kidane Mehret* | *13* |
| *16* | *Debre Mehret Kidus Michael* | *75* |
| *40* | *Debre Genet Kidus Giorgis* | *28* |
| *28* | *Debre Selam Kidus Estifanos* | *27* |
| *05* | *Debre Nazareth Kidus Yosef* | *160* |
| *37* | *Tserha Nigist Kidiste Hanna* | *32* |
| *47* | *Merafe Kidusan Felegehiwot G/Menfes Kidus.* | *28* |
| *29* | *Debre Tiguhan Kidus Michael* | *40* |
| *59* | *Hamere Werk Mariam* | *07* |
| *09* | *Mekane Semait Kidus Kirkos* | *183* |
| *41* | *Mahdere Sebhat Lideta* | *35* |
| *23* | *Debre Kewakbt Gebre Kiristos /Weabune Aregawi* | *69* |
| *08* | *Debre Beserat Kidus Gebriel WoGebreMenfes Kidus* | *15* |
| *33* | *Debre Keranio Medhanealem* | *63* |
| *25* | *Reppi Golgota Medhanealem* | *47* |
| *32* | *Debre Yidras Kidus Giorgis.* | *36* |
| *31* | *Anketse Mehret Kidane Mehret* | *26* |
| *11* | *Woibela Mariam* | *85* |
| *58* | *Debre Genet Inqui Kidus Gebriel* | *18* |
| *10* | *Berhanate Alem Petros Wopaulos* | *103* |
| *06* | *Tulu Dimtu Kidus Giorgis* | *91* |
| *63* | *Koye Gebre Menfes Kidus* | *02* |
| *62* | *Kilinto and Gelan Gura Kidiste Selassie* | *05* |
| *14* | *Salo Debre Tsehay Kidus Giorgis* | *76* |
| *61* | *Debre Kermelos Medhanealem WoAbune/Gerima* | *05* |
| *21* | *Debrelul Kidus Gebriel* | *48* |
| *20* | *Mekane Kidusan Iyakem Wohanna* | *65* |
| *22* | *Debre Mitimak Sealite Mehret* | *98* |
| *60* | *Debre Mehret Kidus Gebriel* | *08* |
| *67* | *Bole Bulbula DebreG/Medhanealem* | *05* |
| | ***SUB - TOTAL DEATHS*** | ***3,031*** |

*Continuation of Annex 3.*

***B. Mosque–based cemeteries ( n =08 ) :***

| *Code.No.* | *Cemetery* | **Total Deaths** |
|---|---|---|
| *39* | *Gulele* | *68* |
| *53* | *Kechene ( Meketeya )* | *04* |
| *70* | *Entoto* | *00* |
| *55* | *Ferensai* | *05* |
| *69* | *Gelan Gura/Klinto* | *00* |
| *68* | *Kaliti* | *00* |
| *48* | *Akaki* | *12* |
| *36* | *Kotebe* | *22* |
| | ***SUB - TOTAL DEATHS*** | ***111*** |

***C. Catholic–based cemeteries (n=01):***

| *Code.No.* | *Cemetery* | **Total deaths** |
|---|---|---|
| *57* | *Petros Wopaulos* | *17* |
| | ***SUB TOTAL DEATHS*** | ***17*** |

***D. Jewish (Bete Esrael)–based cemetery ( n=01):***

| *Code.No.* | *Cemetery* | *Total deaths* |
|---|---|---|
| *52* | *Bete-Esrael* | *11* |
| | ***SUBTOTAL DEATHS*** | ***11*** |

***E Yesenbete Mahber–based cemeteries (n=02):***

| *Code No.* | *Cemeteries* | **Total deaths** |
|---|---|---|
| *45* | *Giorgis Mahbere Bekur* | *07* |
| *46* | *Giorgis Anketse Abagei* | *02* |
| | ***SUB- TOTAL DEATHS*** | ***09*** |

*F. Labour and Social Affaires Bureau-based cemeteries (n=07)*

| Code.No. | Cemeteries | Total deaths |
|---|---|---|
| 01 | Kechene | 346 |
| 54 | Abo Gurara | 21 |
| 03 | Yosef | 313 |
| 38 | Mechanissa | 41 |
| 02 | Philipos | 209 |
| 34 | Kolfe Muslim | 349 |
| 35 | Baytewar | 675 |
| | **SUB-TOTAL DEATHS** | **1,954** |

**S U M M A R Y:**

| **Sr.No.** | **Burial site** | **No. of sites** | **Total deaths** |
|---|---|---|---|
| **1.** | **Orthodox – Churchyards** | **51** | **3,031** |
| **2.** | **Muslim - Based** | **08** | **111** |
| **3.** | **Municipality - Cemeteries** | **07** | **1,954** |
| **4.** | **Yesenbete Mahber** | **02** | **09** |

| | | | | |
|---|---|---|---|---|
| | 5. | Catholic-Cemetery | | 01 |
| 17 | | | | |
| | 6. | Jewish-Cemetery | | 01 |
| 11_____ | | | | |
| | | TOTAL | 70 | _ 5, |
| 133_ _ ____ | | | | |

ANNEX-4

FORM-1

**QUESTIONNAIRE FOR THE DECEASED**

Code Number_____

DEAR_____

- We have come from Department of Community Health, Addis Ababa University;
- We are here to gather information on the health problems of the population of Addis Ababa City Administration, and especially factors associated with mortality;
- This information will be useful in the health planning process of the City as well as the Country as a whole;
- We assure you that the information gathered in this study is **STRICTLY CONFIDENTIAL:**

