PATTERN OF DISEASES AND HIV INFECTION AMONG ELDERLY MEDICAL ADMISSIONS AT MUHIMBILI MEDICAL CENTRE, DAR ES SALAAM, TANZANIA

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF MEDICINE (INTERNAL MEDICINE) IN THE UNIVERSITY OF DAR ES SALAAM, 1999.

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Abstract

Objectives: To determine the causes of hospitalisation, the prevalence and presentation of HIV infection, and the socio-economic status among medical admissions aged 55 years and above.

Methods: Consecutive patients aged 55 and above hospitalised at the medical wards were clinically evaluated, socio-demographic data collected, and venous blood samples drawn. HIV antibodies were determined by ELISA; all reactive sera were tested by Western Blot for confirmation.

Results: Of 1,934 patients hospitalised during the study period, 276 (14.3%) were 55 years or more. 253/276 (91.7%) patients were recruited into the study and comprised of 151 (59.7%) males and 102 (40.3%) females. Diseases of the cardiovascular system accounted for 29.0% of the diagnoses, followed by infections (22.1%), and cerebrovascular accidents (8.9%). The HIV-1 seroprevalence by sex was 18.5% (28/151) among males compared to 9.8% (10/102) among females ($p = 0.06$). The HIV-1 prevalence among those aged 55 to 59 was 29.7%. There was no association between HIV-1 serostatus and whether one lived in a rural or urban area, marital status, level of education, occupation, nor socio-economic status. The presentation among HIV-1 seropositive patients was wasting 44.7%, fever 39.5%, pallor 34.2%, weight loss 31.6%, productive cough 28.9%, palpitations 23.7%, and 23.7% had skin

lesions. HIV infection was correctly suspected in 6/38 (15.8%) patients. The study patients were generally of a poor economic status with low purchasing power.

Conclusions: 1. HIV infection is a major problem in the population of elderly medical admissions. 2. The possibility of HIV infection should be considered among elderly patients with clinical features of immunodeficiency. 3. HIV/AIDS prevention programs directed to the elderly should be established. 4. There does not appear to be any significant change in the pattern of diseases in the elderly over time. 5. Cost sharing for medical services is an extreme burden on the elderly population.

Table of Contents

1. Abstract iii
2. Acknowledgement vi
3. Introduction and Literature Review 1
    - Process of ageing 1
    - Significance of the elderly population 8
    - Pattern of diseases among the elderly in Tanzania 10
    - Infection with Human Immunodeficiency Virus 13
    - Tanzanian HIV/AIDS statistics 15
    - HIV infection in the elderly population 17
    - Clinical presentation of HIV infection in the elderly 24
    - The situation in Tanzania 28
    - Socio-economic factors 30
    - International Year of the Older Person 34
4. Rationale and Study Objective 35
5. Patients and Methods 37
    - Statistical analysis 40
6. Results 41
7. Discussion 62
    - Socio-demographic characteristics of the study population ..62
    - HIV seroprevalence 65
    - Clinical presentation of HIV seropositive patients 67
    - Possible source of HIV infection 69
    - Diagnosis 72
    - Economic status 76
    - Medical costs 78
    - Conclusions 82
8. References 84
9. Appendices 94

Acknowledgement

Foremost I would like to thank my supervisor, Professor K. Pallangyo, for the relentless sacrifice he gave to read and reread my numerous drafts. The advice and corrections that he suggested were worth all the effort. My sincere thanks to members of the Department of Internal Medicine especially the head, Professor W. Matuja, and postgraduate co-ordinator, Dr. J. Lwakatare, for authorising me to utilise the facilities in the department in conducting my research and doing the write-up.

I appreciate the help in the socio-economic aspect that was provided by Mr P. Mujinja of the Institute for Public Health. He tried to summon my interest in a subject that was quite perplexing to me. I could not have done without Dr. J. Paul and Dr. K. Nokes who searched for and sent to me literature from the USA, and also Mrs. Kapya of the World Bank who furnished relevant literature. Ms. C. Moshiro was willing to provide guidance with the statistical analysis. I appreciate the aid provided by Mr. F. Mayunga and Ms. K. Mtei in computer use and trouble-shooting. Mr. A. Patrick was instrumental in assisting in data collection and follow-up and gets my full gratefulness. Ms. J. Mlalasi and Mr. Sufi were a big help in processing the blood samples and conducting the tests, not forgetting Dr. F. Mugusi and Dr. D. Mwakagile for giving me the opportunity to utilise the laboratories. I appreciate the valuable comments given by Dr. T. Nyambo, Dr. N. Ndosi, and Dr. F. Mugusi concerning the write-up. A lot of thanks go to Dr. A. Sasi for always being there for me especially at times of

extreme despair. I also thank all other colleagues whom I did not mention here.

Lastly, but definitely with the most love, I thank my family especially my husband, Freeman, and my children, Dudley and Nicole, for missing me so much but still appreciating the little I could do as a mother and wife during the process of conducting this research. I dedicate this dissertation to my daughter, Nicole, who was born during the course of this work.

I hereby declare that this is my own original work and has not been submitted for a similar degree in any other University.

Signed .....

Date 30th June 1999

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Introduction and Literature Review

Process of ageing

As the normal human being continues with life the biological process of ageing comes into play. There is no single mechanism for ageing, but there seem to be multiple and interacting causes. There are also major differences between cells and organs that are renewable (bone marrow, skin, gastrointestinal mucosal cells) and the postmitotic ones (neurones, cardiac, skeletal muscles). This is exemplified by the damage caused by free radicals such as hydrogen peroxide and superoxides. It is more detrimental in non-replicating cells like neurones as compared to continuos replicating cells for example the bone marrow. Mechanisms to cope with damage have been found to be differentially affected by ageing[1].

Different theories have been put forward to explain the ageing process ranging from organism-based theories, organ-based, to population-based theories. Currently the most revered theories are those which are cellular-based. These have been substantiated by laboratory based experimental results. Cells grown in culture will senesce, that is, after a series of multiplication they will cease to replicate though they will remain alive and continue with normal metabolic activities. The number of replications antecedent to senescence is directly proportional to the lifespan of the particular species that the cells were obtained from; while it is inversely proportional to the age of the donor of the cells. On top of this, cells taken from patients with

premature ageing syndromes exhibit decrease in their lifespan, when in-vitro. These experimental results have given weight to the theory that ageing has a cellular basis[1].

Mechanisms behind these cellular observations are still obscure though some insight has been put forward. Senescent cells fail to replicate even in the presence of growth factors because they fail to induce the *c-fos* gene and thus there is block in the late G_1 phase of the cell cycle. The block is associated with secretion of a 57 k-DA protein known as *statin* and expression of a yet uncharacterised protein located in the outer surface of the plasma membrane. Cellular senescence is also implicated by the *retinoblastoma* gene product - an inhibitor of cell proliferation that is inactivated only by phosphorylation. Ageing cells generally fail to induce kinases that cause phosphorylation. This failure to induce kinases leads to lack of phosphorylation and inability to inactivate the gene product and hence inhibition of cell proliferation. No evidence has been put forward to suggest that during ageing there is routine deletion or inactivation of genes important for coding of specific peptides. However, non-coding DNA sequences that are important in cell division and DNA replication might be affected. Nevertheless, ageing does not seem to have any effect on RNA transcription[1].

Numerous hypotheses thought to be involved in ageing have not been validated and these include somatic mutation (ageing due to somatic mutations), intrinsic mutagenesis (due to ongoing DNA rearrangements) and error catastrophe (due to errors in protein synthesis). Mechanisms postulated and still under intense

investigation are free radical damage of DNA, alterations in DNA methylation, and telomere attrition[1].

Physiologically, ageing can be defined as progressive decline of the homeostatic reserve of each organ system (homeostenosis) which is evident from the third decade of life. This decline is continuous, gradual, and irreversible and occurs within each organ system independent of changes in other systems. In general there is an increase in body fat and a fall in lean body mass leading to obesity. In the eyes, an increase in lens opacification and a decrease in lens elasticity causes failure in accommodation leading to impaired vision. Decrease in high frequency acuity invariably leads to high tone deafness (presbyacusis) in the aged. The bone marrow reserve decreases causing frequent episodes of anaemia[1,2].

The cardiovascular system is greatly affected. The deposition of fibrous tissue in the myocardium and valves invariably destroy the structure and function of the heart causing cardiomyopathies. Reduced arterial compliance cause an elevation in systemic blood pressure and left ventricular hypertrophy resulting in systemic hypertension. Decrease in beta-adrenergic responsiveness leads to heart failure while an impaired baroreceptor response combined with slowing of sinoatrial node automaticity leads to heart block[1,2].

The nervous system is another system with immensely deleterious ageing consequences. Brain atrophic changes lead to dementia and delirium. A fall in the

synthesis of brain catecholamine causes depression while diminished dopamine synthesis causes Parkinsonism. There is a decline in righting reflexes causing frequent falls, and disturbances in stage four sleep causes insomnia and early awakening. Slowing in peripheral nerve conduction both for motor and sensory parts occurs. Autonomic function changes include alterations in heart rate and abnormalities in temperature regulation. The threshold for appreciation of skin temperature changes increase tenfold so the aged have inappropriate response to temperature variations leading to numerous cases of hypothermia and heatstroke[1,2].

Changes in the respiratory system are exaggerated by a history of chronic exposure to cigarette smoke. Stiffening of the chest wall and decreasing lung elasticity lead to ventilation/perfusion mismatch and a fall in P_{O2} resulting in frequent episodes of dyspnoea and hypoxia. The renal system is affected in that there is a decrease in glomerular filtration rate (GFR) of 1% per year from 40 years of age. Combined with reduced tubular reabsorptive and secretory capacities, serum creatinine and urea levels rise. Response to antidiuretic hormone (ADH) is impaired and hence water conservation is less efficient. As a consequence thirst is reduced, and these are the reasons for the frequently reported cases of dehydration in old age. Increased ADH and aldosterone levels and decreased renin lead to hyponatremia and hyperkalaemia[1,2].

As one ages there is impaired ovarian function at menopause in women and a fall in testosterone production in men thus causing difficulties in sexuality. Reduction in insulin secretion and sensitivity is responsible for the greater frequency of patients

with diabetes mellitus. Thyroid hormone levels abate bringing about thyroid dysfunction and impaired vitamin D absorption and activation give rise to osteomalacia and osteoporosis. Functional impairment in mobility and frequent reports of hip fractures are a result of reduced bone density combined with leaner body muscles. Osteoarthritic changes occur in many joints due to the above said factors as well as time-related wear and tear[1,2].

Gastrointestinal changes are varied and range from remission in the number of taste buds hence an alteration in taste, to reduction in saliva production which diminish moistening of food[3]. There is also a fall in gastric acidity with the resultant vitamin B_{12} deficiency and osteoporosis (due to disorders in calcium absorption). Small bowel mucosal atrophy causes slight impairment in absorption of nutrients and diminished colonic motility produces constipation, a rise in diverticular disease and chronic purgative abuse. Decline in anorectal function brings about faecal incontinence. Hepatic function shows some impairment portrayed by the delay in metabolism of drugs and development of cirrhosis. Symptomatic urinary tract infections are a consequence of urethra mucosal atrophy while urinary incontinence and retention is because of the inevitable prostatic enlargement in men[1,2].

The skin undergoes several age-related changes that include dryness, reduced sweating, and poor healing of superficial wound. 80% of people above 75 years are said to have dry, scaly, rough skin. The cumulative exposure to solar radiation lead to increased incidences of skin neoplasm. Degenerative diseases of the vascular system

have dermatological manifestations that include venous ulcers and arterial ischaemic disease. Derangements in hormone production are implicated in hirsutism and baldness[4].

Therefore as individuals age there is an increased likelihood to suffer from diseases and disabilities, which combined with homeostenosis, makes them more vulnerable to environmental, pathologic, and pharmacological challenges. The elderly are thus more prone to diseases with multisystemic involvement and to multiple diseases in different systems. Consequently, there is interference in presentation, delay in response to treatment modalities, and increase in adverse reactions to treatment[1]. The presence of a chronic disease can also interfere with the ageing process as it brings about more detrimental effects causing a vicious cycle. A practical illustration involves nutrition whereby a chronic illness may need modification of diet, may cause interference with food tolerance, and ability to manage one's own diet. Drugs being used may decrease nutrient absorption, increase requirements for a particular nutrient, alter taste, or impair appetite[3]. These are not beneficial to the patient since their effect on the chronic illness is more damaging.

Major influences that are responsible for the person to person variations in the process of ageing and subsequent development of diseases are diet, personal habits, genetic makeup, and environment[1]. High dietary salt predisposes one to hypertension while a diet high in calories and animal fat predisposes one to diabetes mellitus and coronary heart disease. Cigarette smoking accelerates ageing in that it impairs lung functioning,

predisposes one to lung cancer and coronary heart disease, and has anti-oestrogenic effects that reduce bone density and lowers the age of attaining menopause[2]. Premature wrinkling of the skin is associated with smoking and it has been observed 4.7 times more in heavy smokers than in non-smokers[4]. Other personal habits that also have profound effects are alcohol and drug abuse, physical inactivity, poor personal hygiene, and inappropriate response to stress. Genetics has a vital role in longevity and disease patterns an individual will acquire. Social factors like marital status, household status, education, income, urban versus rural dwelling and environmental well-being also affect ageing and its resultant disease patterns. Those individuals reaching old age in good health are said to remain healthy until shortly before death[5].

