

Addis Ababa University
School of Graduate Studies

Determinants and Causes of Adult Mortality in Butajira

By

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Thesis submitted to the School of Graduate Studies
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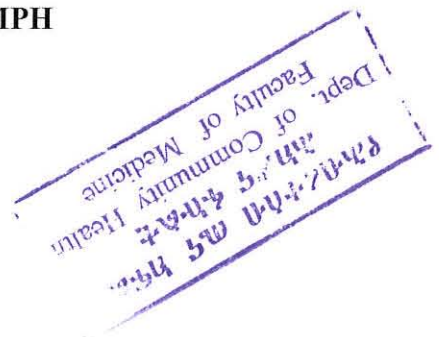
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**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

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Faculty of Medicine, Addis Ababa University**

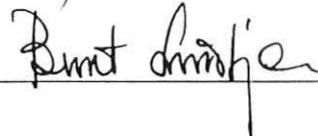
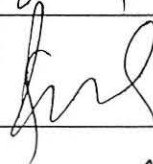
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LIST OF ABBREVIATIONS

AFI	Acute febrile illnesses
AIDS	Acquired Immuno Deficiency Syndrome
BRHP	Butajira Rural Health Program
CHA	Community health agent
CI	Confidence interval
COPD	Chronic obstructive lung diseases
HIV	Human immuno deficiency virus
LB	Live births
MOH	Ministry of Health
OR	Odds ratio
PA	Peasant Association
RR	Relative risk
SNNPR	Southern Nations and Nationalities People's Regional State
TB	Tuberculosis
TBA	Traditional birth attendant
UDA	Urban Development Association
VA	Verbal autopsy

ABSTRACT

Information on adult mortality is essentially non-existent in Ethiopia as in the rest of sub-Saharan Africa. This nested case-control study was conducted with the aim of assessing sociodemographic and behavioural factors associated with adult death in Butajira, Ethiopia. All deaths in the age-group 15-49 years during 1995-99 were taken as cases and unmatched controls of age 15-49 years were selected randomly from the computerized demographic surveillance database. Data were collected by lay interviewers using a simplified verbal autopsy questionnaire. Crude and adjusted odds ratio with 95% confidence interval were calculated to determine associations. Causes of death were diagnosed using an "expert algorithm" programmed into a computer.

A total of 515 deaths and 1507 controls were interviewed. The major determinants of mortality identified are age-groups 30-39 and 40-49 years (OR 2.99, 95%CI 1.91-4.71 and OR 4.01, 95%CI 2.49-6.46), male sex (OR 1.46, 95%CI 1.09-1.95), living in a rural lowland area (OR 1.54, 95%CI 1.03-2.31), single marital status (OR 1.63, 95%CI 1.13-2.35), having no educated person in the family (OR 1.91, 95%CI 1.11-3.29), being unemployed (OR 1.40, 95%CI 1.01-1.82), and poor and very poor perceived economic status (OR 1.97, 95%CI 1.31-2.94 and OR 2.98, 95%CI 1.73-5.13). The major causes of death observed were acute febrile illnesses (25.2%), liver diseases (11.3%), diarrhoeal diseases (11.1%), tuberculosis (9.7%) and HIV/AIDS (7.4%). Communicable diseases accounted for 60.8% of the deaths. The factors associated with mortality and the high level of mortality from communicable diseases reflect the poor socioeconomic development of the country and inadequate coverage

as a whole in education, health and poverty alleviation. Therefore, efforts should be directed at planning and implementing cost-effective interventions to decrease morbidity and mortality particularly from communicable diseases. Emphasis needs to be given also to poverty alleviation programmes.

I. INTRODUCTION

Ethiopian people have a very low socioeconomic status with low standard of living, poor environmental conditions and low level of social services such as health and education. These conditions are aggravated by the high population growth, man made and natural calamities, degradation of the environment and the associated low productivity of land (1). As a result, the health status of the population in Ethiopia is one of the worst in the world, as can be seen from the conventionally accepted health indicators. The infant and under five mortality rates are 110/1000 live births (lb) and 161/1000 children respectively. Maternal mortality is estimated to be 560-850/100,000 lb. The crude birth rate and crude death rate are 44.17/1000 and 14.96/1000 respectively. Life expectancy at birth is 53 years for females and 50.9 years for males, and total fertility rate is 6.52 child/woman (2).

More than 80% of the common diseases are infectious and communicable, some of them occurring in epidemic forms. The most prevalent of these diseases include respiratory infections, diarrheal diseases, malaria, tuberculosis, and sexually transmitted diseases. Nutritional disorders such as protein-energy malnutrition and micro-nutrient deficiencies are also important causes of morbidity and mortality. These health problems have been made far worse with the emergence of AIDS (acquired immuno deficiency syndrome) that has been spreading fast in the last two decades. Health care facilities are small in number, ill-equipped, maldistributed, and in a state of disrepair; in addition insufficient human and material resources are chronic problems. The potential health service coverage at present is only 52.4%. As a result, mortality rates are very high in this country but most of the deaths may occur unattended by a health worker and hence pass

unrecorded (1,2,3).

The Ethiopian health sector strategy was developed in 1995 with the objective of enabling the health service to give comprehensive and integrated primary health care in the health institutions at the community level. The approach was designed to emphasize on the preventive and promotive aspect of health care without neglecting essential curative services; focusing on communicable diseases, common nutritional disorders, and environmental health and hygiene. To do this, relevant information are lacking. Studies on differentials and causes of mortality will help to identify areas in need of intervention as well as prioritize and plan actions according to the magnitude of the problem (1).

Information on cause and determinants of death has served as the cornerstone for monitoring health progress and determining health priorities for control of diseases and research. It is also very important for policymaking, planning, monitoring and evaluation of health programs. As a result routine cause-of-death information systems have been established in many countries of the developed world and, have evolved to the point where there is now virtually complete coverage of death certification. However, majority of the developing countries, do not have routine vital registration systems. Where they have, the reliability of cause of death data acquired from the registration is too poor to be used in assessing the national health situation (4,5).

Information on adult mortality is essentially non-existent in Ethiopia as in the rest of Sub-Saharan Africa (6). Most of the statistics available on mortality in this country is what is collected from health facilities as the 10 top causes of hospital death. But even this information is not properly compiled and included in the Health and Health Related

Indicators published yearly by the Ethiopian Ministry of Health (2). It was with this background that the present study was conducted.

II. LITERATURE REVIEW

Adults comprise more than 50% of the total population in the developing world. This group includes those in society who are economically productive, biologically reproductive, and responsible for the support of children and elderly dependents. Yet adult health in developing countries received little attention (7).

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 sociomedical and biomedical research; monitoring of public health programme; allocating and distributing resources within the health sector; and offering clues for epidemiological research (8).

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 (2). In these resource poor countries an indirect scheme, which makes use of lay reporters, can be adopted to ascertain cause of death. This method that is used for estimating cause specific mortality is the verbal autopsy (VA). It uses information on the circumstances leading to death, symptoms and signs during the terminal illness, obtained from bereaved relatives, to assign cause of death through retrospective questioning in surveys or in demographic surveillance systems (9,10,11,12).

The VA technique is based on the assumption that most causes of death have distinct sign

and symptom 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. Also, it assumes that it is possible to classify deaths based on the reported information into useful categories of causes of death (11,13,14).

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 combinations of categories of causes of death assigned. The choice of categories of disease affects the complexity of diagnostic algorithms. A classification with fewer categories will group causes of death with closely related symptom complexes together and hence tends to increase the validity of the VA at the expense of a less detailed information. The other advantage in broadly classifying mortality is that the classification can be used in different settings, with minor modifications for site-specific causes of death (11).

The type of questionnaire designed also influences the validity of VA's. An open format VA questionnaire helps to maintain good rapport with respondents and limits the questions to the case at hand only, but it would require skilled and possibly medically trained interviewers, and would have a higher inter-interviewer variability. It would also need physicians for coding and diagnosing cause of death, which would be expensive. A checklist with filters would not need medically trained interviewers, and would be more

efficient for data collection. But, a false negative answer to a filter question will result in omitting one whole disease category and hence decrease the sensitivity of the VA. A checklist without filters would not require a medically trained person and would reduce interviewer bias, but it may not capture all details of the symptoms leading to death and may increase the number of symptoms falsely reported to have been present. The closed-ended questionnaires have the advantage of allowing development of pre-defined algorithms for diagnosing cause of death (11,13,14).

Different validation studies for verbal autopsies have been done for deaths in children (15-18) and in adults (12,19) suggesting that the VA method is an important tool for diagnosing causes of death, especially in developing countries. Studies in Tanzania (20) and in Butajira (21) have substantiated the robustness of VA method in identifying cause of death in field set-ups using lay interviewers.

Trends in cause-specific mortality over time, differentials of mortality between different population groups, or evaluation of the effect of interventions can be studied from data using the VA method. Additionally, they can be used to establish the relative public health importance of different causes of death in the populations in order to identify priorities and appropriate interventions (11,22)

Mortality rates differ between males and females. Generally, women live longer than men. The sex differential in mortality is thought to arise from two broad categories of causes: genetic-biological and environmental (behavioral, economic and cultural) (23). Girls are born with biological advantage over boys, making them more resistant to infection and malnutrition. So, when equally treated, girls are at a lesser risk of dying in

their first five years of life than boys (24). In the developed world the life expectancy of women is much higher than men: as high as 8.5 years in Finland (25) and 7.7 years in the United States (25). However, in some countries where the average life expectancy is short, girls and young women still have higher death rate than their male counterparts. In these developing countries the environmental factors act directly as well as indirectly on reduction or even reversal of the biological advantage (23). For example in Ethiopia, the difference is only 2 years (2). This is the result of environmental conditions such as diet, and health care that are particularly unfavorable for females. Maternal mortality, which is inherently restricted to females, plays a major role in the life expectancy gap in most developing countries. Aden et al found that in rural Somalia, females showed a lower risk of mortality in infancy but this risk was reversed in their reproductive years. After their 15th year young women and men had life expectancies of 47 and 52 years respectively (26). A study in the BRHP area that analyzed mortality over a ten-year period showed that females in general had lower risk of mortality, and that the widest gap in gender mortality was observed in the urban area (27).

Studies done on the socioeconomic differentials of mortality are based on the sociological concept that societies are stratified into hierarchies according to closely related variables such as occupational class, income, wealth, material living conditions and education. The reason in doing these studies is to find out to what extent and how social factors affect the health and mortality of populations. Many of the studies done on the socioeconomic differentials of mortality are in the developed countries. This is because of the availability of reliable computerized linkage of census and death records; and the possibility of conducting follow up studies on large census based samples (28).

In a study done in the United States of America among randomly chosen black and white men of age more than 34 years, it was found that in both the white and black socioeconomic status had a powerful influence on mortality from coronary diseases as well as all causes. In every comparison controlling for socioeconomic status, the mortality rates for black men were not significantly lower than for white men. They concluded that socioeconomic status is an important predictor of mortality. Black men had fewer years of education and were more likely to be laborers than white men (29).

Level of education is the most useful socioeconomic indicator for comparative mortality studies. A comparative study which included data from six countries (Finland, Sweden, Norway, Denmark, Hungary, England and Wales) in the 70's, showed that middle aged male mortality decreased with increasing years of education for each of the six countries (28). The age-standardized death rates in the categories with the longest education being 40-60% lower than those categories with the shortest education. Male mortality decreased by 8-9% per one year of education in all countries. A study of socioeconomic differentials in mortality in Finland, using census linked death recordings between 1970 and 1985 has also shown marked differences in mortality among the educational groups. Men with only basic education had a probability of death 50% higher than men with higher education (at least 13 years). Over the years, mortality had declined among all educational groups but the change was greater among those with more education (28).

The same study also examined the association between mortality and education. Accordingly, it was noted that total male mortality had declined most (27%) for white-collar upper class workers over the years 1971-85, and least for unskilled workers (13%).

This widening gap was explained by structural changes in mortality in all classes (meaning a slow decline in mortality for those causes of death in which differences in mortality are large or a faster decline for causes having smaller differences between social classes, would lead to growth in differences pertaining to total mortality), and faster decline of mortality in the upper than in the lower occupational classes for most causes of death (28).