**ARE YOU WILLING TO PARTICIPATE IN THE STYDY? POR**

**YES= 1:** **NO= 2**

ANNEX-4

FORM-1

## QUESTIONNAIRE FOR THE DECEASED

Code Number_____

DEAR_____

- We have come from Department of Community Health, Addis Ababa University;
- We are here to gather information on the health problems of the population of Addis Ababa City Administration, and especially factors associated with mortality;
- This information will be useful in the health planning process of the City as well as the Country as a whole;
- We assure you that the information gathered in this study is **STRICTLY CONFIDENTIAL:**

**ARE YOU WILLING TO PARTICIPATE IN THE STYDY? POR**

**YES= 1:** **NO= 2**

## PART 3 VEBRAL AUTOPSY FOR CHILDREN 29 DAYS TO 12 YEARS OF AGE

- Code. No._____

***1*. Prematurity**

1.1 What was the duration of pregnancy in months? D.K 99.9 ☐ ☐ ☐

***1.2*** Was the child born at term, pre-term or post term?

***1***. Pre-term ☐ ***2***. At term ☐

***3***. Post term ☐ ***8***. D.K ☐

***2*. Low Birth Weight**

2.1 What was the birth weight of the child? If it is known state in Gms._____

1 Very small ☐ 2 .Small ☐

3 Normal ☐ 4 D.K ☐

8 D.K._____

***2.2*** Was the child born single or twin ? 1.Single ☐ 2. Twin ☐

***3* Malformation**

3.1 Did the deceased have congenital malformation?

3.2 If the answer is yes, which part of the body was malformed?

1. Head ☐ 3. Arm ☐ 5. Other ☐

2. Chest/Abdomen/ back. ☐ 4. Leg ☐

***4* Measles**

4.1. Any rash? ***1*** Yes ***2*** N o ***8*** D.K

If the answer is yes, answer Q4.2 –4.13

4.2 . Was the child more than 4 months of age at the time of rash?

***For how long did the rash stay?***

***1. Less than three days*** ***2. More than three days*** ☐ ***8. D.K***

***4.4 Did the child have fever***

***4.5 Did the child have cough ?*** ☐ ***1.Yes*** ☐ ***2.No*** ☐ ***8.DK***

***4.6. Were the eyes red and tearing?*** ***1.Yes*** ☐ ***2.No*** ☐ ***8.DK*** ☐

4.7. Was the rash first red before its disappearance? ***1*** Yes ☐ ***2*** N o ☐ ***8*** D.K ☐

4.8. Was the rash all over the body ? ***1*** Yes ☐ ***2*** N o ☐ ***8*** D.K ☐

4.9 Did the rash appear on face? ***1*** Yes ☐ ***2*** N o ☐ ***8*** D.K ☐

***4.10 For how long did the rash stay on face?***

hour Day

1 . If it is for less than a day write it in hour

2. If it is for a day or more write it in a days

8. D.K. 88 88

4.11. Was the rash blistered? ***1*** Yes ☐ ***2*** N o ☐ ***8*** D.K ☐

4.12.. Did the child's skin get ulcerated after the start of rash? 1.Yes ☐ 2.No ☐ ☐ 8.DK

4.13. Did the child have measles? ***1*** Yes ☐ ***2*** N o ☐ ***8*** D.K ☐

***5* Malnutrition**

5.1 Was the child very emaciated? ***1*** Yes ☐ ***2*** N o ☐ ***8*** D.K

***5.2. Was the child marasmic?*** ☐ ***1.Yes 2.No 8.DK***

***5.3 Were the arms and legs oedematous ?*** ***1.Yes*** ☐ ***2.No*** ☐ ***8.DK***

***5.4. If the answer is yes, for how long did the oedema stay?***

hour day

1. If it is less than day feel it in hours

2. If it is more than a day feel it in day

3. D.K 88 88

***5.5 Did the child's skin get black and ulcerated? 1.Yes 2.No 8.DK***

***5.6 Did the child's hair changed to yellow or red colour? 1.Yes 2.No 8.DK***

**If the answer for all is No or do not know go to question number 6, but if it is yes for at least one continue to question the following.**

5.7 For how long did the child breast feed?

1. Less than 4 months ☐ 2. 4-6 months ☐
3. More than 6 months ☐

5.8. At what age was additional food given to the child?

1. Before 4 months ☐ 2. 4-6 months ☐

***3. More than 6 months 8. D.K☐***

***5.9. Did the child bottle feed? 1.Yes☐ 2.No☐ 8.DK☐***

***5.10 What was the child's appetite ? 1.Poor 2 .Normal 8.DK***

5.11 Did the child have repeated diarrhoea? 1. Yes & 2. No & 8. D.K &

***5.12 Did the child have whooping cough or measles? 1.Yes & 2.No & 8.D.K.***

5.13 Did the child have night blindness? 1.Yes & 2.No & 8. D.K&

***5.14 Did the child have vision problem at daytime? 1.Yes & 2.No & 8.DK &***

5.15 Was the child very small at birth? 1. Yes 2. No. 8. D.K&

**6 ARI**

6.1 Did the child have cough? 1. Yes & 2. No & 8. D.K

&

6.2 Did the child have difficulty in breathing? 1.Yes & 2. No & 8. D.K &

6.3 Did the child have fast breathing? 1.Yes & 2. No & 8. D.K &

6.4 Did the child have in-drawing of chest? 1. Yes & 2.No & 8. D.K &

6.5 Did the child have fever? 1. Yes & 2. No & 8. D.K

&

6.6 Did the child have restlessness? 1. Yes & 2. No & 8. D.K

&

**If the answer for all is No or D.K proceed to No.7 , but if it is yes for at least one continue questioning the following**.