As explained earlier, it becomes evident that ageing reduces one's physical and mental capability. It reduces the potential to generate and possess resources like land and capital. Unfortunately, it is associated with a myriad of particular ill health and morbidity patterns that may involve long term disabilities[6]. Furthermore, the health of the elderly person living in the developing world has invariably suffered from childhood malnutrition, hard physical labour, and a wide range of infections in an environment where medical care is poorly accessible and unaffordable. Women exhibit an extra burden due to numerous pregnancy and lactation periods[7].

It is not easy to decide exactly when someone should be considered elderly as it has been shown that the process of ageing varies from person to person. However, for purposes of definitions, the World Health Organisation (WHO) considers an elderly

person to be 60 years and above[8,9]. This study has regarded an elderly person to be 55 years and above in keeping with the current official retirement age of Tanzania. In view of the low life expectancy in Tanzania, which was 49 years according to the last official census conducted in 1988[10], the above specification is anticipated to conform to the selection of such patients for the purpose of this study.

Significance of the elderly population

During the 20th century a main feature of the global population has been a significant increase in both the absolute and relative numbers of older people, a phenomenon known as "population ageing"[8]. Of the 580 million elderly people aged 60 years and more in the world today, about 355 million (61.2%) live in developing countries. This population has been growing due to extended survival time caused by better access to health services, improved dietary habits, and an overall enhanced quality of life. In the developing world there has been a considerable decline in infant mortality rates and fertility rates[5]. This has been the effect of spread in the use of contraceptives, increase in child survival (hence no need to bear more children), and improvement in management of diseases[7].

In 1950 the global population above 60 years consisted of 200 million people with 9 million (4.5%) of them being in Sub Saharan Africa. There was a consistent rise to 488 million in 1990, 23 million (4.7%) being in Sub Saharan Africa. It has been estimated that by the year 2000, out of the 662 million individuals above 60 years old

world-wide, 32 million (4.8%) will be in Sub Saharan Africa; and by 2030 of the 1,363 million, 85 million (6.2%) will be Sub Saharan Africans[11]. In 1985 the world population above 80 years was 45 million and by 2025, 60% of this age group is expected to be living in developing countries[12]. This indicates the importance of this elderly age group which is currently escalating tremendously more so in the developing world.

The results of the mainland Tanzanian 1967 census[13] indicated that there were 1.1 million Tanzanians aged 55 years and above, making up 9.1% of the total population. According to the 1978 census[14], this age group had increased to 1.4 million, but was now 8.2% of the total population. This was due to an even larger growth of the population below 15 years of age. It was estimated that in 1990 there were 1.9 million Tanzanians 55 years and above constituting 8.2% of the population, and in 2010 there will be 2.7 million (6.4%). Despite the fall in the proportion of the aged population, the absolute numbers have been projected to increase immensely. The life expectancy of Tanzanians at birth was 41 years in 1967, climbing to 44 years in 1978 and 49 years in 1988[10]. It is estimated that by 2010, the life expectancy of Tanzanians at birth will have dropped to 47 years instead of the expected 56 years because of the impact of HIV/AIDS[15].

The current estimated population of Tanzania is 29 million with those 55 years and above comprising 8.2% (2.4 million)[16]. The ageing of the population causes a gradual transformation in the pattern of diseases encountered. There is a growing burden of

degenerative conditions and chronic disabilities with more people needing long term treatment which includes medication and rehabilitation[7]. It is projected that by 2020, 3/4 of all deaths in the developing world will be related to ageing[8]. Non-communicable diseases like those of the circulatory system, cancers, and diabetes will mainly cause these age-related deaths. Analysis of the health problems and health service needs of the Tanzanian elderly population is thus warranted.

Pattern of diseases among the elderly in Tanzania

The number of elderly patients being hospitalised in Tanzania, as in other countries world-wide, is quite significant. A prospective study conducted by Mtango[17] on 224 patients above 50 years hospitalised at the Muhimbili Hospital between January and March 1974 revealed a mortality rate of 7.1%. Cardiovascular problems accounted for 20.6% of the morbidity and congestive cardiac failure for 37.5% of the mortality.

In 1983 Kitange[18] found that of all patients hospitalised at the Muhimbili Medical Centre medical wards during a one month period, 20.1% were above 55 years old and 5.5% were 65 years and above. Although 72% denied to have suffered from any serious illness in the past, 55% of the patients were on regular medication for a particular chronic condition. Residents of Dar es Salaam constituted 64% of the patients. While over half the patients were peasants, almost 60% had received no formal education, 26% primary education, and 2.1% had secondary education. There were no university graduates among these patients above 55 years. 52.1% of them

were married while 37.5% were widowed. 75% were economically dependent, mainly on their offspring, while only 25% of these patients were supporters of their respective households. Pathologies involved mainly the cardiovascular system (33%), and the gastrointestinal system (30%). Moreover all other systems were represented and the number of systems involved per patient was 1.81. During a three-month follow up period 11.5% of these patients died and 2% remained in confinement. Compared to a younger age group (15 to 35 years) hospitalised at the same period, the elderly had a longer duration of symptoms, poorer nutrition, multiple pathologies, needed more drugs per patient, had a longer duration of stay, and a higher mortality.

Ndosi et al[19] studied the morbidity and mortality of elderly patients above 60 years at the Muhimbili Medical Centre. It was found that 1,338 of the 33,914 patients (3.9%) hospitalised at the centre in the year 1987 were above 60 years of age. Surgical conditions involving the eye, hyperplasia of the prostate, and inguinal hernias were common problems. The most prevalent medical conditions were essential hypertension, tuberculosis, anaemia, diabetes mellitus, and heart failure. 1.4% of the elderly patients died during their hospital stay.

Data from another study by Matuja et al[20] covering the period 1988 and 1989 found that people aged 60 and above accounted for 6% of all patients with medical conditions hospitalised at the Muhimbili Medical Centre. Of these, 70% were males and 30% were females. The majority was between 60 and 74 years with only 26% being 75 years and above. Although the major reasons for hospitalisation were

neurological (17.5%) and cardiovascular pathologies (15.8%), infectious diseases had a significant contribution to the morbidity of these patients (14.9%). Forty percent of the women and 32% of men suffered from multiplicity of chronic diseases; on average there were 4 chronic diseases in persons aged 60 to 74 years. Most of these elderly patients (93% of males and 91% of females) lived in extended family structures. Persons who were living with their spouses constituted 60% of those below 75 years and 35% of those 75 years and above.

A total of 15,361 patients were hospitalised at the Muhimbili Medical Centre during 1996 of whom 1,516 (9.3%) were 55 years and above[21]. Of those hospitalised, 1,719 (11.2%) died during their confinement and patients above 55 years comprised 12.2% of the deaths. The mortality rate for those above 55 years was 13.1% as compared to 10.9% in those below. For those patients aged 55 years and above, 443 (29.2%) had two different diagnoses while 42 (2.8%) had three. In the 1,516 patients 55 years and above, there were 1,100 diagnoses which were of a medical nature; the rest being mainly genitourinary disorders in male patients, neoplasm, and ocular disorders. The top ten medical conditions encountered from the medical records in order of decreasing frequency were heart disorders which included cardiomyopathy and hypertensive heart disease with or without heart failure (15.4%), hypertension (10%), pulmonary tuberculosis (10%), anaemia (6.5%), diabetes mellitus (6.2%), malaria (6.1%), pneumonia (3.9%), disorders of the immune system (3.5%), intestinal infections (3%), and cerebrovascular accidents (2.9%).

Infection with the Human Immunodeficiency Virus

The emergence of the pandemic of the human immunodeficiency virus (HIV) infection and the ensuing acquired immunodeficiency syndrome (AIDS) has had tangible consequences on the pattern of diseases encountered world-wide. The situation is quite alarming and disturbing because of the enormous effects on medical practice. There has been interference in the epidemiology of diseases in each discipline of medicine as a result of this incurable and rapidly spreading infection.

The world HIV clock continues ticking and on midnight 14th July 1998, the number of persons living with HIV/AIDS had crossed the 34 million mark[22]. About 1% of adult humankind (15 to 49 years) was living with HIV/AIDS by the end of 1997 when the global adult HIV prevalence was estimated to be 29,499,160 with 67.2% in Sub Saharan Africa. 5,229,691 (17.7%) of these people were new adult HIV infections which occurred in the year 1997. The regions which had the highest growth of HIV infections in 1997 were Asia (Central, South and Southeast) and Eastern Europe. In Sub Saharan Africa there were 3,430,000 new cases in 1997 and these were 17.3% of the end 1997 prevalence.

HIV/AIDS has contributed to 11.7 million deaths world-wide, 2.3 million of them occurring in 1997 alone[16]. It accounted for about 1% of all global deaths in 1990 and was estimated that it would account for about 2% of the deaths in 2020[23]. In considering deaths due to infectious diseases, HIV infection caused 2.0% of them in

1990 and was projected to be responsible for 13.6% of them in the year 2020. Prime aged adults (aged 15 to 59 years) are the economically productive age group and have been adversely affected by the pandemic. Deaths caused by HIV/AIDS were 8.6% of all infectious disease deaths in prime aged adults in 1990 and were projected to rise to 37.1% in 2020.

Over decades there had been a struggle to combat health problems in the developing world and the results had been exhibited by a consistent rise in the life expectancy. This is a basic measurement of human welfare as it reflects a change in overall quality of life. However, HIV infection has had a major impact on life expectancy levels resulting in a drastic fall in life expectancy in these countries back to levels observed more than a decade ago. Examples are exhibited by Thailand where it is 2 years less than what should have been expected with the previous trend, and by Burkina Faso where it has dropped to 11.3 years less[23].

Sub Saharan Africa is home to the first 22 countries with the highest prevalence of HIV infection world-wide, with Botswana leading the list portraying 2,557 cases per 10,000 population. Tanzania is 14th down the list with a prevalence of 976 per 10,000 population. Compared to a developed country, example Germany, it was established that for each German adult (15 to 49 years) living with HIV or AIDS at the end of 1997, there were 114 adult Tanzanians. Countries with over 200 cases were Botswana (300), followed by Zimbabwe (295), Namibia (234), Zambia (223), and Swaziland (216). The country with the highest prevalence outside Sub Saharan Africa

was Haiti (23rd world-wide) with 505 cases per 10,000 population[22].

Major epidemics of tuberculosis have occurred in Sub Saharan Africa with 40% of the cases being attributed to a coexisting HIV infection. The prevalence of HIV infection in pregnant women attending antenatal clinics is supposed to have an indication of the extent of infection in the community. In 1997 some countries had quite impressive figures reflecting rampant infection in these communities[24]. The prevalence was a little over 50% in Zimbabwe, 43% in Botswana, 30% in Blantyre, Malawi and 25% in Lusaka, Zambia. The prevalence in Orange Free State, South Africa which was less than 1% in 1990 had risen to 18% by 1996; while that in Kwa Zulu/Natal rose from 1.6% in 1990 to 20% in 1996. Poverty is said to enhance HIV infection because poor women cannot convince their partners to use condoms or practise monogamy[23].

Tanzanian HIV/AIDS statistics

A recent report from the National AIDS Control Programme[16] covering the period up to December 1997 gave a bleak outlook on the frantic spread of this infection in the country. It emphasised the fact that probably only one out of 4-6 HIV infected cases were reported in the country due to problems of diagnosis and logistics existing in the majority of the health care facilities. Thus though the current total number of estimated cumulative cases of HIV infection stands at about 1,400,000; only 103,185 cumulative cases had been reported by December 1997. The above estimates were obtained mainly by the use of blood donor statistics. One should remember that

despite these high figures, blood donor data grossly underestimates the prevalence of HIV infection since blood donors are a selected group of those with low risk of having the infection.

The adult mortality rate in Tanzania rose from 7 per 1,000 population in the late 1980s to 25 per 1,000 in 1994[25]. The main reason for this is thought to be a result of the increase in HIV infection. Furthermore, the life expectancy is expected to fall from 49 years in 1988[14] to 47 years in 2010[15]. From 1985 onwards there had been an annual growth of 6 to 8% in the detection rate for tuberculosis in Tanzania. In spite of an improvement in provision of tuberculosis services, including data collection and reporting, a study by van Cleff et al[26] attributed this increase to HIV infection.

In the developing world more than 85% of infections occur through heterosexual intercourse[11]. A World Bank country study[25] found Tanzania to be no exception with this route contributing to between 75 and 80% of infections. Perinatal transmission (considered an indirect heterosexual route transmission) account for 10% as does the blood transfusion route. The study reported that although blood transfusion is rare in Tanzania with an estimated 6 transfusions per 1,000 population per year, by 1992 there were 2,832 cases of HIV infection attributed to blood transfusion. Moreover, screening of blood for transfusion began in 1987. Transmission via the homosexual route, intravenous drug injection, and in haemophiliacs are not important transmission means in Tanzania because of the extreme small numbers of people in these groups.