A mortality study done in Barcelona and Madrid residents aged more than 24 years has also found lower mortality rate among individuals with higher educational levels. The differences in mortality were more important for the younger population than for the middle aged and elderly population. AIDS was considered responsible for the difference in overall mortality by educational level in the 25-34 year olds (30).

In rural Somalia, Aden reported that mortality risks were generally lower in households where the head of the family was literate, but this influence differed for male and female members of the household. Older women in a house headed by a literate man had higher mortality risks than those with an illiterate head (26).

An earlier study about the effect of marital status on mortality for men in London had shown that unmarried men had higher total mortality rate than the married men. Patterns of mortality however were different in the sub-groups of unmarried men ie divorced/separated men had an increased risk from neoplasm, widowed men from coronary heart diseases; and the initial increased mortality for single men was no longer evident after adjustment for other risk factors like coronary heart disease (31).

A prospective study in Washington has also tried to see the association between mortality

and marital status based on information obtained from death certificates. The male widowed had significantly higher deaths from infectious diseases, accidents, and suicides; while among the female widowed the only cause having statistical significance was cirrhosis of the liver. There was no statistically significant similarity in causes of death of the widowed and their predeceased spouses. This study also showed there is a greater risk of mortality in the widowed than married people (32).

One of the factors influencing mortality in a community is the illness and health behavior of that society. Thus, information on morbidity of a particular area can be useful in understanding the mortality pattern. Kloos et al found that morbidity rates were significantly lower in the affluent Kebeles of Addis Ababa compared to the poorer kebeles, the industrial village of Kaliti, and the rural communities of central Ethiopia. There was no significant sex difference in overall illness prevalence. One third of the ill persons reported use of modern health facilities, 19.9% self care using manufactured drugs, and 26% self-care using traditional medicine. More than one fifth claimed to have used no treatment of any kind. The higher Socio-economic neighborhood residents in Addis Ababa used modern medicine more and traditional healers less often. The reasons for non-use of medical care were given as mildness of illness, lack of money for transport and treatment, distance to health facility, long waiting lines, inappropriateness of medical treatment, and failure to locate appropriate practitioners or medicine (33).

An important demographic variable that influences mortality is sex. In reproductive age group, particularly in developing countries, maternal mortality may attribute significantly in explaining mortality differences by sex. It indicates if and how states have chosen to

intervene or not in reducing the costs of reproduction to women's lives (34). Nearly 99% of maternal deaths occur in the developing countries and the vast majority of these deaths are preventable (35). Women in Africa have the highest lifetime risk of maternal death because the effect of high mortality rate is compounded by high fertility (36). In Ethiopia, only a few studies have been done on the issue of maternal mortality, and one of the reasons why maternal mortality has remained a neglected tragedy for such a long time is due to lack of information. The official estimate of the Ministry of Health (MOH) for the year 1999 ranges from 560 to 850 per 100,000 live births (2). A population-based study done in Addis Ababa almost two decades ago reported a maternal mortality rate of 566 per 100,000 live births (37). Another study, which was done in rural communities of Illubabor in 1991 using the sisterhood method, reported a lifetime risk of maternal mortality of one in 23 and a maternal mortality ratio of 570 per 100,000 live births (38).

In Ethiopia, mortality has not been studied in detail systematically. Thus differentials and causes of adult death are not well documented. The lack of studies have been attributed to lack of proper vital events registration system and the problem of identifying the cause of death as most of the deaths are occurring at home. This study took the advantage of having a community based demographic surveillance database in Butajira and the availability of a simplified technique of diagnosing cause of death (verbal autopsy) to shed some light into this grossly un-researched area. The information obtained in this study can be used to implement cost-effective interventions and to identify further areas of research in adult mortality in rural communities.

III. OBJECTIVES

1. General Objective

To assess causes of adult death in the Meskan and Mareko district.

2. Specific Objectives

- To identify factors associated with adult death in the district.
- To identify major causes of death in the area.

IV. RESEARCH METHODOLOGY

1. Study Area

The study area is the Meskan and Mareko District of the Gurage Zone in the Southern Nations Nationalities People's Regional State (SNNPR). Butajira, the principal town has four Urban Dwellers' Association (UDA) and the rural part of the district has 82 peasant associations (PA). The estimated size of the district is 797 km². It lies at an average altitude of 2,100 m above sea level with a range of 1,750m in the low lands to 3,400m in the mountainous areas. The annual rainfall ranges between 900mm and 1,400mm (39).

The total population of the area was estimated to be 257,000 in 1999. Two thirds of the population follows Islamic religion and the rest are mostly Christians. The main language spoken is Guragigna (Ethio-Semitic language). The economy is mainly based on agriculture. The main cash crops produced are pepper, coffee and khat. Teff is also mainly produced for sell. In Butajira town most people are engaged in commercial activities. There are all-weather roads connecting Butajira to Addis Ababa and Zeway. The villages in the district with few exceptions are connected to the town by dry weather roads. Butajira town has postal and telephone services as well as a 24 hour supply of electricity (39).

There is one functional government health center in the district, located in Butajira town, which provides both curative and preventive service. Additionally, there are two government health stations, 11 private clinics, 11 functional health posts, and 8 private drug vendors. One hospital has recently been constructed, but it is not functional yet (39).

The actual study sites were the nine rural and one urban study kebeles that are under

surveillance by the Butajira Rural Health Program (BRHP) since 1987. These sites were previously randomly selected using the probability proportionate to size technique. The population of the study area is estimated to be 37,323. The BRHP registers events such as birth, death, marriage, new household, out migration, in migration and internal move (migration within the BRHP surveillance area). Data on mortality as well as the above mentioned other events are collected monthly, by trained village-based enumerators, through household visits (39).

The reasons for choosing the BRHP area for this study were:

- ◆ The fact that the area is under surveillance made provided opportunity to identify deaths required for the study.
- ◆ Selection of appropriate controls was possible from the database.
- ◆ Trained and experienced enumerators (employees of the BRHP) who know the local languages and cultures were available. This made it less expensive, and less time and energy consuming to train them on this particular questionnaire.

2. Study Design

The first part of this research is a case-control study based on a longitudinal surveillance system (a nested case-control design). The second part, which employed the verbal autopsy method for identifying causes of death, is a cross-sectional survey also based on the longitudinal surveillance system.

3. Study Population

The source population is all reproductive age people in the BRHP area. The study population included all people aged 15-49 who died in the past 5 years in the area and randomly selected controls, also in the reproductive age. The 49 years age limit was selected because the life expectancy in Ethiopia is about 50 years (2). This was expected to help identify premature deaths in the adult population.

4. Sampling

All deaths that have been registered by the BRHP during 1995 to 1999 in the reproductive age group (15 to 49 years) were identified from the database. The controls that are also 15-49 years were randomly selected, proportionate to the size of cases, by computer from the same BRHP database.

5. Sample Size

The minimum number of cases and controls required to achieve a significance level of 95% and power of 80% in order to get an OR of at least 2 was 392 and 1176, respectively. Thus data generated following the 1995 census in BRHP was judged to be adequate to fulfill the requirement. Accordingly, all the deaths in the years 1995-1999 in the BRHP area aged 15-49 were included in the study. Three unmatched controls were taken for each case.

6. Data Collection

The questionnaire was prepared in English and then translated to Amharic. Two sets of questionnaires were prepared one for cases and the other for controls. Data for the cases were collected using a simplified verbal autopsy questionnaire administered to relatives of the deceased. The first part of the questionnaire has questions on the sociodemographic characteristics of the subjects and their personal habits such as area of residence, age, sex, marital status, education, economic status, health service usage, smoking habits and drinking habits. This part of the questionnaire is identical with the controls' questionnaires. The second part has questions on circumstances surrounding mortality such as health care seeking, taking medications, and admission to a health facility, as well as symptoms of illness. The VA questionnaire used in this study is short and simplified for the following reasons:

- since lay interviewers were used and the time for their training and the data collection was limited, it was important to avoid a complicated questionnaire with many filter questions;
- majority of the respondents were known to be rural and uneducated people and hence questions needed to be easily understandable;
- making the questionnaire short and simple had the advantage of possibly incorporating it into routine surveillance systems in the future;
- it also had the advantage of allowing the development of an uncomplicated algorithm for the diagnoses of cause of death; and

- improving the validity of findings as questionnaires can be fairly complete.

Data collectors and supervisors were recruited from the study area. The data collectors were all 12th grade complete and experienced in a similar type of fieldwork since all were employees of the BRHP. A total of 15 data collectors and 2 supervisors were employed. They were given a three days training on the contents of the questionnaire, on how to elicit information on mortality without offending respondents, and on how to conduct interviews in general. The principal investigator gave the training.

Pretesting was done for one day in a part of Butajira town that is not included in the BRHP area (Kebele- 03). The pretest helped the interviewers to understand the questionnaire well. They encountered only a few problems in administering the questionnaire, and the problematic questions were rephrased. The interviewers were given a half day training to acquaint them with the corrected questionnaire.

Data collectors went house to house to collect information on the cases identified from the study base, the same procedure was followed to collect information on the controls. In the event respondents were not available on first visits, repeated visits were arranged on at least two occasions. The interviewers going on these repeat visits were those living in the same kebele and they also took questionnaires with incomplete answers in order to complete them.

The principal investigator was fully in charge of the fieldwork, and participated in field supervision and in providing on-site guidance during field data collection. Supervisors organized the system of visiting households by assigning specific areas for each data collector, checked the completeness of the questionnaires, clarified questions arising

during the process and randomly checked the accuracy of some of the questionnaires.

7. Method of Analysis

Data entry and part of the analysis were done using EPI Info Version 6 statistical package. The descriptive part consisted of socio-demographic information and cause of death for all study participants. Causes of death were analyzed using an expert algorithm programmed into a computer.

Factors associated with mortality were analyzed based on the following conceptual framework. The assumption was that socio-demographic factors such as sex; area of residence as in urban, rural highland or lowland; education of the individual or the family; economic status; and accessibility of health facilities basically determine the health status and magnitude of mortality of a particular population. These factors affect and are in turn affected by the health behavior of the people. When some illness occurs in one member of a family their response to this problem depends on both the sociodemographic and behavioral factors. The type and timing of response to the illness associated with its severity directly influences the outcome i.e. recovery or death (Figure-1).

The factors associated with adult mortality such as the socio-demographic characteristics and behavioral aspects of the study population were examined by calculating OR and 95% confidence interval. Logistic regression was performed using the statistical package SPSS 10.0 for Windows. This was calculated first by adjusting for all the socio-demographic characteristics, then for the behavioral factors, and finally for the two groups together.

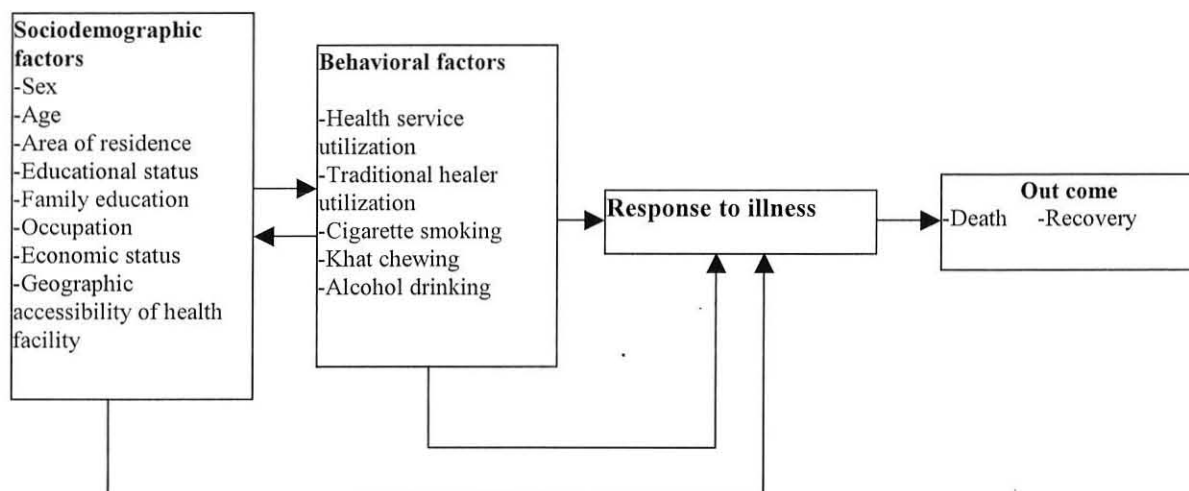


Fig-1 Conceptual framework for analyzing sociodemographic and behavioral risk factors in adult mortality.