6.7 For how long was She/he coughing? ☐☐ ☐☐

1. If less than a day write it in hours — hour
2. If more than a day write it in days — day

***3. D.K /88. 88/***

***6.8 Was the cough severe?1 Yes & 2.No & 8. D.K &***

6.9 If the answer for Q.6 .2 is yes for how long was the breathing difficulty?

1.If less than a day write it in hours ☐ ☐ ☐ ☐

2. If a day or more than a day write it in days hours
days

3. D.K 88. 88

6.10 If the answer is yes for 6.3, for how many days was the fast breathing?

☐ ☐ ☐ ☐

1. If less than a day write it in hours hours
days

2. If a day more or more write it in days

3. D.K 88. 88

6.11 Had the child interruption of breathing?

***1.Yes & 2. No. & 8.D.K &***

6.12_If the answer for Q.6.5 is yes for how long ? ☐ ☐ ☐ ☐

1. If less than a day write it in days? hours
days

2. I a day or more write it in a days

3. D.K 88. 88

6.13 Had the child abnormal breathing sound?

***1.Yes & 2. No & 8.D.K &***

***If the answer is yes probe the following:-***

6.14 Had the child croup 1. Yes & 2. No & 8. D.K &

***6.15 Had the child wheezing? 1. Yes & 2. No & 8. D.K &***

6.16 If other specify_____

***6.17 Did the child have flaring of nose?*** ☐ ***1. Yes 2. No & 8. D.K &***

6.18 Did the child's face, lips and tongue change to brown or bluish?

***1. Yes 2. No & 8. D.K &***

6.19 Was the child vaccinated? 1. Yes & 2. No & 8. D.K&

6.20 If yes how many times? 1. Once only 2. Two times only
3. More than two 8. D.K

6.***21*** Did the child have shortness of breathing? 1. Yes & 2. No& 8. D.K If the answer is yes probe the following

6.22 For how long did the child have shortness of breathing?

1. Less than 12hours ☐ 2. More than 12 hours ☐ 8 D.K ☐

7 **Diarrhoea**

7.1 Did the child have diarrhoea? 1.Yes & 2. No & 8. D.K &

7.2 . Did the child go to toilet frequently? 1. Yes & 2. No & 8. D.K &

7.3 Was the diarrhoea bloody or mucous? 1. Yes & 2.No & 8. D.K &

7.4 Did the child have vomiting? 1. Yes & 2. No & 8. D.K &

**If the answer in no or D.K proceed to Q.8, but if it is yes for at least one continue questioning.**

7.5 For how long? ☐☐ ☐☐

1. If less than a day write it in hours hour
day
2. If it is a day or more write it in days
3. D.K 88. 88

7.6 What was the frequency of diarrhoea?_____

7.7 Did the child take fluid (ORS) when he/she had diarrhoea?

1. Yes & 2. No &8. D.K &

7.8 Did the child take home made fluid ( ORS)? 1.Yes & 2. No & 8. D.K &

7.9 Did the child have thirsty? 1. Yes & 2. No. & 8. D.K &

7.10 Did the child have bulging fontanel? 1. Yes & 2.No & 8.D.K &

7.11 Did the child have sunken eyes ? 1. Yes & 2.No. ☐ 8.D.K.☐

7.12 What was the amount of urine? 1. Not at all ☐ 2. Small ☐
3. Normal ☐ 8. D.K ☐

7.13 What was the colour of urine ?

1. Yellowish/Red/ black 2. Watery clear 8. D.K

8. **CNS Infection**

8.1 Did the child have fever? 1.Yes & 2. No & 8. D.K &

8.2 .If yes how long?

1. If less than a day write it in hour
2. If it is a day or more write it in days hour ☐☐ day ☐☐
3. D.K /88.88/

8.3 Did the child have fits? 1. Yes & 2.No & 8.D.K&

8.4 Was the child unconscious or unusual sleepy? 1.Yes & 2. No & 8.D.K &

**If the answer is no or D.K for all proceed to Q.9 but if it is yes for at least one continue questioning**

8.5 Was the child unable to grasp? 1.Yes & 2. No & 8. D.K &

8.6 Did the child stop[ reaction ? 1. Yes & 2. No & 8. D.K &

8.7 Did the child have staring eyes? 1.Yes & 2. No & 8. D.K &

8.8 Did the child have ear discharge? 1Yes & 2 No & 8 D.K &

8.9 Did the child have neck stiffness? 1.Yes & 2. No & 8.D.K &

8.10 Did the child have vomiting? 1.Yes & 2. No & 8. D.K &

8.11 Was there any member of the family with tuberculosis? 1. Yes & 2. No & 8. D.K& 8.12 Was the child unable to take food? 1. yes & 2. No & 8. D.K &

