

Addis Ababa University
School of Graduate Studies

Burden of disease
in
Butajira, Southern Ethiopia

By

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Thesis submitted to the School of Graduate Studies
Addis Ababa University

In partial fulfillment of the requirements
for the degree of Master of Public Health

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December, 1998

**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

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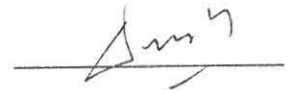
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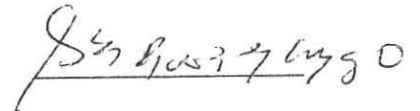
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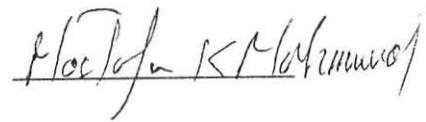


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Acknowledgment

This work would not have been realized had it not been for the assistance and extraordinary effort made by my thesis advisors, Drs. Damen Haile Mariam and Derege Kebede. I would like to thank Drs. Yemane Birhane, Mallede Maru, Lulu Muhe, Tesfaye Shiferaw and Ato Fikre Enque Sellasie for the valuable comments they contributed to this work.

I wish to express my sincere appreciation to Drs. Henry Kalter, G. Burnham, Maria Quigley and A.T. Bang who have provided me with several reference materials and the questionnaire they developed for conducting study on verbal autopsy. My appreciation also goes to Dr. Mark H. Spohr who provided and trained me on the application of the Disease Burden Modeling System software. I would like to acknowledge Dr. Gebre Meskel Haile Mariam who introduced me to these individuals.

I would also like to thank Drs. Mohammed Ahmed, Kiflu Bereda and Ato Yemiru Teka for their contribution during the validation of the verbal autopsy instrument at field level. The secretarial support made by W/o Meliha Rashid and W/t Azeb Abubeker and the data entry done by Ato Lemma Gonfa is also highly appreciated.

My thanks also goes to Drs. Ayele Debebe, Seifudin Abdella, Elias Abebe, Nuredin Abdi and Dhaba Bedada who reviewed and interpreted the information collected by the lay persons to assign the cause of illness and death for each study subjects-the challenging and tedious part of the work.

This thesis research would not have been possible without the financial support of Irish Aid-Ethiopia/ Gurage Development Program, Department of Community Health and reproductive health project (AAU). I wish to specifically thank Drs. Degene Mekonnen and Seid Mohammed and Ayuba Sani for their assistance in that line.

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Lists of abbreviation

AFI	Acute Febrile Illness
AIDS	Acquired Immuno-Deficiency Syndrome
ARI	Acute Respiratory Infections
BOD	Burden Of Disease
BRHP	Butajira Rural Health Project
CE	Cost-Effectiveness
CLD	Chronic Liver Disease
CNS	Central Nervous System
CVA	Cerebro-Vascular Accident
CVD	Cardio-Vascular Disease
DALY	Disability-Adjusted Life Year
DLY	Discounted Life Year
EME	Established Market Economy
FDRE	Federal Democratic Republic of Ethiopia
FSE	Formerly Socialist Economy of Europe
GBD	Global Burden of Disease
GUS	Genito-Urinary System
HIV	Human Immunodeficiency Virus
ICD	International Classification of Diseases
LAC	Latin America and Caribbean
LBW	Low Birth Weight
LRTI	Lower respiratory Tract Infection
MEC	Middle East Crescent
OAI	Other Asia and Islands
PA	Peasant Association
PEM	Protein-Energy Malnutrition
SSA	Sub-Saharan Africa
STD	Sexually Transmitted Diseases
TBc	Tuberculosis
UDA	Urban Development Association
URTI	Upper Respiratory Tract Infection
VAD	Vitamin A Deficiency
WB	World Bank
WDR	World Development Report
WHO	World Health Organization
YLD	Years Lived with Disability
YLL	Years of Life Lost

Abstract

There are only few studies done on burden of disease in Ethiopia. This study was conducted in Butajira, Southern Ethiopia, with the aim of describing the burden of disease in the community using the Disability Adjusted Life Years (DALYs) lost method.

A cross-sectional household survey was carried out in 835 randomly selected households among which a structured questionnaire was administered to assess the cause and magnitude of morbidity. For determining the cause and magnitude of mortality, verbal autopsy questionnaire were administered to the bereaved relatives of the deceased within the previous two years within the study population.

Establishing the causes of morbidity and mortality from the questionnaires was done by what is known as "the expert algorithm" method where a group of physicians would review the collected data from the questionnaire and assign diagnosis. The information collected at field level along with respective diagnosis made by the expert algorithm were again analyzed using the software called "Disease Burden Modeling System" to calculate the number of DALYs lost for each condition per 100,000 population.

The results showed that the prevalence of morbidity within the preceding two weeks in the community was 13%.

In addition, there were 875 deaths in the last two years making an annual mortality rate of 14 per 1,000 population and a maternal mortality ratio of about 625 per 100,000 live births. The total burden of disease in terms of DALYs lost calculated from these data was 59,125 per 100,000 population. Communicable, maternal and perinatal diseases contributed to 72% of the total DALYs lost, non-communicable diseases contributed to 24% of the DALYs lost while the proportion of DALYs lost due to injuries was 4%.

As most of the DALYs lost (72%) were due to communicable, maternal and perinatal conditions, strategies aimed at reducing the incidence of morbidity and mortality due to diseases in this category can improve the health status of the study population. Furthermore, studies must be done to assess types and cost-effectiveness of interventions aimed at this category of diseases. Risk factor for this disease category should also be studied and analyzed for preventive intervention.

I. Introduction and background

Health status in Ethiopia is among the lowest in the world as could be attested by conventionally accepted health indicators, i.e. infant mortality rate of 110/1000 live births, child mortality rate of 99/1000 live births, maternal mortality rate of 5.6/1000 live births, life expectancy at birth of 53.4 years, fertility rate of 7.5 children per woman, crude birth rate of 46.7/1000 population and crude death rate of 17.9/1000 population⁽¹⁾. At the center of the problem is the backward socio-economic development resulting in one of the lowest standard of living status, poor environmental conditions and low level of social services. This prevailing situation has been aggravated, in recent years, by high population growth, and repeated natural disasters. Health service coverage is very low and of precarious quality. In addition, the distribution of health services is skewed to urban areas⁽¹⁾.

Infectious and communicable diseases are wide spread and nutritional disorders are quite common. About 75% of the endemic diseases in Ethiopia are communicable and potentially preventable. Major problems among these include respiratory infections, diarrhoeal diseases, malaria, tuberculosis, and sexually transmitted diseases such as syphilis. Malaria at the moment heads the list of

killing diseases, quite often occurring in epidemic forms. Tuberculosis is the next and recently on the ascendance. HIV/AIDS is also becoming the major killing disease. Children under five years and women of childbearing age are the most vulnerable groups to the morbidity situations in the country. Protein-Energy malnutrition is also among the leading causes of morbidities in infants and children⁽¹⁾.

As one of the least developed countries, infrastructures for the provision of health services in Ethiopia are weakly organized. Specially the health information system is very rudimentary. The importance of adequate information in health planning cannot be overemphasized. Clearly understanding the distribution and magnitude of health problems is the main prerequisite for planning, implementation, and evaluation of health programs.

The government of the Federal Democratic Republic of Ethiopia (FDRE) envisages a health policy to address the major health problems of the country by targeting communicable diseases, health problems of mothers and children, and other under served segments of the population as priorities. The five year health sector strategic plan is also drawn in line with the above priority areas⁽²⁾.

Rational evaluation of such policies for health improvement requires a detailed assessment of the burden of disease, inventory of resources available and data on the cost-effectiveness of available intervention measures⁽³⁾. However, it is only morbidity and mortality statistics that are most commonly used to measure the health status of a community and thus the burden of prevailing diseases. But mortality statistics do not reflect the effect of different disorders on productivity (for instance, diseases that result in deaths at 75 are equivalent in importance to those that result in the same number of death at 25), and morbidity statistics do not reflect the severity and duration of the disability caused by disorders. Thus, these traditional measures are not very useful when trying to compare the effect of different disorders on the overall health of a community or when trying to decide which of several possible research topics could result improvement in the level of health in the community⁽⁴⁾.

To quantify the full loss of healthy life by capturing the effects of both mortality, morbidity, and prolonged disability, the World Bank and the World Health Organization (WHO) took a joint exercise to develop an indicator which measures the present value of the future

stream of disability-free life lost as a result of death, disease, or injury. According to this indicator, the burden of disease (the extent to which populations suffer from diseases) is, in effect, the gap between a population's actual health status and some "ideal", or reference status. It is estimated in terms of Disability Adjusted Life Years (DALYs) lost. The DALY expresses years of life lost due to premature death (quantity of life) and years lived with a disability of specified severity and duration (quality of life). One DALY is thus one lost year of healthy life. Here, a "premature" death is defined as one that occurs before the age at which the dying person could have expected to survive if he/she was a member of a standardized model population with a life expectancy at birth equal to that of the world's longest surviving population, Japan⁽³⁾.

Due to the lack of adequate information, an earlier BOD study in Ethiopia was limited to measuring the effects of mortality based on secondary data obtained from health institutions only. This latter measure, expressed as Discounted Life Years (DLYs) does not include the possible short term and long term consequences of disease and injury. Therefore, it was necessary to devise ways of generating the necessary data for performing proper and comprehensive BOD analysis⁽⁷⁾.

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Thus based on the feedback from the previous study a small scale pilot survey was conducted in 1997 to develop an instrument and to test how well the data collection instrument will work as a means of collecting data appropriate for a comprehensive BOD analysis using the DALY method. This pilot survey had very good results when compared with the previous BOD analysis. It indicated that household survey can provide an appropriate information required for burden of disease analysis⁽⁸⁾.

Therefore the present study was conducted at a community level to determine the causes, magnitude and healthy years of life lost due to morbidity, mortality and disability in the rural Butajira community in a single measure (DALYs lost). Such a study, in addition to providing the BOD analysis in the area which will serve as a ground work for having proper information on which to base planning, priority setting, monitoring and evaluation of health programs, will also come up with some recommendations for similar future studies in other areas.

