

**PREVELANCE OF ERECTILE DYSFUNCTION AND ASSOCIATED FACTORS  
AMONG MEN LIVING WITH HIV ON ARVS ATTENDING CARE AND  
TREATMENT CLINIC AT MUHIMBILI NATIONAL HOSPITAL DARESSALAM  
TANZANIA**

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**MMed (Urology) Dissertation  
Muhimbili University of Health and Allied Sciences  
October, 2021.**

**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES**

**DEPARTMENT OF SURGERY**



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**BY**

**DR TARIQ ESMAIL ESSAJEE (MD)**

**A dissertation submitted in partial fulfillment of the requirements for award of the  
degree of masters of medicine in urology of the  
Muhimbili University of Health and Allied Sciences**

**October, 2021**

**CERTIFICATION**

The undersigned certifies that they have read and hereby recommend for acceptance of a dissertation entitled “ Prevalence and Factors associated with Erectile Dysfunction among men attending Care and treatment clinic in Dar es Salaam Tanzania “.submitted in partial fulfillment of the requirement for the degree of master of urology of the Muhimbili University of Health and Allied Health Science .

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Date

## DECLARATION AND COPYRIGHT

I Tariq Esmail Essajee , declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other award .

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## ACKNOWLEDGEMENTS

Glory is to the Almighty God for guiding me, bestowing upon me knowledge to complete this dissertation and making everything possible.

It is pleasure to acknowledge my sense of uttermost gratitude to the teaching faculty and members of the surgery department at MUHAS .Nevertheless I hope I will be pardoned for singling out few upon whom I called most frequently for help.

I am greatly indebted to my supervisor Prof Sidney C Yongolo whose guidance and whole hearted cooperation contributed to the successful and completion of this study.

I would also like to thank my co supervisor Dr Gabriel Mtaturu , for his guidance, support, advice, inputs and critique throughout this work.

My heartfelt appreciation to Prof Muhsin Aboud our post graduate coordinator of Urology, for his tireless mentorship, advise, support, patience to read and re read my drafts . Thanks for your boundless energy, your beautiful spirit and love to your students .The extra ordinary motivation and making me believe the seeming impossible work can be done, and truly the dream has become true.

My sincere gratitude to Prof C Mkony for, his effortless kind hearted advises constructive criticism and encouragement in this study.

I also pass my appreciation to the Head of Department of Surgery Dr Obadia Nyongole, for providing continuous encouragement and support .Thank you for being a good teacher, a model of vision, purpose and passion.

## **DEDICATION**

This work is affectionately dedicated to my beloved wife Fatma Ali Omar for showing uttermost love, offering emotional support, care, motivation and extraordinary patience during the whole period of my studies, and to my two daughters Haneefah and Saudah, who, though too young to offer support, their waving hands when I left home for school and whole hearted hugs when I returned home continue to inspire me and provide a driving force to work harder for their brighter future .

## **ABBREVIATIONS AND ACRONYMS**

AIDS	Acquired Immunodeficiency Syndrome.
ART	Antiretroviral Therapy
ARV	Antiretroviral
CTC	Care and Treatment Clinic
DM	Diabetes Mellitus
ED	Erectile Dysfunction
EF	Erectile Function
HIV	Human Immunodeficiency Virus
HAART	Highly Active Anti-Retroviral Therapy
IIEF	International index Of Erectile Function
LSD	Low Sexual Desire
LUTS	Lower Urinary Tract Symptoms
MNH	Muhimbili National Hospital .
MUHAS	Muhimbili university of health and allied science
PCA	Prostate Cancer.
PGEI	prostaglandin E1
RP	Radical Prostatectomy
SSRIS	Selective Serotonin Reuptake Inhibitors
TURP	Transurethral Resection of the Prostate
WHO	World Health Organization

## **DEFINITION OF KEY TERMS**

**ERECTILE DYSFUNCTION** - Inability to initiate or maintain an erection that is satisfactory for sexual intercourse.

**HYPOGONADISM** – Decreased functional activity of the gonads .It can be either hyper gonadotropic (primary , resulting when the gonads fail) or hypo gonadotropic (results from failure of the hypothalamic luteinizing hormone releasing hormone pulse generator or from the inability of the pituitary to respond with secretion of luteinizing hormone and follicle stimulating hormone .

**LOWER URINARY TRACT SYMPTOMS** – It ncludes irritative (frequency ,urgency , nocturia ,urge incontinence) and obstructive symptoms ( poor stream ,hesitancy , straining ,incomplete bladder emptying )

**ANHEDONIA** –The inability to feel pleasure from activities usually found enjoyable ,such as Exercise , hobbies ,music ,sexual activities or social interactions .



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## **ABSTRACT.**

**Introduction:** Erectile dysfunction (ED) is defined as the inability to attain and maintain an erection for satisfactory sexual performance. There has been an increase in the prevalence of erectile dysfunction (ED) in the general population especially among men living with HIV on ARVS. This increase has been attributed to the disease itself and to several factors, such as dyslipidemia, antiretroviral therapy, age, diabetes, smoking and depression.

**Objectives/Aim of the study:** To evaluate the magnitude and factors associated with Erectile Dysfunction among men living with HIV on ARVS attending care and treatment clinic at Muhimbili National Hospital.

**Material and Methods:** We conducted a cross-sectional study at Care and Treatment Clinics at Muhimbili National Hospital in Dar es Salaam from August 2020 to January 2021. Participants comprised of males aged 18 years or above with regular sexual partners who were on ARTs for at least 6 months, within the scope of their clinical WHO stage. Using convenient sampling, we recruited 420 males. The international index of erectile dysfunction (IIEF) was used to identify the ones with ED. A structured questionnaire was used to collect data from the patients. Data was analyzed using SPSS Version 23. Tables, graphs and charts were used to present the gathered information. Erectile dysfunction was measured using IIEF index and categorized as mild, moderate, severe or normal erectile function.

**Results:** A total of 420 males aged more than 18 years living with HIV on ARVs were recruited. Sixty four percent of the study respondents had erectile dysfunction. There were 42% of respondents with mild ED, 17% with moderate ED and only 1% with severe ED. Among the factors which showed increased risk of ED were age, depression, cigarette smoking and duration of treatment with ARVs .

**Conclusion :**It is evident that Erectile dysfunction among men living with HIV is common .The study found that the prevalence and severity of ED increased with an increase in age , duration of treatment , cigarette smoking and depression.

## CHAPTER ONE

### INTRODUCTION

Human immunodeficiency virus (HIV) is an RNA retrovirus transmitted through sexual intercourse, through contaminated blood, or vertical route. It has become a pandemic infection, and it is estimated that over 34 million people are infected worldwide. (1)

In regulating HIV/AIDS, various management protocols have been discovered and put in use; these managements normally include the use of multiple antiretroviral drugs in an attempt to control HIV infection. HAART decreases the patient's total burden of HIV, maintains function of the immune system, and prevents opportunistic infections that often lead to death.

The introduction of HAART resulted in a dramatic benefit in the outcome of HIV-infection, but also in the appearance of many adverse events related to this therapy among them being Erectile Dysfunction (ED).

ED is largely described as the inability to initiate or maintain an erection that is satisfactory for sexual intercourse. According to different studies, ED among men living with HIV on ARVS was found to be 65.1% (2). Furthermore, a research by Carter (2018) has shown that HIV-positive men are more likely to report erectile dysfunction than men in the general population.

At a global level, ED has approximately a prevalence of 16%, which increases with advancing age. ED is a multifactorial condition, and is associated with comorbidities that include vascular, metabolic, psychogenic, and neurologic diseases.

The exact causes of ED in patients with HIV are poorly understood, however, they could include the effects of HIV infection itself, treatment with antiretroviral drugs, most especially protease inhibitors, and traditional risk factors such as age (3). Before the HAART era, ED was often related to advance HIV disease and hypogonadism, both conditions frequently observed in such patients. (4) However, the prevalence and etiologies of these conditions among HIV-infected men remained unclear (5).