8.13 Did the child have stiffness of neck? 1. Yes & 2. No &8.D.K &

8.14 Did the child have bulging enlarged? 1. Yes & 2. No &8. D.K &

9 **Anaemia**

9.1 Did the child have paleness? 1. Yes & 2. No &8. D.K &

9.2 Was the child's palm pale? 1. Yes & 2. No &8. D.K &

9.3 Were his/her finger nails pale? 1. Yes & 2.No & 8. D.K &

***10*** **HIV/TBC**

10.1 Did the child have loss of weight? 1. Yes & 2.No. &8.D.K &

10.2 Was the child stunted? 1. Yes & 2. No &8.D.K &

10.3 Did the child have continuous diarrhoea for more than a month?

1. Yes & 2. No& 8. D.K &

10.4 Did the child have continuous fever for more than a month?

1. Yes & 2. No &8. D.K &

**If the answer is no or D.K proceed to Q.11 but if it is yes for at least one continue questioning**.

10.5 Did the child have axillary's swelling? ☐Yes 2.No. & 8. D.K &

10.6 Did the child have whitish patch on the tongue/throat? 1.Yes & 2. No & 8.D.K &

10.7 Did the child have repeated ear and throat problem? 1. Yes & 2. No & 8. D.K &

10.8 Did the child have repeated cold or cough? 1. Yes & 2. No & 8.D.K &

10.9 Did the child have rash all over the body? 1. Yes & 2. No & 8. D.K &

10.10 Was there any tuberculosis case in the family? 1. Yes & 2. No & 8. D.K& 10.11 Did the child have sweating? 1. Yes & 2. No &8. D.K &

10.12 Did the child have loss of appetite? 1. Yes & 2. No & 8.D.K &

***11*** **Cardio Vascular Diseases**

11.1 Did the child have dyspnoea or fast breathing ? 1.Yes & 2. No & 8. D.K &

11.2 Did the child have palpitation? 1. Yes & 2. No & 8. D.K &

11.3 Did the child have puffiness of face? 1. Yes & 2. No &8. D.K &

11.4 Did the child have fatigue? 1. Yes & 2. No & 8.D.K &

11.5 Did the child have cough? 1.Yes & 2. No & 8. D.K &

*If the answer is No or do not know for all go to question number 12 but if it is yes for at least one continue to ask the following*

11.6 Was the child disturbed from sleeping due to dyspnoea? 1.Yes & 2. No & 8.D.K&

11.7 How many pillows did the child use while sleeping? 1.None & 2. One & 3.Two

4. More than two & 8.D.K

11.8 Were the child's lips, finger nails changed to blue (cyanosis)?

1. Yes ☐ 2. N o ☐ 8. D.K ☐

12 **Malaria**

12.1 Did the child have fever? 1.Yes & 2. No & 8. D.K &

12.2 Did the child have fits? 1. Yes & 2. No & 8. D.K &

12.3 Did the child have sweating? 1. Yes & 2. No & 8. D.K &

12.4 Did the child's body/ hand/ nails have paleness? 1. Yes & 2. No & 8. D.K&

**If the answer is no or D.K for all go to Q.13 but if it is yes for at least one continue questioning**

12.5 Did the child have stiffness of neck? 1.Yes & 2. No & 8. D.K &

12.6 Did the child have bulged fontanel ? 1.Yes & 2. No & 8. D.K &

12.7 Did the child have measles? 1.Yes & 2.No & 8. D.K &

12.8 Did the child have staring eyes? 1. Yes & 2. No & 8.D.K &

12.9 Did the child have breathing difficulty? 1. Yes & 2. No & 8. D.K &

13. **Subcutaneous Infection**

13.1 Did the child have ulcer/rash on his body?

Yes=1 No=2 D.K=8

13.2 If the answer is yes on which part of the body?

Arm/Leg =1
Abdomen/back =2
Head =3
D.K =8

13.2 What wash the amount and appearance of the rash?

1-5 =5
Very minute & many =2

13.3 Did the rash contain blood or pus?

Yes =1
No =2
D.K =8

14. **Helmenthiasis**

14.1 Did the child have abdominal pain?

Yes=1 No=2 D.K=8

14.2 Did the child have abdominal distension?

Yes=1 No= 2 D.K =8

14.3 Did the child have Nausea?

Yes=1 No=2 D.K= 8

14.4 Did the child have poor appetite?

Yes=1 No=2 D.K=8

14.5 Did the child have diarrhoea?

Yes=1 No=2 D.K =8

1 5 **Eye Disease**

15.1. The child's eyes get red?

Yes=1 No=2 D.K =8

15.2 Did the child have eye discharge?

Yes=1 No 2 D.K =8

16. **URTI**

16.1 Did the child have throat/tonsil/ problem?

Yes= 1 No=2 D.K=8

16.2 Did the child have difficulty in swallowing?

Yes= 1 No.=2 D.K=8

16.3 Did the child have an ear problem?

Yes =1 No =2 D.K 8

16.4 Did child have running Nose?

Yes=1 No=2 D.K =8

16.5 Did the child have too much sputum?

***Yes=1 No=2 D.K=8***

***16.6 Did the child have an ear discharge?***

***Yes=1 No=2 D.K=8***

***17.** Accident*

***17.1 Was the child suffer any accidental injury?***

☐ ***Yes= 1 No=2 D.K=8***

☐ ***17.2 If yes, what type of accidental injury?***

***Asphyxia/Aspiration =1***
***Fall =2***
***Fire-born =3***
***Chemical burn =4***
***Car accident =5***
***Animal bite =6***
***Poisoning =7***