II. Literature review

1. Mortality

The classification system used for the Global Burden of Disease as well as for the present study is a so called 'tree' structure of diseases and injuries. At the first level of desegregation, overall mortality is divided into three broad cause groups: Group I, consisting of communicable diseases, maternal causes, conditions arising in the perinatal period and nutritional deficiencies; Group II encompassing the noncommunicable diseases; and Group III comprising all injuries⁽⁹⁾. Group I causes of death, the pre-transitional causes, consist of the cluster of conditions that typically decline at a faster pace than all-cause mortality during the process of the epidemiological transition. As a result, in low mortality populations, these causes account for only a small proportion of deaths. Conversely, the noncommunicable diseases clustered in Group II are the most important health problems in populations that have undergone the epidemiological transition. While it is true that mortality rates from some noncommunicable conditions such as stomach cancer may decline faster than all-cause mortality, these conditions have been maintained in Group II along with other cancers, since death rates from cancer as a whole appear to be relatively constant throughout the transitions. Finally,

injuries are separately classified into Group III, in part because their etiology is very different from that of most diseases, but also because there is no generalized pattern of change in injury mortality that accompanies the epidemiological transition⁽⁹⁾.

Each Group has then been divided into several major sub-categories of disease and injury that are mutually exclusive and exhaustive. Specifically, Group I has been divided into infectious and parasitic causes, respiratory infections, maternal causes, conditions arising during the perinatal period and nutritional deficiencies. Noncommunicable causes (Group II) have been divided into 14 categories. Group III (Injuries) has been divided into two major sub-categories, unintentional injuries and intentional injuries⁽⁹⁾.

A third level of desegregation is used to identify more specific causes of death within each of these second-level categories.

According to the Global Burden of Disease study, worldwide one death in every three is from group I causes (communicable, maternal and perinatal, and nutritional deficiencies). Virtually all of these deaths are in the developing regions. One death in ten is from group III

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causes (Injuries) and just over half of all deaths are from group II causes (noncommunicable diseases)⁽¹⁰⁾.

In several major developing regions, more people already die of group II causes than group I causes. In Latin America and the Caribbean, there are almost twice as many deaths as from group I causes. In China, there are four and half times as many deaths from non-communicable diseases as from group I. The balance has also tipped towards group II causes in the middle Eastern Crescent and the region comprising Asia beyond India and China, and the Pacific islands (OAI). Only in India and Sub-Saharan Africa (SSA) do group I causes still dominate, accounting for 51% and 65% of deaths respectively⁽¹⁰⁾.

Just over 50 million people died worldwide in 1990, with Ischemic heart disease (IHD) causing more deaths than any other disease or injury. Only 2.7 million of the 6.3 million who died of IHD were in the developed world. Lower respiratory infection (Pneumonia) killed 4.3 million people, all but 0.4 million of them in the developing world. Diarrhoeal diseases caused 2.9 million deaths, virtually all in the developing world. The ten leading causes of death together accounted for just over half of all deaths⁽¹⁰⁾.

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Despite the epidemiological transition, deaths from communicable diseases, maternal and perinatal conditions and nutritional deficiencies continue to take a heavy, largely avoidable, toll even though there have been spectacular successes in their control over the past 30 years. Fully 17.3 million deaths in 1990 were due to this group of causes, and more than 16.5 million of these were in developing regions, mainly India and SSA. Of all group I deaths, four out of ten were due to either pneumonia or diarrhoea, which together accounted for more than 7 million deaths. Perinatal conditions were responsible for more than 2.4 million deaths, and tuberculosis another 2 million death. The vast majority of these deaths could have been prevented with existing interventions⁽¹⁰⁾.

In contrast to crude numbers of deaths, a time based measure such as years of life lost (YLL) allows public health researchers to identify those causes that account for premature deaths, more informative measure for the design of health policies. For example, injuries affect mainly young people so, while injuries accounted for only 10% of deaths in 1990, they accounted for 15% of YLL. Accordingly none-communicable diseases, which affect mainly older people, accounted for only 31% of YLL, compared with 56% of death⁽³⁾.

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2. Disability-The invisible burden.

The Global burden of disease's findings demonstrate clearly that Disability plays a central role in determining the overall health status of a populations. Yet that role has still now been almost invisible to public health. The leading causes of disability are shown to be substantially different from the leading causes of death, thus casting serious doubt on the practice of judging a population's health from its mortality alone⁽³⁾.

The study further showed that the burden of psychiatric conditions has been heavily underestimated. Of the ten leading causes of disability worldwide in 1990, measured in years of life lived with Disability (YLD), five were psychiatric conditions: Unipolar depression, alcohol use, bipolar affective disorder (manic depression), schizophrenia and obsessive compulsive disorder. Unipolar depression alone was responsible for more than one in every ten YLD worldwide. Altogether, psychiatric and neurological conditions accounted for 26% of all YLDs, compared with 1.4% of all death and 1.1% of YLL. The predominance of these conditions is by no means restricted to the rich countries, although their burden is highest in the Established Market Economies(EME). They were the most important contributor to YLDs in all regions except SSA, where they accounted for a relatively modest 16% of the total⁽³⁾.

3. The Global Burden of Diseases-DALY.

The peoples of SSA and India together bore more than 40% of the Global Burden of Diseases (GBD) in 1990, although they make up only 26% of the world's population. By contrast, the EME and the Formerly Socialist Economy of Europe (FSE), with about a fifth of the world's population between them, together bore less than 12% of the total disease burden. China emerged as substantially the most "healthy" of the developing regions, with 15% of the global disease burden and a fifth of the world's population⁽³⁾. Worldwide five out of the ten leading causes of disease burden are group I condition: Lower respiratory infection (Pneumonia), Diarrhoeal disease, perinatal conditions, tuberculosis and measles. In developing countries Malaria is added to this list.

When causes of death are compared, in rank order with causes of disease burden, substantial difference emerge, again reinforcing the need to take non-fatal conditions into account as well as death when assessing a population's health status. While a few leading conditions- such as lower respiratory infections, diarrhoeal diseases and perinatal conditions- are at the top in both lists, there are 14 conditions in the top half of the list for disease burden that are in the

bottom half of the list for deaths. Depression is the most marked of these, falling within the top ten for disease burden, but the bottom ten for deaths⁽³⁾.

Worldwide, 1.36 billion DALYs were lost in 1990, the equivalent of 42 million deaths of newborn children or 80 million deaths at age 50. Premature deaths were responsible for 66% of all DALYs lost and disabilities for 34%. In the developing world 67% of all DALYs loss was a result of premature death; in the established market economies of Europe the figure was only 55%⁽⁴⁾.

Diarrhoeal diseases, childhood diseases such as measles, respiratory infection, worm infestations, and malaria account for one quarter of the GBD. The burden of these largely preventable or inexpensively curable diseases of children is far larger in SSA (43% of all DALYs lost) than anywhere else.

Comparison of absolute numbers of DALYs lost may be misleading because the sizes and age structures of the populations at risk are not the same. The effects of population size can be allowed for by expressing the burden per 1000 population. This index is 259 for the world as a whole, but it varies widely among regions. Sub-Saharan Africa loses 574 DALYs for every 1000 populations, more than twice the global average. India,

the Middle East Crescent, and Other Asia And Islands (OAI) all have values between 250-350. For China, Formerly Socialist Economy of Europe, And Latin America and the Caribbean (LAC), the figures are between 150-250. The burden per population for the Established Market Economy is easily the lowest, at 117. It turns out that these broad rankings are not significantly affected by differences in age distributions between regions⁽⁴⁾.

The higher the disease burden, the higher the population attributable to the communicable group of causes. Sub-Saharan Africa has the highest disease burden per 1000 population and 71% of this is from the communicable disease group, where as in Latin America (a medium burden region) the figure is 42% and in the Established Market Economy it is only 10%. Non-communicable disease show the opposite pattern, accounting for 19% of the total burden in Sub-Saharan Africa, 43% in Latin America and 78% in Established Market Economies. Despite these marked differences in relative burden, however, the absolute rate of loss for both groups are highest in Sub-Saharan Africa and lowest in the Established Market Economies. The pattern is plain: as health improves, the burden from all types of disease decline, but the distribution of the burden shifts dramatically from a preponderance of communicable disease to a preponderance of non- communicable disease⁽⁴⁾.

Despite the sharp improvements in health around the world, the GBD calculations shows that a large burden of premature mortality and disability still remains, particularly in the world's poorer regions. There are inexpensive effective ways to eliminate the share caused by communicable disease(other than maternal and perinatal conditions), which is roughly 35% of the world burden (more than 60% in SSA). The remaining 65% (40% in SSA) of the world burden is less responsive to such measures, and reducing it will require changes in behavior and life styles of adults.

While measuring the burden of disease, a society has to decide what the ideal or reference status should be. This involves making five value choices⁽³⁾:

1. How long "should" people live? If health researchers are to estimate how many years of life are lost through death at any given age, they must decide on the number of years for which a person at that age should expect to survive in the ideal, or reference, population. That could be, for example, 60, 80, or 90 years from birth.
2. Are years of healthy life worth more in young adulthood than in early or late life?
3. Is a year of healthy life now worth more to

society than a year of healthy life in 30 years time?

4. Are all people equal? For example should one socio-economic group's year of healthy life count for more than another's?
5. How do you compare years of life lost due to premature death and years of life lived with disabilities of differing severity?

To gauge the impact of changing these social choices on the final measures of disease burden, the global burden of disease researchers re-calculated their assessments with alternative age-weighting and discount rates, and with alternative methods for weighing the severity of disabilities⁽⁵⁾.

Overall, the ranking of disease and the distribution of burden by broad cause group are largely unaffected by age-weighting and only slightly affected by changing the method for weighing disability. Changes to the discount rate, by contrast, may have a more significant effect on the overall results. The accuracy of the underlying basic epidemiological data from which disease burden is calculated will influence the final results much more than the discount rate, the age weight, or the disability weighing method⁽⁵⁾.