ED is an increasingly recognized condition in HIV infected men, with significant impact in quality of life and satisfaction with sexual life and partnership. It is more prevalent in men with HIV than in marched men without HIV. However, the reported prevalence among men with HIV varies widely from 9% to 74%. (4)

Global efforts in addressing the HIV/AIDS epidemic have focused on preventing new infections, reduction of viral loads through treatment and care and support for the patients. Hardly any attention has been given to their quality of life in particular sexual health and functioning. There is a growing body of literature indicating high prevalence of sexual problems amongst HIV infected individuals, whose mechanisms remain unclear. This may affect individuals' quality of life, interpersonal relationships and HIV treatment. The sub-Saharan Africa (SSA) region is the epicenter of the HIV epidemic, majority of the patients being young (< 30 years old) and in long-term heterosexual relationships. With increased life expectancy due to expanded access to HAART, the prevalence and potential impact of erectile dysfunction are certain to be significant. There is urgent need for appropriate research on sexual experiences and functioning amongst HIV patients in SSA and appropriate interventions to address them.

Dutch investigators reported in the online edition of journal of AIDS that Living with HIV is an independent risk factor for erectile problems among middle-aged men. HIV infection was associated with more than twice the risk of erectile dysfunction. They found that men who are aged >45 years had a decreased sexual functioning and ED was more prevalent among HIV-1 infected participants, most of whom were on c ART (combination antiretroviral therapy), compared to similar, HIV-uninfected controls. The authors concluded that HIV status was independently associated with decreased erectile function. (6)

There may be physical or psychological causes, or more frequently a combination of the two. Factors such as dealing with a new diagnosis, stigma, and anxiety about passing on HIV may impact upon the ability to get hard or stay hard. Research suggests that around 40 to 60% of men with HIV may have some degree of erectile dysfunction. (7)

Erectile dysfunction is often associated with conditions that affect blood flow in the penis, including diabetes, high cholesterol, high blood pressure, cigarette smoking, obesity and heart disease. Other factors commonly linked to erectile dysfunction include older age, low testosterone levels, alcohol or drug use, anxiety and depression. Also, many men with HIV have low testosterone levels (hypogonadism). This can be difficult to diagnose because some symptoms (such as loss of vitality, low sexual desire, low bone mineral density and loss of muscle mass) are less specific and can occur in men with HIV who have normal testosterone levels. It is important for a doctor to investigate whether this could be the cause of impotence. Chronic illness, HIV replication, antiretroviral medications, lipodystrophy , metabolic

syndrome, other co-morbidities and co-infections can contribute to low testosterone levels in people living with HIV .(7)

Erectile dysfunction (ED) is a common complication of diabetes, with a prevalence ranging from 15 to 55%. The basis underlying diabetes associated ED is multifactorial, involving changes in peripheral nerve activity and alterations in endothelial cell function.(8).Among the different studies which have been done supports the view that ED is a worldwide problem with prevalence in developing countries similar to, if not higher than, that reported for men in industrialized societies. (9).

Erectile dysfunction has an impact on the quality of life and very often leads to negative attitudes on the part of the individual, including poor adherence to antiretroviral regimens and to safer sex strategies.

In this study, the aim is to assess the factors associated with erectile dysfunction in HIV patients using ARVs attending Care and Treatment Clinic, to enable the care giver to address the problems encountered and refer to the respective department for treatment and follow up.

## Pathogenesis of ED in HIV infected men

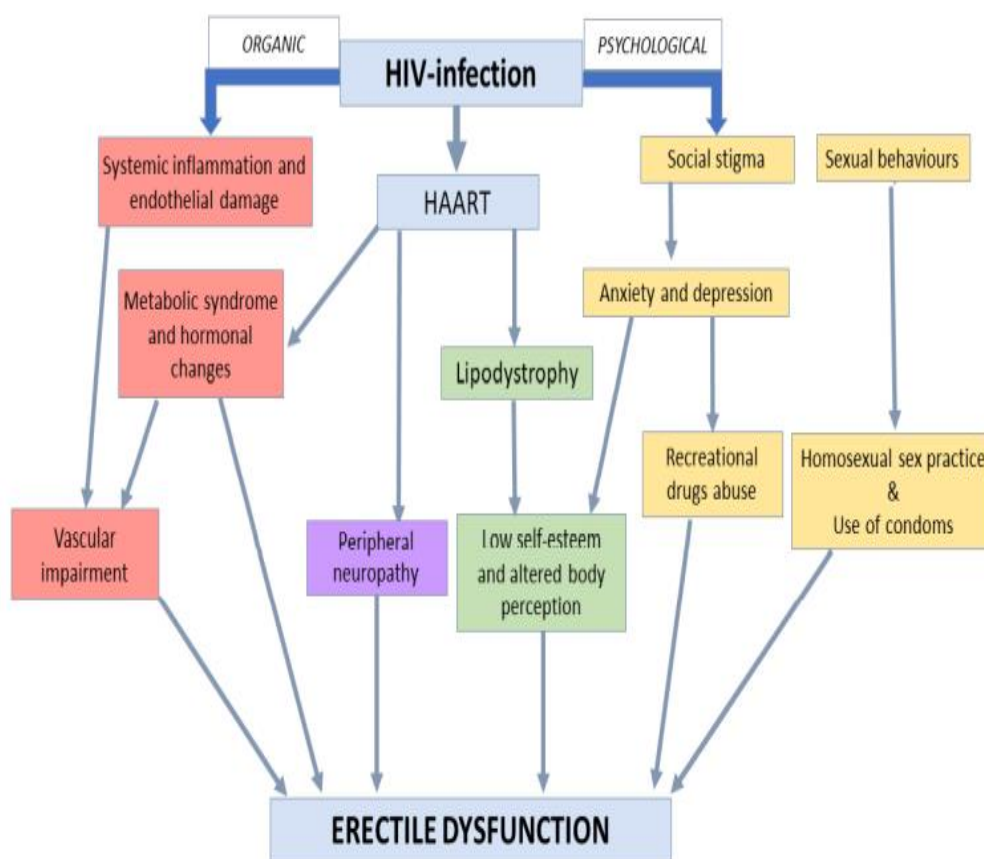


Figure 1: Organic and psychological factors associated ED pathogenesis among men living with HIV on ARVs.

In clinical practice, ED is classically categorized on the basis of either organic—both Endocrine and non-endocrine—or psychogenic etiology (Figure 1). Among organic, non-endocrine factors, the most common is vascular impairment, involving a deficit of arterial blood inflow or venous blood outflow (Figure 1). The presence of vascular arterial dysfunction could be an early indicator of a systemic vascular condition and often precedes major cardiovascular events (78). HIV-infected men demonstrate increased risk for cardiovascular disease (79) as a result of the presence of classical risk factor for cardiovascular disease, such as metabolic syndrome, diabetes and obesity (80, 81) and HIV-related factors, in particular systemic inflammation, immune system activation, and endothelial dysfunction (82). However, a previous study (44) failed to demonstrate an association between vascular endothelial dysfunction and ED in HIV-infected patients, while

another study found dyslipidemia as a main risk factor for ED in these patients (2). Other disease involved in ED development, common in HIV-infected patients, is neurogenic impairment, such as peripheral neuropathy (83). The association between peripheral neuropathy of the sacral region causing ED and the use of specific HAART drugs has been investigated, although with inconclusive results (75). Moreover, the use of other drugs potentially inducing ED, such as antihypertensive and anti-depressant agents, is frequently used in HIV-positive patients (84). Further risk factors for ED, such as cigarettes smoking (51) and the use of illicit and recreational drugs (85) are also linked .



## **LITERATURE REVIEW**

ED affects approximately 10–20 million men in the USA, with a global prevalence of 16%, which increases with advancing age (62). It has been well described in the literature that the prevalence of ED is positively correlated with age: less than 10% in men under 40, 52% among men 40 to 70, and up to 70% in men over 70 years old.(41,42). Most of the studies analyzing the prevalence of sexual dysfunctions were conducted after the introduction of HAART. (60)

A large number of studies have been investigated on the prevalence of ED in HIV men following the introduction of HAART with Overall ED prevalence ranging from 13% to 86%.(6,10,17,43,44,45,46-59).