In this study, residence area was classified into urban, rural highland, and rural lowland with the intention of finding out if there is any difference among the urban and rural population as well as the highland and lowland areas. The urban Butajira town is situated at 2,100 meters above sea level (39).

Occupational status was classified as employed and unemployed based on whether the person's work was income generating or not. In this case farmers were included in the employed group.

The study classified smoking habits as smokers and non-smokers. The smokers being those currently smoking for the controls and those who were smoking until the time of death for the cases, while the non-smokers are those who do not smoke as well as those who had quit smoking. Khat chewing and alcohol drinking are also classified on the same basis.

In the “Results” section, when presenting the missed cases, percentages were calculated out of the total number identified from the computer database. For example, out of the 123 deceased identified in the age group 15-19 years, 35 (28.5%) were missed and out of the total 405 females identified, 153 (37.8%) were missed.

The categorization used for the dates of death in tables 1 and 2 (“01/01/95”-“08/31/96”, “09/01/96”- “08/31/97”, “09/01/97”- “08/31/98”, and “09/01/98”- “12/31/99”) were unequal because of the discrepancy in the calendars used by the BRHP data-base (Gregorian calendar) and the one used during the data collection (Ethiopian calendar).

V. ETHICAL CONSIDERATIONS

The study had ethical clearance from Addis Ababa University. During the process of data collection respondents were briefed on the aim of the study and assured of confidentiality. Verbal consent was obtained from all respondents. Respondents were not subjected to any risk during the study, neither were they promised or given monetary or material benefits.

VI. RESULTS

The total numbers of adult (15-49 years) deaths identified from the computer database were 819. From these, relatives of only 515 adults who died in the years 1995-1999 were actually identified in the field and interviewed. Numbers of the deceased whose relatives were unavailable for interview in the age group 15-19 were 35 (28.5%), 116 (53.0%) in 20-29, forty-nine (23.1%) in 30-39 and 104 (39.2%) in 40-49 age groups (Table-1). Of these, 153 (37.8%) were females and 151 (36.5%) were males (Table-2). The reasons for this were out-migration of relatives of the deceased, unavailability of relatives on repeated visits, mistaken information, and double entry of some of deceased. The highest proportion of the missed cases (59.7%) were for those who died from "01/01/95"- "08/31/96", in contrast only 19.4% of the cases who died from "09/01/98"- "12/31/99" (Tables 1-2).

Table-1 Cases missed during the study by time of death and age group, Butajira, 2000.

Time of death	Age-group								Total	
	15-19		20-29		30-39		40-49			
	Sub- total	Missed n (%)	Sub- total	Missed n (%)	Sub- total	Missed n (%)	Sub- total	Missed n (%)	Sub- total	Missed n (%)
01/01/95-08/31/96	35	18(51.4)	73	55(75.3)	58	29(50.0)	65	36(55.4)	231	138(59.7)
09/01/96-08/31/97	20	10(50.0)	31	17(54.8)	40	14(35.0)	63	38(60.3)	154	79(51.3)
09/01/97-08/31/98	19	1(05.3)	30	17(56.7)	25	2(08.0)	25	2(08.0)	99	22(22.2)
09/01/98-12/31/99	49	6(12.3)	85	27(30.6)	89	4(04.5)	112	28(25.0)	335	65(19.4)
Total	123	35(28.5)	219	116(53.0)	212	49(23.1)	265	104(39.2)	819	304(37.1)

Table-2 Cases missed during the study by time of death and sex, Butajira, 2000.

Time of death	Sex				Total	
	Female		Male			
	Sub-total	Missed n(%)	Sub-total	Missed n(%)	Sub-total	Missed n (%)
01/01/95-08/31/96	114	69(60.5)	117	69(59.0)	231	138(59.7)
09/01/96-08/31/97	75	42(56.0)	79	37(46.8)	154	79(51.3)
09/01/97-08/31/98	47	13(27.7)	52	9(17.3)	99	22(22.2)
09/01/98-12/31/99	169	29(17.1)	166	36(21.7)	335	65(19.4)
Total	405	153(37.8)	414	151(36.5)	819	304(37.1)

Out of the total 515 available for interview, 254 (49.3%) were females and 261 (50.7%) were males. The controls were 785 (52.1%) females and 722 (47.9%) males.

Overall controls were younger than the cases. Polygamous marriage, and divorce and widowhood were reported more among the deceased than live controls. The controls were more educated than the cases, and more families among the controls had at least one educated person. Perceived distance from a health facility were of approximately equal percentage for both the cases and controls. More than three quarters of both the cases and controls followed the Islam religion. A greater proportion of the deceased were unemployed and perceived themselves to be of poor economic status. Area of residence, distance to health facility, religion and occupation were not significantly different between the cases and controls (Table-3).

Table-3 Sociodemographic characteristics of the study population, Butajira, 2000.

CHARACTERISTICS	CASES(n=515) number (Percent)	CONTROLS(n=1507) number Percent	χ^2	P-VALUE
Age group				
15-19	88 (17.0)	384 (25.5)	46.08	0.001
20-29	102 (19.8)	418 (27.7)		
30-39	163 (31.7)	403 (26.8)		
40-49	162 (31.5)	302 (20.0)		
Sex				
female	254 (49.3)	785 (52.1)	1.07	0.3
male	261 (50.7)	722 (47.9)		
Residence area				
Urban	71 (13.8)	257 (17.1)	3.28	0.19
Rural highland	236 (45.8)	682 (45.2)		
Rural lowland	208 (40.4)	568 (37.7)		
Marital status				
monogamous marriage	295 (57.3)	843 (55.9)	10.31	0.01
never married	139 (27.0)	490 (32.5)		
polygamous marriage	46 (8.9)	110 (7.3)		
divorced & widowed	35 (6.8)	64 (4.3)		
Educational status				
completed primary & above	47 (9.1)	172 (11.4)	21.26	0.001
read and write & primary	75 (14.6)	346 (23.0)		
illiterate	393 (76.3)	989 (65.6)		
Persons educated in a family				
two or more persons	24 (4.7)	122 (8.1)	49.02	0.001
one person educated	186 (36.1)	759 (50.4)		
no educated person	305 (59.2)	626 (41.5)		
Distance to health facility				
near	214 (41.6)	639 (42.2)	0.27	0.87
average	66 (12.8)	181 (12.0)		
far	235 (45.6)	687 (45.6)		
Religion				
Muslim	392 (76.1)	1169 (77.6)	5.39	0.06
Orthodox Christian	112 (21.8)	280 (18.6)		
other Christian	11 (2.1)	58 (3.8)		
Occupational status				
employed	299 (58.1)	923 (61.2)	1.50	0.22
unemployed	216 (41.9)	584 (38.8)		
Perceived economic status				
well to do	39 (7.6)	198 (13.1)	47.27	0.001
average	204 (39.6)	736 (48.8)		
poor	222 (43.1)	510 (33.9)		
very poor	50 (9.7)	63 (4.2)		

Analysis for the determinants of mortality was done step-wise. After the univariate analysis, multivariate analysis was done in two steps. First adjustment was done for all the sociodemographic factors and the behavioral factors separately, and then for both groups together.

On the univariate analysis, a significantly higher risk of mortality in the age groups 30-39 and 40-49 was observed compared to the youngest age group. There was no statistically significant difference in the risk of mortality by gender, area of residence, marital status, religion, occupational status and distance to health facility. The variables most significantly associated with mortality are educational status, presence of an educated person in the family and perceived economic status. A higher risk of mortality was observed in the illiterate when compared to people who had completed at least primary education. Those with no educated person in the family had higher risk than when at least two persons are educated. A significantly increasing risk of mortality was observed with declining perceived economic status. A two to four fold increased risk was seen in the poor and very poor (Table-4).

On multivariate analysis, the age groups 30-39 and 40-49, having no educated person in the family, and poor and very poor perceived economic status still had a significantly higher risk of mortality after adjustment for sociodemographic factors. Being male, never married, Orthodox Christian and being unemployed showed higher risk of mortality on adjustment for all sociodemographic factors. In contrast, the higher risk of mortality observed on the illiterate lost its significance after the adjustment (Table-4). All the above mentioned variables, except for Orthodox Christian religion were still significantly

associated with mortality when adjustment was done for all the sociodemographic and behavioral factors at once. Age groups 30-39 and 40-49 showed a three-fold and four-fold higher risk of mortality compared to the youngest age group (OR 2.99, 95%CI 1.91-4.71 and OR 4.01, 95%CI 2.49-6.46, respectively). The male sex (OR 1.46, 95%CI 1.09-1.95), single marital status (OR 1.63, 95%CI 1.13-2.35), having no educated person in the family (OR 1.91, 95%CI 1.11-3.29), being unemployed (OR 1.40, 95%CI 1.01-1.82), and poor and very poor perceived economic status (OR 1.97, 95%CI 1.31-2.94 and OR 2.98, 95%CI 1.73-5.13, respectively). It was also found that living in the rural lowlands had a higher risk of mortality when compared to the urban area (OR 1.54, 95%CI 1.03-2.31) (Table-6).

Table-4 Sociodemographic differentials of mortality among cases and controls,
Butajira, 2000.

CHARACTERISTICS	CASES	CONTROLS	Crude OR (95% CI)	Adjusted OR* (95%CI)
Age group				
15-19	88	384	1	1
20-29	102	418	1.06 (0.77, 1.48)	1.35 (0.93, 1.96)
30-39	163	403	1.76 (1.30, 2.40)	2.73 (1.76, 4.25)
40-49	162	302	2.34 (1.72, 3.20)	3.72 (2.33, 5.93)
Sex				
female	254	785	1	1
male	261	722	1.12 (0.91, 1.37)	1.38 (1.06, 1.79)
Residence area				
Urban	71	257	1	1
Rural highland	236	682	1.25 (0.92, 1.72)	1.23 (0.82, 1.83)
Rural lowland	208	568	1.33 (0.97, 1.83)	1.42 (0.95, 2.11)
Marital status				
monogamous marriage	295	843	1	1
never married	139	490	0.81 (0.64, 1.03)	1.66 (1.16, 2.40)
polygamous marriage	46	110	1.20 (0.81, 1.75)	1.17 (0.79, 1.73)
divorced & widowed	35	64	1.56 (0.98, 2.45)	1.16 (0.73, 1.86)
Educational status				
completed primary & above	47	172	1	1
read and write & primary	75	346	0.79 (0.52, 1.22)	0.68 (0.44, 1.06)
illiterate	393	989	1.45 (1.02, 2.10)	0.78 (0.49, 1.24)
Persons educated in a family				
two or more persons	24	122	1	1
one person educated	186	759	1.25 (0.77, 2.08)	1.22 (0.75, 1.98)
no educated person	305	626	2.48 (1.55, 4.10)	2.08 (1.21, 3.56)
Distance to health facility				
near	214	639	1	1
average	66	181	1.09 (0.78, 1.52)	0.91 (0.64, 1.31)
far	235	687	1.02 (0.82, 1.27)	0.89 (0.69, 1.14)
Religion				
Muslim	392	1169	1	1
Orthodox Christian	112	280	1.19 (0.92, 1.54)	1.46 (1.12, 1.91)
other Christian	11	58	0.57 (0.27, 1.10)	0.68 (0.34, 1.34)
Occupational status				
employed	299	923	1	1
unemployed	216	584	1.14 (0.93, 1.41)	1.48 (1.15, 1.91)
Perceived economic status				
well to do	39	198	1	1
		736	1.41 (0.96, 2.11)	1.38 (0.94, 2.04)
average	204	510	2.21 (1.50, 3.31)	1.99 (1.33, 2.97)
poor	222	63	4.03 (2.35, 6.89)	3.14 (1.83, 5.37)
very poor	50			

* adjusted for all the sociodemographic factors.