The burden of disease methodology for priority-setting as presented in the World Development Report, 1993 was critically reviewed. It was observed that the methodology represents an important contribution to the debate of providing 'evidence based policy' in the health sector⁽⁶⁾. However, the major deficiency was the limited nature of the data on which the conclusions of the report are based. A need for considerable improvement of the data base was recommended. The expansion on the number of diseases, and household surveys for data collection were recommended. With this kind of extended data base, the model could be used to forecast the estimated future burden of disease. In addition, with intended improvements the methodology has potential benefit at the (sub) national level, where more precise data can be collected and the local context can be taken into account. As such the methodology could (among others) be an important tool to aid health planners and decision makers⁽⁶⁾.

According to an earlier study, Ethiopia's BOD is dominated by ARI and perinatal and maternal conditions, followed by malaria, nutritional deficiency, diarrhoea and AIDS. Indeed the top ten causes of mortality account for 74% of all deaths and 81% of DLYs lost, reflecting the leading causes of morbidity and mortality in the

country. The study is also limited to DLYs without considering the possible short term or long term consequences of diseases and disability. The results also underestimate the BOD (350 DLYs compared to 574 DALYs for Sub-Sahara Africa)⁽⁷⁾.

The results of a second study showed reported illness of 7% in which adult cases were more (close to two folds) than the children. 41% of deaths were in children under 12 years, of which 75% occurred in the under five children. The total number of DALYs lost per 100,000 population was 58,287 and most of years of healthy life lost are in the category of communicable, maternal and perinatal diseases being 44,336 DALYs (76%) of total. Maternal and perinatal causes constitute 8,262 DALYs lost (14.2% of the total). Non-communicable diseases account for 11,907 DALYs lost (20.5%) and Injuries 2,046 (3.5%) of the DALYs lost. 78% of the total DALYs were attributed to premature death and the rest 22% to disabilities⁽⁸⁾.

country. The study is also limited to DLYs without considering the possible short term or long term consequences of diseases and disability. The results also underestimate the BOD (350 DLYs compared to 574 DALYs for Sub-Sahara Africa)⁽⁷⁾.

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III. Objective

General objective

To measure the burden of diseases- DALYs lost due to disability and premature death by cause for Butajira population.

Specific objectives

1. To determine the causes and magnitude of morbidity and mortality in the community.
2. To measure healthy life years lost due to premature death, morbidity, and acute and long term disability.
3. To quantify the combined burden of fatal and non fatal health outcomes in a single measure: Disability-Adjusted Life Year (DALY).

IV. Methods and Subjects

1. **Study design:** The study design included a descriptive cross-sectional household sample survey conducted to determine the cause and magnitude of morbidity and a retrospective longitudinal study to determine the cause and magnitude of mortality.

2. **Study area:** The study was conducted between 1 June and 12 July, 1998, within the Butajira Rural Health Project (BRHP) setting. The study population has been under continuous demographic surveillance since 1987. The BRHP is carried out in Butajira district which is one of the 11 districts in Gurage Zone of southern Ethiopia. Butajira town is located about 130 Kms south of Addis Ababa. The population is approximately 300,000 according to the 1994 census projections⁽¹¹⁾.

The BRHP covers nine rural and one urban villages in Butajira town, a sample previously selected randomly using probabilities proportionate to size, constituting 10% of the district population (approximately 32,000)⁽¹¹⁾.

The major ethnic group of the study area is Gurage, with further division into minor ethnic groups. The

population is predominantly Moslem. The economy of the Wereda is based on agriculture. The Wereda consists of both highland and lowland areas. Its altitude ranges from 1,500 to 2,300 meters above sea level. The climate of the highlands and lowlands are temperate and tropical respectively⁽¹¹⁾.

There is one health center and two health stations in the Wereda. The health center is found in Butajira town, while the health stations are in Koshe and Hamus Gebeya town just 25 and 15 Kms respectively away from the health centre. A rural hospital is under construction in the town of Butajira. There are six private clinics, two pharmacies and five rural drug vendor shops in the Wereda. Four of the private clinics, the two pharmacies and three rural drug vendor shops are located in Butajira town, while the remaining two clinics and two drug shops are located out of Butajira town⁽¹²⁾.

3. Study population: The source population was all individuals living in the study area who were included in the study irrespective of age and sex, a population of approximately 32,500. The study population includes all individuals who were sick in the last two weeks and all deceased person in the last two years prior to the study regardless of the type and cause of illness and death.

4. Selection of study subjects: For mortality assessment, all deceased individuals in the last two years were included in the study. The name, age, sex, and addresses of all the deceased were retrieved from the BRHP data set and thus located at their respective addresses. No sampling technique was applied. For morbidity assessment, probabilities proportionate to size was used to determine the number of households to be selected in the ten kebeles in the study base. Then the number of households to be in respective kebeles were randomly selected. Once the specific household to be visited is located, all individuals who were sick in the last two weeks prior to the study were included in the study.

5. Sample size: Since the study is aimed to capture as many diseases as possible, a disease with a lowest prevalence (as low as 1%) is assumed, and accepting a margin of error of 0.3 with 95% confidence, the sample size, for morbidity assessment, was calculated as follows

$$\begin{aligned}
 n &= \frac{Z^2 P (1-P)}{d^2} \\
 &= \frac{(1.96)^2 * 1(100-1)}{(0.3)^2} \\
 &= 3746
 \end{aligned}$$

A 20% (750) allowance was made to adjust failure to response, thus the sample size for morbidity study was 4471.

6. Instruments used for data collection

6.1. Verbal Autopsy Questionnaire: Verbal autopsy questionnaires (administered to the bereaved relatives of the deceased to determine the cause of death) and structured questionnaires (administered to the sick individuals to assess the prevalence and causes of morbidity) were used for data collection. The structured questionnaire was designed by modifying the tools for assessing verbal autopsy so that they would enable to assess sickness.

Verbal autopsy: Is an epidemiological tool that is used to ascribe causes of death by interviewing bereaved relatives of deceased who were not under medical supervision at the time of death. Trained field workers interview bereaved relatives using a structured questionnaire in order to illicit information on the symptoms the deceased experienced before death. Then the information from completed questionnaire was summarized and interpreted to give the likely cause of death⁽¹³⁾.

The questionnaire had three parts: Demographic details including date of birth and death; an open ended section where all unprompted description of illness given by the

respondent are recorded in detail; and a pre-coded section of prompted responses about specific symptoms and signs relating to the illness. The last part consists of a series of modules, each opening with screening questions that have a high sensitivity (e.g. the presence of a cough), which, if positive, are followed by questions to probe further and increase the specificity. If the response to the screening question(s) is negative, the rest of the module is omitted. It took about 30 minutes to complete the questionnaire once a proper informant is located; and about 5 to 10 minutes to review the information and arrive at the cause of illness or death.

6.2. Expert algorithms: Causes of illness/death were assigned from the questionnaire according to a particular set of diagnostic criteria made by experts. i.e. expert algorithm. A validated verbal autopsy questionnaire in Kenya and Namibia (with specificity and sensitivity of 70-90%) was translated in to Amharic and field tested and further comment was made by senior internist and pediatrician who had experience in verbal autopsy method.

7. Data collection: A six day training on interview technique was given to nine lay persons who completed 12 grades. Interviews were conducted with the person who had closest contact with the deceased during the terminal illness in the case of mortality and the sick person in

the case of morbidity. Each completed questionnaire was then reviewed by a group of medical doctors who give the likely cause of illness/death for each individual according to the International Classification of Diseases (10th revised edition) using expert algorithms and their judgement. When there was insufficient evidence to ascribe a cause of death/illness confidently the cause was classified as undetermined.

8. Analysis and assessment of data quality. Information collected from the study populations was entered and analyzed with Epiinfo version 6.04b statistical software to calculate the prevalence of each diseases. A two weeks prevalence of morbidity and a two years of mortality incidence was obtained from the data collected and then the annual incidence of morbidity and mortality were computed for various conditions. To calculate the DALYs lost due to each disease (a measure of disease burden), the information required for burden of disease analysis; incidence rate, average age of onset, average duration of illness and disability weight for each diseases were entered into "Disease Burden Modeling System" software developed for this purpose.

To determine the reliability of this methodology information on causes of death collected by lay interviewers were compared with that of independent group of physicians using Stata software. Among the 875 deaths

that occurred in the preceding two years within the study population, 62 were randomly selected for this comparison. The results showed that there was an observed agreement of 80.7% (Kappa=0.79, chance agreement of 8.4% with p-value of 0.000) between the diagnoses assigned based on lay interviews and those of physicians.

V. Results

1. Morbidity

Out of a total of 834 selected households in which 4170 people live, 575 (13.74%) individuals reported illness during the previous two weeks prior to the survey. Of the total of 575 individuals who reported illness 259 (45%) were males and 316 (55%) were females. The age group 0 to one year comprise 30 (5.2%), 2 to 4 Year 54 (9.4%), 5 to 14 Year 125 (21.7%), 15 to 64 year 331 (57.6%), 65 and above 35 (6.1%). (See table 1).

The majority, 421 (73.2%) of the reported morbidity were in group I diseases (communicable, maternal and perinatal), while 146 (25.4%) were in group II diseases (non-communicable diseases), and only 8 (1.4%) were among group III categories (Injuries). (see table 2)

A higher proportion of those reporting illness were adults 419 (73%) as compared to children 156 (27%).

Malaria, Acute Respiratory Infection (ARI), diarrhoeal diseases (DD), and tuberculosis, comprised 313 (74.3%) of the total of 421 group I diseases and 54.4% of total morbidity condition. (Table 3)

The main causes of group II diseases, 70 (48%), were diseases of genito-urinary system, bronchial asthma,

mental illness, diseases of cardiovascular system, epilepsy, anaemia and chronic liver diseases in decreasing order. Injury constituted for 1.4% of morbidities and all were unintentional.