The prevalence of HIV seropositivity in Tanzanian blood donors in 1997 was 7.6% for males and 11.6% for females. Figures for males ranged from 2.8% in Arusha and Kigoma regions to 19.8% in Dar es Salaam region, while those for females ranged from 2.6% in Kigoma to 40.6% in Dar es Salaam region[16]. Muhimbili Medical Centre, the main referral hospital situated in Dar es Salaam, Tanzania, gets a fair share of patients with HIV infection. For instance, of 955 consecutive medical admissions in two Muhimbili Medical Centre wards during a four-week period in 1992, Pallangyo et al[27] found that the prevalence of HIV antibody was 38% for females and 35% for males.

HIV infection in the elderly population

It is known that HIV infection can affect every age group, income bracket, nationality, and both sexes[28]. The incidence of HIV infection among older adults appears to be rising faster than in younger age groups in the USA[29]. Because of its long latency period, a person infected at middle age may progress to old age before AIDS manifests itself while infected elders may live out their life expectancy without adequate time for AIDS manifestations to occur[28,30].

Unforeseen high prevalence of HIV infection in the elderly group have been reported from different parts of the world. In the USA 10.3% of all reported cases of HIV/AIDS through June 1997 were in patients aged 50 years and above at diagnosis. It has been estimated that 10% of HIV positive patients will be more than 60 years at

68,645. 1,379 were aged 55 years and above accounting for 2.0% of reported adult cases. The estimated population of 55 years and above was 2,375,641 giving an age specific rate of 58.0. (The rate for ages 55-59 being 123.6, that for ages 60-64 being 74.2, and for over 65 years being 19.8 per 100,000 population.) The population above 55 accounted for 8.2% of the total population and had 1.9% of all the reported HIV infected cases. It should be noted that this age group is anticipated to enlarge in the future and the incidence of HIV infection is similarly on the rise.

A significant observation is that the current age specific rates in the ages 55-59 and 60-64 given above are much higher than that in the 0-4 age group (rate of 70.0) which acquires infection mainly via perinatal transmission[16]. In many HIV/AIDS reports and control programmes, the presence of the infection in the young age group is appreciated and a lot of effort put to try and arrest the situation. However, the elderly group has not been considered as a risk group and hence not much emphasis has been put in trying to control the infection in this group.

The Adult Morbidity and Mortality Project performed in selected areas of Tanzania gave out its report in August 1997[38]. Among significant findings were that HIV/AIDS was the leading cause of death among adults aged 15-59 years in the project areas which included Dar es Salaam, Morogoro Rural District, and Hai District. In Dar es Salaam AIDS was reported to be the fourth commonest cause of death in males 60 years and older contributing to 6.3% of the deaths in this group. Only stroke, heart failure, and acute febrile illnesses surpassed it. It should be emphasised here that acute

febrile illnesses embody an assortment of conditions where HIV infection cannot be ruled out. Tuberculosis was reported as the fifth leading cause of death in this population. Tuberculosis is common in the elderly even in the absence of HIV infection. Nevertheless, there are some elders who have tuberculosis and are infected by HIV[39], and it is quite likely that some of the elderly patients reported to have had tuberculosis in the Adult Morbidity and Mortality Project had underlying HIV infection.

Close associations between tuberculosis and HIV infection have been well established. In 1991, 58% of patients with tuberculous pleural effusions[40] and 76% with tuberculous lymphadenitis[41] in Dar es Salaam were HIV positive. In 1995, 65.6% of patients with sputum negative pulmonary tuberculosis and 53.5% with smear positive pulmonary tuberculosis were HIV positive[42]. Likewise, 64.5% of patients with pulmonary tuberculosis were HIV positive, 47.1% of them with full-blown AIDS in another 1996 study done in Dar es Salaam[43]. This goes to say that some of the deaths reported to have been due to tuberculosis might have been a consequence of HIV infection.

In the Dar es Salaam females aged 60 and above, AIDS was the 13th (1.7%) cause of death while acute febrile illnesses was the second cause accounting for 14.3% of the deaths[38]. In the other project areas AIDS was not reported among the top 15 though pulmonary tuberculosis and acute febrile illnesses were major contributors to the cause of death. There is suspicion that HIV infection may ensue unknown to relatives

since older people find it traumatic to inform their offspring of the diagnosis (if known) considering the attached stigma and grief[29]. One can speculate that the magnitude of the infection was grossly underrated here.

AIDS/HIV infection is not generally thought of when dealing with the elderly for they are not considered a group at risk. There is a persistent myth that the elderly disengage from sexual matters and therefore do not have sexual histories[29,44]. On the contrary, the elderly remain sexually active and studies have shown that in persons in their sixties, 65%[29] to 70%[45] are sexually active, and even at 78 years and above, 20%[29] to 25%[45] engage in sexual activities. Sexual intercourse is said to be a healthy and fulfilling part of older adult life and with good health and an interested partner people can enjoy sexual relationships up to the ninth decade. However as some live with their children, they are embarrassed to show sexual interest or desire and those taken care of in extended facilities like nursing homes find their sexual activities restricted[46].

Since sexual intercourse is related to pregnancy, some women enjoy coitus for the first time after menopause. Freedom is exaggerated, especially with widows, and so these women might engage themselves in sexual relationships with any willing partner increasing the risk for sexually transmitted diseases including HIV infection[47]. As pregnancy is no longer a concern, the elderly person is less likely to use a condom[29,46]. Lack of oestrogen reduces vaginal lubrication and increases friability due to atrophy of the vaginal walls resulting in easy disruption during intercourse[28,29,48]. These post

menopausal changes coupled with decreased immunity makes the elderly woman highly susceptible to sexually transmitted diseases including HIV infection[35]. As a consequence to some of the above factors, heterosexual contact was found to be the leading cause of transmission in elderly patients in Maryland, USA between 1993 and 1994[32]. Accordingly, Ship et al[49] noted that women comprised a greater percentage of AIDS cases as age increases in the USA. While 6.1% of those aged 50 to 59 were women, the percentage of cases in women between 60 and 69 years was 13.2% and in those above 65 years was 28.7%.

Transfusion of blood and blood products is thought to be an important mode of infection in this age group[49,50,51]. Older people are more likely to be transfused than their younger counterparts owing to their age and vulnerability to disease[29,35]. Ship et al[49] found blood transfusion to be the second highest cause of transmission and it becomes the most likely means of exposure to infection with increasing age. It was the only identified means of exposure in 1% of those aged 13 to 49 years, 28% of cases aged 60 to 69 and for 64% of cases in individuals 70 years and older. Ferro et al[50] found that 21% of the patients between 55 and 72 years acquired infection via this route. Receiving HIV infected blood carries a high risk of seroconversion to recipients ranging from 70%[52] to 93%[53]. Furthermore, the rate of diagnosis of AIDS was 5 times higher in patients who seroconverted at or after 55 years than in those who seroconverted below 15 years[54]. The time interval from transfusion with infected blood and diagnosis of AIDS is between 4 and 7 years[55] and is said to be shorter in older individuals as compared to younger ones[46].

Transfusion acquired AIDS has the worst prognosis[56]. The patients who were diagnosed as having AIDS within the same month that they died were 12% of those aged 13 to 49 years, 22% of those aged 60 to 69 years, and 37% of those over 80 years old[49]. In a study of the UK haemophilia population[54], the median survival after seroconversion was 9.4 years for those aged between 35 and 54 years and dropped to 4.8 years for those 55 years and above; while median survival after AIDS diagnosis was 32 months in those below 15 years and slumped to 3 months in those above 55 years. While 86% of those below 15 years survived for more than 10 years, only 12% of those aged 55 years and above did so. Chen et al[32] found that the percentage of cases attributed to transfusion declined from greater than 50% in 1987 to 19% in 1993. Therefore elders who had received blood transfusions prior to the onset of the practice of screening for HIV antibodies were the ones at potential risk. Yet screening is not absolutely safe since 1 in 40,000 people transfused in the USA are thought to have received HIV infected blood that had previously tested negative for antibodies[53]. Nevertheless, it is a known fact that the practice of screening blood for HIV is not achievable at all centres in the developing world. For instance in Tanzania only 80% of the blood donating centres had reliable screening facilities in 1991[25].

Not all HIV infected people manifest related signs and symptoms. Bausch et al[57] found that 35% of those over 60 years were asymptomatic and could not identify any risk factor in 25% of them. Older patients might not be aware that they are at risk and so can easily spread the infection. Most health care providers do not consider the possibility that older patients may be infected[46]. The diagnosis of HIV infection is thus

delayed until it becomes too late to treat the patient effectively[49]. Likewise, policy makers have not realised the significance of HIV/AIDS among the elderly and thus few resources are provided for research projects and public health initiatives targeted at AIDS risk behaviour in older Americans[44]. A lot more resources are allocated to projects geared for those under five years who constitute a lesser percentage of HIV infected cases.

Clinical presentation of HIV infection in the elderly

The presentation of HIV infection in patients above 60 years who were assessed by Whipple et al[29] was generally of fatigue, anorexia, weight loss, decreased physical and cognitive functions. Some of the patients had opportunistic infections consistent with immunosuppression; the commonest being *Pneumocystis carinii* pneumonia, tuberculosis, Mycobacterium avium complex, Herpes Zoster, and Cytomegalovirus infections. There were instances whereby oesophageal candidiasis or Kaposi's Sarcoma might have been present but HIV infection was still not considered. In another examination of HIV infected patients above 60 years[32], 84% were found to have at least one indicator disease while 16% were suspected on account of CD_4 lymphocyte counts alone. The commonest disease was *Pneumocystis carinii* pneumonia in 43% of the patients. Other prominent conditions were the wasting syndrome, oesophageal and/or pulmonary candidiasis, and HIV encephalopathy.

Non-specificity of problems and similarities with other illnesses associated with ageing

like depression and Alzheimer's dementia highlights the challenge of diagnosing HIV infection in the elderly[32]. Whipple et al[29] reported that physicians viewed cognitive impairment as a normal consequence of ageing calling it "part of getting old". Dementia was the only sign of HIV infection in 25% of her patients. There was a potential for the misdiagnosis of AIDS dementia complex as Alzheimer's type which has also been discussed by Kernutt et al[35]. Ferro et al[50] found HIV encephalopathy to be commoner in patients above 55 years of age as compared to those below 40 years of age. Drobniewski et al[33] found HIV-1 infection in older men with respiratory illnesses who had no previous suspicion for the infection. Blood dyscrasias like pancytopenia[58] and autoimmune thrombocytopenic purpura[51] have been reported in increasing frequency as presentation of HIV infection in elderly people in the absence of other symptomatology.

The above studies indicate that although the clinical manifestations may sometimes be suggestive, the index of suspicion for HIV infection is so low that the diagnosis is often overlooked[28,49,59]. Elderly people do not routinely test for HIV so some are diagnosed at advanced stages when undergoing treatment for other illnesses which initially were not suspected to be HIV related[60]. A study in Texas[59] found that 40% of doctors rarely or never asked patients older than 50 years questions concerning HIV/AIDS risk factors while only 6.8% rarely or never asked patients under 30 years such questions.

Progression and mortality in HIV infected individuals is rapid in the very young

infants as well as in the elderly[61]. In its surveillance report for 1997, The Centre for Disease Control and Prevention reported that the 10-year survival rates after seroconversion ranged from 86% in those below 15 years to just 12% for those older than 55 years[31]. In a study done in AIDS patients in the USA, median life span was 9 months in those above 60 years at diagnosis as compared to 22 months in those aged between 20 and 39 years at diagnosis[32]. Martin et al[62] analysed 846 patients in San Francisco and found no difference in survival with advancing age until approximately 50 years (median survival time of 1,668 days). Thereafter there was a trend towards poorer survival in those aged 50 to 59 years (1,438 days) and stronger evidence for a shorter duration of survival for those aged 69 years and older (1,364 days). In recent years there has been a report of improved survival in HIV infected patients noted since 1991 though older age at diagnosis has persistently been associated with a relatively shorter survival[63].

Various explanations have been put forward for the stark decline in survival observed in the elderly. One theory is that there is delayed diagnosis due to lack of experience with HIV infection in the older adult and thus they invariably have AIDS at presentation with rapid progress to death[48,50,64]. Another theory ascribes this perception to an accumulated burden of chronic debilitating diseases common in the elderly which complicate convalescence from HIV related conditions, and in some instances were the actual causes of the deaths reported. Drugs for HIV treatment may interact with medications the older person may be taking for pre-existing chronic conditions, add on this the difficulty in compliance and delivery of care distinctive to

this age group[39,62,64]. Some have attributed this to the fact that a majority of the elderly got infected through blood transfusion which carries a high mortality rate[50,62].

The most revered reason is that due to senescence, the immune system is unable to oppose both the effects of the virus itself and its attendant opportunistic infections[29,46,51,54,62]. It has been proven that there is decreased vigour of immune response especially with cytotoxic T-lymphocyte activity, and the ability to regenerate CD_4 lymphocytes is reduced[54,65]. A study in Northern Ireland by Rae et al[66] found CD_4 lymphocyte counts of less than 400 cells/mm^3 in 9.1% and less than 300 cells/mm^3 in 4.3% of healthy elderly people living at home. Lower counts were related to a lower body mass index (BMI) and lower albumin levels, which are both recognised nutritional markers. Unfortunately HIV seropositivity was not tested in these old people and was only reported to be "unlikely" in the group. Additionally in Japan[67], 29% of healthy elderly persons above 63 years were found to have CD_4 lymphocyte counts of below 400/mm^3 (mean CD_4 lymphocyte count 299/mm^3). 66.7% were tested for HIV seropositivity and were all found to be negative. The frequency of infectious episodes did not differ between those with and without CD_4 lymphopenia as opposed to a report from France[68] that indicated an increased frequency of infections in elderly people with CD_4 lymphopenia.