### **Prevalence of ED among HIV positive on ARVS .**

The prevalence of ED among several studies done in USA was between 21% -74% (46,49,51). In South American countries: The prevalence of ED in Mexico was 65.1 % ( 2) and in Brazil the prevalence of ED was 29.6 % ( 57). A study conducted in seven European centres found the prevalence of ED was 33%.(17).The prevalence among several European countries :in France was 86%(48), Italy with 54.5%(63), Spain with 67.1%(10) and Belgium with a prevalence of (56%) .The prevalence of ED in Malaysia was 82.3 % ( 56).

A study done in Tanzania Dares Salam , found the prevalence of erectile dysfunction among men aged between 18- 49 years living with HIV on ARVs attending selected public care and treatment clinics to be 80.9% with majority of the participants with moderate ED (36.1%).(27)

### **Prevalence of ED among men living with HIV on ARVs versus ARVs naive.**

Most studies of ED among men living with HIV infection which were done since the introduction of HAART have looked only at individuals taking ARV treatment and so direct comparison with ARV naive groups has not been well established. In a study done by Collazos et al in 2002, which compared both groups, ED was more in the ARV treated individuals compared to ARVS naïve individuals. The prevalence of ED was found to be 24% among HIV men on ARVs compared to 3.8% in ARVs naïve patients. The rate of ED among patients who were receiving ARVs was 16.7% for those using only NRTIs ,20.2% for those treated with NRTIS and NNRTIS ,27.2% for NRTIS and PI, 25.8% with NRTIS plus PI and NNRTIs (P=0.009) (19).

In a cross-sectional study conducted in seven European HIV treatment centers, found that the prevalence of ED was 35% on ARV experienced participants with reported moderate or severe ED compared with 22% of those who were ARV naïve (17).

### **HIV an independent factor for ED .**

ED in HIV-infected men is not only attributed to factors traditionally related to ED, but the role played by the HIV infection itself. In a study done by Dijkstra et al, in men aged  $\geq 45$  years found that HIV-1 status was independently associated with decreased erectile function in the era of c ART. Hence, the clinical approach to ED in patients with HIV, both in terms of diagnosis and treatment, should consider either HIV-related or non-HIV related issues (6).

### **Prevalence of ED in HIV infected men compared to HIV uninfected men.**

Erectile dysfunction (ED) is more prevalent in HIV men than in the general population, ranging from 33 to 74 % (10, 16, 46 ) versus a prevalence ranging from 0 to 18 % in general population samples (64, 65, 66).

A cross-sectional, observational, controlled study on 444 HIV-infected men and 71 HIV uninfected men conducted in Italy ,found the prevalence of mild, moderate, and severe ED was higher in HIV-infected men than in HIV-uninfected men of all decades of age and this was statistically significant in both univariate analysis (odds ratio [OR] = 34.19,  $P < 0.001$ ) and in multivariable logistic regression analysis (OR = 42.26,  $P < 0.001$ ) followed by hypogonadism, after adjusting for age and BMI.(63).

Another study conducted in the United States of America conducted at four centers: Baltimore Washington DC, Chicago, Los Angeles, and Pittsburgh. Six thousand nine hundred and seventy two men were recruited, 2,100 participants were HIV positive on ARVS and 1,704 HIV-negative participants. The prevalence of ED among the HIV positive men was 21% compared to 16% among HIV negative participants. (59).

### **Factors associated with Erectile Dysfunction in HIV.**

ED is a multifactorial disease and is associated with comorbidities that include vascular, metabolic, psychogenic, and neurologic diseases. These factors may play an independent role as the cause of ED or may have a synergistic effect with HIV, ARVS or socio demographic factors in causing ED.

**a) Prevalence of ED among men living with HIV on ARVS and Age.**

In Massachusetts Male Aging Study (MMAS) and the National Health and Social Life Survey (NHSLs), that consisted of 1709 non institutionalized men between the ages of 40 and 70 years. The first cross-sectional, community-based, random-sample, multidisciplinary epidemiologic survey on ED and its physiologic and psychosocial correlates in men in the United States. From the prevalence rates reported in the MMAS study, between the ages of 40 and 70 years, the probability of complete ED increased from 5.1% to 15%, moderate dysfunction increased from 17% to 34%, and mild dysfunction remained constant at about 17%. The prevalence rates for ED was reported to be 7% for ages 18 to 29 years, 9% for ages 30 to 39, 11% for ages 40 to 49, and 18% for ages 50 to 59.(41,42). In comparison in HIV positive men on ARVS several studies have shown a higher prevalence of ED with an increase of age. (9, 10, 17,14, 33).

**b) Prevalence of Erectile Dysfunctions among HIV Adult Men and Diabetes.**

Erectile dysfunction (ED) is a common complication of diabetes, with a prevalence ranging from 15 to 55%. The basis underlying diabetes associated with ED is multifactorial, involving changes in peripheral nerve activity and alterations in endothelial cell function. (8) The prevalence of erectile dysfunctions in the years since the advent of highly active antiretroviral therapy (HAART), includes high rates of erectile dysfunction (ED) (9–74%), ejaculatory disturbances (36–42%), and low sexual desire (LSD) (24–73%)(8).

In comparison with studies done on HIV individuals on HAART. A study done by Asboe et al in assessing the factors associated with ED among HIV men on ARVs, found the prevalence of ED among DM to be 40% (17). In another study conducted in Brazil by Moreira et al, the prevalence of ED was 37% (9). The findings may be linked to the HIV itself, the ARVs use and DM as an independent factor of ED.

**c) Prevalence of ED among men living with HIV on ARVs associated with decreased testosterone levels.**

A cross sectional, observational study was carried out among 1325 men living with HIV on treatment with ARVS, to investigate the gonadal status in HIV-infected men in order to characterize testosterone (T) deficiency and to identify predictive factors for low serum T. The prevalence of ED was 53.4%. Testosterone deficiency was found in 212(16%) among

men aged 40-59 years and was attributed mainly with low serum luteinizing hormone (LH) levels with increased visceral fat. (45). An impairment of the hypothalamic-pituitary axis plays a possible major role in determining T deficiency, as suggested by the common occurrence of low T in concomitance with inappropriately low or normal serum LH in HIV-infected patients (49,50). However, the underlying causes and mechanisms remain unknown.

Circulating testosterone (T) declines with advancing age (67) especially after the age of 65 years (67-69). The prevalence of T deficiency in different studies varies from 13.8% (70) to 20%–25% (71, 72) and 38.7% (69), depending on different cut-off values of serum T and different age ranges. Androgen deficiency is common among men with HIV infection treated with HAART, ranging from 20 to 30% according to different studies (73, 74)

#### **d) Prevalence of ED in HIV positive patient on ARVs and smoking**

Smoking is strongly associated with ED. Endothelial dysfunction together with increased oxidative stress represent major pathophysiologic mechanisms, and smoking cessation may mitigate this effect and leads to restoration of erectile function (12). At the molecular level, several changes associated with smoking have been documented in man and experimental models. These changes could contribute to the pathogenesis of ED. Similarly, impaired penile flow has been documented in men who smoke. Cigarette smoking also interferes with the effectiveness of intracavernous papaverine and Prostaglandin E1.(13)

In a cross sectional survey done in Australia to examine association between smoking and ED. A total of 8367 Australian men aged 16–59 years were recruited in the study. A proportion of 9.1% of the respondents reported ED. More than a quarter (27.2%) of respondents were current smokers, with 20.9% smoking twenty cigarettes or less per day, and 6.3% smoking more than twenty cigarettes per day. Compared with non-smokers, the adjusted odds ratios for ED were 1.24 (95% confidence interval (CI) 1.01 to 1.52,  $p = 0.04$ ) for those smoking twenty cigarettes or less per day and 1.39 (95% CI 1.05 to 1.83,  $p = 0.02$ ) for those smoking more than twenty cigarettes per day, after adjusting for other confounding factors. (14).