Univariate analysis of mortality by behavioral factors showed that individuals who never visited a health facility had significantly higher odds of mortality compared to people who at least visited once (OR 1.71, 95%CI 1.21-2.39). No significantly increased risk was observed among cigarette smokers and khat chewers compared to people who are not exposed to these substances. Alcohol drinkers had higher odds of mortality than non-drinkers (OR 1.40, 95%CI 1.02-1.90). Spending the night outside home was not significantly associated with mortality (Table-5).

On the multivariate analysis, adjusting for the behavioral factors alone showed that never visiting a health facility and drinking alcohol had a higher risk of mortality than their counterparts; while those who spend nights outside their home had less risk of mortality than people who do not spend nights outside home (Table-5). But these variables lost their significance when the adjustment was done on all the sociodemographic and behavioral factors together. Here, the only statistically significant finding was that occasional khat chewers had less risk of mortality than non-chewers (OR 0.70, 95%CI 0.53-0.92) (Table-6).

Table-5 Behavioral factors as differentials of mortality among the study population,
Butajira, 2000.

CHARACTERISTICS	CASES	CONTROLS	Crude OR (95%CI)	Adjusted OR* (95% CI)
Visit health facility (n=2020)				
yes	450	1393	1	1
no	63	114	1.71 (1.21, 2.39)	1.65 (1.18, 2.29)
Cigarette smoking (n=2021)				
does not smoke	483	1433	1	1
smoking	31	74	1.24(0.78, 1.94)	1.01 (0.63, 1.64)
Khat chewing (n=2020)				
does not chew	261	732	1	1
chews occasionally	196	659	0.83 (0.67, 1.04)	0.87 (0.70, 1.09)
chews mostly or daily	56	116	1.35 (0.94, 1.94)	1.37 (0.93, 2.01)
Alcohol drinking (n=2021)				
does not drink	443	1352	1	1
drinks	71	155	1.40 (1.02, 1.90)	1.43 (1.04, 1.97)
Spend the night out				
no	284	764	1	1
yes	231	743	0.84 (0.68, 1.03)	0.80 (0.65, 0.99)

*Adjusted for all the behavioral factors.

Table-6 Sociodemographic characteristics and behavioral factors as determinants of mortality, Butajira, 2000.

CHARACTERISTICS	CASES	CONTROLS	Adjusted OR* (95%CI)
Age group			
15-19	88	384	1
20-29	102	418	1.44 (0.98, 2.12)
30-39	163	403	2.99 (1.91, 4.71)
40-49	162	302	4.01 (2.49, 6.46)
Sex			
female	254	785	1
male	261	722	1.46 (1.09, 1.95)
Residence area			
Urban	71	257	1
Rural highland	236	682	1.29 (0.86, 1.95)
Rural lowland	208	568	1.54 (1.03, 2.31)
Marital status			
monogamous marriage	295	843	1
never married	139	490	1.63 (1.13, 2.35)
polygamous marriage	46	110	1.16 (0.78, 1.72)
divorced & widowed	35	64	1.13 (0.71, 1.82)
Educational status			
completed primary & above	47	172	1
read and write & primary	75	346	0.66 (0.42, 1.04)
illiterate	393	989	0.75 (0.47, 1.19)
Persons educated in a family			
two or more persons	24	122	1
one person educated	186	759	1.14 (0.70, 1.87)
no educated person	305	626	1.91 (1.11, 3.29)
Distance to health facility			
near	214	639	1
average	66	181	0.88 (0.61, 1.27)
far	235	687	0.90 (0.69, 1.16)
Religion			
Muslim	392	1169	1
Orthodox Christian	112	280	1.25 (0.92, 1.71)
other Christian	11	58	0.57 (0.28, 1.15)
Occupational status			
employed	299	923	1
unemployed	216	584	1.40 (1.01, 1.82)
Perceived economic status			
well to do	39	198	1
average	204	736	1.37 (0.93, 2.03)
poor	222	510	1.97 (1.31, 2.94)
very poor	50	63	2.98 (1.73, 5.13)
Visit health facility (n=2020)			
yes	450	1393	1
no	63	114	1.31 (0.92, 1.86)

CHARACTERISTICS	CASES	CONTROLS	Adjusted OR* (95%CI)
Cigarette smoking (n=2021)	483	1433	1
does not smoke	31	74	0.91 (0.55, 1.51)
smoking			
Khat chewing (n=2020)			
does not chew	261	732	1
chews occasionally	196	659	0.70 (0.53, 0.92)
chews mostly or daily	56	116	1.01 (0.64, 1.57)
Alcohol drinking (n=2021)			
does not drink	443	1352	1
drinks	71	155	1.11 (0.77, 1.59)
Spend the night out			
no	284	764	1
yes	231	743	0.87 (0.69, 1.09)

* adjusted for all the sociodemographic and behavioral factors.

Communicable diseases accounted for 60.8% of the deaths, non-communicable for 31.1%, injuries 1.7% and undetermined causes consisted of 6.4%. The highest number of deaths were due to acute febrile illnesses (AFI) which were 130, comprising 25.2% of the causes. AFI, diarrheal diseases, tuberculosis, AIDS, and liver diseases together accounted for 64.7% of the deaths (Table-7).

AFI was the cause for 28% and 25.5% of the deaths in the rural highland and lowland areas respectively, while it occurred in only 15.5% of the urban deaths. Diarrheal diseases accounted for 7% of the deaths in the urban area, for 10.6% in the rural highland and 13% in the rural lowland. However, HIV/AIDS in the urban area accounted for 11.3% in contrast to 8.5% and 4.8% in the rural high- and lowlands (Table-7).

Meningitis, chronic obstructive lung diseases (COPD), and injuries were in higher number among males while pneumonia was higher in females. In general, communicable diseases occurred in a higher percentage of the male deaths (62.8%) than the females' (58.7%); while the reverse was true in the case of non-communicable diseases, which accounted for 35.4% of the female and 26.8% of the male deaths. Maternal mortality accounted for 7% of all cases and 14.2% among the female deaths (Table-8).

Table-7 Possible causes of death by area of residence, Butajira, 2000.

POSSIBLE CAUSE	URBAN Number(%)	RURAL HIGHLAND Number (%)	RURAL LOWLAND Number (%)	TOTAL Number (%)
I. Communicable Diseases	37 (52.1)	150 (63.6)	126 (60.6)	313 (60.8)
Acute Febrile illnesses	11 (15.5)	66 (28.0)	53 (25.5)	130 (25.2)
Diarrheal diseases	5 (7.0)	25 (10.6)	27 (13.0)	57 (11.1)
All forms of tuberculosis	6 (8.5)	23 (9.7)	21 (10.1)	50 (9.7)
HIV/ AIDS	8 (11.3)	20 (8.5)	10 (4.8)	38 (7.4)
Pneumonia	4 (5.6)	14 (5.9)	10 (4.8)	28 (5.4)
Meningitis	3 (4.2)	2 (0.8)	5 (2.4)	10 (1.9)
II. Non-communicable Diseases	23 (32.4)	75 (31.8)	62 (29.8)	160 (31.1)
Liver diseases	8 (11.3)	26 (11.1)	24 (11.5)	58 (11.3)
Cardio-vascular diseases	6 (8.5)	13 (5.5)	13 (6.3)	32 (6.2)
Chronic obstructive lung diseases	4 (5.6)	14 (5.9)	9 (4.3)	27 (5.2)
Acute abdomen conditions	2 (2.8)	3 (1.3)	2 (0.9)	7 (1.4)
Maternal causes	3 (4.2)	19 (8.1)	14 (6.7)	36 (7.0)
III. Injuries	2 (2.8)	6 (2.5)	1 (0.5)	9 (1.7)
Undetermined	9 (12.7)	5 (2.1)	19 (9.1)	33 (6.4)
Total	71 (100)	236 (100)	208 (100)	515 (100.0)

Table-8 Possible cause of death by sex, Butajira, 2000.

POSSIBLE CAUSE	FEMALES	MALES	TOTAL
	Number (%)	Number (%)	Number (%)
I. Communicable Diseases	149 (58.7)	164 (62.8)	313 (60.8)
Acute Febrile illnesses	63 (24.8)	67 (25.7)	130 (25.2)
Diarrheal diseases	28 (11.0)	29 (11.1)	57 (11.1)
All forms of tuberculosis	21 (8.3)	29 (11.1)	50 (9.7)
HIV/ AIDS	19 (7.5)	19 (7.3)	38 (7.4)
Pneumonia	17 (6.7)	11 (4.2)	28 (5.4)
Meningitis	1 (0.4)	9 (3.4)	10 (1.9)
II. Non-communicable Diseases	90 (35.4)	78 (26.8)	160 (31.1)
Liver diseases	26 (10.2)	32 (12.3)	58 (11.3)
Cardio-vascular diseases	14 (5.5)	18 (6.9)	32 (6.2)
Chronic obstructive lung diseases	10 (3.9)	17 (6.5)	27 (5.2)
Acute abdomen conditions	4 (1.6)	3 (1.1)	7 (1.4)
Maternal causes	36 (14.2)	---	36 (7.0)
III. Injuries	3 (1.2)	6 (2.3)	9 (1.7)
Undetermined	12 (4.7)	21 (8.1)	33 (6.4)
Total	254 (100.0)	261(100.0)	515(100.0)

Malaria consisted of 26.3% of the perceived primary causes of death. Tuberculosis that was described as lung disease, *bird beshita* and pulmonary tuberculosis consisted of 14.6%. Generalized body swelling consisted of 9.2% of the deaths, diarrhea 7.2% and pneumonia 5.2%. “Evil-eye” and “spirit possession” were blamed in 4.3% of the deaths (Table-9). Only one of the deceased’s relatives gave AIDS as cause of death.

About twenty percent of the deceased had not sought modern medical care from any health facility during their illness. On use of medications, 76.1% had taken modern manufactured drugs, 7% had used traditional medicine and 2.2% had utilized both types of medicines. No treatment was used by 8.5% of the deceased. Excluding the sudden deaths, accidents and suicides, this group consisted of about 6% of the deceased. Of the 410 cases who visited a health facility during their terminal illness 77 (18.8%) were admitted into the facility for treatment, and of those who were admitted 7 (9.1%) had undergone surgical interventions (Table-10).

Maternal causes constituted 14.2% of the female deaths. Of the 36 women identified to have died from maternal causes; 17 (47.2%) had fever, 10 (27.8%) had prolonged labour, and 4 (11.1%) had hemorrhage, and the other associated problems mentioned were body swelling, retained placenta, operative delivery, chest pain, jaundice and cough (Figures not included in the tables).

Table-9 Perceived first causes of death, Butajira, 2000.

Perceived causes of death	Number	Percent
Malaria	135	26.2
Tuberculosis	76	14.7
Generalized body swelling	47	9.1
Diarrhea	37	7.2
Pneumonia	27	5.2
Renal disease	24	4.7
Evil eye and possession	22	4.3
Abdominal illness	22	4.3
Mental disorder	11	2.1
Liver disease	9	1.7
Delivery	8	1.6
Accidental causes	8	1.6
Fever	7	1.4
Seizure disorder	6	1.2
Hypertension	6	1.2
Sudden death	5	1.0
Others	63	12.2
Cause not stated	2	0.4
Total	515	100.0

Table-10 Actions taken in response to illness before death, frequency of admissions and surgical interventions, Butajira, 2000.

Actions taken	Number (%)
Visited Health facility	
Yes	410 (79.6)
No	105 (20.4)
Use of medication	
Manufactured drugs	392 (76.1)
Traditional medicine	36 (7.0)
Both manufactured and traditional	11 (2.2)
No medication taken	44 (8.5)
Respondent did not know	28 (5.4)
No answer given	4 (0.8)
Admission into health facility (N=410)	
Yes	77 (18.8)
No	333 (81.2)
Surgical intervention (N=77)	
Yes	7 (9.1)
No	70 (90.9)

VII. DISCUSSION

This study has attempted to find out the socio-demographic and behavioral factors associated with mortality, and causes of death at a district level. Information of this type is very important for health planning and decision making purposes.