Elderly people with HIV infection suffer more because of the emotional isolation, lack of a support network, and family tensions[46]. The stigma associated with the infection is far greater in older people especially when considering the moral climate in which

they were raised which is very different from today whereby the family can discuss issues of sexual orientation and promiscuity[35]. The elderly are relatively poor; and being elderly, poor, and having HIV/AIDS carries a heavy burden of stigmatisation[28].

Nevertheless, the elderly are not targeted in education concerning HIV/AIDS[44]. A survey by the American National Center for Health Statistics conducted in August 1987 discovered that adults over 50 years were less likely to know that HIV can be transmitted by needles or that blood can be tested for HIV antibodies[28]. They were more likely to think that HIV infection could be spread by casual contact, or to say they knew nothing about HIV/AIDS. The above factors increase the likelihood for easy spread of the infection among the elderly population.

The situation in Tanzania

As stated previously, the prevalence of HIV infection in the Muhimbili Medical Centre medical wards was 35% for males and 38% for females in 1992[27]. The prevalence of the infection was reported to be on average about ten times higher in urban areas than in rural settings in the early 1990s and similar situations had been encountered in other African countries[25]. The seroprevalence of HIV infection in the general population is currently 9 - 10%[22]. The total cases reported in Tanzania in 1997 gave a rate of 262.5 persons per 100,000 population. The prevalence for blood donors was 7.6% in males and 11.6% in females[16]. Moreover the prevalence of HIV infection among women attending various antenatal clinics in Tanzania ranged between 7.3 - 44.4% in the

rural areas and 22.0 - 36.0% in urban centres[16] indicating that infective rates were increasing rapidly in rural areas. Nevertheless, a report given last year disclosed an increase in global rural cases from 3.7% in 1994 to 5.6% in 1996, and that 15.6% of all HIV infected cases in Mexico were rural[69].

A substantial proportion of males in the elderly group is polygamous and invariably sexually active. The age span of female spouses is quite variable and it is not uncommon for elderly men to have spouses twenty or more years younger. This is because of a belief that younger women give warmth and vigour to the elderly men and thus revitalise them. However, in many instances these men cannot sexually satisfy their young wives therefore they (wife) seek sexual satisfaction outside marriage[70]. Anecdotal evidence suggest that elderly widowers also have a tendency to remarry[20] and in many instances do so with younger spouses. On the contrary, when a female becomes widowed she normally continues with her advanced age without remarrying. There is a particular tradition found in Northern Uganda and which has trickled to parts of Tanzania whereby a father has sexual intercourse with the daughter in law on the wedding night and whenever her husband has travelled[70]. The above factors expose the elderly male population to acquiring HIV infection from the younger generations.

Our health system is overworked and incapable of taking care of most of the terminally ill AIDS patients. The family thus remains the main caretaker of these patients. Family members accomplishing this task frequently consist of elderly parents

caring for their single or married young adult children. This has given rise to the term "grandmothers' burden" which describes elderly women who after caring for their grown children with HIV/AIDS, later on have to care for their grandchildren who may also be infected[28]. These elders remain destitute as they had disposed of their assets to meet medical bills and purchase food for the sick. They have now lost children; they have lost an economic source, and are poorer and more insecure. They may equally have orphaned grandchildren to care for amidst the poverty. In Northwest Tanzania, 25% of these elders were found to have psychological problems that included crying spells[71].

The care facilities at home lack essential protective gear to prevent transmission via body fluids. Basic knowledge of the carers on routes of HIV transmission may be inadequate. In the rural societies there are notable numbers of traditional birth attendants who conduct their duties in conditions that do not prevent body fluid contact. These additional potential factors may lead to an increased risk of HIV transmission in the community including the elderly population.

Socio-economic factors

In most developed countries the elderly population falls under some social welfare scheme whereby the minimum requirements of health, food, and shelter are provided. This depends on years of taxation and insurance that the person had contributed in his/her younger productive years. Five to six percent of the elderly are

institutionalised in the developed world compared to 0.1% in the developing world because in the developing countries family members have a traditional role in caring for their elders[72].

African health systems are not structured to deal with numerous old persons having chronic ailments and permanent disabilities requiring institutionalisation or long term care[7]. In Tanzania there is an absence of health professionals specialised in geriatrics and there are no units which would specifically cater for their medical needs. A social insurance scheme to deal with their medical and social needs is non-existent, and there are few centres or establishments to attend to their social problems. A simple example is that there is no waiver for bus fares or health services for those in an advanced age as it is in the developed world where the population comprising this age group is significant.

The traditional social fabric in most communities in Tanzania whereby elderly people were taken care of by their offspring has disintegrated. There has been rapid migration of the young and middle aged from rural settings to urban areas leaving the elderly to care for themselves and in isolation[20]. More emphasis has been put on the nuclear family and the extended family no longer provide the support that it did[3,7]. The elderly therefore become geographically separated from their children. Their own parents are either dead or too weak and debilitated to care for them when diseased. Parents and children are the most reliable in providing care as it has been shown that siblings are usually not committed. The elderly are thus isolated from the family support system

vital for their survival since their own parents are incapable or non-existent and their children are in separate areas[28].

It was reported that 79.7% of people above 55 years in rural Tanzania and 63.9% of those in urban centres were economically active in 1990/91[10]. These impressive figures do not however reflect an economically sustainable lifestyle since the benefits obtained are quite low. Anecdotal evidence suggests that Tanzanians have very meagre survival means and retirement benefits from the government sector are minimal and cannot sustain life even for a perfectly healthy retiree. Survival becomes quite difficult for the average elderly person and they invariably depend on their "displaced" offspring.

With the majority of Tanzanians living below poverty line, it is an extra predicament having a dependent elderly relative who then acquires multiple chronic illnesses causing an increase in expenses. Older people need about three times as many prescription drugs as younger individuals because of increased prevalence of chronic medical conditions[73]. It has been reported that due to economic constraints, rural based families in the developing world are sometimes unwilling but more often than not unable to provide medical care to their elders[74]. The death of a spouse is another factor that adversely affects this already disadvantaged group of people. Widowhood affected 50 - 70% of females above 65 years in Western Kenya and most of them were poorly educated, had low incomes, were impoverished, and lived in isolation[6].

In 1987 the World Bank advocated that comprehensive funding of publicly provided health services in developing nations should be abandoned. Some kind of cost sharing was needed in view of escalating health costs and the limited capabilities of the pertinent governments to deliver subsidised health care to all its citizens[75]. In Tanzania this was worsened by poor economic performances; unprecedented population growth rates; rampant mismanagement, corruption, and misappropriation of public finances in government institutions; and the unexpected cost the HIV/AIDS epidemic had been imposing on the health budget. The cost sharing policy was introduced in health services rendered by the government at national, regional, and district levels starting 1993/94. Relief was provided for those citizens aged 5 years and below as a method of averting the large mortality otherwise anticipated. Relief was also put forward for some chronic illnesses example diabetes mellitus, cancer, HIV/AIDS, and heart failure though its implementation has not been clear.

The cost sharing exercise is presumed to have a tremendous impact on the disadvantaged elderly population. As previously explained, the advent of poverty comes hand in hand and is worsened by the advent of multiple diseases and physical disabilities.

International Year of the Older Person

The World Health Organisation (WHO) has realised the significance of "population ageing"[8]. The year 1999 has been designated the "International Year of the Older Person", the main theme being active ageing[9]. As it is inevitable that the population will comprise more elderly people, there should be a global campaign to develop policies and interventions promoting active and healthy ageing.

Rationale and Study Objectives

The elderly population is growing in size in Tanzania[10]. There has not been a recent study looking into the pattern of their diseases and studying changes, if any, caused by strides in economic developments over time. With the upcoming International Year of the Older Person[9] it would be of benefit to have recent data addressing to issues relevant to the elderly population.

The pandemic of HIV infection has affected a significant proportion of the elderly population in some countries world-wide[28-35]. The infection is known to have adversely affected the Tanzanian population[16,22,27,38]. The elderly population in Tanzania is at an increased risk of acquiring this infection as compared to counterparts in the developed world. The prevalence and presentation of the infection in this age group is unknown. Also its effects on other diseases known to be prevalent in the elderly is obscure.

The elderly population in Tanzania is in general one that is not economically able. Most of them are likely to be dependent on their families for survival[5]. There has also been the introduction of cost sharing in obtaining medical services[75]. The impact of the cost sharing policy on the elderly and their families is not well documented.

Broad Objective

To establish the causes of hospitalisation in the elderly population, the extent and presentation of HIV infection in this age group, and socio-economic factors affecting hospitalised elderly patients.

Specific Objectives

1. To establish the proportion of elderly people among patients hospitalised in the medical wards.
2. To establish the causes of hospitalisation among elderly patients.
3. To determine socio-demographic characteristics of the hospitalised elderly patients.
4. To establish the economic status of the elderly patients.
5. To determine the prevalence and clinical presentation of HIV infection among the elderly.
6. To estimate the direct costs incurred by the elderly patients during their hospitalisation.

Patients and Methods

Study subjects were recruited from patients hospitalised in the medical wards of the Muhimbili Medical Centre from February 7th to May 14th 1998. Muhimbili Medical Centre is located in Dar es Salaam, the largest commercial city in Tanzania with a population of about 3 million. The centre is Tanzania's national referral hospital and it incorporates the Muhimbili University College of Health Sciences. Patients attending the centre are referred from various hospitals within the city and from upcountry. The patient referral system in Dar es Salaam is not streamlined and due to various reasons, the medical centre receives a large number of patients who could have been adequately attended at lower levels of care.

All patients with medical conditions aged above 8 years are hospitalised in the internal medicine department. The department has three medical firms each having a male ward and two female wards shared among them. Patients aged 55 years and over hospitalised in these wards during the study period were included in the study. Age was determined by date or year of birth or by any major event remembered to have occurred around the time of birth or during childhood and early adulthood. History from relatives was also considered in trying to establish the age. Patients who died within 24 hours of admission, and those discharged upon arrival at the admitting wards were excluded from the study.

Recruitment was made within 24 hours of hospitalisation after informed consent. A

standard questionnaire [Appendix I] was administered to each patient by the sole investigator (self). In situations where it was not possible to converse with the patient amicably (patient in a state of confusion, coma, or language barrier), a suitable person with a close relationship to the patient was interviewed. Information recorded included socio-demographic data (age, sex, marital status, education status), economic status data (occupation, income level, property ownership, consumption level, financial ability), and a profile of the presenting symptoms. For those patients for whom a reliable or authoritative source of information was unavailable, the above data was not recorded.

The patient was physically examined within the first 24 hours and the findings were recorded. All patients who could attain the standing position unsupported were weighed to the nearest kilogram using a bathroom scale. At the initial encounter the blood pressure was taken and recorded and a sample of venous blood was drawn from each patient. Each sample was encoded and then processed to separate serum which was subsequently frozen at -20°C.

The patients remained under the care of their respective admitting physicians. There was no interference in their management except in situations where further essential information from the patient was obtained. This was communicated to the respective physicians, or the investigator took action in urgent situations. The investigations ordered, those taken, and the fees for performing those investigations were enumerated. The medications prescribed, those obtained free or procured, and costs

involved were also noted. The expenditure incurred by the patient during hospital stay which included the hospital admission fees, consultation fees, fees for all investigations performed, and costs of purchased medication were then calculated.

Each patient was visited daily by the investigator during the entire hospital stay and subsequently classified as follows:

1. Discharge with improvement if the symptoms and/or physical signs on hospitalisation had significantly disappeared on the day of discharge.
2. Discharge with the same condition if the initial symptoms and/or physical signs had more or less remained up to the day of discharge.
3. Discharge with deterioration if the symptoms and/or physical signs had worsened from the day of hospitalisation.
4. Those who died during the hospital stay were classified as thus.
5. Those who were referred to other centres, transferred to other departments, or absconded from the wards were classified accordingly.

The discharge diagnoses documented in the patients' files were recorded. For those who died, the causes of death as indicated in the death registry were recorded.

After the end of the data collection period, the frozen sera samples underwent HIV testing. HIV antibodies were determined by the ELISA test Enzygnost® Anti-HIV 1/2 plus (*Behring*) and those found to be positive were confirmed by Western blot assay (*Diagnostic Bio-Technology immunoblot*). The HIV serostatus was then recorded into the statistical data package for analysis.

Statistical analysis

Data collected was entered into the statistical data package of Epi Info version 6.02. Analysis was done using *Chi square test* for categorical variables, the difference between proportions and means was analysed using the *student's t-test*. Differences were considered significant if the p-value was less than 0.05.

Calculations for one year were based on 365 days. The official conversion rate for the US dollar was TShs 670 at the time of the study.