Among the 419 morbidity conditions that occurred in adults, 277 (66.1%) were diseases of group I, 135 (32.2%) were in group II and 7 (1.7%) group III conditions. Malaria, acute respiratory infections, diarrhoeal diseases, tuberculosis, viral hepatitis and acute febrile illnesses comprise 214 (77.3%) of group I morbidity conditions among the adults. Out of the 135 group II conditions in adults 64 (47.4%) were diseases of urinary system, bronchial asthma, diseases of cardiovascular system, epilepsy, mental illnesses and chronic liver disease. 67 (49.6%) were due to different types of disability. Injury constituted for 1.7% of morbidities among the adults. (Table 4)

Of the 156 morbidity conditions which occurred in children, 144 (92.3%) were group I diseases, 11 (7.1%) were group II diseases and only one case (0.6%) were due to injury. Malaria, acute respiratory infection, diarrhoeal diseases, and protein-energy malnutrition (PEM) comprise 112 (77.8%). Cardiovascular diseases, anemias, and physical disabilities were the causes of group II diseases. (Table 4)

2. Mortality

A total of 875 deaths had occurred during the past two years prior to the survey within a total population of 32,500 making a mortality rate of 13.8 per 1000 population per year. Out of the 875 deceased 449 (51.27%) were males, and 426 (48.73%) were females. The age group 0 to 1 year comprise 270 (30.8%), 2 to 4 year 153 (17.5%), 5 to 14 year 88 (10.1%), 15 to 64 year 262 (29.9%), and 65 years and above 102 (11.7%). (Table 5,6)

Based on the above, the infant mortality rate would be 116.8 per 1000 live births, the child mortality 183 per 1000 live births, and maternal mortality would be 625 per 100,000 live births.

When the causes of deaths were distributed among the major disease categories, 721 (82.4%) were due to group I conditions, 124 (14.2%) were due to group II and 30 (3.4%) were due to group III. Diarrhoeal diseases, malaria, tuberculosis, acute respiratory infection, viral hepatitis, Protein Energy Malnutrition (PEM), and HIV/AIDS share 471 (65.4%) of the 721 group I conditions. Maternal, perinatal and neonatal conditions contributed to 133 (18.5%) of the total group I deaths. The main causes, 113 (91.1%), of group II conditions were diseases of cardiovascular system, diseases of urinary system, acute abdomen, malignancies,

chronic liver diseases, cerebrovascular accidents and bronchial asthma. Out of a total of 30 group III (injury) conditions 26 (86.7%) were due to unintentional while 4 (13.3%) were due to intentional. (Table 7 and 8)

The proportion of adults was 402 (46%) while the proportion of children was 473 (54%).

Among the mortality conditions which occurred in adults, 271 (67.4%) were in group I, 110 (27.4%) were in group II and 21 (5.2%) were in group III. Tuberculosis, diarrhoeal diseases, HIV/AIDS, malaria, viral hepatitis, and acute respiratory infection comprise 194 (71.6%) of group I diseases among the adults. The causes for group II mortality conditions were diseases of cardiovascular system, diseases of urinary system, chronic liver disease, cerebrovascular accident, acute abdomen, malignancies, epilepsy, diabetes mellitus, and bronchial asthma. (table 7).

Among the child mortality, 450 (95%) were in group I, 14 (3%) were in group II conditions and 9 (2%) were in group III (injury). 398 (88.6%) of the cause of death in group I conditions were due to diarrhoeal diseases, malaria, acute respiratory infection, malnutrition measles, and perinatal conditions. The main causes of death in group II were diseases of the cardiovascular system, diseases of the urinary system, bronchial asthma,

district in terms of DALY lost was 59,125/100,000 population. Group I disease accounted for 71.3% (42,134 DALY per 100,000) of the DALYs lost, group II diseases accounted for 24.7% (14,620 and anemia. (Table 7)

3. Burden of diseases.

The total burden for Butajira DALY per 100,000) of the total DALYs lost and group III disease for 4% (2,370 DALY per 100,000) of the total DALYs lost. (Table 9 and 10)

Disability had contributed to 21,542 (36.4%) of the total DALYs lost while the remaining 37,583 (63.6%) of the DALYs lost were due to premature death. Females had a relatively higher proportion, 31,801 (53.8%) in contributing to the total DALYs lost when compared to males, 27,324 (46.2%) which is mainly due to group I diseases. The proportion of adult and children were almost equal in contributing to the total DALYs lost: adults (age 13 years and above) contributed to 30,568 DALYs lost (51.7%) and children (age 12 and below) contributed to 28,557 (48.3%). (Table 9 and 10)

Malaria, diarrhoeal diseases, acute respiratory infections and Tuberculosis constituted 22,386 (37.84%) of the total DALYs lost. Childhood cluster constituted about 4,342 (7.34%) of the total DALYs lost. Perinatal and maternal causes constitute 6285.5 (10.62%) of the total DALYs, and HIV to 2,089.8(3.53%). (Table 11)

About 35,104 (83.3%) of group I diseases and 59.4% of the total DALYs is dominated by malaria, diarrhoeal diseases, ARI, tuberculosis, childhood cluster, perinatal and maternal causes, and HIV.

Neuro-psychiatric conditions, diseases of genito-urinary system, cardiovascular diseases, bronchial asthma, and chronic liver disease are the main health problems in group II conditions. These five conditions contribute for 13,689.5 (23.1%) of the total DALYs and 93.6% of group II conditions. The remaining diseases in this group were malignancies, anemias, diabetes mellitus and physical disabilities. (Table 11).

Injuries constituted for 4% (2,370 DALY/100,000) of the total DALYs lost out of which 93.3% (2,212 DALY/100,000) were due to unintentional causes (road traffic accidents, poisoning, falls, fires and drowning) and 6.7 (158 DALY/100,000) were due to intentional causes (self-inflicted, homicide and violence). (Table 11).

TABLE 1. PREVALENCE OF MORBIDITY BY AGE GROUPS,
BUTAJIRA, ETHIOPIA, 1998.

Age group (Year)	Population No (%)	Illness No (%)	Morbidity rate (per 1000)
0-1	146 (3.5)	30 (5.2)	20.5
2-4	546 (13.1)	54 (9.4)	9.9
5-14	1,209 (29.0)	125 (21.7)	10.3
15-64	2,143 (51.4)	331 (57.6)	15.4
65+	126 (3.0)	35 (6.1)	27.8
TOTAL	4,170 (100)	575 (100)	13.8

TABLE 2. DISTRIBUTION OF SICK INDIVIDUAL BY AGE, SEX AND DISEASE
CATEGORY (TWO WEEKS) IN BUTAJIRA POPULATION, BUTAJIRA,
ETHIOPIA, 1998. (N=575)

CHARACTERISTICS	NUMBER	PERCENT
AGE		
ADULT	419	73
CHILDREN	156	27
SEX		
MALE	259	45
FEMALE	316	55
CATEGORY		
COMMUNICABLE	421	73.2
NON-COMMUN.	146	25.4
INJURIES	8	1.4

TABLE 3. DISTRIBUTION OF MORBIDITY CONDITIONS BY DISEASES CATEGORY, BUTAJIRA, ETHIOPIA, 1998.

S.N.	DIAGNOSIS	TOTAL No. (%)	ADULT NO. (%)	CHILD No. (%)
GROUP I				
1.	MALARIA	151 (26.3)	105 (18.3)	46 (8)
2.	ACUTE RESPIRATORY INFECTION	75 (13)	38 (6.6)	37 (6.4)
3.	DIARRHOEA	47 (8.2)	32 (5.6)	15 (2.6)
4.	TUBERCULOSIS	26 (4.5)	26 (4.5)	- (0.0)
5.	PROTEIN-ENERGY MALNUTRITION	14 (2.4)	- (0.0)	14 (2.4)
6.	VIRAL HEPATITIS	13 (2.3)	13 (2.3)	- (0.0)
7.	HELMINTHIASIS	13 (2.3)	4 (0.7)	9 (1.6)
8.	SKIN DISEASES	10 (1.7)	6 (1.0)	4 (0.7)
9.	DISEASES OF THE EYE	8 (1.4)	4 (0.7)	4 (0.7)
10.	VIT. A DEFICIENCY	5 (0.9)	- (0.0)	5 (0.9)
11.	MEASLES	3 (0.5)	- (0.0)	3 (0.5)
12.	HIV	3 (0.5)	3 (0.5)	- (0.0)
13.	SEPSIS	2 (0.3)	- (0.0)	2 (0.3)
14.	CONGENITAL MALFORM.	1 (0.2)	1 (0.2)	- (0.0)
16.	OTHER	26 (4.5)	26 (4.5)	- (0.0)
17.	ILL DEF.	23 (4.0)	18 (3.1)	5 (0.9)
TOTAL		421 (73.2)	277 (45.2)	144 (24.9)
GROUP II				
1.	GENITOURINARY SYST.	22 (3.8)	22 (3.8)	- (0.0)
2.	BRONCHIAL ASTHMA	13 (2.3)	13 (2.3)	- (0.0)
3.	MENTAL ILLNESS	11 (1.9)	11 (1.9)	- (0.0)
4.	CARDIOVASCULAR DISE	9 (1.6)	8 (1.4)	1 (0.2)
5.	EPILEPSY	7 (1.2)	7 (1.2)	- (0.0)
6.	ANEMIA	5 (0.9)	2 (0.3)	3 (0.6)
7.	CHRONIC LIVER DISEA	3 (0.5)	3 (0.5)	- (0.0)
8.	MALIGNANCIES	2 (0.3)	2 (0.3)	- (0.0)
9.	PHYSICAL DISABILITY	74 (12.9)	67 (11.7)	7 (1.2)
TOTAL		146 (25.4)	135 (26.6)	11 (1.9)
GROUP III				
1.	UNINTENTIONAL INJURY	8 (1.4)	7 (1.2)	1 (0.2)
2.	INTENTIONAL INJURY	-	-	- (0.0)
TOTAL		8 (1.4)	7 (1.2)	1 (0.2)
TOTAL		575 (100)	419 (73)	156 (27)

TABLE 4. CAUSES OF MORBIDITY BY DISEASE CATEGORY IN BUTAJIRA POPULATION, BUTAJIRA, ETHIOPIA, 1998. (n=575)

CATEGORY		NUMBER	PERCENT
COMMUNICABLE	Malaria	151	26.3
	ARI	75	13.0
	Diarrhoea	47	8.2
	Tuberculosis	26	4.5
	PEM	14	2.4
	TOTAL	313	54.5
74.3% OF GROUP I CONDITIONS			
NON-COMMUNICABLE	GUS	22	3.8
	B.Asthma	13	2.3
	Mental ill.	11	1.9
	CVD	9	1.6
	Epilepsy	7	1.2
	Anemia	5	0.9
	CLD	3	0.5
	TOTAL	70	12.2
48% OF GROUP II CONDITIONS			
INJURIES	Unintentional	8	1.4
	Intentional	-	-
	TOTAL	8	1.4

TABLE 5. INCIDENCE OF MORTALITY BY AGE GROUP, BUTAJIRA, ETHIOPIA, 1998.