The major determinants of mortality identified from the study are age, marital status, family educational status, having an income generating work and poor perceived economic status from the socio-demographic characteristics of the study population. On behavioral aspects only occasional khat chewing showed a significantly less risk of mortality. The major causes of death were acute febrile illnesses, liver disease, diarrheal diseases, tuberculosis and HIV/AIDS in that order. Maternity related deaths accounted for 14.2% of the female mortality.

The present study has employed a simplified questionnaire of which the first part had questions on socio-demographic and behavioral characteristics of the study population. This part is identical for both cases and controls. The controls as well as the family of the deceased were cooperative and had no difficulties in answering this first part. The VA questions included if the deceased visited a health facility, the duration of illness, use of medications, and questions on signs and symptoms of illness. The questionnaire was short and easily understandable, making it easy to use by lay interviewers in a rural area where the majority of the respondents are illiterate. The fact that it was simplified has narrowed the possibilities of making very specific diagnoses, but was advantageous on the completeness of the answers and the ease with which the enumerators performed the interviews.

Information was collected as far back as five years. Mortality is a very unique event that can be remembered for a long time and recall of the event was not a problem. In addition to this, the questions on events surrounding mortality are very simple and direct. For example, one of the questions was on duration of illness in general, not on duration of specific symptoms. The omission of very specific questions had been helpful in minimizing the problem of recall. However, some details in the questionnaire may be difficult to recall. The major problem associated with the long time span was the unavailability of relatives of the deceased for interview, due to out migration or other reasons. There was a marked decline in the proportion of the missed cases from 1995 to 1999. The high number of missed cases for the deaths during “01/01/95”-“08/31/97” may have affected the results of this study and can be sighted as one of the limitations encountered. Hence, in such studies information must be gathered close to the event i.e. over a time span of not more than two years.

In this study male mortality was in excess compared to the females, which is consistent to many previous studies (24-27). Being single has higher risk of mortality than monogamous marriage, but the divorced and widowed category did not. Other studies indicate divorced and widowed people as having higher risk of mortality than the married ones (31,32). The reason for the discrepancy here may be due to the fact that the ones remaining in the villages are stronger and healthier to cope with the burden of living as single in the society. The more vulnerable may have out migrated.

People living in the rural lowland areas had higher odds of mortality than the other places. This may be due to the high prevalence of communicable diseases like malaria,

and diarrheal diseases that may be the result of water shortage related to the arid nature of these areas. A study in the Butajira area (27) has also shown females of the rural lowland areas to have higher risk of mortality compared to the others.

Different studies have shown that level of education is one determinant for mortality. However, in this study no significant difference was observed between the literate and the illiterate. This may be because the majority of the population in Butajira is illiterate and very few people have completed secondary schools. So there may not be a significant difference between the illiterate and those with only primary education on health behavior and practice. Studies done in the developed countries, where people achieve higher education level, have shown significant differences in mortality by educational status (28,30). Thus it appears that education, as a mortality differential is more important in modern societies than in traditional societies where the majorities are illiterate.

There was an increased risk of mortality when there was no educated person in the family, compared to having at least two educated people. Having educated members in a family may have an impact on the health seeking behavior of the family, such as the response to illness of a family member resulting in either going to a health institution or to a traditional healer or doing nothing about it.

Employed people had less risk of mortality than people with no income generating work, which may be because of the difference in their economic status. Having employment improves the family economic status, which has an impact on better living conditions, nutrition, and economic access to health services. Also, mortality rate ratio was higher among people who perceived their economic status as poor or very poor. In a rural

setting where assessment of economic status in a conventional way is difficult for various reasons, information on perceived economic status could be a valuable indicator of socioeconomic status of families.

Never visiting a health facility had not shown a statistically significant association with the risk of mortality, contrary to what is generally expected. Among the cases 20.4% had not visited a health institution during their terminal illness. This figure is similar to what Kloos et al found, where 20% of the population did not seek medical care even when they were seriously ill (33). Cigarette smoking did not show significant risk of mortality. The number of people who smoke is very few, also none of the females smoked, and this may affect the significance of the result. Alcohol drinking also did not have an increased risk of mortality. Alcohol drinking was reported by only about one in seven cases and one in ten controls. This may be because the majority of the people are Muslims and hence non-drinkers. Additionally, people may give false information resulting in a social desirability bias. A previous study in Butajira has reported that 23.4% of the adults admitted to drinking alcohol at the time of the study (40). Occasional khat chewers were found to be less at risk of mortality than non-chewers. Based on a study in Butajira Alem discussed, the common belief that khat chewing results in negative health and socio-economic effects may not be true for moderate users. Contrarily, moderate use might improve performance and improve output of work because of its stimulant and fatigue-postponing effects (41). However, in this study the results may have been affected by the classification used for khat chewing, which categorized those who had quit with non-chewers, since people usually stop substance uses like khat chewing and alcohol drinking during their illness.

The VA questionnaire and the “expert algorithm” used in this particular study had not been validated. The simplified algorithm used for diagnosis classified the diseases into “broad” categories consisting of 12 causes of mortality. For example all acute febrile illnesses and all forms of tuberculosis were lumped into one category. Although this “broad” classification has the disadvantage of diagnosing only a limited variety of diseases and leaving out some diseases as undetermined, it makes it easier to apply the VA and algorithm in other settings with only minor modifications. The simplicity of the questionnaire, the use of lay interviewers, the lack of complexity in the algorithm used, and the broad categories of diseases increase the validity of the study and its reproducibility in other settings (11).

Although validation studies were not done on the “expert algorithm”, the combinations of symptoms and duration of illness used for diagnosing injuries, maternal deaths, acute febrile illnesses, and meningitis are expected to be highly sensitive but not very specific (Annex-2). For example the algorithm of AFI has the combination of “duration of illness less than 15 days”, “fever” and “headache”. This combination can pick out a very high number of AFI, but it may also include other diseases that are not actually in the AFI category.

The algorithm used for tuberculosis, AIDS, liver diseases, diarrheal diseases and pneumonia may be less sensitive but more specific than the previously stated diseases categories, also because of the nature of the combinations used (Annex-2). A validation study for verbal autopsy in adults had shown that the cause specific mortality fraction obtained using “expert algorithms” was within $\pm 20\%$ of the gold standard for malaria,

meningitis, tuberculosis/AIDS, acute abdomen conditions, diarrheal diseases, direct maternal causes, chronic liver diseases and renal disorders (19).

The algorithm used for cardiovascular diseases and chronic obstructive pulmonary diseases may not have performed well because of the unstable nature of the diseases resulting in difficulty of sighting symptoms specific to them (12). The “expert algorithm” used in this study may not have given the right diagnoses for some of the diseases at the individual level. However, in the face the absence of information on causes of mortality in Ethiopia, the information generated at the population level using these combinations is very useful in identifying problems that need urgent intervention in the study area.

Causes of death diagnosed through the expert algorithm showed that one fourth of the deaths were due to acute febrile illnesses. The proportion was much higher in the rural areas than Butajira town. In contrast, HIV/AIDS accounted for a higher proportion in the town than the rural areas. A previous study in Butajira has shown a similar pattern of disease occurrence in broad categories (21). Also, the diagnoses from the algorithm are similar to the perceived causes of death given by the respondents. The 25% for acute febrile illnesses is very close to what was given as malaria (26.3%). Since the symptoms for tuberculosis and HIV/AIDS are similar, lay people usually describe both as tuberculosis. This accounted for 14.6% of the perceived causes and is close to the tuberculosis and HIV/AIDS, which is 17.1%. Pneumonia accounted for 5.2% of the perceived causes and 5.4% of the diagnosed ones. This shows the internal validity of the verbal autopsy questionnaire and the expert algorithm used in the diagnoses of cause of death.

VIII. CONCLUSION AND RECOMMENDATIONS

This study provides evidence that using lay interviewers interviewing deceased relatives, a simplified VA questionnaire and expert algorithm for diagnoses can provide fairly valid information on causes of mortality in a poor-resource community.

The factors highly associated with mortality are older age, male sex, living in the rural lowland areas, being single, having no educated person in the family, having no employment and perceived low economic status. All these factors are interrelated and reflect that the poor socio-economic development of Ethiopia is the major determinant for the high mortality rates the country endures.

The major causes of death in the study area are communicable diseases. This also mirrors the backwardness of the community in terms of education, economy, environmental and personal hygiene, and healthy behavior. These communicable diseases are easily preventable with cost effective measures. So efforts should be directed towards planning and implementing interventions that will decrease mortality and morbidity from these conditions. These interventions may be related to control of malaria, diarrheal diseases, tuberculosis, and HIV/AIDS.

Further researches should be done in the area of mortality to establish differences, if any in other parts of Ethiopia. Regions can employ the VA method to find out causes of death in their locality.

At the national level, such a simplified form of VA can be applied during census surveys. This would fill a big information gap from which the country is suffering and provide planners and policy makers with the necessary data to use in prioritizing problem areas

and focusing on effective interventions.

In the rural areas, vital registration systems can be established after retraining the existing community health workers (CHAs) and traditional birth attendants (TBAs) or training new ones on the VA method. They can be educated to collect information using VA questionnaires as well as diagnose the cause of death using simple algorithms.

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Annex-1
FORM-1

Code number _____

QUESTIONNAIRE FOR THE DECEASED

Dear _____

We have come from the Butajira Rural Health Project under the Addis Ababa University. We are here to gather information on the health conditions of the area, and specially factors associated with mortality. This information will be useful in the health planning process of the district 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 study? ____ Yes ____ No

No	Question	Answer	Code
001.	Name of Wereda		
002.	Name of kebele		
003.	Place of kebele	____ urban ____ rural high land ____ rural low land	
004.	Household number	_____	
005.	Name of respondent		
006.	Family size	____ female ____ male ____ total	
007.	Persons aged 15-49 in the household	____ female ____ male ____ total	
008.	Has anyone in this house died in the past 5 years?	____ female ____ male ____ total	
009.	What was the age of the deceased ? In what year did he/she die?	Deceased1 _____ year _____ Deceased2 _____ year _____ Deceased3 _____ year _____ Deceased4 _____ year _____ Deceased5 _____ year _____	
101.	Name of the deceased	_____	
102.	Age of the deceased	_____ years	
103.	Sex of the deceased	1. Female 2. male	
104.	Year of death	_____	
105.	Marital status	1. Single 4. Divorced 2. Monogamous marriage 5. Widowed 3. Polygamous marriage	
106.	Educational status of the deceased	1. Illiterate 4. Completed secondary 2. Read and write 5. Above secondary 3. Completed primary school	

No	Question	Answer	Code
107.	Family educational status (mark every possible answer)	1. No educated person 2. Husband educated 3. Wife educated 4. An educated child 5. Other educated person	
108.	Religion	1. Muslim 2. Orthodox Christian 3. other Christian	
109.	Did the deceased have an income generating work?	1. Yes 2. No 3. I don't know	
If the answer is "no" or "I don't know" go to Q.111			
110.	Type of work	1. Farmer 2. Self employed 3. Employed 4. other _____ 5. I don't know	
111.	(For farmers only) How many oxen does the family own?	1. None 3. Two 2. One 4. Three or more	
112.	(For others) How much is the family's average monthly income?	1. < 50 Birr 2. 50-105 Birr 3. 106-300 Birr 4. 301-600 Birr 5. > 600 Birr	
113.	Compared to your neighbors where do you classify the family's economic status?	1. Very poor 2. Poor 3. Average 4. Well to do 5. Rich	
114.	Has the deceased ever visited a health facility?	1. Yes 2. No 3. I don't know	
115.	How far is the health facility from your home?	1. Near 2. Average 3. Far 4. Very far	
116.	Has the deceased ever smoked cigarettes?	1. Yes 2. Used to smoke but quit 3. No 4. I don't know	
If the answer is "no" or "I don't know" go to Q.119			
117.	For how long did he/she smoke?	1. < 5 years 2. 5-10 years 3. >10 years	
118.	How many cigarettes per day did he/she smoke?	1. < 10 2. 10-20 3. >20	
119.	Did the deceased chew khat?	1. Yes daily 2. Yes most of the time 3. Yes sometimes 4. Used to chew but quit 5. No 6. I don't know	
120.	Did the deceased drink alcohol?	1. Yes daily 2. Yes most of the time 3. Yes sometimes 4. Used to drink but quit 5. No 6. I don't know	
If the answer is "no" or "I don't know" go to Q.122			
121.	For how long has he/she drank alcohol?	1. < 5 years 2. 5-10 years 3. >10 years	
122.	Has the deceased ever spent the night outside home (out of town or village) in another place?	1. Yes 2. No 3. I don't know	