Results

During the study period, February 7th to May 14th 1998, a total of 1,934 patients were hospitalised in the Muhimbili Medical Centre medical wards. 1,064 (55.0%) were males and 870 (45%) were females.

Patients above 55 years were 276 constituting 14.3% of all those hospitalised. 23/276 (8.3%) patients were excluded from the study because of the following reasons:

- 13 males and 6 females died within 24 hours of hospitalisation.
- 4 patients were discharged upon reaching the wards. They were all males.

253/276 (91.7%) patients met the entry criteria and were thus recruited into the study. These included 151 (59.7%) males and 102 (40.3%) females. These results are shown in Table 1.

Table 1: **Patients hospitalised at the medical wards during the study period.**

	Patients *No (%)*	*Males* *No (%)*	*Females* *No (%)*
All patients	1,934	1,064 (55.0)	870 (45.0)
Patients 55 years and older	276 (14.3)	168 (60.9)	108 (39.1)
Patients included in study	253 (91.7)	151 (59.7)	102 (40.3)
Patients excluded	23 (8.3)	17 (73.9)	6 (26.1)

The ages of the patients recruited into the study ranged from 55 to 96 years.

Table 2: **Distribution of the study patients by age and sex.**

Age (years)	*Males No (%)*	*Females No (%)*	*Total No (%)*
55 to 59	41 (64.1)	23 (35.9)	64 (25.3)
60 to 64	41 (56.2)	32 (43.8)	73 (28.9)
65 to 69	23 (52.3)	21 (47.7)	44 (17.4)
70 to 74	24 (64.9)	13 (35.1)	37 (14.6)
75 to 79	11 (50.0)	11 (50.0)	22 (8.7)
80 and above	11 (84.6)	2 (15.4)	13 (5.1)
Total	151(59.7)	102 (40.3)	253

The mean age (SD) for all patients was 65.0 (7.9) years. The mean age (SD) for males was 65.3 (8.4) years and for females was 64.6 (7.1) years ($p = 0.48$). More than half of the patients were between 55 and 64 years old and the numbers tapered down with increasing age. Males outnumbered females in each age group except the 75 to 79 years group where the numbers were equal. After 80 years of age, most of the patients were male.

On conducting the interview, 200/253 (79.1%) patients were able to converse amicably and thus were able to provide adequate information to complete the study questionnaire. For 28 patients, relatives were able to provide answers to the study questions. Information could not be obtained for 25/253 (9.9%) of the patients since efforts to get a person who was closely related to the patient for interview were unsuccessful. Hence adequate information to complete the study questionnaire was available for 228/253 (90.1%) of the study population.

Referral system

In studying the mode of arrival at the centre considering the fact that Muhimbili Medical Centre is the main referral hospital countrywide, it was found that 96/253 (37.9%) of the patients self reported to the hospital without referral papers. 92 (36.4%) were referred from the three Dar es Salaam government district hospitals, while 35 (13.8%) were referred from various private or government dispensaries. 14 (5.5%) patients were hospitalised via Muhimbili Medical Centre outpatient clinics, 9 (3.5%) via private hospitals and 8 (3.1%) were referred from hospitals outside Dar es Salaam. Hence over a third of the study population used Muhimbili Medical Centre as their primary health care contact.

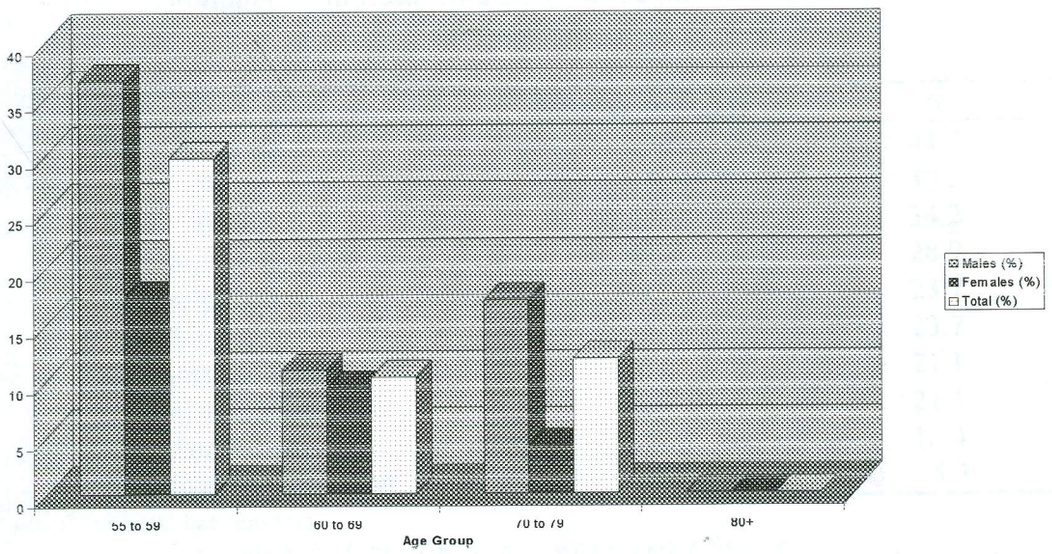
HIV seroprevalence

Antibodies to HIV-1 were detected in blood samples of 38 (15.0%) of the study population. This accounted for 28/151 (18.5%) of the male patients compared to 10/102 (9.8%) of the females ($p = 0.06$). The oldest patient was a 78 year old female.

Half of the HIV-1 seropositive patients were in the age group 55 to 59 years old, and made up almost 30% (19/64) of the population in this age. 12/38 (31.6%) of the patients were between 60 and 69 years old while 7/38 (18.4%) were between 70 and 79 years old. HIV-1 seropositive patients constituted 12/117 (10.3%) of patients aged 60 to 69 years and 7/59 (11.9%) of those aged between 70 and 79.

In each age group the prevalence of HIV-1 seropositivity was greater in males than in females though the differences were not significant. These results are as shown in Figure 1.

Figure 1: **Distribution of HIV-1 seroprevalence in the study patients according to age and sex.**



Age Grp	*55 to 59 No/Total (%)*	*60 to 69 No/Total (%)*	*70 to 79 No/Total (%)*	*80 + No/Total (%)*
Male	15/41 (36.6)	7/64 (10.9)	6/35 (17.1)	0
Fem	4/23 (17.4)	5/53 (9.4)	1/24 (4.2)	0
Total	19/64 (29.7)	12/117 (10.3)	7/59 (11.9)	0

Clinical presentation of HIV-1 seropositive patients

Analysis of the clinical presentation of patients who tested positive for HIV-1 was as shown in Table 3.

Table 3: **Commonest symptoms and signs in the patients who tested HIV-1 seropositive.**

Symptom/Signs	*Number (n = 38)*	*%*
Wasting	17	44.7
Fever	15	39.5
Pallor	13	34.2
Productive cough*	11	28.9
Palpitations	9	23.7
Skin lesions#	9	23.7
Chest tightness	8	21.1
Oral candidiasis	8	21.1
Diarrhoea	7	18.4
Disorientation/Confusion	2	5.3

* One patient had haemoptysis.
# These included 2 patients with Herpes Zoster and 1 with Kaposi's Sarcoma.

Abnormal physical signs were found in almost all systems. The gastrointestinal system was involved in 10/38 (26.3%) patients, the respiratory system in 9 (23.7%) patients, the cardiovascular system in 5 (13.2%) and the nervous system in 4 (10.5%). During hospitalisation 6 patients (15.8%) who presented with severe anaemia (haemoglobin below 5 gm/dL) received blood transfusion.

Upon staging of the patients following the WHO clinical staging system for HIV infection and disease [Appendix II], the following was obtained:

Table 4: **WHO clinical staging for the HIV-1 seropositive patients.**

Clinical stage	*Number (n =38)*	*%*
Clinical stage 1	5	13.2
Clinical stage 2	9	23.7
Clinical stage 3	18	47.4
Clinical stage 4	6	15.8

Possible route of HIV infection

Of the 228 patients who responded to the study questionnaire, 194 tested HIV-1 seronegative and 34 tested HIV-1 seropositive. A positive history of blood transfusion was obtained in 1/34 (2.9%) of the HIV-1 seropositive and 20/194 (10.3%) of the HIV-1 seronegative patients ($p = 0.29$). History of blood transfusion in the HIV-1 seropositive patient was recent and the current hospitalisation was due to anaemia.

Exposure to HIV-1 may occur while providing care to an infected patient. The study patients were thus asked if they had provided terminal care to a patient and whether they knew the disease entailed. 35/228 (15.4%) said they had cared for terminally ill patients. These were 31/194 (16.0%) of those tested HIV-1 seronegative, and 4/34 (11.8%) of the HIV-1 seropositives.

4/35 (11.4%) who had cared for terminal ill patients affirmed that their patients had suffered from AIDS. All the four were female, three of them had cared for their dying adult son or daughter; they were all HIV-1 seronegative. The remaining one had cared for her spouse and she tested HIV-1 seropositive. Three other HIV-1 seropositive patients had cared for their terminally ill spouses. Though they did not know the diseases their spouses had suffered from, they (the spouses) had all died from chronic debilitating diseases that could have been HIV related.

There were two traditional birth attendants (TBAs) who admitted to working in environments where protective gear was scarce. However, both tested HIV-1 seronegative.

Previous chronic illness

Each of the 228 interviewed patients was asked whether s/he had suffered from a chronic illness in the previous one year. A chronic illness was defined to be that lasting for more than six months, was diagnosed at an established health centre, and appropriate management was executed. 124/228 (54.4%) of the patients responded to the affirmative and suffered a total of 167 diseases, making 1.35 diseases per patient. 14/34 (41.2%) of the HIV-1 seropositives and 110/194 (56.7%) of the seronegatives admitted to having had a chronic illness ($p = 0.09$). The commonest ailments were as shown in Table 5.

Table 5: **Distribution of previous chronic illnesses in the study patients according to HIV-1 serostatus.**

Illness	*All n=167 No (%)*	*HIV-1 Seronegative n=152 No (%)*	*HIV-1 Seropositive n=15 No (%)*	*p - value*
Hypertension	63 (37.7)	59 (38.8)	4 (26.7)	0.35
Diabetes Mellitus	26 (15.6)	24 (15.8)	2 (13.3)	0.87
Tuberculosis	20 (11.9)	12 (7.8)	8 (53.3)	< 0.0001
Previous stroke (CVA)	16 (9.6)	16 (10.5)	0	
Heart condition	13 (7.8)	13 (8.6)	0	
Cancer	2 (1.2)	2 (1.3)	0	
AIDS	1 (0:6)	0	1 (6.7)	
Others	26 (15.6)	26 (17.1)	0	

The patients were asked whether they were on regular medication for which 89/228 (39.0%) said they were. These were 89/124 (71.8%) of those with a chronic illness. There was no difference in the intake of medication when regarding HIV-1 serostatus.

Marital status

137/228 (60.1%) of the study population were married whereby 105/134 (78.4%) were males and 32/94 (34.0%) were females ($p < 0.001$). 70/228 (30.7%) were widowed and in this presentation the gender differences were reversed with 51/94 (54.3%) being females while 19/134 (14.2%) were males ($p < 0.003$). One female was single while 20/228 (8.8%) patients had been divorced. The divorcees were composed of 10/134 (7.5%) males and 10/94 (10.6%) females ($p = 0.40$).

16/24 (66.7%) of the HIV-1 seropositive males were married compared to 2/10 (20%) of the HIV-1 seropositive females ($p = 0.04$). On the contrary, 4/24 (16.7%) of the HIV-1 seropositive males compared to 7/10 (70%) of the HIV-1 seropositive females were widowed ($p = 0.009$). However, the one patient who had never married was HIV-1 seropositive.

Of the 105 married males, 87 (82.9%) had a single wife, 11 (10.5%) had two wives, 5 (4.8%) had three wives, one (0.9%) had four wives, and another one (0.9%) had six wives. Of the 16 married males who tested HIV-1 seropositive, 14 (87.5%) had a single wife and 2 (12.5%) had two wives. It should be pointed out here that we are dealing with figures of legally married partners and one does not know the exact number of sexual partners of any of the study patients.

Association between HIV seropositivity and age of spouse

The age of the spouses of the patients was sought to find whether there was an association between HIV seropositivity and age of the spouse. None of the female patients had more than one husband, though three of them (all HIV-1 seronegative) were married to husbands who had much younger second wives. A 64 year old HIV-1 seropositive woman reported to have lost her husband, 5 years earlier, after a long illness. Her marriage involved a co-wife who was 40 years at the time of her hospitalisation.

All the male patients had spouses who were younger than them or were about the same age in contrast to the females whom all had older spouses except for one nurse who was 2 years older than her spouse. The ages of the spouses were between 23 and 79 years. The mean age of the second wives was younger than the mean age of the first ones by about 5.6 years ($p = 0.04$). In general, HIV-1 seropositive patients had wives whose mean age (45.4 years) was significantly younger than that of HIV-1 seronegative patients (53.1 years) with $p = 0.007$.