Age group (Year)	Population No (%)	Death No (%)	Death rate (per 1,000)
0-1	1,156 (3.5)	270 (30.5)	116.8
2-4	4,262 (13.1)	153 (17.5)	17.9
5-14	9,409 (29.0)	88 (10.1)	4.7
15-64	16,701 (51.4)	262 (29.9)	7.8
65+	972 (3.0)	102 (11.7)	52.5
Total	32,500 (100)	875 (100)	13.5

TABLE 8. CAUSES OF DEATH BY DISEASE CATEGORY IN BUTAJIRA POPULATION, BUTAJIRA, ETHIOPIA, 1998. (N=875)

Disease group		Number	Percent
Communicable	Diarrhoea	153	17.5
	ARI	86	9.8
	Tuberculosis	81	9.3
	Malaria	79	9.0
	HIV/AIDS	35	4.0
	PEM	20	2.3
	V.hepatitis	17	1.9
	Total	471	53.8
		65% of group I diseases	
	Mater/Perin.	133	18.5
Non-communicable	Cardiovascular	32	3.7
	Genito-urinary	32	3.7
	Malignancy	13	1.5
	Acute abdomen	12	1.4
	Chr.liver dis.	11	1.3
	Cerebro-vasc.	7	0.8
	B.asthma	6	0.6
	Total	113	13.0
		91% of group II disease	
Injuries	Unintentional	26	86.7
	Intentional	4	13.3

TABLE 9. DISTRIBUTION OF DALY LOST PER 100,000 POPULATION BY AGE, SEX, TYPE AND DISEASE CATEGORY, BUTAJIRA, ETHIOPIA, 1998. (N=59,125)

Characteristics		Number	Percent
Category	Communicable	42,134	71.3
	Non-communicable	14,621	24.7
	Injuries	2,370	4.0
Type	Mortality	37,583	63.6
	Morbidity	21,542	36.4
Age	Adult	30,568	51.7
	Child	28,557	48.3
Sex	Male	27,324	46.2
	Female	31,801	53.8

TABLE 10. DISTRIBUTION OF DALYS LOST PER 100,000 POPULATION BY DISEASE CATEGORY, BUTAJIRA, ETHIOPIA, 1998.

Disease category	DALY/ 100,000 pop.	Percent of DALY
I. GROUP I: COMMUNICABLE, MATERNAL, AND PERINATAL CONDITIONS.		
1. Infectious and parasitic	18,642.7	31.50
2. Acute resp. infection	4,648.5	7.86
3. Maternal conditions	695.8	1.17
4. Perinatal conditions	5,589.7	9.45
5. STDs	2,089.8	3.53
6. Childhood clusters	4,342.5	7.34
7. Tropical clusters	6,124.9	10.35
SUB TOTAL	42,134.1	71.26
II. GROUP II: NON-COMMUNICABLE CONDITIONS.		
1. Malignancies	321.5	0.54
2. Diabetes mellitus	50.9	0.08
3. Anemia	466.5	0.78
4. Cardiovascular disease	1,960.1	3.31
4. Mental illness	7,361.2	12.45
5. Bronchial Asthma	835.9	1.41
6. Chronic liver disease	850.4	1.43
7. Nephritis and Nephrosis	2,681.9	4.53
8. Musculo-Skeletal	91.9	0.15
SUB TOTAL	14,620.6	24.72
III. GROUP III: INJURIES		
1. Unintentional	2,212.2	3.74
2. Intentional	156.0	0.26
SUB TOTAL	2,370.2	4.00
<hr/>		
TOTAL	59,125	100

TABLE 11. DISTRIBUTION OF DALY/100,000 POPULATION BY DISEASE CATEGORY IN BUTAJIRA POPULATION, BUTAJIRA, 1998.

Disease group	Number	Percent

Communicable, maternal, Perinatal.		
Diarrhoea	7,391.9	12.50
Matern/Pern.	6,285.5	10.62
Malaria	6,124.9	10.35
ARI	4,648.5	7.86
Childhood	4,342.5	7.34
Tuberculosis	4,220.8	7.13
HIV/AIDS	2,089.8	3.53
	-----	-----
	35,104	59.37
	* 83% of group I disease	
Non-communicable		
Mental Ill	7,361.2	12.45
GUS	2,681.9	4.53
CVD	1,960.1	3.31
CLD	850.4	1.43
B.asthma	835.9	1.41
	-----	-----
	13,689.5	23.13
	*94% of group II disease	
Injury		
Unintentional	2,212	3.74
Intentional	158	0.26
	-----	-----
	2,370	4.00
	-----	-----

TABLE 12. BURDEN OF DISEASE BY RANK, BUTAJIRA, ETHIOPIA, 1998.

DISEASE RANK	DISEASE/ INCIDENCE NAME /100,000	INCIDENCE /100,000	DALY /100,000	PERCENT OF TOTAL
1.	Diarrheal disease	23,094.64	7,391.9	12.50
2.	Matern/Perinat.	711.72	6,285.5	10.62
3.	Malaria	47,945.92	6,124.9	10.35
4.	ARI	14,181.20	4,309.4	7.85
5.	Measles	1,635.14	4,342.5	7.34
6.	Tuberculosis	1,835.74	4,220.8	7.13
7.	Depression	1,299.00	3,844.8	6.50
8.	Schizophrenia	400.00	2,713.2	4.58
9.	Nephritis	319.28	2,681.9	4.53
10.	HIV infection	90.9	2,089.8	3.53
-----		91,513.54	44,004.7	74.43

VI. Discussion

The present study has estimated the burden of disease at a district level. Such information is very vital for health planning and decision making.

Burden of disease analyses have been made in developing countries and also in Ethiopia earlier to the present study. However, the present study has further advanced measurement of these indices so that they can be used in developing country setting where recorded data from health facilities are scanty.

The burden of disease in the Butajira community was 59,125 DALY/100,000 population which is similar to most of the developing countries. In fact it is slightly higher than that for the Sub-Saharan Africa (57,390 DALY/100,000). The burden of disease for the world during 1992 was 26,186 DALY/100,000 populations indicating a higher figure in Sub-Saharan Africa and in the study areas and even more higher when compared to the Established Market Economies (EME) which have a disease burden of 12,380 DALY/100,000 population ⁽³⁾.

Put differently, about 591 and 574 years of healthy life were lost for every 1000 people in the study area and SSA respectively, compared with just 124 for every 1000 people in EME.

About more than two-thirds, 42,134 DALY/100,000 population (72%) of the DALYs lost were due to group I diseases which reflects the study community is in the pre-transitional state. The proportion of group I diseases in the SSA, 38,152 DALY/100,000 population (66%), is lower than the study finding which further

shows the study population is far behind epidemiological transition. The group I burden of disease of both SSA and study area is significantly higher when compared with the EME which is 883 DALY/100,000 population (7%).

The rates of premature death varied sharply between regions, with rates 6 and 7 times higher in the study area and SSA, respectively, than in the EME. By contrast the rates of disability were less varied, with SSA having twice the rate of YLDs and the study area having three times as the rich countries.

The traditional enemies- communicable, maternal, perinatal conditions and nutritional deficiencies- persisted as a main health problems. More than two-third of healthy life years lost were due to group I conditions. Even though this group I conditions accounted for only 7% of the burden in the EME and less than 9% in the FSE, they nevertheless made up more than four tenths of the total global burden of disease in 1990, and almost half of the burden (49%) in developing regions. In SSA two out of three years of healthy life lost were due to group I conditions.

Most of the DALYs lost in group I conditions were due to diarrheal diseases, malaria, acute respiratory infections, perinatal causes, childhood clusters and HIV. These diseases had accounted for 86% of group I conditions and 59% of the total DALYs lost. This shows that study population is suffering from diseases that are avoidable and amenable to preventive measures. The basic and underlying causes of these problems are poor health service coverage, poor sanitation, and poor public health interventions like immunization service, health education, antenatal and obstetric care, and poor malaria control programme.

In group II conditions five diseases, namely neuro-psychiatric illness, diseases of genito-urinary system, cardiovascular diseases, chronic liver disease, and bronchial asthma were responsible for 23% of the total DALYs lost and 93% of group II causes. This condition is almost a problem of adults who contributed for 13,626 (93.2%) DALYs lost.

Depression and Schizophrenia had contributed for 6559 (11%) of the total DALYs lost and 45% of group II conditions with females having higher proportion 9.5% as compared to males(1.5%). The male to female ratio was 6.3:1 in this disease category.

Thus utilizing the existing information in the community, using a sampling procedure that is representative to all group of population in the community, and having the information collected by lay person interpreted by high level health professionals, the health status of Butajira district was assessed in a detailed, consistent and comprehensive way.

VII. Conclusion and recommendations

The study has provided internally consistent, comprehensive and comparable assessments of causes of death, prevalence and incidence of diseases and injuries.

The total burden of the study population was 59,130/100,000 populations which was typical of the developing countries but six times higher than the developed countries. Group I conditions have contributed to 72% of the healthy years of life lost. Maternal,

perinatal and childhood conditions along with tuberculosis, diarrhoeal diseases, acute respiratory infections, HIV and malaria had contributed to the 35,104 health years of life lost which is more than half of the total DALYs lost (59%) and 86% of the total group I conditions. Fortunately all these group I categories are amenable and can be averted with cost-effective intervention measures.

Therefore, the scarcely available resources should be directed to interventions that will reduce the burden of diseases due to this categories specially in the area of maternal and child health service, control of malaria, ARI, diarrhea diseases and tuberculosis.

Public health measures such as improvement of nutritional status, immunization service, health education and environmental health activities should be strengthened. These measures are inexpensive and cost-effective and can reduce the disease burden significantly.