No	Question	Answer	Code
If the answer is "no" or "I don't know" go to Q.201			
123.	If the answer is yes, at what interval ?	1. Once a week 2. Once a month 3. Once in 3 months 4. Once in 6 months 5. More than 6 months	
124.	Where did he/she spend the night?	1. At a relative's 2. At an hotel 3. I don't know 4. Others _____	
Questions on events around the time of death.			
201.	What was the cause of death?	_____	
202.	Was he/she ill just before death?	1. Yes <15 days 2. Yes 15-30 days 3. Yes >30 days 4. No 5. I don't know	
203.	What was the health problem?	_____	
204.	Did he/she visit a health facility just before death?	1. Yes 2. No 3. I don't know	
205.	Was the deceased taking medicine?	1. Yes 3. No 2. Traditional medicine 4. I don't know	
206.	Was he/she admitted to a health facility?	1. Yes 2. No 3. I don't know	
If the answer is "no" or "I don't know" go to Q.208			
207.	During admission did he/she have surgery?	1. Yes 2. No 3. I don't know	
208.	Did the deceased face an accident just before death?	1. Yes 2. No 3. I don't know	
If the answer is "no" or "I don't know" go to Q.212			
209.	Where did the accident happen?	1. At work 3. Car accident 2. At home 4. Others _____	
210.	Was the accident purposely committed?	1. Yes 2. No 3. I don't know	
211.	Was the accident the cause of death?	1. Yes 2. No 3. I don't know	
212.	Did the deceased have shortness of breath?	1. Yes 2. No 3. I don't know	
213.	Did the deceased have chest pain?	1. Yes 2. No 3. I don't know	
214.	Did he/she have leg or facial swelling?	1. Yes 2. No 3. I don't know	
215.	Did he/she have palpitation?	1. Yes 2. No 3. I don't know	
216.	Did he/she have cough?	1. Yes 2. No 3. I don't know	
217.	Did he/she have bloody sputum?	1. Yes 2. No 3. I don't know	
218.	Did he/she have wheezing?	1. Yes 2. No 3. I don't know	

No	Question	Answer	Code
219.	Did he/she have diarrhea?	1. Yes 2.No 3.I don't know	
220.	Did he/she have haematemesis?	1. Yes 2.No 3.I don't know	
221.	Did he/she have jaundice?	1. Yes 2.No 3.I don't know	
222.	Did he/she have abdominal swelling?	1. Yes 2.No 3.I don't know	
223.	Did he/she have repeated vomiting?	1. Yes 2.No 3.I don't know	
224.	Did he/she have fever?	1. Yes 2.No 3.I don't know	
225.	Did he/she have marked weight loss?	1. Yes 2.No 3.I don't know	
226.	Did he/she have headache?	1. Yes 2.No 3.I don't know	
227.	Did he/she have neck stiffness?	1. Yes 2.No 3.I don't know	
If the deceased is male the questionnaire ends here			
<i>Questions for deceased females only.</i>			
301.	Has the deceased ever been pregnant?	1. Yes 2.No 3.I don't know	
If the answer is "no" or "I don't know" the questionnaire ends here			
302.	How many children did the deceased deliver?	1. One 2. 2-4 3. More than 5 4. None	
303.	Was she pregnant at the time of death?	1. Yes 2.No 3.I don't know	
If the answer is "yes" go to Q. 306			
304.	Was she in labour at the time of death?	1. Yes 2.No 3.I don't know	
If the answer is "yes" go to Q. 306			
305.	Was she in confinement at the time of death?	1. Yes 2.No 3.I don't know	
If the answer is "no" or "I don't know" to Q. 303, 304 and 305 the questionnaire ends here			
306.	Did she have Ante-natal care during the pregnancy?	1. Yes 2.No 3.I don't know	
307.	Where was the deceased at the time of labour?	1. Yes 2.No 3.I don't know	
308.	Is her death related to the pregnancy, labour or the time of confinement?	1. Yes with the pregnancy 2. Yes with the labour 3. Yes with the confinement 4. No 5. I don't know	

No	Question	Answer	Code
309.	If the answer to Q. 308 is "yes", what do you think was the problem?	1. Hemorrhage 2. Hypertension 3. Prolonged labour 4. Fever 5. Other _____	

Thank-you for your cooperation.

Name of the interviewer _____

QUESTIONNAIRE FOR LIVE CONTROLS

Dear _____

We have come from the Butajira Rural Health Project under the Addis Ababa University. We are here to gather information on the health conditions of the area, and specially factors associated with mortality. This information will be useful in the health planning process of the district 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 study? ____ Yes ____ No

No	Question	Answer	Code
001.	Name of Wereda	_____	
002.	Name of Kebele	_____	
003.	Place of Kebele	____ urban ____ rural high land ____ rural low land	
004.	Household number	_____	
005.	Name of respondent	_____	
006.	Family size	____ female ____ male ____ total	
007.	Persons aged 15-49 in the household	____ female ____ male ____ total	
101.	Name of the respondent	_____	
102.	Age of the respondent	_____ years	
103.	Sex of the respondent	1. Female 2. male	
105.	Marital status	1. Single 4. Divorced 2. Monogamous marriage 5. Widowed 3. Polygamous marriage	
106.	Educational status of the respondent	1. Illiterate 4. Completed secondary 2. Read and write 5. Above secondary 3. Completed primary school	
107.	Family educational status (mark every possible answer)	1. No educated person 4. An educated child 2. Husband educated 5. Other educated 3. Wife educated person	
108.	Religion	1. Muslim 2. Orthodox Christian 3. other Christian	
109.	Do you have an income generating work?	1. Yes 2. No	

No	Question	Answer	Code
If the answer is "no" go to Q.111			
110.	Type of work	1. Farmer 2. Self employed 3. Employed 4. other _____ 5. I don't know	
111.	(For farmers only) How many oxen does your family own?	1. None 2. One 3. Two 4. Three or more	
112.	(For others) How much your the family's average monthly income?	1. < 50 Birr 2. 50-105 Birr 3. 106-300 Birr 4. 301-600 Birr 5. > 600 Birr	
113.	Compared to your neighbors where do you classify the family's economic status?	1. Very poor 2. Poor 3. Average 4. Well to do 5. Rich	
114.	Have you ever visited a health facility?	1. Yes 2. No	
115.	How far is the health facility from your home?	1. Near 2. Average 3. Far 4. Very far	
116.	Have you ever smoked cigarettes?	1. Yes 2. Used to smoke but quit 3. No	
If the answer is "no" go to Q.119			
117.	For how long have you smoked?	1. < 5 years 2. 5-10 years 3. >10 years	
118.	How many cigarettes per day do you smoke?	1. < 10 2. 10-20 3. >20	
119.	Do you chew khat?	1. Yes daily 2. Yes most of the time 3. Yes sometimes 4. Used to chew but quit 5. No 6. I don't know	
120.	Do you drink alcohol?	1. Yes daily 2. Yes most of the time 3. Yes sometimes 4. Used to drink but quit 5. No	
If the answer is "no" go to Q.122			
121.	For how long have you drunk alcohol?	1. < 5 years 2. 5-10 years 3. >10 years	
122.	Have you ever spent the night outside home (out of town or village) in another place?	1. Yes 2. No	
If the answer is "no" go to Q.201			
123.	If the answer is yes, at what interval?	1. Once a week 2. Once a month 3. Once in 3 months 4. Once in 6 months 5. More than 6 months	
124.	Where do you spend the night?	1. At a relative's 2. At an hotel 3. Others _____	
Questions for females only.			

No	Question	Answer	Code
301.	Have you ever been pregnant?	1. Yes 2. No	
If the answer is "no" the questionnaire ends here.			
302.	How many children have you delivered?	1. One 2. 2-4 3. More than 5	
303.	Have you been pregnant in the past 5 years?	__87 __88 __89 __90 __91 __92	
306.	Did you have Ante-natal care during your pregnancy?	__87 __88 __89 __90 __91 __92	
307.	Did you deliver in a health institution?	__87 __88 __89 __90 __91 __92	
310.	Have you been pregnant in the past 1 year?	1. Yes 2. No	
311.	Have you delivered a live baby in the past 1 year?	1. Yes 2. No	

Thank-you for your cooperation.

Name of the interviewer _____

ፎርም-1

የኮድ ቁጥር _____

የጤና መረጃ ለመስብሰብ የተዘጋጀ መጠይቅ (በህይወት ስለሌሉ ሰዎች)

ውድ (ተጠያቂው ስም)

እኛ የመጣነው በአዲስ አበባ ዩኒቨርሲቲ ስር ባለው የቡታጅራ ገጠር ጤና ፕሮግራም ነው። ይህ ጥናት በአከባቢው የተሟላ የጤና መረጃ ለመስብሰብ የሚደረግ ሲሆን በተለይም የሞት አደጋ የሚያስከትሉ ችግሮችን በስፋት ለመረዳት ያገለግላል። ይህ መረጃ የአገር አቀፍና የአከባቢው የጤና ሀሳፊዎች ለህዝቡ የተሻለ የህክምና አገልግሎቶችን እቅድ ለማውጣት ይረዳቸዋል። በቤተሰባችሁ ውስጥ ስለነበሩ ሞቶች በጣም አስፈላጊ የሆኑ መረጃዎችን እንጠይቃለን። በዚህ ጥናት የሚሰበሰቡት መረጃዎች ዝርዝር ማንም ሰው እንዳያገኛቸው በሚስጥር ይጠበቃሉ። ስለዚህ በጥናቱ ለመሳተፍ ፈቃደኝነትዎን በትህትና እንጠይቃለን።

በዚህ ጥናት ለመሳተፍ ፈቃደኛ ነዎት? _____ አዎን _____ የለም

ተ.ቁ.	ጥያቄ	መልስ	ኮድ
001.	የወረዳው ስም		
002.	የገበሬ ማህበሩ ስም		
003.	የገበሬ ማህበሩ ቦታ	_____ ደጋ _____ ወይናደጋ _____ ቆላ	
004.	የቤት ቁጥር		
005.	የተጠያቂው ስም		
006.	በቤት ውስጥ ያለው ሰው ብዛት	_____ ሴት _____ ወንድ _____ ጠቅላላ ብዛት	
007.	በቤት ውስጥ ያሉ 15-49 አመት የሆኑ ሰዎች	_____ ሴት _____ ወንድ _____ ጠቅላላ ብዛት	
008.	ባለፈች 5 አመታት በቤቱ ውስጥ የሞተ ሰው አለ?	_____ ሴት _____ ወንድ _____ ጠቅላላ ብዛት	
009.	የሞተው ሰው እድሜ ስንት ነው?	ሚች 1. _____ አመት _____ ሚች 2. _____ አመት _____ ሚች 3. _____ አመት _____ ሚች 4. _____ አመት _____ ሚች 5. _____ አመት _____ ሚች 6. _____ አመት _____	
101.	የሚች ስም ማን ነበር?	_____	
102.	የሚች እድሜ ስንት ነበር?	_____ አመት	
103.	የሚች የታ ምን ነበር?	1. ሴት 2. ወንድ	
104.	መቼ ነው የሞቱት?		
105.	የሚች የጋብቻ ሁኔታ እንዴት ነበር	1. ጭራሽ አላገቡም 4. ፈት 2. ያገባ አንድ 5. የሞተበት 3. ያገባ ሁለትና ከዚያ በላይ	