***Other type of accident, specify_____***

*The interview ends here. Thank respondent and go to the next deceased.*

**PART 4: FOR THOSE PHYSICALLY & MENTALLY DISABLED CHILDREDN**

**1. PHYSICAL DISABILITY**

1.1 Did the child have seeing/hearing or arm or leg mobility/usage/problem?

1. Yes ☐ No ☐ 8 D.K ☐

**If the answer is No, or D.K go to Q.2 but if it is yes continue questioning**

1.2 If yes, what kind 1. Seeing ☐ 2. Hearing ☐ 3. Both ☐ 4. Arm/Leg ☐

1.3 If it s seeing or hearing is it complete or partial? 1. Complete ☐ 2. Partial ☐

1.4 If the problem is arm or leg on which part?

| | Right | left | Both |
|---|---|---|---|
| 1. No one Arm | ☐ | ☐ | ☐ |
| 2. No part below elbow | ☐ | ☐ | ☐ |
| 3. No part below wrist | ☐ | ☐ | ☐ |
| 4. No one leg | ☐ | ☐ | ☐ |
| 5. No part below elbow | ☐ | ☐ | ☐ |
| 6. No part below ankle | ☐ | ☐ | ☐ |

7. Other, specify_____

1.5 For how long was the problem?

1. 1-3 months ☐ 2. 4-6 months ☐ 3. 6-12 months ☐
4. 1-2 years ☐ 5. 3-5 years ☐ 6. 6-12 years ☐

1.6 At what age did the problem occur?

1. Within one year ☐
2. Within 1-4 years ☐
4. Within 5-12 years ☐

1.7 What was the cause of the problem? 1. Sickness ☐ 2. Accident ☐
3.Other, specify_____

1.8 Did the child learn? 1. Yes ☐ 2. No ☐ 8. D.K ☐

1.9 Did the child work? 1.Yes ☐ 2. No ☐ 8. D.K ☐

**2. MENTAL DISABILITY**

2.1 Did the child have mental problem? 1.Yes ☐ 2. No ☐ 8. D.K ☐

2.2 If the answer is yes how was that? 1. Very calm/Lonely 2. Disturber/Aggressive ☐

2.3 For how long did the problem exist?

1. For not less than a year ☐
2. 1-4 years ☐
3. 5-12 years ☐

2.4 At what age did the problem occur?

1. 1-4 years ☐
2. 5-12 years ☐

2.5. What was the cause? Specify:_____

2.6 Was the child learning? 1. Yes ☐ 2. No ☐ 3. D.K ☐

**2.7** Was the child working? 1. Yes ☐ 2. No ☐ 3. D.K ☐

***Interviewing ends here. Thank the respondent and go to the next deceased.***

**Annex- 4**

**FORM-2**

**ለሞቱ ሕፃናትና አዋቂዎች የተዘጋጀ ቃለመጠይቅ**

**ክቡር /ክብርት** _____

- **እኛ የመጣነው ከአዲስ አበባ ዩኒቨርሲቲ የሕብረተሰብ ጤና ትምህርት ክፍል ነው::**

- **በአሁኑ ጊዜ ስለ የአዲስ አበባ ከተማ ሕዝብ አጠቃላይ የጤና ችግር፣ በተለይም ደግሞ ለሞት/ለህልፈት የሚዳርጉ ሁኔታዎች በማጥናት ላይ እንገኛለን::**

- **ይህ ጥናት ለመንግሥትም ሆነ ለሕብረተሰቡ በጣም ጠቃሚ እንደሆነ ይታመናል:: ስለሆነም እያንዳንዱ የሕብረተሰብ ክፍል አስፈላጊ ድጋፍና ትብብር በማድረግ የጥናቱ ተካፋይ በመሆን ለጥናቱ መሳካት ትልቅ ድርሻና ኃላፊነት እንዳለበት እውን ነው::**

- **ስለዚህ በተለይ እርስዎ ጋር የመጣንበት ጉዳይ ደግሞ የእርስዎ ቤተሰብ የሆኑት ባለፉት ጥቂት ወራት ውስጥ ከዚህ ዓለም በሞት ስለተለዩዎት አቶ/ ወ/ሮ ወ/ት/ልጅ _____የተባሉት /የተባለ /የተባለች ለሞት ያደረሳቸውን/ ያደረሰውን /ያደረሳትን የጤና ችግር መረጃዎች ጠይቀን ለማሰባሰብ ነው::**

- **በጥናቱ ሂደት የሚገኙትን መረጃዎች ከጥናቱ ውጪ ጥቅም ላይ የማይውሉ መሆኑን እናረጋግጣለን::**

*** በጥናቱ ላይ ለመሣተፍ ፈቃደኛ ነዎት? አዎ =1 ፣ አይደለሁም = 2** ☐ **POR**

**መልሱ አዎ ከሆነ መጠይቁን ቀጥል መልሱ አይ ከሆነ ደግሞ የመቃወም መብቱ አክብረህ**

**ስለሰጠው ጊዜ አመስግነህ ተለይ::**

## Part 5 VERBAL AUTOPSY QUESTIONNAIRE FOR

## ADOLESCENT & ADULT DEATHS

### I. PERSONAL IDENTIFICATION OF THE DECEASED

Q 1. Code No. ☐☐☐☐☐☐ CNO

Q 2. Full name_____ --- --- ---NOD

Q **3**. Age_____ Years --- --- AOD

Q **4**. Sex/_____ Male= 1 Female= 2 --- -- SXD

Q **5**. Address:_____ --- ---- ADD

5.1 Wereda_____

5.2 Kebele _____

5.3 House No._____

Q **6**. Marital status_____ --- MSD

Single = ***1*** Married= 2, Divorced/separated =3, Widowed=***4/***

Q **7** Educational status_____ ---- YED

| | |
|---|---|
| Illiterate | =1 |
| Can read & write only | =2 |
| Grade1-6 | =3 |
| " 7-8 | =4 |
| " 9-12 | =5 |
| Diploma | =6 |
| Degree & above | =7 |

Q 8 Occupation_____ ---- OCC

### II. DEATH-RELATED INFORMATION

Q 9 Duration of his illness before death ? (dd/mm/yy )_____ ---- --- --- DID

Q 10 Date of death (dd/ mm/ yy)……. --- --- --- --- --- --- DOD

Q 11 Place of death Home = 1 Hospital / Clinic =2 Others= 3 ---- POD

If the answer is home or other go to question number 12

a . If the answer is hospital state ( Name & Address of the hospital_____

b. Were you informed the cause of death by the medical personnel?