A study done in Mexico City in a HIV clinic of a tertiary center among HIV men on ARVs. Among 109 patients enrolled in the study 71 individuals (65.1%) were found with ED. Thirty eight percent were smokers (2). In a study done by Asboe et al, among 478 participants HIV participants on HAART who were smokers, 168 (35.2%) had ED (17) .

**e) Prevalence of ED among HIV positive patients on ARVS and Depression.**

A cross-sectional study in seven European HIV treatment centers to establish the prevalence of ED among HIV men and the associated factors. The prevalence of ED in those on ARVs was 35% and among factors consistently associated with ED was depression with a proportion of 43.7% compared to 27.9% among non-depressed participants. This was statistically significant in multivariate analysis. (17).

An observational cohort study on asymptomatic HIV positive men on ARVS carried out in Spain. A total of 158 men were recruited into the study with a mean age of 46 years. Depression and anxiety were both related to ED with a prevalence of 12.3% and 29.5% respectively, however anxiety was statistically significant in logistic regression. (10)

A study of 300 HIV infected men on ARVs in HIV clinic at the Naval Medical Center San Diego found that older age and depression were positively associated with ED. (49)

**(f) Prevalence of Erectile Dysfunction according to CD4 count.**

A study done in HIV clinics in Tanzania in the year 2008 by Eliasa Mkongo revealed that erectile dysfunction was progressively increasing with a decrease in CD4 count, with majority of patients having CD4 count of 200-400. The prevalence of Erectile Dysfunction among men living with HIV aged 18-49 was 80.9% ranging from mild to severe. (27).

### **g) Drugs associated with Erectile Dysfunction.**

Erectile dysfunction has been shown to be associated with the use of didanosine. Moreover, HIV-infected individuals use many other medications to treat opportunistic infections, which are associated with decreased sexual responses. Medications such as ketoconazole, fluconazole, ganciclovir, megestrol, methadone, and cimetidine may decrease testosterone levels and cause erectile dysfunction. Antihypertensive, diuretics, hyperlipidemics, benzodiazepines, antidepressants, and antipsychotics are also associated with erectile dysfunctions (18).

Erectile dysfunction seems to be a very common event after the introduction of HAART. The possible role of antiretroviral drugs in the generation of erectile dysfunction is controversial. The average prevalence's of erectile dysfunction among the different studies was 51%, erectile dysfunction 46%, decreased libido 44%, ejaculatory disturbances 39% and orgasmic disorders 27%. As a conclusion, antiretroviral therapy, particularly protease inhibitors, seem to be to some extent directly or indirectly related to erectile dysfunction through different mechanisms.(19)

### **(h) Effect of male Circumcision and Erectile Dysfunction and pleasure.**

A study done in Kenya by Krieger et al to assess adult male circumcision's effect on men's sexual function and pleasure. Adult male circumcision was not associated with sexual dysfunction in the study. No significant difference between circumcised and uncircumcised men with respect to the frequency of erectile dysfunction, inability to ejaculate, pain during intercourse, lack of pleasure with intercourse, or these dysfunctions combined. Circumcised men reported increased penile sensitivity and enhanced ease of reaching orgasm. These data indicate that integration of male circumcision into programs to reduce HIV risk is unlikely to adversely affect male sexual function.(20)

### **(i) Erectile Dysfunction associated with Dyslipidemia among HIV.**

Erectile Dysfunction is linked with dyslipidemia among HIV positive patients Undergoing ARVs, in a study which was conducted in Mexico with a mean age of 40 years, the prevalence of ED was found to be 65.1%. Among many factors which were investigated in the study, Dyslipidemia had a significant association with ED among HIV patients. (21)

#### **(j) Lower urinary tract symptoms associated with Erectile Dysfunction.**

Several studies have shown that men with lower urinary tract symptoms are more likely to experience erectile dysfunction. Men with severe lower urinary tract symptoms had a statistically significant 40% higher risk of erectile dysfunction subsequently than men without lower urinary tract symptoms (22).

A study done in China on Erectile dysfunction (ED) in men with lower urinary tract symptoms (LUTS) in 1000 men aged 40 - 80 years with regular sex partners, evaluated their erectile function using IIEF-5, and investigated LUTS among them by International Prostate Symptom Score (IPSS). LUTS was found in 42.81% and ED in 76.18%. The incidence of ED was high in men with LUTS and increased with age and the severity of LUTS. (23)

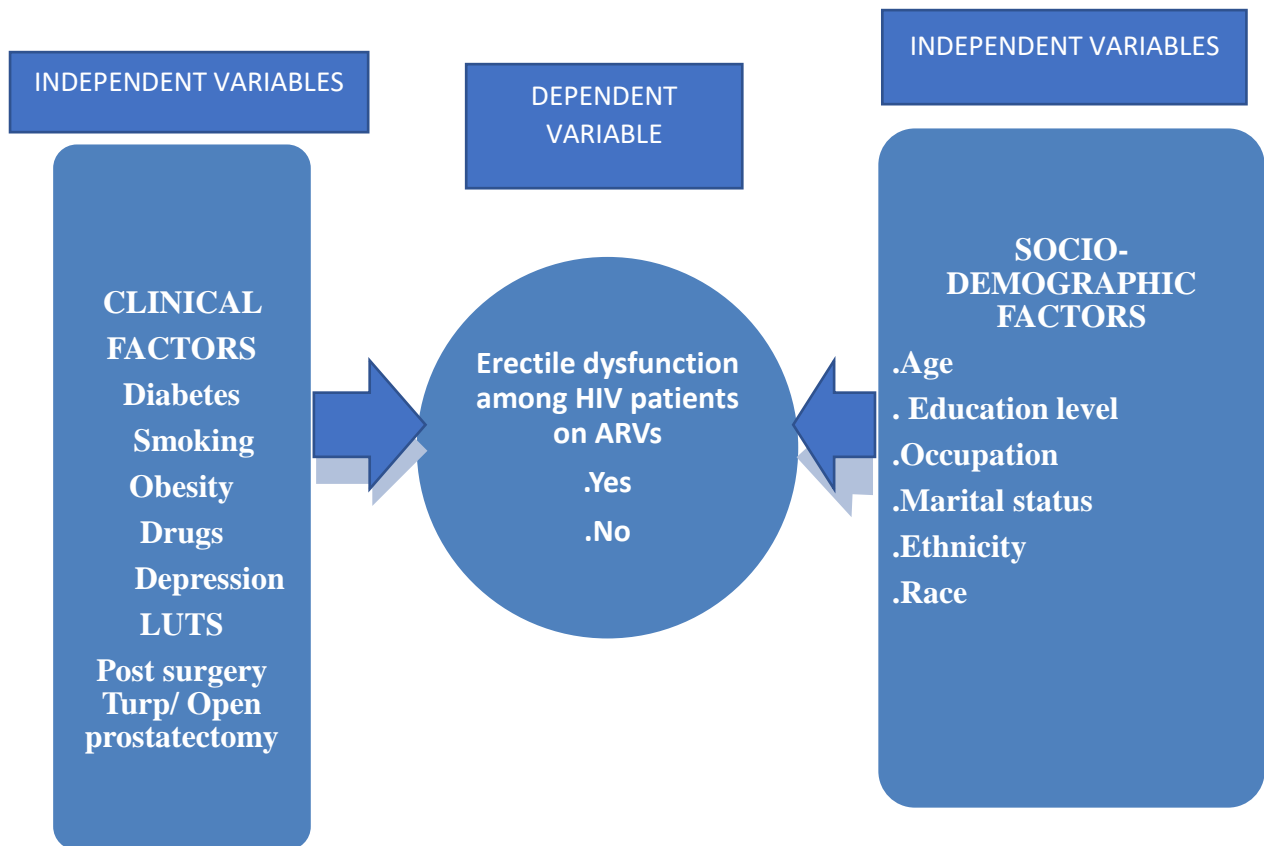
#### **(k) Post Radical Prostatectomy and TURP associated with ED**

In the current era of the early diagnosis of prostate cancer (PCa) and the development of minimally invasive surgical techniques, erectile dysfunction (ED) represents an important issue, with up to 68% of patients who undergo radical prostatectomy (RP) complaining of postoperative ED. (24)

Another study showed that erectile dysfunction (ED) can occur after any treatment for prostate cancer. After radical prostatectomy (RP), ED may occur in 12-47% of patients depending upon patient age, comorbidities, preoperative ED and surgical technique. Following nerve injury, penile neuropraxia can result in corpus cavernosum smooth muscle dysfunction, fibrosis and an increase in veno-occlusive ED (25).