106.	የሚችሉ የትምህርት ደረጃ እንዴት ነበር	1. ያልተማረ 2. ማንበብና መፃፍ 3. አንደኛ ደረጃን አጠናቀዋል 4. ሁለተኛ ደረጃን አጠናቀዋል 5. ከሁለተኛ ደረጃ በላይ	
107.	የቤተሰቡ አባላት የትምህርት ደረጃ እንዴት ነው መልስ የሆኑትን ሁሉ ይክበቡ	1. ምንም የተማረ ሰው የለም 2. ባል ተምረዋል 3. ሚስት ተምረዋል 4. ሁለተኛ ደረጃን አጠናቀዋል 5. አብሮ የሚኖር የተማረ ሰው አለ	
108.	የሚችሉ ሀይማኖት ምን ነበር	1. እስላም 2. ኦርቶዶክስ ክርስቲያን 3. ሌላ ክርስቲያን	
109.	ሚችሉ ገቢ የሚያስገኝ ስራ ይሰሩ ነበር	1. አዎ 2. የለም 3. አላውቅም	
መልስ **የለም** ወይም **አላውቅም** ከሆነ ወደ ጥያቄ 111 ተሻገር::			
110.	የሚችሉ የስራ ዓይነት ምን ነበር?	1. ገበሬ 3. ተቀጣሪ 2. የግል ስራ/ ነጋዴ	
111.	ለገበሬዎች ብቻ የሚችሉ ቤተሰብ ስንት በሬዎች አሉዎቸው?	1. ምንም 3. ሁለት 2. አንድ 4. ሶስትና ከዚያም በላይ	
112.	ለግል ሰራተኞችና ተቀጣሪዎች በአማካይ የቤተሰቡ የወር ገቢ ስንት ነው?	1. ከ50 ብር በታች 2. 50-100 ብር 3. 106-300 ብር 4. 301-600 ብር 5. ከ600 ብር በላይ	
113.	ከሌላው ያካባቢው ነዋሪዎች በአማካይ የቤተሰቡ የወር ገቢ ስንት ነው?	1. በጣም ደፃ 4. ጥሩ ኑሮ የሚኖር 2. ድፃ 5. ሀብታም 3. መካከኛ	
114.	ሚችሉ በሕይወት እያሉ የህክምና መስጫ ተቂም ሄደው ያውቃሉ?	1. አዎ 2. የለም 3. አላውቅም	
115.	የህክምና መስጫ ተቂሙ ከቤታችሁ ምን ያህል ይርቃል?	1. ቅርብ ነው 3. ሩቅ ነው 2. መካከኛ ነው 4. በጣም ሩቅ ነው	
116.	ሚችሉ ሲጋራ አጭሰው ያውቃሉ?	1. አዎ 2. ያጨሱ ነበር ግን አቁመዋል	
መልስ **የለም** ወይም **አላውቅም** ከሆነ ወደ ጥያቄ 119 ተሻገር::			
117.	ሚችሉ ሲጋራ ለምን ያህል ጊዜ ሲጋራ አጭሰዋል?	1. ከ5 አመት በታች 2. 5-10 አመት 3. ከ10 አመት በላይ	
118.	ሚችሉ በቀን ምን ያህል ጊዜ ሲጋራ አጭሰው ያውቃሉ?	1. ከ10 በታች 2. ከ10-20 3. ከ20 በላይ	

119.	ሚች ጫት ይቅሙ ነበር?	1.አዎ በየቀኑ 2.አዎ ብዙውን ጊዜ 3.አዎ አንዳንድ ጊዜ 4.አቁመው ነበር 5.የለም 6.አላውቅም	
120.	ሚች የአልኮል መጠጥ ይጠጡ ነበር?	1.አዎ በየቀኑ 2.አዎ ብዙውን ጊዜ 3.አዎ አንዳንድ ጊዜ 4.አቁመው ነበር 5.የለም 6.አላውቅም	
መልሱ **የለም** ወይም አላውቅም ከዚያ ወደ ጥያቄ 122 ተሻገር።			
121.	ሚች የአልኮል መጠጥ ለምን ያህል ጊዜ ጠጥተዋል?	1. ከ 5 አመት በታች 2. ከ5-10 አመት 3. ከ10 አመት በላይ	
122.	ሚች ከቤት ውጭ ወደ ከተማ ወይም ገጠር ሄደው አድረው ያውቃሉ?	1. አዎ 2. የለም 3 አላውቅም	
መልሱ **የለም** ወይም **አላውቅም** ከዚያ ወደ ጥያቄ 201 ተሻገር።			
123.	በየሰንት ጊዜ እየሄዱ ያድሩ ነበር?	1.በሳምንት አንዴ 4.በ6 ወር አንዴ 2.በወር አንዴ 5.ከ 6 ወር በላይ 3.በ3 ወር አንዴ	
124.	ሲሄዱ የት ነበር የሚያድሩት?	1. ዘመድ ቤት 2. ሆቴል 3. ሌላ ይገለፅ _____	
በሞት አከባቢ ስለነበሩ ጠቅላላ ሁኔታዎች የሚጠየቁ ጥያቄዎች			
201.	የሞቱ መንስኤ ምን ነበር?	1. _____ 2. _____	
202.	ሚች ከማረፋቸው በፊት ታመው ነበር?	1. አዎ ከ15 ቀን በታች 2. አዎ ከ15-30 ቀን 3. አዎ ከ30 ቀን በላይ 4. የለም 5. አላውቅም	
ለጥያቄ 202 መልሱ **የለም** ወይም **አዎ** ከዚያ ወደ ጥያቄ 208 ተሻገር።			
203.	ከመሞታቸው በፊት የነበራቸው የጤና ችግር ምን ነበር?	1. _____ 2. _____	
204.	ሚች የህመሙ ጊዜ ወደ ህክምና መስጫ ተቋም ሄደው ነበር?	1. አዎ 2. የለም 3.አላውቅም	
205.	ሚች መድሃኒት እየወሰዱ ነበር? (መልስ የሆነውን ሁሉ ይክበቡ)	1. አዎ ዘመናዊ መድሃኒት 2 አዎ የባህል መድሃኒት 3. የለም 4. አላውቅም	
206.	ሚች ከማረፋቸው በፊት ሆስፒታል ተኝተው ነበር?	1. አዎ 2. የለም 3.አላውቅም	
መልሱ **የለም** ከዚያ ወደ ጥያቄ 208 ተሻገር።			
207.	ሚች ሆስፒታል በገቡበት ጊዜ የቀዶ ህክምና ተደርጎላቸው ነበር?	1.አዎ 2. የለም 3.አላውቅም	

208.	ሚች ከማረፋቸው አጭር ጊዜ በፊት አደጋ ደርሶባቸው ነበር?	1.አዎ 2. የለም 3.አላውቅም	
መልሱ ^{የለም} ወይም ^{አላውቅም} ከሆነ ወደ ጥያቄ 212 ተሻገር።			
209.	አደጋው የደረሰው የት ነው?	1.ስራ ቦታ 2. ቤት ውስጥ 3. የመኪና አደጋ 4. ሌላ /ይገለፅ/	
210.	አደጋው ሆኖ በሎ የተደረገ ነበር?	1. አዎ 2. የለም 3.አላውቅም	
211.	የደረሰባቸው አደጋ የሞቱ መንስኤ ምን ነበር?	1. አዎ 2. የለም 3.አላውቅም	
212.	ሚች የመተንፈስ ችግር ነበራቸው?	1. አዎ 2. የለም 3.አላውቅም	
213.	የደረሰው ውጋት የህመም ስሜት ነበራቸው?	1. አዎ 2. የለም 3.አላውቅም	
214.	የእግር ወይም የፊት እብጠት ነበራቸው?	1. አዎ 2. የለም 3.አላውቅም	
215.	ሚች ልቤ ይመታል ይሉ ነበር?	1. አዎ 2. የለም 3.አላውቅም	
216.	ሳል ነበራቸው?	1. አዎ 2. የለም 3.አላውቅም	
217.	ደም የተቀላቀለበት አካታ ነበራቸው?	1. አዎ 2. የለም 3.አላውቅም	
218.	ትንፋሻቸው ሲር ሲር ይል ነበር?	1. አዎ 2. የለም 3.አላውቅም	
219.	ተቅማጥ ነበራቸው?	1. አዎ 2. የለም 3.አላውቅም	
220.	ደም ያስታውካቸው ነበር?	1. አዎ 2. የለም 3.አላውቅም	
221.	አይናቸው ቢጫ ሆኖ ነበር?	1. አዎ 2. የለም 3.አላውቅም	
222.	ሆዳቸው አብጦ ነበር?	1. አዎ 2. የለም 3.አላውቅም	
223.	ተደጋጋሚ ተውከት ነበራቸው?	1. አዎ 2. የለም 3.አላውቅም	
224.	ትኩሳት ነበራቸው?	1. አዎ 2. የለም 3.አላውቅም	
225.	ክብደታቸው ቀንሶ -ከስተው? ነበር?	1. አዎ 2. የለም 3.አላውቅም	
226.	ራስ ምታት ነበራቸው?	1. አዎ 2. የለም 3.አላውቅም	
227.	የማጅራት መገተር ነበራቸው?	1. አዎ 2. የለም 3.አላውቅም	
ሚች ወንድ ከሆነ መጠይቁ እዚህ ላይ ይቆማል።			
እድሜያቸው ከ15-49 ለሆኑ ሴቶች ብቻ የሚጠየቅ መጠይቅ			
ተ.ቁ.	ጥያቄ	መልስ	
301.	ሚች አርግዘው ያውቃሉ?	1. አዎ 2. የለም 3. አላውቅም	
መልሱ ^{የለም} ወይም ^{አላውቅም} ከሆነ ጥያቄው እዚህ ላይ ይቆማል።			
302.	ሚች ስንት ልጆች ወልደዋል?	1. አንድ 2. ከ2 እስከ 4 3. 5 ና ከዚያ በላይ	
303.	ሚች ባረፉ ጊዜ እርጉዝ ነበሩ?	1. አዎ 2. የለም 3.አላውቅም	
304.	ሚች ባረፉ ጊዜ ምጥ ላይ ነበሩ?	1. አዎ 2. የለም 3.አላውቅም	
መልሱ አዎ ከሆነ ወደ ጥያቄ 306 ተሻገር።			
305.	ሚች ባረፉ ጊዜ አራስ ነበሩ?	1. አዎ 2. የለም 3.አላውቅም	
306.	እርግዝናውን ህክምና ቦታ እየሄዱ ይከታተሉት ነበር?	1. አዎ 2. የለም 3.አላውቅም	
307.	የምጡ ጊዜ የት ነበሩ?	1.ህክምና ተቋም ውስጥ 3. አላውቅም 2.ቤት ውስጥ	
308.	የሞታቸው መንስኤ ከእርግዝናው ከምጡ ወይም ከአራስነታቸው ጋር ይያያዝ ነበር?	1.አዎ ከእርግዝናው ጋር 4. የለም 2.አዎ ከምጡ ጋር 5. አላውቅም 3.አዎ ከአራስነታቸው ጊዜ ጋር	

309.	የ308 መልስ አዎ ከሆነ ችግሩ ምን ነበር?	1.ብዙ ደም ፈሳሾችው 2.የደም ግፊት 3.ምጡ ተራዝሞ ነበር 4.ሰውነታቸው አብጦ ነበር 5.ትኩሳት ነበራቸው 6.ሌላ ይገለፅ_____	
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ለትብብርዎ በጣም እናመሰግናለን።

የጠያቂው ስም _____

ፎርም 2

የኮድ ቁጥር _____

የጤና መረጃ ለመስብሰብ የተዘጋጀ መጠይቅ -በህይወት ላሉ ሰዎች?