/ No = 0 Yes =1 D.K. = 9 --- RIF

Q 12 Did you know the cause of death? No = 0 Yes = 1 D.K =9 ---- RKC

If the answer is yes probe to specify the causes :

Cause (1)_____ --- ---- ---- RD1

Cause (2)_____ --- ---- ---RD2

Q ***13*** ( Ask whether s/he had any of the following illness)

a. hypertension… ….. … (no, =0; yes=1 ; Dk= 9) ----- HYP

b. diabetes ….. ……. (no, =0; yes=1 ; D.k= 9) ----- DIA

c. epilepsy …. …… (no, =0; yes=1 ; Dk= 9) ----- EPI

d. ( TBC) …… … .. (no, =0; yes=1 ; Dk= 9) ---- PTB

e. AIDS……. (no, =0; yes=1 ; Dk= 9) ----- HIV

Code No,- ------ --- CON

Q14 Relationship of the respondent to the deceased: ---- ROR

| | |
|---|---|
| Spouse | = 1 |
| Mother /Father | = 2 |
| Brother/Sister | = 3 |
| Daughter/Son | = 4 |
| Aunt / Uncle | = 5 |
| Grandmother/Grandfather | = 6 |
| Neighbour | = 7 |
| Friend | = 8 |

Other specify/_____

Q15. Respondent's account of final illness of the deceased ---- RAI

_____

_____

_____

_____

_____

_____

Q***16*** Summary of symptoms & signs reported by Respondent:

| S.No. | Symptoms | Duration | Severity |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |

**III. Questions to probe for symptoms & signs of final illness of deceased**

S1. Did the deceased have fever? No=0 Yes =1 D,K 9 _____ ---- FEV

( If the answer is no or DK proceed to S2.)

a. For how long did the fever stay? D.K = 9_____ --- --- --- DEF

b. Was the fever high ? No=0 Yes =1 D.K =9_____ --- SFE

c. Was the fever continuous or not? _____ ---- TFE

Continuous=1, Sometimes =2, D.K=9

S2. Did the deceased have rash? No=0 , Yes =1, D.K.9_____ ---- RAS

(if the answer is no or DK proceed to S3)

a. For how long did the rash stay? D.K=9_____ --- --- --- --- DRA

b. What did the rash look like?_____ ---- TRA

Measles rash =1 Watery =2 Pusy =3 Other, specify_____ D.K=9

c. Did the eyes look red? No=0 , Yes=1 D.K 9 _____ ---- SEY

d. Did the deceased have itching of the eye ? No=0, Yes=1 , D.K = 9_____ ---- ITC

S3. Did the deceased have weight loss before death? No. =***0*** Yes=***1*** D.K = ***9***_____ ----LOW

**(**If the answer is no or DK proceed to S4)

a. How was the degree of weight loss? If known write in kg._____ ----SLW

/Too much =***1*** Medium =***2*** D.K = ***9/***

S4. Were the legs oedematous? No=0 Yes=***1***, D.K =***9/*** _____ ----SAA

(If the answer is no or DK proceed to S5)

a. For how long did the oedema of leg stay? D.K ***9***_____ ---- DSA

S5. Did the deceased have puffiness of face ? No=0 Yes=***1***, D.K =***9***_____ ---- PUF

S6. Did the deceased have pale face? No=0 Yes=***1***, D.K =***9*** _____ ---PAL

S7. Did the deceased have yellowish eye(jaundice) No=0 Yes=***1***, D.K =***9*** ----JAU

S8. Did the deceased have neck oedema? No=0 Yes=***1***, D.K =***9***_____ ---- SWN

S9. Did the deceased have axillary's oedema? No=0 Yes=***1***, D.K =***9***_____ ---- SWN

S10. Did the deceased have lymph node oedema? No=0 Yes=***1***, D.K =***9*** _____ ---- SWG

S11. Did the deceased have any swelling /wound of the body? No=0 Yes=***1***, D.K =***9*** _____ ---- SOB

( If the answer is yes probe for the site and duration)

S12. Did the deceased have cough? No=0 Yes=***1***, D.K =***9***_____ -----COU

(If the answer is no or DK proceed to S13)

a. For how long did the cough stay ? D.K=***9/***_____ ----- --- ---DCO

b. Was the cough productive? No=0 Yes=***1***, D.K =***9*** _____ ---- PCO

c. Was the cough bloody ? No=0 Yes=***1***, D.K =***9*** _____ -----BCO

S13. Did the deceased have dyspnoea? No=0 Yes=***1***, D.K =***9***_____ ---- DIB

( If the answer is no or DK proceed to S14)

a. Was the dyspnoea continuous or at interval?_____ _____ ----DIB

/Continuous =***1*** At interval=***2*** D.K= ***9/*** _____ ----TDB

b. For how long was the dyspnoea? D.K= 9/_____ ----DDB

c. Did the deceased have wheezy breathing ? No=0 Yes=***1***, D.K =***9***?_____ ---- WHE