TURP is considered the gold standard in men with obstructive benign prostatic enlargement ,the incidence of postoperative, newly reported ED after TURP was 12%.,risk factors for its occurrence were diabetes mellitus and intraoperative capsular perforation.(26).

## CONCEPTUAL FRAMEWORK



**Figure 2 Conceptual Framework**

### **Explanation of the frame work**

The framework involves the dependent and independent variables, the dependent variable is Erectile Dysfunction, which depends on either the respondents' Socio demographic characteristics or clinical factors which might influence the person's Erectile function status.

The independent factors in causing erectile dysfunction include diabetes mellitus, smoking, dyslipidemia, obesity, drugs, depression, LUTS and Post surgery TURP /Open prostatectomy , interacts with both the clinical and socio demographic factors and increases the risk and chances of Erectile Dysfunction among men living with HIV.



## **PROBLEM STATEMENT**

Sex has been a taboo in our society and widely neglected by our physicians. There are few or no clinics to deal with sexual problems and sexuality as a subject and usually not routinely taught in our medical schools. Therefore most patients especially those who are HIV positive with erectile dysfunction are not well provided with the required intervention. Most physicians regards the problem to be trivial and when need of referring a patient they send them to a urologist who is already overwhelmed by a large number of patients in need of other urological problems of concern notably bladder outlet obstruction.

Erectile dysfunction has an impact on the quality of life and very often leads to negative attitudes on the part of the individual, including poor adherence to antiretroviral regimens and to safer sex strategies. There can also be drug-drug interactions with other medications they take, potentially including anti-HIV drugs. When taken with ritonavir or cobicistat (boosting agents included in some HIV treatment regimens), levels of the Erectile Dysfunction may be increased.

Most HIV patients on ARVS have reported experiencing ED in the CTC clinic, however sufficient and reliable knowledge on the factors related to ED and HIV have not been established. Erectile dysfunction seems to be a common problem among people living with HIV yet we don't know the magnitude and associated factors. Little is known in Tanzania on the prevalence and associated factors as far as erectile dysfunction is concerned among HIV patients on ART.

## **STUDY RATIONALE**

Health is a fundamental human right and normal sexual health contributes positively to the general health of an individual. Erectile dysfunction affects sexual health and quality of life even in advanced age. After the expansion of care and treatment clinic for persons living with HIV and introduction of ARVS, people with HIV disease will live longer, healthier and thus sexual problems may become a priority as it is believed that erectile function contributes to the good quality of life in men, including those living with HIV.

The findings of this study will be used by implementers and practitioners to address matters related to sexual function among people living with HIV, and bring to awareness the associated factors in our patients for possible interventions needed. Furthermore clinicians will be able to advise patients on means and ways in preventing or dealing with ED.

## **Research questions**

- I. How prevalent is erectile dysfunction among adult men living with HIV on ARVs attending Care and treatment clinic?
- II. Are clinical and socio demographic factors associated with erectile dysfunction among adult men living with HIV on ARVs attending care and treatment clinic?

## **OBJECTIVES**

### **General objective**

To evaluate the magnitude and factors associated with Erectile Dysfunction among adult men living with HIV on ARVs attending Care and Treatment Clinic at MNH.

### **Specific objectives**

- I. To evaluate the magnitude of Erectile Dysfunction among adult men living with HIV on ARVs attending Care and Treatment Clinic at MNH.
- II. To analyze factors associated with Erectile Dysfunction among adult men living with HIV on ARVs attending Care and Treatment Clinic at MNH.
- III. To analyze the severity of erectile dysfunction among adult men living with HIV on ARVs attending Care and Treatment Clinic at MNH.

## CHAPTER TWO

### METHODOLOGY

#### Study design

The design of this study was a cross sectional study, no follow up was needed for the participants recruited in the study.

#### Study setting

The study was conducted at Muhimbili National Hospital, which is a university teaching hospital. The focal area, was be at Care and Treatment Clinic. The clinic has an average attendance of 50 patients per day, taking place from Mondays to Fridays excluding public holidays, conducted by a medical officer and assisted by two qualified trained nurses in care and treatment of HIV positive patients.

#### Study population

Study population consisted of all HIV positive patients using HAART for at least 6 months attending Care and Treatment Clinic at MNH August 2020 to January 2021. A pilot study which was conducted at the clinic showed an average attendance in Care and Treatment Clinic at Muhimbili National Hospital of 50 patients per day.

#### Sample size estimation

Sample size will be derived from the following formula:

$$n = \frac{z^2 p (1-p)}{\epsilon^2}$$

Where:

Z: Standard normal deviate = 1.96 for 95% confidence level.

P: Expected proportion of HIV men with E.D =51% ( Collazos 2007)

ε: Margin error = 5%

Calculated sample size was 383.

Non response rate of 10% will be added to the calculated sample size

So the sample size was  $\{(10\% \times n) + n\} = 420$ .

## **Inclusion and exclusion criteria**

### **Inclusion criteria**

- All confirmed adult male patients aged more than 18 years, married or with stable partners living with HIV using ARVs for more than 6 months after consent taken, were enrolled in the study at Muhimbili National Hospital, within the scope of their clinical WHO stage including those with Kaposi sarcoma, Hodgkin's lymphoma etc., and were able to attend the Care and Treatment Clinic at MNH.

### **Exclusion criteria**

- Participants with altered mental status.
- Participants with paraplegia

### **Sampling procedure**

- Convenient sampling technique was used. Patients were recruited as they consented to participate in the study. Recruitment continued until the sample size was attained.

### **Data collection procedures**

Eligible patients were informed of the nature of the study and asked for their written consent to participate in it. Questionnaires were administered by the research assistance who is a trained Nurse working in the care and treatment clinic.

A total of 2 research assistants who were nurses and trained in attending HIV patients were recruited and trained for 5 days on elementary research methodologies, data collection tools and interviewing techniques, putting emphasis on client confidentiality and avoiding ambiguity in asking questions during the interview.

Data collection was collected from November 2020 to January 2021.

Each questionnaire evaluated Erectile Dysfunction based on the International Index of Erectile Function (IIEF). The IIEF 5 is a validated questionnaire consisting of five questions, each scored from 0 to 5, in which a global score below 21 is considered significant for ED, scores were classified as 21-25 to be normal Erectile function, 16-20 to be mild Erectile Dysfunction, 11-15 points to be moderate ED, and 10 or less to be severe ED.

The participants also completed a validated survey for the diagnosis of depression using ICD 10 criteria which required 4 or more (of 10) symptoms present for at least 2 weeks, the Symptoms must include  $\geq 2$  of Depressed mood, Anhedonia and Energy loss.

The questionnaire also included information on socio demographic factors, diabetes mellitus, cigarette smoking, hypertension, cholesterol levels, prostate disease, ischemic heart disease, pelvic injuries and lower urinary tract symptoms.

## **Variables**

### **Dependent variable**

The dependent variable is erectile dysfunction which is a categorical variable, categorized as either normal, mild, moderate and severe depending on the IIEF score.

### **Independent variables**

These include the factors associated with Erectile Dysfunction i.e Participants were asked history of hypertension (on follow up clinic, anti-hypertensive medications), history of diagnosis of hypercholesterolemia (on follow up clinics or on medications), cigarette smoking, history of diagnosis of diabetes mellitus (on follow up clinic, on medications), and medication history were grouped according to their respective classes. Depression as ICD 10 mild ,moderate or severe .LUTS graded according to the IPSS score .Post surgery TURP/ Open prostatectomy either was performed or not . Socio demographic factors of participants which includes age (quantitative variable ), level of education ( qualitative variable) , primary, secondary, university/college or not educated and marital status grouped as Married or unmarried (qualitative variable) .