Operational research should also be conducted to identify which intervention(s) are cost-effective among the various available intervention mechanisms in reducing DALYs lost due to communicable, maternal and perinatal causes.

Both clinical and public health practitioners should be trained on these areas and where cost-effective intervention exist.

Data collectors and supervisors working under the

epidemiologic surveillance of Butajira study base should take a training on the interview technique of undertaking verbal autopsy. A health professional with higher quality, who will interpret the information collected by field workers, should also be assigned. This will generate a relatively valid information concerning the causes of deaths in the study base.

Conducting national or sub-national community based study on the burden of diseases using these methodologies is in-expensive and will result in obtaining a comprehensive, internally consistent and comparable information which can be used in priority setting and selecting cost-effective intervention.

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IX. Annexes

Annex 1: Description of formulae used for calculation of DALYs

1.1 Determining Incidence from prevalence: The data was collected as prevalence of disease. However, the DALY measure requires annual incidence of disease. more over the prevalence was not a single point in time but a time period of 14 days. The problem with measuring illness over 14 days is that illnesses with a short duration will be over counted. In order to adjust the "prevalence" that is measured over 14 day period, the following formula was applied.

$$\frac{D}{(D+M-1)} \times P_m = P$$

Where D is Duration of illness, M is measurement period, P_m is "prevalence over the measurement period", and P is prevalence at a single point in time.

Once the prevalence at a single point in time is calculated, it can easily be converted to annual incidence by the standard expression of the relationship: $P=ID$ (where P is prevalence, I is Incidence and D is duration). This relationship holds true if the incidence has been constant over time. One needs to multiply by 365 when the durations are expressed in days per case.

$$I = \frac{P}{D} * \frac{365 \text{ days}}{\text{year}}$$

1.2 Computing DALYs- Disability adjusted life years.

The DALY formula calculates the number of years of healthy life lost per case of the disease. The DALY lost for a single case of a disease is calculated by the following^(14,15,16,17):

$$- \left[\frac{DCe^{-\beta a}}{(\beta + r)^2} \left[e^{-\beta + r(L)} \{1 + (\beta + r)(L + a)\} - \{1 + (\beta + r)a\} \right] \right]$$

a= Age of onset (user input).

The age of onset is the average age that the population contracted the disease.

L= Duration of disability (user input).

The duration of disability is the years lost to disease (YLD). This factor is dependent upon the life expectancy of the population derived from a standard life table.

D= Disability weight (user input).

The disability weight is the severity of the disease. (Scale 0-1.0).

Disability limits an individual's ability to perform activities and they may require assistance with activities. six disability classes of disease have been defined between perfect health and death. Each class represents a greater loss of welfare or

increased severity than the class before. Disabilities in the same class may restrict different abilities or functional capacities but their impact on the individual is considered to be similar.

It is used to compare time lived with a disability with time lost due to mortality.

r= Discount rate/time preference. (usually 0.03)
(formula constant).

The calculation of the DALY allows one to enter a discount rate for years of healthy life lost in future years. The discount implies that years of healthy life lost in future years are less costly to the society because the society has time to prepare and compensate for them. Society has a social time preference which should be used for discounting future benefits to society. The concept of discount is not universally accepted and the rate to use is subject to much debate. Three percent can be taken as an international average real interest rate ... an interest rate above the inflation rate. As such it indicates the implicit value society places on present consumption. a three percent interest rate above inflation implies that society is indifferent between receiving 100 units of a good now or receiving 103 units of the same good one year from now.

An additional advantage to using the 3% rate is that it is the rate that has been used in the past to perform this exercise, and the use of common rate will facilitate comparisons.

increased severity than the class before. Disabilities in the same class may restrict different abilities or functional capacities but their impact on the individual is considered to be similar.

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An additional advantage to using the 3% rate is that it is the rate that has been used in the past to perform this exercise, and the use of common rate will facilitate comparisons.

c= Age weighting correction constant (0.16243) (formula constant).

The age weighting correction constant is a factor that is inserted into the age weighting function that serve the purpose of normalizing the age weights so that the total of the age weighted burden is the same as if the age weights were uniform.

b= Age weighting parameter (0.04) (formula constant).

The age weighting parameter defines the shape of the age weighting function. A year of life lost at different ages has a different value. Peak value years are from age 12 through 60. It is a valuation of a healthy year of life lived at different ages.

Annex 2. Description of disease by their class and severity weight.

Class	Description	Weight
Class 1	Limited ability to perform at least one activity in one of the following areas: recreation, education, procreation or occupation.	0.096
Class 2	Limited ability to perform most activities in one of the following areas: recreation, education, procreation or occupation.	0.220
Class 3	Limited ability to perform activities in two or more of the following areas: recreation, education, procreation or occupation.	0.400
Class 4	Limited ability to perform most activities in all of the areas: recreation, education procreation or occupation.	0.600
Class 5	Needs assistance with instrumental activities of daily living such as meal preparation, shopping, or housework.	0.810
Class 6	Needs assistance with activities of daily living such as eating, personal hygiene or toilet use.	0.920

Source: C.J.L. Murray "Quantifying the burden of disease: the technical basis for disability-adjusted life years," Global Comparative Assessment in the health sector(1994): pg. 12.

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Disease Rank	Disease/Incidence Name	Incidence /100,000	Percent of Total	DALY /100,000
4	Infectious and parasitic diseases - Diarrhoeal diseases	23,090.64	12.50	7,391.9
8	Tropical cluster - Malaria	47,945.92	10.35	6,124.9
22	Perinatal causes - Perinatal causes	711.72	9.45	5,589.7
32	Childhood cluster - Measles	1,635.14	7.34	4,342.5
37	Respiratory infections - Acute lower respiratory infection	14,181.20	7.28	4,309.4
41	Infectious and parasitic diseases - Tuberculosis	1,835.74	7.13	4,220.8
43	Neuro-psychiatric - Bipolar affective disorder	1,299.00	6.50	3,844.8
46	Neuro-psychiatric - Neuro-psychiatric	400.00	4.58	2,713.2
50	Genito-urinary - Nephritis/nephrosis	319.28	4.53	2,681.9
54	Sexually transmitted diseases - HIV infection	90.90	3.53	2,089.8
60	Infectious and parasitic diseases - Other Infectious and Parasitic diseases	9,127.38	3.51	2,077.6
62	Infectious and parasitic diseases - Trachoma	600.00	3.44	2,038.0
66	Cardiovascular disease - Rheumatic heart disease	159.28	3.21	1,900.6
73	Diseases of the digestive system - Cirrhosis of the liver	72.42	1.43	850.4
77	Unintentional - Road traffic accidents	53.94	1.43	850.2
81	Chronic respiratory disease - Asthma	169.24	1.41	835.9
85	Neuro-psychiatric - Epilepsy	93.70	1.35	803.1
88	Infectious and parasitic diseases - Meningitis	23.10	1.32	783.3
92	Infectious and parasitic diseases - Hepatitis	1,584.18	1.31	777.1
95	Unintentional - Fires	38.54	0.97	574.1
105	Infectious and parasitic diseases - Other bacterial diseases	6,759.32	0.95	564.4
107	Infectious and parasitic diseases - Helminthiases	160.00	0.91	541.3
111	Nutritional/endocrine - Anemias	68.70	0.78	466.5
116	Respiratory infections - Acute upper respiratory infection	8,381.24	0.57	339.1
119	Unintentional - Falls	19.70	0.56	332.6
123	Malignant neoplasms - Malignant Neoplasms	45.02	0.54	321.5
124	Maternal conditions - Abortion	9.24	0.47	279.2
127	Infectious and parasitic diseases - Non-arthropod viral CNS diseases	7.70	0.41	247.9
129	Unintentional - Drowning	6.16	0.34	202.5
130	Maternal conditions - Sepsis - Pregnancy	6.16	0.31	186.1
132	Unintentional - Occupational	3.08	0.17	102.5
133	Maternal conditions - Obstructed labour	3.08	0.17	100.5
135	Unintentional - Poisoning	268.08	0.16	99.0
137	Intentional - Homicide & violence	3.08	0.16	97.5
139	Musculo-skeletal system - Musculo-skeletal system	908.00	0.15	91.9
140	Maternal conditions - Hypertension - Pregnancy	3.08	0.14	86.5
141	Intentional - Self-inflicted	3.08	0.10	60.5
144	Cardiovascular disease - Cerebrovascular disease	10.78	0.10	59.4
146	Unintentional - Unintentional	1.54	0.08	50.9
147	Diabetes mellitus - Diabetes Mellitus	1.54	0.08	50.9
148	Maternal conditions - Hemorrhage - Pregnancy	1.54	0.07	43.2
totals		120,101.44		59,125

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Disease Name	Disease Weight	Duration of Disability	Age at Onset	Incidence /100,000	Percent of Total	DALY /100,000
Communicable, maternal and perinatal						
Infectious and parasitic diseases						
Tuberculosis	0.4357	7.547	27	1,835.74	7.13	4,220.8
Diarrhoeal diseases	0.2272	1.030	14	23,090.64	12.50	7,391.9
Meningitis	0.9260	99.000	6	23.10	1.32	783.3
Hepatitis	0.6053	1.803	36	1,584.18	1.31	777.1
Trachoma	0.0960	99.000	4	600.00	3.44	2,038.0
Other bacterial diseases	0.1946	0.380	29	6,759.32	0.95	564.4
Non-arthropod viral CNS diseases	0.9260	99.000	2	7.70	0.41	247.9
Helminthiases	0.0960	99.000	18	160.00	0.91	541.3
Other Infectious and Parasitic	0.2255	0.983	34	9,127.38	3.51	2,077.6
				43,188.06	31.53	18,642.7
Respiratory infections						
Acute lower respiratory infection	0.4045	0.889	7	14,181.20	7.28	4,309.4
Acute upper respiratory infection	0.4005	0.119	8	8,381.24	0.57	339.1
				22,562.44	7.86	4,648.5
Maternal conditions						
Hemorrhage - Pregnancy	0.9260	99.000	28	1.54	0.07	43.2
Sepsis - Pregnancy	0.9260	99.000	24	6.16	0.31	186.1
Hypertension - Pregnancy	0.9260	99.000	28	3.08	0.14	86.5
Obstructed labour	0.9260	99.000	18	3.08	0.17	100.5
Abortion	0.9260	99.000	24	9.24	0.47	279.2
				23.10	1.17	695.8
Perinatal causes						
Perinatal causes	0.6832	25.324	1	711.72	9.45	5,589.7
				711.72	9.45	5,589.7
Sexually transmitted diseases						
HIV infection	0.7118	99.000	22	90.90	3.53	2,089.8
				90.90	3.53	2,089.8
Childhood cluster						
Measles	0.5915	14.286	1	1,635.14	7.34	4,342.5
				1,635.14	7.34	4,342.5
Tropical cluster						
Malaria	0.5048	0.351	14	47,945.92	10.35	6,124.9
				47,945.92	10.35	6,124.9
Total for: Communicable, maternal and perinatal				116,157.28	71.26	42,134.1
Non-communicable						
Malignant neoplasms						
Malignant Neoplasms	0.7449	99.000	47	45.02	0.54	321.5
				45.02	0.54	321.5
Diabetes mellitus						
Diabetes Mellitus	0.9260	99.000	16	1.54	0.08	50.9
				1.54	0.08	50.9
Nutritional/endocrine						
Anemias	0.1890	99.000	8	68.70	0.78	466.5
				68.70	0.78	466.5