S14. Did the deceased have chest pain? No=0 Yes=***1***, D.K =***9***_____ ------CHP

(If the answer is no or DK proceed to S15)

a. Which side of the chest was with sharp pain?_____ ---- SCP

Middle chest =1 , On heart=2, Other part=3

b. Was the chest pain continuous or at interval?_____ ---- TCP

/Continuous=***1*** At interval =***2*** D.K = ***9/***

c. For how long did the chest pain stay ?_____ ----DCP

S15. Did the deceased have diarrhoea ? No=0 Yes=1 D.K=***9/***_____ ----DI

(If the answer is no or DK proceed to S16)

a. For how long did the diarrhoea stay? D.K=9_____ ---- ---- -----DDI

b. Was the diarrhoea continuous or at interval? _____ -----TDI

continuous =1 at interval=2 ,D.K=9

c. How many times was the diarrhoea per day? D.K= ***9***_____ ----FDI

d. What was the condition of diarrhoea /Watery =1 Soft = ***2*** D.K =***9/***_____ ----TST

S16. Was the diarrhoea bloody? /No= ***0*** Yes ***1***= D.K= ***9/*** _____ ----BST

S17. Did the deceased have vomiting? / No= ***0*** Yes ***1***= D.K= ***9/***_____ ---VOM

a. For how long did the vomiting stay ? No= ***0*** Yes ***1***= D.K= ***9/*** _____ ---- ---- ----DVO

b. Was the vomiting continuous or at interval?_____ -----TVO

/Continuous=1, At interval=2, D.K=***9/***

c. How many times per day was the vomiting? D.K=9_____ --- -----FVO

d. What was the appearance of the vomitus? _____ ----CVO

/Watery clear =***1*** Yellowish =***2*** Brownish = ***3*** Bloody=***4***

Faecal= ***5*** Other specify =6, D.K=9

S18. Any abdominal complaint**?** No= ***0*** Yes ***1***= D.K= ***9/*** _____ ----ABP

(If the answer is no or DK proceed to S19)

a. How was the pain ?_____ -----CAP

/Cramps =***1*** Sharp =***2*** Burning =***3*** Other =***4*** D.K=***9***

b. For how long was the abdominal complaint? D.K =***9***_____- ---------DAP

c. Which part of the abdomen was the pain?_____ ----SAP

/Below umbilicus =***1*** Above umbilicus =***2*** abdominal =***3***

Other specify ***4*** D.K=***9/***

d. How severe was the abdominal pain? _____ ----TAP

/Strong= ***1*** Medium =***2*** slight=***3*** D.K= ***9/***

e. Did the deceased have difficulty in passing stool? ___ ----CON

**/**No =***0*** Yes =***1*** No= ***9/***

S19. Any abdominal distension? _____ ----ABD

**/**No =***0*** Yes =***1*** No= ***9/***

a. For how long was the abdomen distended? D.K =***9/***_____ --- --- ---DAD

b. Was the abdominal distension suddenly or gradually? ---TAD

/Suddenly =***1*** Gradually =2 D.K =***9/***

S20. Did the deceased have difficulty in swallowing food ? /No =***0*** Yes =***1*** No= ***9*** -- - --DSW

(If the answer is no or DK proceed to S21)

a. For how long was the difficulty of swallowing food? D.K =***9/***_____ ---- ----DDS

S21. Did the deceased have any abdominal tumour/No =***0*** Yes =***1*** No= ***9/*** ----ABM

(If the answer is no or DK proceed to S22)

a. Which side was the abdominal growth ? _____ ----SAM

/Right =***1*** Left =***2*** Below umbilicus =***3*** Other specify =***9/***

b. For how long was the abdominal growth? = ***9***_____ --- --- ----DAM

S22. Did the deceased have headache ? /No =***0*** Yes =***1*** No= ***9/***_____ ----HEA

S23. Did the deceased have neck stiffness? **/**No =***0*** Yes =***1*** No= ***9/*** _____ ---- ---STN

( If the answer is no or DK proceed to S24)

a. For how long was the neck stiffness? D.K=9_____ --- -- ----DSN

S24. Any loss of consciousness? No= ***0*** Yes =***1*** D.K= ***9/***_____ ----LUC

( If the answer is no or DK proceed to S25)

a. What was the condition of loss of consciousness?_____ ---- ---TUC

/Stuperous=1 Unconscious= ***2*** Other, specify =***3***_____D.K=***9/***

b. For how long was the unconsciousness D.K=9/_____ --- ---- ----DUC

c. How did the unconsciousness start?

Suddenly =1, Within 1 day = ***2***,within 2days= ***3***,D.K =***9***_____ --- --- DUC

S25. Any Fits ? No =***0*** Yes =***1*** No= ***9/***_____ ----FIT

( If the answer is no or DK proceed to S26)

a. For how long ?D.K=9_____ ---- ---- ---DFN

b. How was the fits occur? The whole body=1, Arms/legs only =2, DK =***9/***_____ ----TFI

c. How many times did the fits occur in a day/ D.K=***9/*** ----FFI

d. Was the deceased conscious in between the fits? ? No =***0*** Yes =***1*** No= ***9*** ----BFA

S26. Did the deceased have difficulty in opening the mouth? ? ---LOC

No =***0*** Yes =***1*** D.K= ***9***

S27. Did the deceased have stiffness of the whole body? No =***0*** Yes =***1*** D.K= ***9*** ----OPI