### **Data management and analysis**

The data was captured in the questionnaires that was grouped and examined for errors using SPSS Version 23 then the data cleaning procedure was conducted. Data was analyzed using Statistical Product and Service Solution (SPSS) Version 23. Comparison between more than two groups was done with one- or multi-way analysis of variance (ANOVA). The multivariate analysis for variables related to ED was done using the logistic regression analysis while controlling for confounding variables. The odds ratios and the 95% confidence intervals were calculated in all cases, and significance was set at a  $p < 0.05$ .

### **Objective 1**

The proportion of patients with erectile dysfunction was obtained by dividing the number of patients with Erectile Dysfunction with the total number of patients who were recruited within the study period.

### **Objective 2 and 3 .**

The categorical variables were expressed in percentages and the association between dependent and independent variables were analyzed with the Chi square test or Fischer's Exact test when necessary.

The continuous variables were expressed as the mean and standard deviation and the differences in means were analyzed by the Student t test after confirming that the continuous variables followed a normal distribution. Association between variables was done using the Chi square test and a p value of less than 0.05 was considered for statistical significance. Factors that had a P value of less than 0.05 were analyzed using logistic regression to show association between dependent and independent variable. The multivariate analysis for variables related to ED was done using the logistic regression analysis while controlling for confounding variables. The odds ratios and the 95% confidence intervals were calculated in all cases, and significance was set at a  $p < 0.05$ .

**Ethical consideration**

Ethical clearance to carry out this study was obtained from MUHAS institutional research and publication committee. The patient data from medical register and charts were accessed upon permission of the Hospital research administration. Confidentiality was secured during the data collection, thus name, addresses of the patient were not recorded in the data collection form and data was kept in safe location. Oral and written informed consent was obtained. For those who were unable to write use of thumb print was applied then followed by collection of information. Interview was conducted strictly in a private place.

Patients who were found to have erectile dysfunction were advice to attend urology clinic for further evaluation and treatment.



## **DISSEMINATION PLAN**

Results of the study will be presented to the university research meeting in the department of surgery at MUHAS then later for dissertation defense at MUHAS, in a symposium at MNH department of surgery, at the MUHAS annual scientific conference and at the National Quality improvement annual forum. Service providers at MNH will be provided with results as well as policy makers at the Ministry of Health, Community Development, Gender, Elderly, and Children (MoHCDGEC) so as to enable effective planning of patient management protocols and policies.

The dissertation report will be submitted to MUHAS for partial fulfillment of Masters of Medicine degree in Urology. The report will also be used to prepare manuscript for publication in peer review journals.

## CHAPTER THREE

### RESULTS

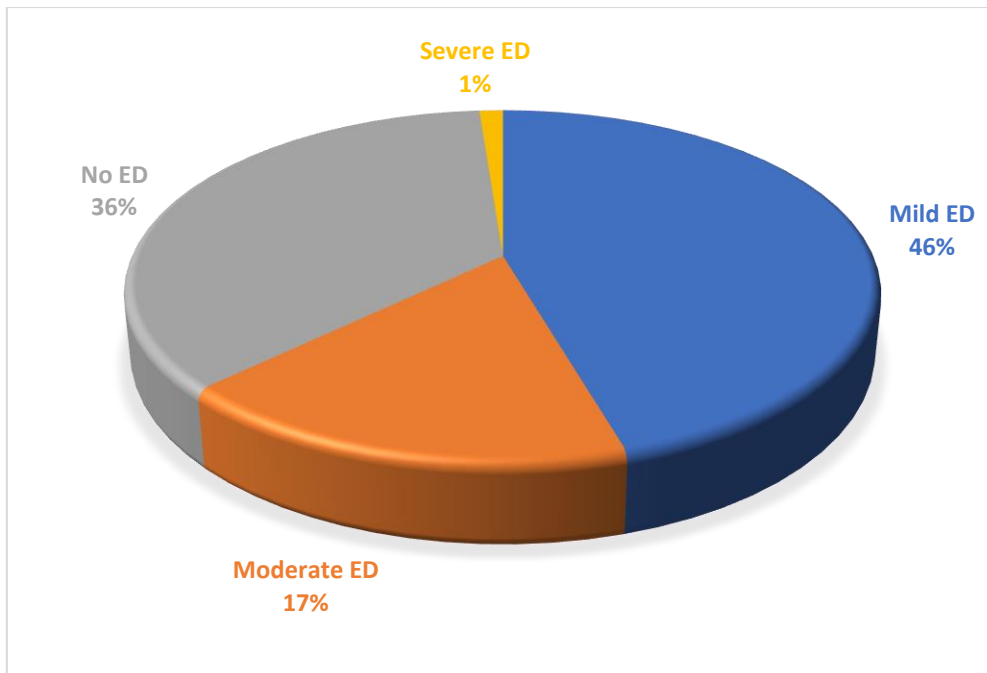
A total of 420 participants were included in the study, their age ranged from 23 – 68 years with a mean age of  $40.9 \pm 9$  years. Most (46%) of the participants had secondary level of Education. Majority (80.5%) were Employed and not married (65%). Of the 420 participants, 269 (64%) had Erectile Dysfunction.

Table 1 below shows the social demographic characteristics of the study respondents.

**Table 1 Social Demographic Characteristics of 420 men with HIV on ARVS attending CTC at MNH**

	Erectile Dysfunction		P Value
	Present (%)	Absent (%)	
Mean Age			
Age			
20 – 39	110 (56.4)	85 (43.6)	0.002
40 – 59	146 (69.2)	65 (30.8)	
≥ 60	13 (92.2)	1 (7.1)	
Level of Education			
Primary	74 (67.3)	36 (32.7)	0.01
Secondary	112 (56.9)	85 (43.1)	
College/University	83 (73.5)	30 (26.5)	
Occupation			
Employed	210 (62.1)	128 (37.9)	0.096
Unemployed	59 (72.0)	23 (28.0)	
Marital Status			
Married	224 (63.1)	131 (36.9)	0.400
Unmarried	45 (69.2)	20 (30.8)	

The proportion of Erectile Dysfunction was increasing with an increase in age, with 92.2% of the participants aged more than 60 years having ED compared to 56.4 % of those with age less than 40 years. This difference was statistically significant ( $p < 0.002$ ). Respondents with college or university education were more likely to present with ED compared with those at lower levels of education ( $p = 0.01$ ). Unemployed respondents had a greater proportion of ED compared to employed respondents. However, this was not statistically significant. Participants who were single reported a higher proportion of ED compared to married. This was not statistically significant.



**Figure 3 Proportion of erectile dysfunction with severity among 420 patients with HIV on ARVs attending CTC at MNH**

Among the 420 patients enrolled, 269 (64%) had erectile dysfunction. Within patients who had erectile dysfunction, a majority had mild erectile dysfunction. Only 1% of had severe erectile dysfunction. Figure 3 above shows the distribution of severity of erectile dysfunction among patients with HIV attending CTC at MNH.

**Table 2 Association of common risk factors among men living with HIV on ARVS attending CTC at MNH with Erectile Dysfunction.**

	ERECTILE DYSFUNCTION		P VALUE
	PRESENT	ABSENT	
<b>Smoking</b>			
Yes	223 (68.2)	104 (31.8)	0.001
No	46 (49.5)	47 (50.5)	
<b>Diabetes Mellitus</b>			
Yes	3 (60)	2 (40)	0.85
No	266 (64.1)	149 (35.0)	
<b>Hypercholesterolemia</b>			
Yes	7 (58.3)	5 (41.7)	0.763
No	262 (64.2)	146 (35.8)	
<b>Hypertension</b>			
Yes	21 (63.6)	12 (36.4)	0.9999
No	248 (64.1)	139 (35.9)	
<b>LUTS</b>			
Yes	37 (56.1)	29 (43.9)	0.163
No	232 (65.5)	122 (34.5)	

Among the risk factors associated with erectile dysfunction, smoking was found to be statistically significant (P =0.001). Risk factors that were not included in the table above showed no statistical significance.