Education status

The level of education was generally lower among females compared to males. 56/94 (59.6%) females had never received formal education compared to 41/134 (30.6%) males ($p < 0.001$). 22/94 (23.4%) females had received primary school education compared to 53/134 (39.6%) males ($p = 0.01$) while 5/94 (5.3%) females and 21/134 (15.7%) males had secondary school education ($p = 0.02$). Although 14/228 (6.1%) of the patients received education above secondary school level, the four females in this group had ordinary diplomas as their highest accomplishments. There were 5 male university graduates making up 2.2% of the population.

In general, there was no association between level of education and HIV-1 serostatus though there was a tendency of finding the least educated patients testing seronegative. 11/34 (32.4%) of the HIV-1 seropositive patients had received no formal education as compared to 102/194 (52.6%) of those who tested HIV-1

seronegative ($p = 0.03$). Those who had received primary education comprised 15/34 (44.1%) of the HIV-1 seropositive and 60/194 (30.9%) of the HIV-1 seronegative ($p = 0.13$). Secondary education had been attained by 6/34 (17.6%) of the HIV-1 seropositive as compared to 20/194 (10.3%) of the HIV-1 seronegative patients ($p = 0.30$) while those who had education higher than secondary level included 2/34 (5.9%) of the HIV-1 seropositive and 12/194 (6.2%) of the HIV-1 seronegative patients ($p = 0.77$).

Occupation

Overall 46.5% (106/228) of the male and female respondents depended on small scale farming as their main source of income at the time of hospitalisation. 17.9% (24/134) and 12.8% (12/94) of males and females respectively were running businesses. 33/94 (35.1%) women were homemakers. 69/228 (30.3%) had retired from different positions in the government and private sector, the majority (89.9%) being male.

These retired persons received trivial amounts of finance as their retirement benefits. Only two retirees, a police officer who got a lump sum of TShs 1.8 million (US$ 2,686.60) upon retirement in 1994 and a retired carpenter from the national commercial bank receiving TShs 20,000 (US$ 29.85) monthly, thought their benefits were worth a mention. 68.1% (47/69) of these retirees had various vocations to enable them earn a living. 34.8% (24/69) were farming, 27.5% (19/69) had business concerns, while 4.3% were re-employed as night security guards. These added

ventures earned them from TShs 180,000 (US$ 268.65) to TShs 9.0 million (US$ 13,432.85) annually, with an average of TShs 1,971,000 (US$ 2,941.80).

Household status

Among the 228 patients for whom the study questionnaire was completed, 159 (69.7%) were heads of their respective households. This comprised 126/134 (94.0%) of the male respondents and 33/94 (35.1%) of the females ($p < 0.0001$). 29/34 (85.3%) of those who were HIV-1 seropositive were heading their households as compared to 130/194 (67.0%) of the HIV-1 seronegatives ($p = 0.03$). For the 69 patients not heading their households, 31 (44.9%) were living in homes where their husbands were the head, 22 (31.9%) sons, and 9 (13.0%) daughters. Four (5.8%) of the patients had a sibling heading their households, one (1.4%) was headed by his father, one (1.4%) by a nephew, and one (1.4%) by a son in law.

The number of other people in the household ranged from none (15 respondents were living alone) to 15. The average was 4.6 persons per household and the median was 4. The 15 patients living alone ranged from 55 years of age to 74 years with a mean age (SD) of 63.9 (5.8) years. 5 were females and 10 were males. All the five females were rural dwellers while 9/10 (90%) of the males lived in urban centres. 119/228 (52.2%) of the respondents had no dependants. The rest had up to 14 dependants, the average being 3.6.

Social habits

120/228 (52.6%) of the patients had never drank alcohol while 68 (29.8%) had been alcohol users sometime in their past. 40 (17.5%) were still alcohol drinkers and spent on average TShs. 41,660.00 (US$ 62.18) per month on the habit. There was no significant association between this habit and HIV-1 serostatus. However 107/194 (55.2%) of the HIV-1 seronegatives had never taken alcohol as compared to 13/34 (38.2%) of the HIV-1 seropositives ($p = 0.07$). 21/228 (9.2%) of the study population were active smokers spending on average TShs 6,432.90 (US$ 9.60) per month.

Economic status

Patients were asked whether they were financially independent, partially dependent, or fully dependent on others for their ordinary requirements when in good health and conducting their normal lives. 80/228 (35.1%) affirmed to have been financially independent, 103/228 (45.2%) had partial independence, and 45/228 (19.7%) were fully dependent on others. 134/148 (90.5%) of the respondents who were dependants admitted depending on their children, 12 (8.1%) on their siblings, and the rest on friends and neighbours. Gender made a marked distinction on the financial ability of the respondents. Over 47% (64/134) of the male patients were financially independent compared to 17% (16/94) of females ($p < 0.0001$). On the other hand, 32/94 (33.7%) females compared to 13/134 (9.7%) males were completely dependent on others

financially ($p < 0.0001$).

Only 9.2% (21/228) of the patients owned vehicles while 19.3% (44/228) had a bicycle as their valued possession. 81.6% (186/228) of them owned houses, though mainly of very low quality situated in rural areas. Only 43.0% (98/228) had electricity in the households they resided.

11/228 (4.8%) patients had to sell assets or borrow money to pay for their medical bills. 5/228 (2.2%) respondents sold various assets including bicycles and furniture, while 6/228 (2.6%) borrowed money ranging from TShs 5,000 (US $ 7.46) to TShs 20,000 (US$ 29.85).

A series of queries were asked which included estimated monthly income; household spending on ordinary consumable goods (consumption index) like daily spending on transportation, weekly food expenditures, monthly spending on utilities, and annual spending on tuition and other fees. 123/134 (91.8%) males and 84/94 (89.4%) females were able to provide complete answers to these sets of questions and formed the basis of subsequent economic evaluations. After scrutiny of the responses to the above, the most likely index that had the expected distribution curve and seemed to correlate to the patient's economic status (that is, it related to income, occupation, and property ownership) was the consumption index. [This was the consumption index for the household of the patient and not the individual. Therefore the economic status was of the household the elder inhabited, whether he/she was the head of the

household or not.]

The household economic status was thus presented as the consumption index [per annum] and ranged from TShs 24,000 (US$ 35.82) to TShs 3,720,000 (US$ 5,552.24) with a median of TShs 724,000 (US$ 1,080.60). There was no association between age, sex or HIV-1 serostatus with the household economic status.

76/253 (30.0%) patients came from rural areas while the rest were urbanites. 13 (5.1%) came from urban centres outside of Dar es Salaam and 164 (64.8%) were residents of Dar es Salaam. There was no association between HIV-1 serostatus and place of residence (urban/rural) ($p = 0.35$). Patients from rural settings tended to have lower household economic status compared to urbanites (p *for trend* < 0.0001).

Diagnosis

The final diagnoses and causes of death of the patients varied, with three of the 253 patients (1.2%) having undetermined diagnoses at the end of the study period. Of the 157 patients with referral letters, the suspected diagnoses were as shown in Table 6.

Table 6: **Suspected diagnosis in the study patients who were referred to Muhimbili Medical Centre.**

Diagnosis	*Number (n=163[!])*	*%*
Cardiovascular disorders *	44	27.0
Anaemia	21	12.9
Cerebrovascular accident	20	12.3
Pulmonary tuberculosis	15	9.2
Gastrointestinal disorders	15	9.2
Malaria and other infections	15	9.2
Diabetes Mellitus and its complications	13	8.0
Surgical diagnoses	9	5.5
Others	11	6.7

* Hypertension accounted for half of these.
[!] Some patients had more than one referral diagnosis.

There was agreement between referral diagnosis and hospital discharge diagnosis/cause of death in 117/157 (74.5%) patients. A further diagnosis was obtained in 32/117 (27.4%) of these patients. Hospital discharge diagnosis was totally different from referral diagnosis in 40/157 (25.5%) patients.

There was more than one final diagnosis/cause of death in 59.2% (148/250) patients and there was on average 1.75 diagnoses/causes of death per patient. There was no relationship between the number of diagnoses/causes of death and advancing age (p =

0.40). The most single system involved was the cardiovascular system accounting for 127/438 (29.0%) of the diseases in this age. Of the patients with afflictions in this system, 52/250 (20.8%) were hypertensive. Infections accounted for 97/438 (22.1%) diagnoses, and cerebrovascular accidents followed involving 39 (8.9%) of the diagnoses. Pulmonary tuberculosis itself was diagnosed in 35/250 (14.0%) patients while 8/250 (3.2%) patients had a diagnosis/cause of death indicating possible infection with the human immunodeficiency virus. The cardiovascular system, cerebrovascular accidents, and infections including malaria made up 51.8% of all the disorders detected.

The diagnoses written in the referral letters of 29 patients found to be HIV-1 seropositive were as shown in Table 7. Pulmonary tuberculosis accounted for a quarter of them. However, none of the referral letters indicated any suspicion of underlying HIV infection and/or immunodeficiency.

Table 7: **Suspected diagnosis in the study patients referred to Muhimbili Medical Centre and found to be HIV-1 seropositive.**

Referral diagnosis	*Number (n=35*)*	*%*
Pulmonary tuberculosis	9	25.7
Anaemia	6	17.1
Hypertension	4	11.4
Malaria	4	11.4
Surgical diagnoses	4	11.4
Gastrointestinal disorders	3	8.6
Renal disease	2	5.7
Diabetes Mellitus and its complications	2	5.7
Cerebrovascular accident	1	2.9

* Some patients had more than one referral diagnosis.

On considering the final diagnoses for these patients, 22/38 (57.9%) had more than one diagnosis/cause of death; 16 (42.1%) had two while 6 (15.8%) had three. There was on average 1.74 diagnoses/causes of death per patient. The commonest diseases were infections [29/66 (43.9%)] followed by anaemia [9/66 (13.6%)]. Pulmonary tuberculosis was the diagnosis in 13/38 (34.2%) of the patients. HIV infection was correctly suspected in only 6/38 (15.8%) of these patients meaning that more than 80% of HIV-1 seropositive patients left hospital without their HIV-1 seropositivity being suspected. HIV infection was correctly reported as the secondary cause of death in 3/7 (42.9%) of the HIV-1 seropositive patients, the primary diagnoses being pulmonary tuberculosis in two patients and gastro-enteritis in one.

Two of the patients reported to have HIV infection actually tested HIV-1 seronegative. These were a 72 year old widowed female who presented with fevers, disorientation, and had oral candidiasis. She improved after treatment for malaria, but her discharge diagnosis was HIV encephalopathy and malaria. The other one was a 70 year old married male peasant who was referred to Muhimbili Medical Centre because of urine retention. He was febrile, extremely wasted and disoriented. He died four days after hospitalisation and the cause of death was reported as pulmonary tuberculosis and HIV infection.

The hospital stay

The patients were hospitalised for an average of 7.4 days, ranging from 1 day in 13/253 (5.1%) patients to more than 51 days. While the median stay was 5 days, 164 (64.8%) patients spent only one week in hospital and 240 (94.9%) patients had been released by the end of one month. There was no association between the mean number of days spent in hospital with sex or HIV-1 serostatus. There was also no difference on the mean number of days spent in hospital for those who died and those who left the hospital in better conditions ($p > 0.91$).

Four (1.6%) of the 253 patients were still hospitalised at the end of the study period, and were thus excluded from the following analysis. A total of 1,144 investigations were ordered for the 249 patients with an average of 4.6 investigations per patient. None was ordered for 18/249 (7.2%) patients while 2 (0.8%) patients needed 16 investigations each. However, only 898/1,144 (78.5%) of the investigations were actually done averaging 3.6 per patient. 71/898 (7.9%) investigations were done free to 24 patients. 16/24 (66.7%) had diabetes mellitus, 3/24 (12.5%) had malignant conditions, and the remaining 5 patients had other diagnoses. There was no significant difference in the investigations done between males and females ($p = 0.68$). HIV-1 seronegatives were more likely to have paid for their investigations than HIV-1 seropositives ($p = 0.02$).

866 drugs were prescribed to the patients ranging from none in 7/249 (2.8%) patients

to 11 in 2 patients, with an average of 3.5 drugs per patient. The patients consumed 831 (96.0%) of the 866 prescribed drugs, an average of 3.3 drugs per patient, with 254/866 (29.3%) being obtained free of charge from the hospital. 148/249 (59.4%) patients enjoyed this free facility with only 15/148 (10.1%) securing all their prescribed drugs free of charge. The patients who received all their drugs free had pulmonary tuberculosis in 7/15 (46.7%), cardiovascular disorders in 6 (40.0%), and 2 (13.3%) had diabetes mellitus. One patient (0.4%) left the hospital without purchasing the drugs which were prescribed for him. Males were allotted on average 3.4 drugs per patient, not different from females with 3.6 drugs per patient ($p = 0.61$). Nevertheless, whereas the male patients were able to acquire 500/514 (97.3%) of drugs prescribed, females acquired 331/352 (94.0%) .[$p = 0.02$]. There was no difference in drug acquisition when HIV-1 serostatus was considered ($p = 0.69$).

Hospital costs

Patients incurred various costs while confined to hospital. For purposes of this study only costs for accommodation, medication, and investigations were analysed. Since grade one facilities were optional and hence do not portray the minimum costs that any hospitalised patient will require, analysis was done disregarding costs incurred by the 17 patients who opted to be admitted into grade one facilities.