( If the answer is no or DK proceed to S27)

a. If yes, for how many days? D.K =***9/***_____ ---DOP

S28. Had the deceased hemiplegia ? No =***0*** Yes =***1*** No= ***9***_____ ----HEM

(If the answer is no or DK proceed to S29)

a. If yes, for how many days? ? No =***0*** Yes =***1*** No= ***9***_____ ---- ---- ----DHE

S29. Had the deceased paraplegia? No =***0*** Yes =***1*** No= ***9***_____ -----PAR

(If the answer is no or DK proceed to S30)

a. If yes, for how many days? D.K =9 / _____ ---- ---- ---DPA

S30. Did the colour of urine changed to black? ? No =***0*** Yes =***1*** No= ***9*** ----CCU

(If the answer is no or DK proceed to S31)

a. What was the colour of urine?_____ ----TCC

/Yellow=***1*** Brown =***2*** bloody =***3*** D.K =***9/***

b. For how many days was the colour of urine changed?_____ --- --- --DCC

S31. Was the amount of daily urine changed? No =***0*** Yes =***1*** D.K=***9***_____ ----
CQU

(If the answer is no or D.K proceed to S32)

a. If yes, the amount of daily urine was. D.K=9_____ ----
AQU

b. For how many days was the amount of urine changed?_____D.K=9 --- ----- ---DQU

S32. Did the deceased have difficulty in urination? No =***0*** Yes =***1*** No= ***9***_____ ----DPU

( If the answer is no or DK proceed to S33)

a. If yes, how was the difficulty in urination?_____ ----TDP

/Could not pass urine=***1*** Incontinency= ***2***Burning in urination=3, D.K=9

S33. Did the deceased have operation recently?_____ ----HOP

No =***0*** Yes =***1*** D.K= ***9***

( If the answer is no or DK proceed to S34)

a. If yes, how many days before death was the operation done? D.K =***9/***_____ ---- --- ---OPD

b. On which part of the body was operated? _____ ----OPS

Abdomen =***1*** Other part ***2*** D.K =***9/***

If other, specify_____

**IF THE DECEASED IS A FEMALE AND >50 YRS OLD PROCEED TO S34**
**IF THE DECEASED IS A MALE PROCEED TO S39**

S34 Was the deceased pregnant at the time of death? No =***0*** Yes =***1*** D.K= ***9*** -------PRE
(If the answer is no or DK proceed S35)
a. What was the duration of pregnancy? D.K = ***9***/……. -------MPR
S***35***. Did the deceased give birth 45 days before her death? …… -------DEL

No =***0*** Yes =***1*** D.K= ***9***

(If the answer is no or DK proceed to S36)
a. If yes, how many days before death? D.K= ***9***/ …….. -------EDD
b. Where did the deceased give birth ? …….. -------PDE
/Home =***1*** Clinic =2 Hospital =3Other, specify =4 D.K = ***9***/
If the answer is clinic or hospital, specify?_____
c. What was the duration of labour?……. -------DDE
/One day =***1*** More than a day =2 D.K = ***9***/
d. Did she have to much bleeding during labour? /. No =***0*** Yes =***1*** D.K= ***9*** -------BDE

e. If yes, was the too much bleeding before or after delivery? _____ -------HDE
/before =1 after =2 D.K= ***9***/_____
f. How was the delivery ?_____ -------MDE
/spontaneous =1 Instrumental=2 operation=3, D.K = ***9***/……
g. How was the baby ? ------PNC
/Alive =1 Born dead =2 ,Died within 7 days? =3
If born dead, specify the duration of pregnancy?_____D.K=9

h. Did she have difficulty in delivering? No =***0*** Yes =***1*** D.K=9_____ ----PCP

S***36***. Did she have abortion recently? No =***0*** Yes =***1*** D.K=9 _____ -----ABO

S***37***. Did she have abnormal vaginal bleeding? No =***0*** Yes =***1*** D.K= ***9***_____ ------
ABV

S38. Did she have swelling or ulcer in breast ? No =***0*** Yes =***1*** D.K= ***9***_____ ------
BT

S39. Did the deceased suffer any accidental injury ? No =***0*** Yes =***1*** D.K= ***9***_____ -------
INJ

**(**If the answer is no or DK proceed to S40)

39.1 a. If the answer is yes, probe for the type of injury _____ -----
TIN

/Assault =1, Car accident =2, War wounded=3; Animal bite =4
Burning =5; Poison =6; If other accident, specify =7 D.K= ***9***/

39.2 b. If yes , how many days before death? D.K= ***9***/_____ -------
DIN

S***40***. Did the deceased commit suicide? …… No =***0*** Yes =***1*** D.K= ***9*** -------
SUI

(If the answer is no or DK Proceed to next section)

***40***. a. How was the deceased commit suicide? …… -------
TSU

/ Hanging=***1***;poison =2; Burning=3; Other, specify =4 D.K=9

41. Time taken for interview_____Minutes.
TOI

/<30=1
/31-40=2
/41-50=3
/51-60=4
/>60=5

**END OF INTERVIEW**:

---

**THANK RESPONDENT (S) FOR HER /HIS/ THEIR COOPERATION**!

***42***. Interviewer's Assessment of cause of death of deceased
CDI Cause of death ***1***._____
" " ***2***._____
" " ***3***._____

***43***. Interviewers signature:-
IIID

| ID No. | Signature | Date |
|---|---|---|
| 1st _____ | | |
| 2nd _____ | _____ | _____ |

***44***. Date of Interview (dd/mm/yy) _____
DOI