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Disease Name	Disease Weight	Duration of Disability	Age at Onset	Incidence /100,000	Percent of Total	DALY /100,000
Communicable, maternal and perinatal						
Infectious and parasitic diseases						
Tuberculosis	0.4357	7.547	27	1,835.74	7.13	4,220.8
Diarrhoeal diseases	0.2272	1.030	14	23,090.64	12.50	7,391.9
Meningitis	0.9260	99.000	6	23.10	1.32	783.3
Hepatitis	0.6053	1.803	36	1,584.18	1.31	777.1
Trachoma	0.0960	99.000	4	600.00	3.44	2,038.0
Other bacterial diseases	0.1946	0.380	29	6,759.32	0.95	564.4
Non-arthropod viral CNS diseases	0.9260	99.000	2	7.70	0.41	247.9
Helminthiasis	0.0960	99.000	18	160.00	0.91	541.3
Other Infectious and Parasitic	0.2255	0.983	34	9,127.38	3.51	2,077.6
				43,188.06	31.53	18,642.7
Respiratory infections						
Acute lower respiratory infection	0.4045	0.889	7	14,181.20	7.28	4,309.4
Acute upper respiratory infection	0.4005	0.119	8	8,381.24	0.57	339.1
				22,562.44	7.86	4,648.5
Maternal conditions						
Hemorrhage - Pregnancy	0.9260	99.000	28	1.54	0.07	43.2
Sepsis - Pregnancy	0.9260	99.000	24	6.16	0.31	186.1
Hypertension - Pregnancy	0.9260	99.000	28	3.08	0.14	86.5
Obstructed labour	0.9260	99.000	18	3.08	0.17	100.5
Abortion	0.9260	99.000	24	9.24	0.47	279.2
				23.10	1.17	695.8
Perinatal causes						
Perinatal causes	0.6832	25.324	1	711.72	9.45	5,589.7
				711.72	9.45	5,589.7
Sexually transmitted diseases						
HIV infection	0.7118	99.000	22	90.90	3.53	2,089.8
				90.90	3.53	2,089.8
Childhood cluster						
Measles	0.5915	14.286	1	1,635.14	7.34	4,342.5
				1,635.14	7.34	4,342.5
Tropical cluster						
Malaria	0.5048	0.351	14	47,945.92	10.35	6,124.9
				47,945.92	10.35	6,124.9
Total for: Communicable, maternal and perinatal				116,157.28	71.26	42,134.1
Non-communicable						
Malignant neoplasms						
Malignant Neoplasms	0.7449	99.000	47	45.02	0.54	321.5
				45.02	0.54	321.5
Diabetes mellitus						
Diabetes Mellitus	0.9260	99.000	16	1.54	0.08	50.9
				1.54	0.08	50.9
Nutritional/endocrine						
Anemias	0.1890	99.000	8	68.70	0.78	466.5
				68.70	0.78	466.5

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Disease Name	Disease Weight	Duration of Disability	Age at Onset	Incidence /100,000	Percent of Total	DALY /100,000
Neuro-psychiatric						
Neuro-psychiatric	0.2200	99.000	18	400.00	4.58	2,713.2
Bipolar affective disorder	0.0960	99.000	27	1,299.00	6.50	3,844.8
Epilepsy	0.2780	99.000	27	93.70	1.35	803.1
				1,792.70	12.45	7,361.2
Cardiovascular disease						
Rheumatic heart disease	0.5627	99.000	43	159.28	3.21	1,900.6
Cerebrovascular disease	0.9260	99.000	47	10.78	0.10	59.4
				170.06	3.31	1,960.1
Chronic respiratory disease						
Asthma	0.2585	99.000	51	169.24	1.41	835.9
				169.24	1.41	835.9
Diseases of the digestive system						
Cirrhosis of the liver	0.6572	99.000	42	72.42	1.43	850.4
				72.42	1.43	850.4
Genito-urinary						
Nephritis/nephrosis	0.3289	99.000	37	319.28	4.53	2,681.9
				319.28	4.53	2,681.9
Musculo-skeletal system						
Musculo-skeletal system	0.4000	0.200	42	908.00	0.15	91.9
				908.00	0.15	91.9
Total for: Non-communicable				3,546.96	24.72	14,620.6
Injuries						
Unintentional						
Unintentional	0.9260	99.000	8	1.54	0.08	50.9
Road traffic accidents	0.5652	99.000	32	53.94	1.43	850.2
Poisoning	0.4060	1.196	2	268.08	0.16	99.0
Falls	0.6055	99.000	32	19.70	0.56	332.6
Fires	0.4210	99.000	4	38.54	0.97	574.1
Drowning	0.9260	99.000	17	6.16	0.34	202.5
Occupational	0.9260	99.000	15	3.08	0.17	102.5
				391.04	3.74	2,212.2
Intentional						
Self-inflicted	0.9260	99.000	43	3.08	0.10	60.5
Homicide & violence	0.9260	99.000	20	3.08	0.16	97.5
				6.16	0.26	158.0
Total for: Injuries				397.20	4.00	2,370.3
Totals				120,101.44		59,125

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Population: 33000

Disease Name	Disease Weight	Duration of Disability	Age at Onset	Incidence /100,000	Percent of Total	DALY /100,000
Communicable, maternal and perinatal						
Infectious and parasitic diseases						
Tuberculosis male	0.4000	0.880	24	987.00	0.86	512.0
Tuberculosis female	0.4000	0.880	25	724.00	0.63	375.6
Tuberculosis female death	0.9260	99.000	30	52.36	2.36	1,399.0
Tuberculosis male death	0.9260	99.000	30	72.38	3.27	1,934.0
Tuberculosis	0.4357	7.547	27	1,835.74	7.13	4,220.8
Diarrhoeal diseases male	0.2200	0.020	7	10,698.00	0.06	40.4
diarrhea male death	0.9260	99.020	22	106.28	5.56	3,292.9
diarrhea disease female	0.2200	0.020	8	12,157.00	0.08	50.5
diarrhea female death	0.9260	99.020	22	129.36	6.77	4,008.0
Diarrhoeal diseases	0.2272	1.030	14	23,090.64	12.50	7,391.9
Meningitis		0.000	0	0.00	0.00	0.0
female death	0.9260	99.000	10	9.24	0.53	313.3
male death	0.9260	99.000	10	13.86	0.79	470.0
Meningitis	0.9260	99.000	6	23.10	1.32	783.3
Hepatitis male	0.6000	0.170	32	839.00	0.20	123.2
female	0.6000	0.170	32	719.00	0.17	105.6
female death	0.9260	99.000	40	10.78	0.38	225.7
male death	0.9260	99.000	40	15.40	0.54	322.4
Hepatitis	0.6053	1.803	36	1,584.18	1.31	777.1
VAD male	0.0960	99.000	4	360.00	2.06	1,222.8
VAD female	0.0960	99.000	4	240.00	1.37	815.2
Trachoma	0.0960	99.000	4	600.00	3.44	2,038.0
Eye disease male	0.0960	0.200	20	340.00	0.01	9.5
Other bacterial diseases		0.000	0	0.00	0.00	0.0
Skin infection male	0.0960	0.200	23	232.00	0.01	6.6
eye disease female	0.0960	0.200	20	340.00	0.01	9.5
other female	0.2200	0.200	52	4,275.00	0.33	197.4
other female death	0.9260	99.000	52	3.08	0.07	44.7
other male	0.2200	0.200	52	1,018.00	0.07	47.0
other male death	0.9260	99.000	52	3.08	0.07	44.7
skin infection female	0.0960	0.200	23	542.00	0.02	15.4
sudden death female	0.9260	99.000	1	6.16	0.32	189.3
Other bacterial diseases	0.1946	0.380	29	6,759.32	0.95	564.4
Male death	0.9260	99.000	3	6.16	0.33	198.3
Non-arthropod viral CNS diseases		0.000	0	0.00	0.00	0.0
female death	0.9260	99.000	3	1.54	0.08	49.5
Non-arthropod viral CNS	0.9260	99.000	2	7.70	0.41	247.9
Helminthiasis male	0.0960	99.000	18	86.00	0.49	290.9
female	0.0960	99.000	18	74.00	0.42	250.3
Helminthiasis	0.0960	99.000	18	160.00	0.91	541.3
Other Infectious and Parasitic		0.000	0	0.00	0.00	0.0
Tetanus female	0.9260	99.000	66	1.54	0.01	11.5
ill defined female	0.2200	0.200	30	2,264.00	0.24	145.6
ill defined female death	0.9260	99.000	40	35.42	1.25	741.7