ውድ (ተጠያቂው ስም)

እኛ የመጣነው በአዲስ አበባ ዩንቨርሲቲ ስር ባለው የቡታጅራ ገጠር ጤና ፕሮግራም ነው። ይህ ጥናት በአከባቢው የተሟላ የጤና መረጃ ለመስብሰብ የሚደረግ ነው። ይህ መረጃ የአገር አቀፍና የአከባቢው የጤና ሀላፊዎች ለህዝቡ የተሻለ የህክምና አገልግሎቶችን እቅድ ለማውጣት በዚህ ጥናት የሚሰበሰቡት መረጃዎች ዝርዝር ማንም ሰው እንዳያገኛቸው በሚስጥር ይጠበቃሉ። ስለዚህ በጥናቱ ለመሳተፍ ፈቃደኝነትዎን በትህትና እንጠይቃለን።

በዚህ ጥናት ለመሳተፍ ፈቃደኛ ነዎት? _____ አዎን _____ የለም

ተ.ቁ	ጥያቄ	መልስ
001.	የወረዳው ስም	
002.	የገበሬ ማህበሩ ስም	ደጋ _____ ወይናደጋ _____ ቆላ _____
003.	የገበሬ ማህበሩ ቦታ	_____
004.	የቤት ቁጥር	_____
005.	የተጠያቂው ስም	_____
006.	በቤት ውስጥ ያለው ሰው ብዛት	_____ ሴት _____ ወንድ _____ ጠቅላላ ብዛት _____
007.	በቤት ውስጥ ያሉ 15-49 አመት የሆኑ ሰዎች	_____ ሴት _____ ወንድ _____ ጠቅላላ ብዛት _____
102.	የተጠያቂው እድሜ	_____ ዓመት
103.	የተጠያቂው ፆታ	1. ሴት 2. ወንድ
105.	የተጠያቂው የጋብቻ ሁኔታ	1. ጭራሽ አላገቡም 2. ያገባ አንድ 3. ያገባ ሁለትና ከዚያ በላይ 4. ፊት 5. የሞተበት
106.	የተጠያቂው የትምህርት ደረጃ	1. ያልተማረ 2. ማንበብና መፃፍ 3. አንደኛ ደረጃን አጠናቀዋል 4. ሁለተኛ ደረጃን አጠናቀዋል 5. ከሁለተኛ ደረጃ በላይ
107.	የቤተሰቡ አባላት የትምህርት ሁኔታ እንዴት ነው? (መልስ የሆኑት ሁሉ ይክበቡ)	1. ምንም የተማረ ሰው የለም 2. ባል ተምረዋል 3. ሚስት ተምረዋል 4. የተማረ ልጅ አለ 5. አብሮ የሚኖር የተማረ ሰው አለ
108.	የተጠያቂው ህይማኖት ምንድነው?	1. እስላም 3. ሌላ ክርስቲያን 2. ኦርቶዶክስ ክርስቲያን
109.	ተጠያቂው ገቢ የሚያስገኝ ስራ ይሰራሉ?	1. አዎ 2. የለም
መልስ የለም ከሆነ ወደ ጥያቄ 111 ተሻገር።		
110.	የተጠያቂው የስራ አይነት	1. ገበሬ 2. የግል ስራ/ነጋዴ 3. ተቀማሪ 4. ሌላ ይገለፅ _____
111.	ለገበሬዎች ብቻ በቤተሰቡ ውስጥ ስንት በሬዎች አሉ?	1. ምንም 2. አንድ 3. ሁለት 4. ሶስትና ከሶስት በላይ

112.	ለግል ሰራተኞችና ተቀጣሪዎች በአማካይ የቤተሰቡ የወር ገቢ ስንት ነው?	1. ከ 50 ብር በታች 2. 50-105 ብር 3. 106-300 ብር 4. 301-600 ብር 5. ከ600 ብር በላይ	
113.	ከሌላው ያከባቢው ነዋሪዎች ጋር ሲወዳደር የቤተሰብዎን የኑሮ ሁኔታ የት ይመድቡታል?	1.በጣም ደሃ 2.ደሃ 3.መካከለኛ 4.ጥሩ ኑሮ የሚኖር 5.ሀብታም	
114.	ወደ ህክምና መስጫ ተቂም ሂደው ያውቃሉ?	1. አዎ 2. የለም	
115.	የህክምና መስጫ ተቂሙ ከቤታችሁ ምን ያህል ይርቃል?	1. ቅርብ ነው 2. መካከኛ ነው 3. ሩቅ ነው 4. በጣም ሩቅ ነው	
116.	ሲጋራ አጭሰው ያውቃሉ?	1. አዎ 2.ያጨሱ ነበር ግን አቁመዋል 3.የለም	
መልሱ ^{**የለም**} ከዞን ወደ ጥያቄ 119 ተሻገር::			
117.	ለምን ያህል ጊዜ ሲጋራ አጭሰዋል?	1. ከ5 አመት በታች 2. ከ5-10 አመት 3. ከ 10 አመት በላይ	
118.	በቀን ምን ያህል ሲጋራ ያጨሳሉ?	1. ከ10 በታች 2. ከ10-20 3. ከ20 በላይ	
119.	ጫት ይቅማሉ?	1. አዎ በየቀኑ 2. አዎ ብዙ ጊዜ 3. አዎ አንዳንድ ጊዜ 4. ይቅሙ ነበር አቁመዋል 5. የለም	
120.	የአልኮል መጠጥ ይጠጣሉ?	1. አዎ በየቀኑ 2. አዎ ብዙ ጊዜ 3. አዎ አንዳንድ ጊዜ 4. ይጠጡ ነበር አቁመዋል 5. የለም	
መልሱ ^{**የለም**} ከዞን ወደ ጥያቄ 122 ተሻገር			
121.	የአልኮል መጠጥ ለምን ያህል ጊዜ ጠጥተዋል		
122.	ከቤት ውጭ ወደ ከተማ/ገጠር ሂደው አድረው ያውቃሉ?	1. አዎ 2.የለም	
መልሱ ^{**የለም**} ወይም አላውቅም ከዞን ወደ ጥያቄ 301 ተሻገር			
123.	በየስንት ጊዜ እየሄዱ ያድሩ ነበር?	1. በሳምንት አንድ ጊዜ 2. በወር አንዴ 3. በ3 ወር አንዴ 4. በ6 ወር አንዴ 5. ከ6 ወር በላይ	
124.	ሲሄዱ የት ነው የሚያድሩት? ተጠያቂው ወንድ ከሆነ መጠይቁ እዚህ ላይ ይቆማል	1. ዘመድ ቤት 2. ሆቴል 3. ሌላ ይገለፅ	

ከ15-49 አመት ሳሉ ሴቶች ብቻ የሚጠየቅ			
301.	አርግዘው ያውቃሉ?	1. አዎ 2.የለም	
መልሱ የለም ከዚያ መጠይቁ እዚህ ላይ ይቀማል			
302.	ስንት ልጆች ወልደዋል?	1. አንድ 2. 2-4 3. 5ና ከዚያ በላይ	
303.	ባለፉት አምስት አመታት ውስጥ አርግዘዋል?	____ 87 ____ 88 ____ 89 ____ 90 ____ 91 ____ 92	
306.	በእርግዝናዎ ጊዜ የወሊድ ክትትል አድርገዋል?	____ 87 ____ 88 ____ 89 ____ 90 ____ 91 ____ 92	
307.	የወሰዱት ህክምና ተቂም ውስጥ ነው?	____ 87 ____ 88 ____ 89 ____ 90 ____ 91 ____ 92	
310.	ባለፈው አንድ አመት ውስጥ አርግዘዋል?	1. አዎ 2. የለም	
311.	ባለፈው አንድ አመት ውስጥ በህይወት ያለ ልጅ ወልደዋል?	1. አዎ 2. የለም	

ለትብብርዎ በቅድሚያ እናመሰግናለን።

የጠያቂው ስም _____

Annex-2

Algorithm used for the diagnoses of cause of death, Butajira, 2000.

Duration of illness < 30 days + Accidents (intentional or unintentional)	→	Injuries
Female sex + (Pregnant or In labour or In the puerperal period)	→	Maternal causes
Duration of illness > 30 days + Cough + Weight loss + (Bloody sputum or Fever or Ascites) + no diarrhea	→	Tuberculosis
Duration of illness > 30 days + Cough + Diarrhea + Fever + Weight loss	→	AIDS
Duration of illness > 15 days + (Edema of legs or Ascites) + Jaundice	→	Liver diseases
Duration of illness < 15 days + Abdominal swelling + Repeated vomiting + No diarrhea	→	Acute abdomen
Duration of illness > 30 days + cough + Dyspnea + Wheezing + No bloody sputum	→	Chronic obstructive lung diseases
Duration of illness < 30 days + Diarrhea + No cough	→	Diarrheal diseases
Duration of illness < 15 days + Fever + Headache	→	Acute febrile illness
Duration of illness < 15 days + Fever + Headache + Neck stiffness	→	Meningitis
Duration of illness < 30 days + Cough + Fever + (Dyspnea or Chest pain)	→	Pneumonia
Duration of illness < 30 days + Dyspnea + Palpitation + (Edema of legs or Ascites)	→	Cardio Vascular diseases

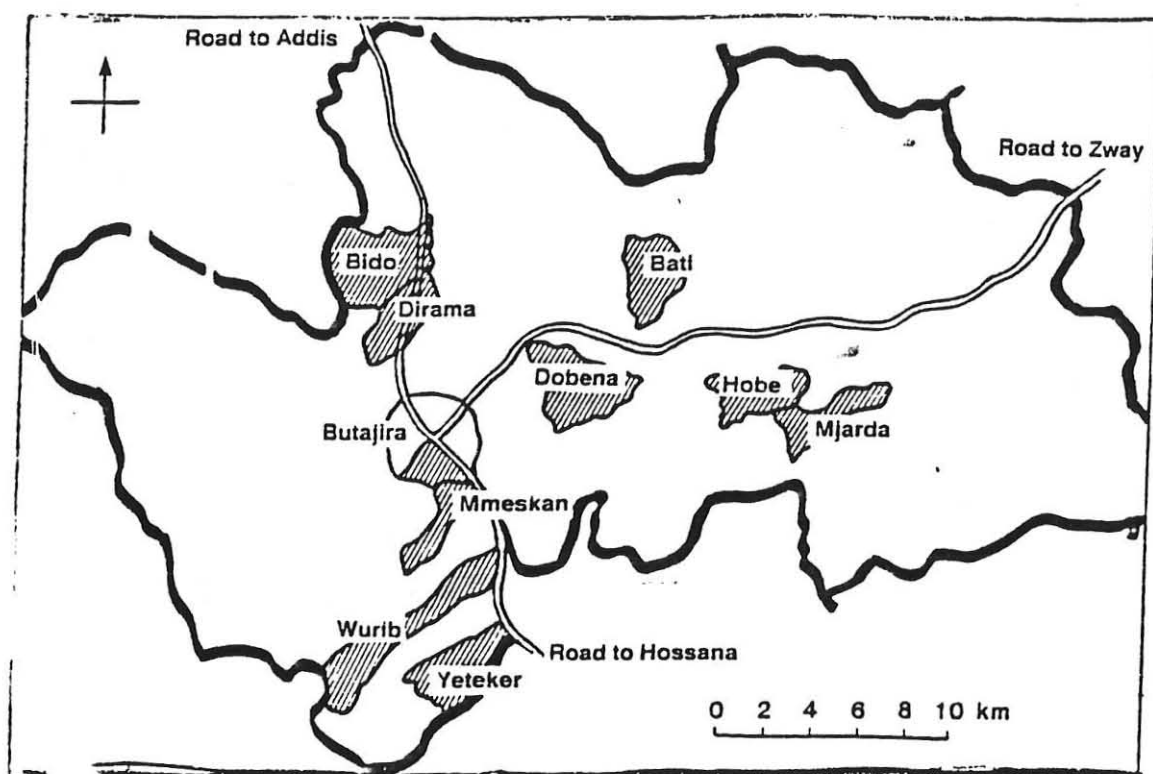


Fig-2 Map of the study area.

DECLARATION

I, the undersigned, declare that this thesis is my original work and that all sources of material used for this thesis have been duly acknowledged.

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Signature: 

Place: Addis Ababa

Date of submission: December 2000.

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

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