**Table 3 : The relationship between the severity of erectile dysfunction and common risk factors among men living with HIV attending CTC at MNH.**

Variable	GRADES OF ERECTILE DYSFUNCTION		P value
	Moderate and Severe	Mild ED	
<b>Age</b>			
20 – 39	8 (7.3)	102 (92.7)	< 0.001
40 – 59	58 (39.7)	88 (60.3)	
> 60	12 (92.3)	1 (7.7)	
<b>Marital Status</b>			
Married	74 (33.0)	150 (67.0)	< 0.001
Not Married	4 (8.9)	41 (91.1)	
<b>Depression</b>			
No	6 (13)	40 (87.0)	0.009
Yes	72 (32.3)	151 (67.7)	
<b>Duration of HIV Treatment</b>			
< 5 years	6 (8.5)	65 (91.5)	< 0.001
5 – 9 years	25 (21.9)	89 (78.1)	
10 – 15 years	35 (54.7)	29 (45.3)	
> 15 years	12 (60.0)	8 (40.0)	

The severity of erectile dysfunction was related to several demographics and disease characteristics. The severity of ED increased with advancing age. This was statistically significant ( $p < 0.001$ ). Patients who were married had more severe grades of erectile dysfunction compared to men who were not married ( $p < 0.001$ ). Erectile dysfunction was high among depressed compared to those who were not depressed ( $p < 0.05$ ). Patients who have been on HIV treatment for more than 15 years were more likely to present with severe erectile dysfunction compared to those who had been on treatment for a shorter duration ( $p < 0.001$ ).

**Table 4 logistic regression for Risk factors associated with ED among men living with HIV on ARVS attending CTC at MNH**

	Unadjusted OR ( 95% CI)	Adjusted OR ( 95% CI)
Age		
20 – 39	1	1
40 – 59	1.7(1.16-2.614)	1.75(1.15-2.65)
≥ 60	10.04(1.29-78.31)	8.73(1.09-69.61)
Employment		
Employed	1	1
Unemployed	1.56(0.92-2.66)	1.48(0.86-2.56)
Smoking		
Yes	2.19(1.37-3.500)	2.15(1.36-3.47)
No	1	1

There was a linear relationship between erectile dysfunction in HIV men on HAART with age ,where men aged more than 60 years were 8 times more likely to have ED compared to those with age less than 40. The chances of men living with HIV on HAART to have ED among smokers were 2 times more than non-smokers (P <0.001).

**Table 5 Logistic Regression showing association of common risk factors among men living with HIV on ARVS attending CTC at MNH with Severity of Erectile Dysfunction**

	Unadjusted OR ( 95% CI)	Adjusted OR ( 95% CI)
Age		
20 – 39	1	1
40 – 59	8.4(3.81-18.56)	5.01(1.95-12.91)
≥ 60	153(17.59-1330.9)	56.01(5.56-564.237)
Marital Status		
Married	5.1	4.07(0.927-17.92)
Unmarried	1	1
Depression		
Yes	3.2(1.29-7.84)	2.9(1.03-7.52)
No	1	1
Duration of Rx		
< 5	1	1
5 – 9	3.04(1.18-7.84)	1.84(0.671-5.031)
10 – 15	13.08(4.96-34.5)	5.01(1.71-14.70)
> 15	16.25(4.76-55.39)	16.80(3.68-76.68)

There was a linear relationship between the severity of erectile dysfunction in HIV men on HAART with an increase in age .The married men living with HIV on HAART were 4 times more likely to have higher grades of erectile dysfunction compared to un married men. However this did not have statistical significance on multivariate analysis. Depression had almost 3 times the risk of having a higher grade of erectile dysfunction compared to those who were not depressed. There was an increase of severity of erectile dysfunction among men living with HIV on HAART who have been using medication for more than 10years compared to those who have been on treatment for less than 10years.

## CHAPTER FOUR

### DISCUSSION

The prevalence of erectile dysfunction among men with HIV on ARVs was 64 %. Among the factors which were found to be associated with erectile dysfunction were increase in age , cigarette smoking , depression and duration of symptoms . The severity of erectile dysfunction was increasing with increase in age, depression and duration of symptoms.

HIV is one of the chronic illnesses which constitute a huge instigation in sexual function, this emphasizes how imperative it is to investigate on factors associated with erectile dysfunction among HIV patients in order to develop specific measures and strategies to improve on their way of life specifically the quality of sexual life.

The mean age of the respondents was  $40.9 \pm 9$  (23 – 68) years. These findings were consistent with the National HIV /AIDS indicator survey of 2005 (28), which showed that the most affected age with HIV is 20-49 years ,with a mean age of 36.5 years .The age group constitutes a period of maximum sexual actuality . An increase with age above 40 increases the risk of erectile dysfunction (29) .Therefore the age of the study population is significant as it portrays the age as one of the factors responsible to ED.

In the current study it was found that 64 % of patients had erectile dysfunction ranging from mild, moderate and severe with majority of the respondents with mild ED. The severity of ED increased with an increase in age, duration of treatment and almost 3 times more in those with depression compared to non-depressed. The prevalence of ED in this study was slightly lower compared to a study done by Perez et al in Spain which found the prevalence of erectile dysfunction among HIV patient on ARV to be 67% (10). In another study done by Thang Van Vo in Vietnam found a prevalence of erectile dysfunction to be 66.9% with 40.8% of the respondents with mild ED (34). Both studies shows a higher prevalence of erectile dysfunction .In this study it is also clear that majority of patients had mild symptoms which means if diagnosed early and timely intervention is done ,the magnitude of ED among the participants will reduce.

The study shows that the severity of ED increases with age which is the same as observed in study done by Asboe et al (17) that showed age more than 45 years was found to be statistically associated with increased risk of ED. Another study done by Nyalile et al showed that increase in age group of 40-54 to age of more than 55 years showed a higher



odds ratio from 5 and 11.7 respectively compared to participants aged 18-39 (30). Age was also a strong predictor of ED. In an Ethiopian study where men aged 40-59 were 6.5 times more likely to develop ED and those aged 60 years and above were 7 times more likely to develop ED compared to those aged 18-30 years (31). Their findings could be due to the fact that old age is associated with decreased testosterone levels, Loss of compliance of the penile sinusoids associated with increased deposition of collagen and decreased elastic fiber (32) but also older males are prone to vascular diseases, atherosclerosis ,hypertension ,as well as diabetes ,all these conditions can contribute to ED .

In this study, it was observed that patients who were married had a higher grade of erectile dysfunction compared to men who were not married, this was similar to another study done by Chew K et al where he found a prevalence of ED among married couples to be higher 38% than un married men and the findings were statistically significant(33) .In another study done in Vietnam by Thang Van Vo et al found a prevalence of erectile dysfunction among married men was 66.9% (34). The findings in this study can be explained due to stress in terms of socioeconomic status related to provide for the family basic needs that may have a negative impact to sexual function.

Patients who have been ARVs for 15 years were more likely to present with severe erectile dysfunction compared to those who had been on treatment for a shorter duration .This was similar to the study done by Asboe et al that found a significantly increased prevalence of dysfunction was in a quartile of patients with the longest duration of ARV treatment (greater than 81months) where the relative risk of moderate/severe EDF was approximately three times that seen in ARV naive individuals. This is due to associated metabolic and mitochondrial toxicities that might be related to cumulative exposure to ARVs which raises the possibility that erectile dysfunction may in some way be related to these toxicities. ED has been seen in association with peripheral neuropathy and is also hypothesized to be associated with endothelial dysfunction seen in forms of metabolic syndrome.