Disease Burden Report

Date: 26/03/99

Area: Butajira

Population: 33000

Disease Name	Disease Weight	Duration of Disability	Age at Onset	Incidence /100,000	Percent of Total	DALY /100,000
ill defined male	0.2200	0.200	30	6,791.00	0.73	436.9
ill defined male death	0.9260	99.000	40	35.42	1.25	741.7
Other Infectious and Parasitic	0.2255	0.983	34	9,127.38	3.51	2,077.6
Infectious and parasitic diseases				43,188.06	31.53	18,642.7
Respiratory infections						
Acute lower respiratory infection		0.000	0	0.00	0.00	0.0
LRTI female	0.4000	0.030	7	5,305.00	0.09	54.7
LRTI female death	0.9260	99.000	13	56.98	3.26	1,930.4
LRTI male	0.4000	0.030	6	8,753.00	0.13	80.6
LRTI male death	0.9260	99.000	13	66.22	3.79	2,243.5
Acute lower respiratory infection	0.4045	0.889	7	14,181.20	7.28	4,309.4
Acute upper respiratory infection		0.000	0	0.00	0.00	0.0
URTI Female	0.4000	0.010	18	4,947.00	0.04	28.1
URTI female death	0.9260	99.000	2	6.16	0.32	194.2
URTI male	0.4000	0.010	18	3,425.00	0.03	19.4
URTI male death	0.9260	99.000	2	3.08	0.16	97.1
Acute upper respiratory infection	0.4005	0.119	8	8,381.24	0.57	339.1
Respiratory infections				22,562.44	7.86	4,648.5
Maternal conditions						
Hemorrhage - Pregnancy	0.9260	99.000	28	1.54	0.07	43.2
Hemorrhage - Pregnancy	0.9260	99.000	28	1.54	0.07	43.2
Sepsis - Pregnancy	0.9260	99.000	24	6.16	0.31	186.1
Sepsis - Pregnancy	0.9260	99.000	24	6.16	0.31	186.1
Hypertension - Pregnancy	0.9260	99.000	28	3.08	0.14	86.5
Hypertension - Pregnancy	0.9260	99.000	28	3.08	0.14	86.5
Obstructed labour	0.9260	99.000	18	3.08	0.17	100.5
Obstructed labour	0.9260	99.000	18	3.08	0.17	100.5
Abortion	0.9260	99.000	24	9.24	0.47	279.2
Abortion	0.9260	99.000	24	9.24	0.47	279.2
Maternal conditions				23.10	1.17	695.8
Perinatal causes						
still birth male	0.9260	99.000	1	4.62	0.24	142.0
Cong. malform male	0.9260	99.100	1	1.54	0.08	47.3
Low birth weight male	0.9260	99.100	1	1.54	0.08	47.3
Perin. asphyxia male	0.9260	99.000	1	36.96	1.92	1,136.2
Perinatal asphyxia female	0.9260	99.000	1	12.32	0.64	378.7
Sepsis female death	0.9260	99.000	1	52.36	2.72	1,609.7
Sepsis male death	0.9260	99.000	1	47.74	2.48	1,467.6
hypothermia female	0.9260	99.000	1	1.54	0.08	47.3
hypothermia male	0.9260	99.000	1	4.62	0.24	142.0
low birth weight female	0.9260	99.100	1	1.54	0.08	47.3
preterm female	0.9260	99.100	1	6.16	0.32	189.3
preterm male	0.9260	99.100	1	6.16	0.32	189.3
sepsis male	0.6000	0.060	1	530.00	0.00	3.0
still birth female	0.9260	99.000	1	4.62	0.24	142.0
Perinatal causes	0.6832	25.324	1	711.72	9.45	5,589.7

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Area: Butajira

Population: 33000

Disease Name	Disease Weight	Duration of Disability	Age at Onset	Incidence /100,000	Percent of Total	DALY /100,000
Perinatal causes				711.72	9.45	5,589.7
Sexually transmitted diseases						
HIV female death	0.9260	99.000	25	32.34	1.60	950.2
HIV infection male	0.4000	99.000	20	12.00	0.27	164.1
HIV infection female	0.4000	99.000	20	25.00	0.57	341.9
HIV male death	0.9260	99.000	25	21.56	1.07	633.5
HIV infection	0.7118	99.000	22	90.90	3.53	2,089.8
Sexually transmitted diseases				90.90	3.53	2,089.8
Childhood cluster						
Measles female death	0.9260	99.000	2	13.86	0.73	437.1
Measles male	0.6000	0.058	2	1,050.00	0.01	11.0
PEM male death	0.9260	99.000	2	15.40	0.82	485.7
measles female	0.6000	0.058	2	350.00	0.00	3.6
measles male death	0.9260	99.000	2	12.32	0.65	388.5
pem female	0.4000	99.000	2	74.00	1.70	1,008.2
pem female death	0.9260	99.000	2	12.32	0.65	388.5
pem male	0.4000	99.000	2	98.00	2.25	1,335.2
pertussis female death	0.9260	99.000	1	4.62	0.24	142.0
pertussis male death	0.9260	99.000	1	4.62	0.24	142.0
Measles	0.5915	14.286	1	1,635.14	7.34	4,342.5
Childhood cluster				1,635.14	7.34	4,342.5
Tropical cluster						
Malaria male	0.4000	0.040	12	23,052.00	0.75	444.9
female	0.6000	0.040	12	24,743.00	1.21	716.4
female death	0.9260	99.000	17	73.92	4.11	2,431.1
male death	0.9260	99.000	17	77.00	4.28	2,532.4
Malaria	0.5048	0.351	14	47,945.92	10.35	6,124.9
Tropical cluster				47,945.92	10.35	6,124.9
Communicable, maternal and perinatal				116,157.28	71.26	42,134.1
Non-communicable						
Malignant neoplasms						
Malignant Neoplasms		0.000	0	0.00	0.00	0.0
female death	0.9260	99.000	57	15.40	0.31	183.9
male death	0.9260	99.000	57	4.62	0.09	55.1
pelvic malignancy	0.6000	99.000	74	25.00	0.13	82.4
Malignant Neoplasms	0.7449	99.000	47	45.02	0.54	321.5
Malignant neoplasms				45.02	0.54	321.5
Diabetes mellitus						
Diabetes Mellitus male death	0.9260	99.000	16	1.54	0.08	50.9
Diabetes Mellitus	0.9260	99.000	16	1.54	0.08	50.9
Diabetes mellitus				1.54	0.08	50.9
Nutritional/endocrine						
Anemias male	0.0960	99.000	13	12.00	0.07	42.1
female	0.0960	99.000	13	49.00	0.29	172.1
female death	0.9260	99.000	4	4.62	0.25	151.3
male death	0.9260	99.000	4	3.08	0.17	100.9

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Disease Name	Disease Weight	Duration of Disability	Age at Onset	Incidence /100,000	Percent of Total	DALY /100,000
Anemias	0.1890	99.000	8	68.70	0.78	466.5
Nutritional/endocrine				68.70	0.78	466.5
Neuro-psychiatric		0.000	0	0.00	0.00	0.0
Schizophrenia male	0.2200	99.000	27	100.00	1.14	678.3
schizophrenia female	0.2200	99.000	27	300.00	3.44	2,034.9
Neuro-psychiatric	0.2200	99.000	18	400.00	4.58	2,713.2
Deepression female	0.0960	99.000	27	1,199.00	6.00	3,548.8
Depression male	0.0960	99.000	27	100.00	0.50	295.9
Bipolar affective disorder	0.0960	99.000	27	1,299.00	6.50	3,844.8
Epilepsy male	0.2200	99.000	27	37.00	0.42	250.9
female	0.2200	99.000	27	49.00	0.56	332.3
female death	0.9260	99.000	27	1.54	0.07	43.9
male death	0.9260	99.000	27	6.16	0.29	175.8
Epilepsy	0.2780	99.000	27	93.70	1.35	803.1
Neuro-psychiatric				1,792.70	12.45	7,361.2
Cardiovascular disease						
Female	0.4000	99.000	38	73.00	1.20	709.8
Female death	0.9260	99.000	48	26.18	0.74	441.4
Male death	0.9260	99.000	48	23.10	0.65	389.5
Rheumatic heart disease Male	0.4000	99.000	38	37.00	0.60	359.7
Rheumatic heart disease	0.5627	99.000	43	159.28	3.21	1,900.6
Cerebrovascular disease		0.000	0	0.00	0.00	0.0
female death	0.9260	99.000	71	4.62	0.04	25.4
male death	0.9260	99.000	71	6.16	0.05	33.9
Cerebrovascular disease	0.9260	99.000	47	10.78	0.10	59.4
Cardiovascular disease				170.06	3.31	1,960.1
Chronic respiratory disease						
Asthma male	0.2200	99.000	44	86.00	0.66	392.8
Asthma female	0.2200	99.000	44	74.00	0.57	338.0
Asthma female death	0.9260	99.000	59	4.62	0.08	52.4
Asthma male death	0.9260	99.000	59	4.62	0.08	52.4
Asthma	0.2585	99.000	51	169.24	1.41	835.9
Chronic respiratory disease				169.24	1.41	835.9
Diseases of the digestive system						
Cirrhosis of the liver		0.000	0	0.00	0.00	0.0
acute abdomen female	0.9260	99.000	34	7.70	0.32	191.7
acute abdomen male	0.9260	99.000	34	10.78	0.45	268.4
female	0.4000	99.000	48	25.00	0.30	182.1
female death	0.9260	99.000	68	3.08	0.03	21.9
male	0.4000	99.000	48	12.00	0.14	87.4
male death	0.9260	99.000	68	13.86	0.16	98.7
Cirrhosis of the liver	0.6572	99.000	42	72.42	1.43	850.4
Diseases of the digestive system				72.42	1.43	850.4
Genito-urinary						
Nephritis/nephrosis male	0.2200	99.000	18	123.00	1.61	953.6

Disease Burden Report

Area: Butajira

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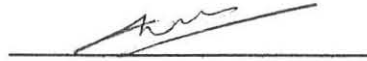
Disease Name	Disease Weight	Duration of Disability	Age at Onset	Incidence /100,000	Percent of Total	DALY /100,000
Intentional				6.16	0.26	158.0
Injuries				397.20	4.00	2,370.3
Totals				120,101.44		59,125

DECLARATION

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

Name Harar Abdulahi, M.D.

Signature



Place Addis Ababa, Ethiopia

Date of submission:

December 1998

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

Name Dr. Damen Haile Mariam