All patients paid a flat rate of TShs 300 (US$ 0.45) for consultation and TShs 2,000 (US$ 2.98) for accommodation upon hospitalisation. Costs for medication ranged

from none in 23/232 (9.9%) patients to TShs 19,400 (US$ 28.96) with a median of TShs 1,235 (US$ 1.84). The amount of money paid for investigations ranged from none in 30/232 (12.9%) patients to TShs 81,400 (US$ 121.49) with a median of TShs 1,700 (US$ 2.54). The total costs therefore ranged from TShs 2,300 (US$ 3.43) to TShs 92,260 (US$ 137.70) with a median of TShs 5,790 (US$ 8.64).

It was thus determined that on average an elderly patient is expected to pay about TShs 5,800 (US$ 8.65) for hospitalisation at the centre. There were no significant differences in costs incurred by the HIV-1 seropositive compared to the HIV-1 seronegative patients ($p = 0.14$).

Outcome of hospitalisation

41/249 (16.5%) patients died during hospitalisation. 203/249 (81.5%) were discharged from hospital, and 5/249 (2.0%) were transferred or referred to other departments. Improvement at discharge was recorded in 75/150 (50.0%) males compared to 67/99 (67.7%) females ($p = 0.006$). On the other hand, 44/150 (29.3%) compared to 17/99 (17.2%) male and female patients respectively were discharged with no improvement ($p = 0.03$). The outcome of the hospital stay was found to have no relationship with advancing age. There were also no significant differences in the outcome of hospitalisation between HIV-1 seropositive and HIV-1 seronegative patients.

Discussion

Socio-demographic characteristics of the study population

The elderly aged 55 years and above constituted 14.3% of all patients hospitalised in the medical wards of Muhimbili Medical Centre during the study period. This group is estimated to contain 12.1% of the current relevant population[16] and is well reflected in the hospitalised patients. This is much lower than the 20.1% figure obtained by Kitange[18] in a similar study conducted in 1983 and might be as a result of the extensive proportions of young adults being hospitalised presently because of the high prevalence of HIV-1 infection in Tanzania[16,22]. Annual cross-sectional data on patients above 15 years hospitalised in the Muhimbili Medical Centre wards have shown stepwise growth of HIV-1 prevalence from 21% in males and 27% in females in 1989 to 48% in both sexes in 1995[76]. A recent study found that 54.5% of all patients 15 years and above hospitalised with fever were HIV-1 seropositive[77]. Since most of the patients in these studies were invariably young adults, their figures are substantial enough to cause a consequential reduction in the proportion of hospitalised elderly patients.

Over a third of the study population used the Muhimbili Medical Centre as their primary health contact. Similar figures are expected of the younger age groups and this signifies the fact that the referral centre receives more than its intended share of patients. This could be explained by the deterioration of health providing services at

lower levels of care.

Patients aged between 55 and 64 years comprised 54.2% of the study population, those 65 to 74 years were 32.0%, and those 75 years and above were 13.8%. This is an older age structure as compared to that found by Kitange[18] whereby 72.9% were aged between 55 and 64 years, 20.8% between 65 and 74 years, and only 6.3% aged 75 years and older. This finding is in agreement with Tanzanian and global population data[8,10,11,13,14,16] that have registered ageing of the population.

60.9% of the hospitalised patients 55 years and above were males as compared to females who made up 39.1% of the patients. Similar situations were encountered by both Kitange[18] (60.4% versus 39.6%), and Matuja et al[20] (70% versus 30%). This gender difference might be the outcome of anecdotal evidence inferring that females are generally more compliant with treatment for chronic illnesses. On the other hand, this could be a consequence of the observation in this study that females were generally more dependent on others financially hence it became difficult for them to attend hospital in the event of an illness.

The marital status of this group had a gender variation whereby the majority of males were married while that of females was widowed. When compared to findings by Kitange[18], there are no differences in the proportion of married couples (60.1% versus 52.1%) and those widowed (30.7% compared to the previous 37.5%). Even the divorcees' figures remain stable reflecting no change in the cultural framework of the

institution of marriage. This is further proven by community data which indicated that 79.1% of males above 55 years in selected areas of Tanzania were married compared to 43.1% of females[38]. On the contrary, 8.2% of the male population were widowers while 39.0% of females were widows. These findings are consistent with the supposition that males have a tendency of being polygamous and of remarrying after their spouse's deaths[20,70]. The observed large number of widows might reflect the survival advantage of women or the fact that once widowed, they were less likely to remarry[38].

There was a definite improvement in the education status of the patients in this age group compared to results from another study done 15 years ago[18]. At that time 59.4% had no formal education, 26.0% had primary education, only 2.1% had secondary education, and there were no university graduates. In 1988/89, Matuja et al[20] found that many of the elderly females had less than four years of formal education and were mainly involved in manual agricultural work. The observed change may be due to the fact that as time goes by a greater proportion of the population gets formal education because it is extensively available and the society realises its importance.

Though there were big advancements in the level of education, it was slower in females maybe because there had seemed no need to educate women in that generation as they tended to remain homemakers. This is exemplified by the fact that 59.6% of females in this study had not received formal education as compared to

30.6% of males. There were also no female university graduates in contrast to the 5 male graduates.

HIV seroprevalence

The prevalence of HIV-1 seropositivity in this population of hospitalised medical patients above 55 years was 15%. The prevalence of 29.7% in the age group 55 to 59 years was astoundingly high reflecting a high infection rate in the society. Relatively lower incidences of HIV infection in elderly populations in Eastern Africa and other parts of the world had previously been quoted. However, since this is data from hospitalised patients, the prevalence is expected to be higher than in the healthy society as this report is from indisposed people.

In the USA the number of HIV infected patients above 50 years is greater than that of the paediatric population[78] and in Tanzania the age specific rate in ages 55-64 is much higher than in the 0-4 age group[16]. The elderly group has surpassed paediatric cases (which acquire infection perinatally) therefore this is an issue that needs to be confronted.

The oldest patient in this study was a 78 year old woman presenting with chronic diarrhoea while the oldest reported patient so far has been a 90 year old man who presented with easy bruisability and was initially thought to have autoimmune thrombocytopenic purpura[21].

18.5% of the male patients and 9.8% of the female patients tested HIV-1 seropositive. This is quite a major difference from the gender proportions observed in the younger population whereby 48% of both female and male patients hospitalised at the same centre in 1995 were HIV-1 seropositive[76]. Indeed, the national figures for blood donors indicated that 11.6% of females and 7.6% of males were HIV seropositive in 1997[16].

Males constituted 73.7% of HIV-1 seropositive elderly patients and this elevated figure compares to previous studies that have all shown a greater proportion of males ranging from 79%[32] to 91%[49]. Whereas homosexuality explained such findings in the developed world[28,29,31,32,35,49], it is not the case here as homosexuality is reported to have an insignificant role in HIV transmission in Tanzania[25]. On the contrary, heterosexual transmission is an important route demonstrating similar proportions of infections in both genders[27,76]. One can assume that the observed infection in this elderly population might have been acquired several years earlier, but a gender difference is observed in this population. A plausible explanation could be that as they both age, males have greater chances of getting infected as compared to females since elderly men remarry upon widowhood and tend to do so with younger women[20,70]. These youthful wives do not obtain sexual gratification from their older spouses and hence become promiscuous[70]. Also older males have fewer sexual opportunities compared to youngsters and are more likely to purchase services of commercial sex workers exposing themselves to the risk of HIV infection[79].

There was a decline in the prevalence of HIV-1 seropositivity with increasing age as has been found in other studies[31,49]. However, though Ship et al[49] found an increase in the prevalence of infected women with increasing age, it was not so in this setting. The explanation he had put forward that transmission via blood transfusion becomes important with increasing age may be appropriate since blood transfusion was not found to be an important factor in this study. Another justification for his observation could be the fact that there are greater numbers of females in advanced age groups as demonstrated in general trends in population in the developed world.

Clinical presentation of HIV seropositive patients

The clinical presentation of HIV infection in the elderly patients in this study was similar to that encountered in patients in younger age groups[27]. Likewise, Chen et al[31] found that 83.9% of her elderly patients had at least one indicator disease while 16.2% were diagnosed by CD_4 counts alone. The only difference with a younger aged group was the increased incidence of dementia with distinct similarities to ageing associated illnesses like Alzheimer's dementia and depression. Whipple et al[29] reported finding opportunistic infections in elderly patients, though she highlights the significance of AIDS dementia as the "great imitator" of Alzheimer's dementia. Elderly Sub Saharan Africans are known to retain confidence in traditional healers[7] and hence the diseases brought to hospital are quite selective with relatively few cases of dementia/depression as compared to the developed world. Demented elderly patients are more likely confined at home and at most will undergo treatment with

traditional medication. Therefore age related depression and dementia (Alzheimer's) which usually present a challenge in diagnosing AIDS dementia in this age group[32,46] was not observed in this study.

It was intriguing to note that upon staging these patients as regards to the WHO clinical staging for HIV infection and disease, only 13.2% fell in clinical stage 1 (asymptomatic). The rest (86.8%) were in advanced clinical stages and in fact 15.8% were in clinical stage 4, meaning that if one had been observant enough, additional patients would have been diagnosed as HIV-1 seropositive.

Gilks et al[80] reported from Kenya that in contrast to findings in Europe and the USA, considerable morbidity and mortality occurred in African HIV-1 infected adults who presented with typical recognised diseases and with relatively few indicators of immunodeficiency. This meant that many adults were diagnosed when they had few indicators of immunodeficiency. However, it seems that HIV-1 infection as a diagnosis was not in the minds of the physicians in this study since the patients had plenty of pointers towards immunodeficiency. One wonders whether there was no impression of HIV-1 infection in the clinicians' minds at all, or they had thought of it but did not reveal their suspicions in order to avoid confronting the patients or relatives with this stigmatised diagnosis.

Possible source of HIV infection

Blood transfusion was not found to be a significant route of HIV infection, quite contrary to its role as a transmission agent in the developed world[49,50,51]. This was mainly due to the small numbers of patients who had received blood transfusion, explained by the fact that this is a rare occurrence in Tanzania[25].

Of the interviewed patients, four (1.8%) acknowledged providing care to HIV infected terminal patients. One of these four was HIV-1 seropositive but had cared for her spouse. The three HIV-1 seronegative patients had cared for their adult children. All lacked proper protective gear and had minimal knowledge on possible methods of contamination. Two patients who were traditional birth attendants (TBAs) recounted performing their duties in poor sanitary conditions and both were HIV-1 seronegative. On the other hand, the three HIV-1 seropositive widow/ers who had cared for a terminally ill spouse described debilitating illnesses that had afflicted the deceased. Though the numbers involved here were quite low, there was ground to presume that infection through viral contamination while providing care to a patient is remote. The little evidence gained here denoted heterosexual transmission as the major route of infection, even in the elderly, in Tanzania.

The mean age of the wives of the HIV-1 seropositive males was younger than that of HIV-1 seronegative males giving weight to the supposition that young wives may not achieve sexual satisfaction with their older spouses and hence are at increased risk of

practising extramarital sex[70]. Such practice is known to increase risk of HIV infection.

The proportion of widowed females rose from 54.3% in all female patients to 70.0% in those found to be HIV-1 seropositive ($p = 0.42$). Though the numbers involved are small, an interpretation could be that their spouses had been HIV infected and these women were infected before widowhood. Another argument is that upon menopause women tend to enjoy sexual intercourse[47] and see no need to use condoms[29,46,79]. This sexual freedom is exaggerated by widowhood. Whichever scenario is regarded, both emphasise the importance of heterosexual transmission as the most likely route of infection. Furthermore, biological changes in post menopausal women cause easy disruption during intercourse with greater chances of acquiring infection [28,29,38,79].

It should also be observed that whereupon elderly women in the developed world might ignore using condoms, its overall use in East African societies is quite low. Studies done between 1993 and 1996 in females aged 15 to 49 years showed that the percentage of condom use varied from 5.5% in Uganda[37], 6.8% in Kenya[36], and 7% in Tanzania[81]. Therefore the use of condoms in the elderly female will definitely be much lower, if at all existent.

Heterosexual transmission has been found to have quite a notable role in Tanzania accounting for almost 80% of infections[25]. It was said to be the leading cause of transmission in elderly patients in Maryland, USA[32]. Research on sexual habits in the elderly population are limited with results available from a few studies mainly

conducted in the USA[29,45,46]. A Kenyan investigation highlighted the plight of post menopausal women who were discovered to be sexually promiscuous as the fear of getting pregnant had now abated[47]. This and other social activities may play an important role in the spread of HIV-1 infection in Tanzania and are issues that have not been addressed to the elderly population yet.

Clinicians and health providers lack data on the risk behaviours and presentation of HIV infection in the elderly, and so do not conduct thorough sexual assessment on the assumption that older people do not engage in such activities[44,78]. Elderly patients will most likely resist disclosing intimate details of their sexual lives to people, including doctors, who may be half their age[79]. An elderly person who knows or suspects to be HIV infected is more likely to conceal it because he has fewer surviving friends and a smaller social network to provide emotional support and care[29,78].

The elderly per se, have not been a target of education concerning HIV/AIDS in Tanzania. Indeed pooled Demographic and Health Survey data from seven Sub Saharan countries showed that those with the lowest knowledge of the protective effects of condoms in HIV infection were rural people above 40 years[23]. A further contributing factor to lack of awareness of these campaigns may be illiteracy, usage of a different vernacular, and lack of access to mass media tools like newspapers, radio, and television. Therefore, in contrast to youngsters, older people have not adopted prevention strategies as they do not believe that the infection affects them[60,79]. Actually, even in countries with resources like the USA, HIV education has not been

geared towards the elderly population since educational advertisements never show images or issues related to older people[44,60].

The introduction of anti-retroviral drugs in the treatment of HIV/AIDS prolongs survival among patients and will invariably result in the epidemic involving more elderly people. Furthermore, it has recently been reported that HIV infected persons above 50 years responded well to anti-retroviral therapy and clinical results may be similar to younger patients[65].

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Diagnosis

The patients were found to have an average of 1.75 diagnoses per patient. The number of diagnoses per patient was independent of age and verifies the theory that the physiological process of ageing has distinct person to person variation[1].

The cardiovascular system was the most affected system in this study succeeded by infectious diseases which were quite prevalent in this environment. Within the infectious diseases, tuberculosis was implicated as a diagnosis in 14.0% of the study patients. These results compare with studies in similar settings that reported the cardiovascular system as a cause of pathology in 15.8%[20] to 39.5%[82] of the elderly population (congestive cardiac failure alone accounting for 37.5% of the observed mortality[17]). Infections involved 12.0%[17] to 23.0%[21], with tuberculosis accounting for 6.0% of all the diagnoses of the Muhimbili Medical Centre's elderly patients in

1996[21]. This ascertains tuberculosis as a disease of importance in the elderly population[19,38,39].

HIV-1 seropositive patients had 1.74 diagnoses per patient with 43.9% of the diagnoses being infectious in nature. This situation deviated from the expected preponderance of diseases involving the cardiovascular system[1,2,17-21,82]. The index of suspicion for HIV infection by the health personnel was low with only 15.8% of the HIV-1 seropositive patients being accorded this diagnosis. This was exemplified by the fact that none of their referral letters had mentioned any deficiency in their immune status. HIV-1 infection was correctly implicated in 42.9% of the patients who died meaning that the diagnosis was entertained more once a patient had expired.

Five of the 8 patients found to have oral candidiasis were correctly diagnosed as harbouring HIV-1 infection. Previously, mucosal candidiasis had been reported as the most frequent opportunistic infection in HIV-1 infected persons in Tanzania[83]. This report had sensitised clinicians to view oral candidiasis as diagnostic for HIV-1 infection. The single patient with Kaposi's Sarcoma was correctly diagnosed as having HIV-1 infection, as was one of those who had Herpes Zoster. Ironically, the three patients with Kaposi's Sarcoma and Herpes Zoster were the only ones with such conditions and compares favourably to a study in the same setting where all patients found with similar dermatological conditions were HIV-1 seropositive[27].

The "double burden of disease" has achieved a global scale with both chronic non-

communicable diseases and infectious diseases assuming importance[84]. Unhealthy lifestyles that incorporate sedentary occupations, unsatisfactory diets, and excessive tobacco and alcohol use; have made non-communicable diseases prevalent in the developing world. On the other hand, the intercontinental spread of HIV/AIDS, tuberculosis, and other infections has popularised infections in the developed world.

16.5% of the study patients died while in hospital. In 1996 mortality was 13.1%[21] while in 1974 the mortality was 7.1%[17]. These findings suggest an increase in the hospital elderly mortality rate with time and might be caused by the change in health care delivery whereby there is less funding by the government. The patient currently shares the costs of health services hence lack of sufficient finances by the patient may lead to delays and inability to attain appropriate medical care and hasten the fatal outcome. Moreover, the high prevalence of HIV infection[27,38,76,77] might be a contributing factor to the increase in mortality since the infection has not spared the elderly population as demonstrated in this study. On the whole, the Tanzanian adult mortality rate is reported to have risen in recent years[25].

One should realise that hospital diagnoses usually do not reflect the disease pattern in the community as the very ill and moribund do not come to hospital[20]. Added to the fact that traditional healers still play an important role in this society[7], the pattern of diseases stated here reflects the circumstances in hospitals and not in the community. A community based study in selected areas of Tanzania[38] found that 29.2% of male and 23.6% of female adults perceived themselves as harbouring an illness in the

antecedent two weeks. Almost 30% were illnesses with fever, 10% were abdominal pains, and hypertension in 3.4%. Of interest is that 56.4% of those who perceived themselves as being hypertensive were confirmed to have the affliction.

As indicated in this study, chronic non-communicable diseases are quite prevalent in our society[17-21,38,82,84]. It has been said that if one reaches old age in good health, one will remain so until shortly before death[5]. The economically able group should be protected from ill health so as to increase their productivity in order to promote economic development and support for dependants[84]. Since the proportion of the elderly population is on the rise, it is imperative that one reaches that age in excellent health, considering the added burden of infections in this environment. The young should be educated on adapting healthier lifestyles and preserving their health to prevent premature death and disability[9].

The prevention of chronic diseases goes hand in hand with the prevention of infections, especially the enigma of HIV infection. Concurrently with ongoing campaigns on prevention methods, some cultural norms need change. The practice of levitate marriages (marrying the widow of a brother) known to exist in some cultures[23,70] should be discouraged. Advocating condom use among married couples would invariably halt the indiscriminate spread of this infection[23]. To quote a former WHO Director, "healthy expectancy is more important than life expectancy"[84].

Economic status

In general, the study patients were of a low economic status signified by the fact that 46.5% were small scale farmers. The median annual household expenditure was TShs 724,000 (US$ 1,080) and 57.0% had no electricity in the households they resided.

30.3% of the study patients had retired from different occupations and 68.1% of these retirees had various vocations to help them earn a living. These jobs were necessary since the retirement benefits they had received were minimal. Most patients, who included among others, a diplomat, a politician, and several civil servants, were ashamed to reveal their monthly retirement benefit as it was too trivial to consider. Delays in getting benefits were rampant and several patients had given up in their pursuit as they had wasted valuable time and money. Only 42.0% of the retirees were financially independent while 11.6% were fully dependent on others for their finances.

69.7% of the respondents were heading their households, though only 50.3% of them were independent financially. 6.6% of these patients were living alone. This is contrary to the 1983 findings by Kitange[18] whereby 25% of his patients were heading their household and only 1.0% were living alone. Matuja et al[20] found that 8.0% lived alone in the late 1980s. These differences might be due to changes in the social and economic structure of the society whereby adult children are neither socially nor economically willing to care for their parents in their households[4,7,74]. If they happen to do so, it brings a "double burden" to the economically able who are obliged to

provide for two sets of dependants - their children and the elderly[84].

64.9% of the patients were dependent on others financially with 90.5% of the dependent patients relying on their children. Kitange[18] found an almost similar situation whereby 75.0% of his patients were financially dependent, mainly on their children. This supports the report that elderly people tend to depend entirely on their offspring[28]. This dependence could be emotionally distressing to the elderly person, as they feel useless and a burden to others. There are instances whereby elders are intentionally deprived of care as a threat for them to change their wills, to sell or transfer property ownership, or to release hefty pension cheques to their children[85]. Some adult children provide care to their parents as blackmail so as to get land or other property upon demise of that parent.

Only 17.0% of the female patients were independent financially, while 33.7% were totally dependent on others. This finding, together with the fact that 54.3% of the females were widowed and 59.6% had no formal education, corroborates the literature from neighbouring Kenya that elderly women tend to be impoverished, uneducated widows[6].

The annual household expenditure ranged from TShs 24,000 (US$ 36) to TShs 3,720,000 (US$ 5,552) with a median of TShs 724,000 (US$ 1,080). 75.5% of it was spent on food alone, 13.9% on transportation, 7.6% for payment of utilities, and 3.0% for school fees. This corresponds with data obtained from mainland Tanzania in

1991/92[10] where it was found that food consumed 76.4% of the household expenditure. The previous data revealed that Tanzanians spent 1.9% of their expenditure on alcohol and tobacco, 0.4% on medical care, and 0.2% on education. With the onset of the HIV/AIDS pandemic, recent data has revealed that households in Kagera region spent 8.2% of their household expenditure on medical expenses for adults[23].

The above figures denote that one rural peasant family spent TShs 2,000 (US$ 3) per month in the purchase of food. They produced most of the food they consumed, they had no utilities to pay for, no daily transport costs, and no school fees. Whatever clarification given cannot dispute the reality that these are conditions of absolute poverty. A median patient spent TShs 60,000 (US$ 90) monthly indicating a tight budget for the family, which averaged 4.6 persons. These data reflect the extent of poverty in Tanzania where 36% of the population lives in absolute poverty[86]. 11 million Tanzanians are believed to go without a meal each day, which gives credence to the above statistics.

Medical costs

39.0% of the study patients were on regular medication for various disease conditions. This was lower than findings by Kitange[18] that 55.2% of his patients were on regular medication. One can theorise that had all patients requiring medication in the present study been compliant, this difference could not have existed. An argument

is that currently it is difficult to purchase drugs in the cost sharing exercise. Conversations with the non-compliant patients verified that it has increasingly become impossible to purchase medication and remain with finances for other necessities. One patient even argued that he would rather die from an illness in hospital than die of starvation at home.

64.8% of the study patients had been discharged from hospital by the end of the first week, and 94.9% a month later. Kitange[18] found that 33.3% were discharged within the first week, and 90.6% by one month. The difference noted where most patients are currently released within a week could be a consequence of reduced government funding for health care and increasing costs to patients for hospitalisation. In the past patients remained in hospital for prolonged periods receiving free services which included meals. Nowadays most services require finances therefore the patient, relatives, and/or attending physician tend to shorten the hospital stay in attempts to avert prohibitive costs.

The expenses that these patients incurred on accommodation, investigations, and medication while hospitalised amounted to a median of TShs 5,800 (US$ 8.65). The costs for meals, transportation at least thrice daily to supply meals to the patients, and other incidental costs were however not considered. It should be remembered that only 78.5% of the ordered investigations were actually done and 96.0% of prescribed medication was consumed. Therefore the monetary figure given here is much lower than it should have been as there is likelihood that the expensive investigations and

medications were not affordable.

Exemption to purchase services for certain chronic diseases was in practice with 29.3% of the drugs and 7.9% of the investigations being provided free of charge. The exercise was not well established in that whenever a drug was out of stock the patient had to purchase it. For instance, during the entire study period insulin was not available in the hospital. The prescribing habits of the physicians seemed to be dictated by the available option of a free or cheap drug and not by the drug that was most suitable for the patient. Investigations and medication were provided free only after the disease was confirmed and were only for those directly concerned with that particular disease, for instance tuberculosis, diabetes mellitus, and neoplasm. Consequently, there was no system for refund when a particular diagnosis was confirmed. This illustrates definite flaws in the exercise of granting exemptions for particular conditions.

There was a gender difference with acquisition of medication in that females were less likely than men to procure prescribed medication. This further affirms the lower purchasing power of females of whom only 17% were financially independent and so most of them could not effectively plan their treatment.

Most patients had chronic diseases that required constant medication estimated at a median of TShs 1,235 equivalent to US$ 1.84, for an average of 7.4 days, and frequent hospital visits. Assuming one hospitalisation per year, a patient would then

spend a median of approximately TShs 66,700 (US$ 99.55) annually for managing the disease that caused hospitalisation. The annual median consumption expenditure on necessities was put at TShs 724,000 (US$ 1,080) meaning that an equivalent of at least 9.2% of the annual expenditure of the household would be directed to one illness of an elderly person whose economic productivity is compromised. In a setting whereby there is no health insurance or any scheme to meet the costs of medical services, the burden is enormous on the patient and supporting family. At old age the advent of other chronic illnesses requiring similar levels of medical attention is not uncommon, adding further hardship on the affected person. It is no wonder that 2.2% of the patients had to sell their valued assets and 2.6% had to borrow money in order to meet medical expenses for the prevailing illness.

Conclusions

The results of this study have shown that elderly medical admissions in Dar es Salaam have a significant prevalence of HIV infection. It is unfortunate that neither the patients, the health personnel, nor the various organisations that deal with HIV/AIDS prevention seem aware of the magnitude of this problem.

The pattern of diseases in the elderly in Dar es Salaam has been consistent over time with chronic non-communicable diseases contributing to a lot of the morbidity and mortality in this population.

The majority of the elderly patients are of poor economic standing with extremely low purchasing power. The apportionment of the costs of medical care to this population has become unbearable.

The following are hereby recommended:

1. Health personnel should consider the possibility of HIV infection in all patients with suggestive features regardless of age.
2. Health education on prevention of HIV infection should target the elderly population with images and issues that relate to them. They should be advised to adapt behavioural changes; for instance, elderly widowers should be dissuaded from marrying younger women and elderly widows should be

encouraged to limit their sexual partners and practise safe sex.

3. Young adults should be given health education on adapting healthier lifestyles including early detection of non-communicable diseases in order to avoid dire consequences later in life.

4. The cost sharing system should consider exemptions on payments to the elderly patients. Exemptions to be considered could even be as part payments, provision of meals, or on particular investigations common to the elderly.

5. Health insurance schemes with low premiums for the elderly should be introduced.

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