In this study cigarette smoking was two times more likely to cause erectile dysfunction among men living with HIV on ARVS compared to non-smokers . This association was found in a study done by Verze et al that found a higher risk of developing ED when compared with nonsmokers(12) .Millett et al examined factors associated with ED in a large representative sample of 8367 Australian men aged 16–59 yr , the adjusted ORs for ED in

this cohort were 1.24 (95% CI, 1.01–1.52;  $p = 0.04$ ) for those smoking <20 cigarettes per day and 1.39 (95% CI, 1.05–1.83;  $p = 0.02$ ) for those smoking >20 cigarettes per day, after adjusting for other confounding factors(14).

He et al examined the association between cigarette smoking and risk of ED among 7684 Chinese men aged 35–74yr.(35) .He found that the OR of ED was 1.41 (95% CI, 1.09–1.81) for cigarette smokers compared with those who have never smoked.(35).

Considerable evidence supports the concept that smoking related ED is mainly associated with endothelial impairment and reduction in nitric oxide (NO) availability. Cigarette smoking provokes different detrimental effects on the endothelial cells, based on architectural and functional changes that include decreased endothelial nitric oxide synthase activity, impaired endothelium-dependent vaso-relaxation, increased expression of cell adhesion molecules and trans endothelial migration of monocyte like cells, reduced response to vascular endothelial growth factor, and impaired regulation of important thrombotic factors.

In this study depression had almost 3 times the risk of having ED compared to men who were not depressed. This was slightly higher compared to a study done by Sugimori et al in Japan, which showed that, the odds ratio for an association between erectile dysfunction and depression was 2.02 (36). In a cross national study between Brazil, Italy, Japan, and Malaysia, depression was shown to be associated with erectile dysfunction in a graded manner, and men with erectile dysfunction were 2.09 times more likely to have depression (37) .Another study done by Araujo et al, the estimated odds ratio for erectile dysfunction was 1.82 in the presence of depressive symptoms (38). This may be explained by the feeling of guilt from having acquired HIV via sexual transmission may be a mental factor that negatively influences the sexual response or stigma from the peers and close family members. Conversely, it has also been shown that erectile dysfunction independently may cause or exacerbate depressive moods (39).

Among the participants with Lower urinary tract symptoms 56.1 % had erectile dysfunction though it was not statistical significant. This is compared to a study done by Liang et al who found a prevalence of erectile dysfunction to be 82.16% in patient aged from 40-80 years (23).A study done by Athuman et al in Muhimbili National hospital that showed a prevalence of 81% , with a higher percentage of ED among respondents more than 40 years of age compared to patients less than 40 years ,indicating an additional risk factor of age in combination with lower urinary tract symptoms is a risk factor in causing erectile

dysfunction (40) . In another study done by Mondul et al found that Men with severe lower urinary tract symptoms had a statistically significant 40% higher risk of erectile dysfunction than men without lower urinary tract symptoms ,the risk of erectile dysfunction increased with increasing lower urinary tract symptom severity (22).The lower prevalence may be explained by a high population group of 2000 respondents in the study done by Mondul et al and low attendance among men living with HIV bothered by lower urinary tract symptoms to seek help in urology clinics rather than in Care and Treatment Clinic

### **Study Limitations and Mitigations**

1. Since erectile dysfunction is an embarrassing condition for men, there is a possibility that some patients might be giving false answers. Therefore, the interviews were conducted in a private environment to ensure confidentiality.
2. There might be unnoticed bias from data collection tools and research assistants through their own understanding which might have influenced responses through interviewer's bias. The interviewers were thoroughly trained on the data collection exercise and supervised.
3. The CD4 count and viral load of the patients were not taken during data collection, as these factors may influence ED. There is a need to conduct more studies which will include the CD4 and viral load in the data collected.

## CHAPTER FIVE

### CONCLUSION AND RECOMMENDATIONS

#### Conclusions

Erectile dysfunction among men living with HIV on ARVs was found to be 64%. Forty six percent of those with erectile dysfunction had mild ED and only 1% had severe ED.

Among the factors found to be associated with erectile dysfunction was an increase in age, cigarette smoking, duration of treatment and depression.

#### Recommendation

- These results demonstrate the impact of ED among men living with HIV on ARVs. There is a need of community apprehension and education programs to raise awareness among men about existence of ED, its consequences, the associated factors and direct them to the appropriate clinic where they can be treated.
- Special attention should be paid to the psychological factors, such as depression, which is so frequent in the HIV-infected population. This study demonstrates the importance of enquiring about ED during routine HIV consultations and prompt referral to urology clinic and psychiatric clinic for further management.

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## **APPENDICES**

### **APPENDIX 'A'**

#### **ERECTILE DYSFUNCTION STUDY QUESTIONNAIRE- ENGLISH**

PLEASE COMPLETE ALL QUESTIONS BY CROSSING THE RELEVANT BLOCKS OR  
FILL IN ANSWERS IN BLANK BLOCKS

##### **A: DEMOGRAPHIC DETAILS**

The following questions are general questions:

I. Study number:

II. Date of interview

III. Name of interviewer

IV. Name of CTC

1. Address:

2. How old are you?

3. What is your education level?

i. Not educated

ii. Primary

iii. Secondary

iv. College/ university

4. Occupation:

i. employed

ii. Unemployed

5. What is your current marital Status?

i. Married

ii. Not married

6. Do you smoke? Yes            No

if no, have you ever smoked? Yes            No

7. Do you suffer from any of the following: (tick where applicable).

i. Diabetes

ii. High blood pressure

iii. High cholesterol

iv. Prostate disease

v. Ischemic heart disease    vi. Pelvic injuries

8. Are you being treated for any of the above ?    Yes                      No  
     a)if yes mention the medication you are using ?
9. Have you suffered from lower urinary tract symptoms ?(frequency ,urgency , nocturia ,weak stream , intermittency ,incomplete bladder emptying and straining )  
     a) if yes ,are you being treated for the above symptoms ?  
     b) Have you ever been operated for the above symptoms?  
     c) if yes , which type of surgery ? - open                                      - endoscopic
10. How long has it been since you were diagnosed with HIV ?
11. When did you start HIV treatment ?
12. Do you keep all medical appointments and taking HIV medicines every day and exactly as prescribed ?  
     Yes                      No
13. Which medications are you using for HIV?
- 14.For the past 2 weeks have you experienced , have you ever experienced any of the following depression symptoms?
1.     Depresses mood
  2.     Loss of interest and enjoyment
  3.     Energy loss and reduced activity
  4.     Disturbed sleep
  5.     Guilt and suicidal ideation
  6.     Unhappy
  7.     Self harm
  8.     Disturbed appetite
  9.     Reduced self esteem and self confidence
  10.    Reduced concentration and attention
15. Are you experiencing loss of libido ?  
     Yes                      No

## APPENDIX B: QUESTIONNAIRE (KISWAHILI VERSION)

### UPUNGUFU WA NGUVU ZA KIUME KWA WAISHIO NA VIRUSI VYA UKIMWI

#### A.UTAMBULISHO .

- I. MSIMBO .....
- II. Tarehe ya usaili ...../...../2020.
- III. Jina la msaili .....
- IV. Jina la kliniki .....

#### TAARIFA BINAFSI

- 1) Umri .....
- 2) Kiwango cha elimu .....
- 3) nafanya kazi gani .....
- 4) Taarifa ya muhusiano ya kimapenzi
  - Umeoa .....
  - Sijaoa.....
  - Naishi na mwenza kwa muda usiopungua miezi sita .....
  - Tumetengana.....
  - Mengineyo taja .....
- 5) Je unavuta sigara  
Ndio .....Hapana .....
- 6) Kama la je umewahi kuvuta sigara mda uliyopita ?.....
- 7) Je unaugua magonjwa yafuatayo
  - Kisukari .....
  - Shinikizo la damu .....
  - Ongezeko la mafuta mwilini.....
  - Ugonjwa wa tezi dume .....
  - Maradhi ya moyo .....
  - Ajali ama kuumia sehemu ya kiuno(pelvic injuries .....
- 8) Je unapokea matibabu ya magonjwa yoyote uliyo jibu  
.....?  
Kama ndio , taja matibabu unayotumia .....

9) Je umewahi kuhisi(kwenda haja ndogo mara kwa mara,kutoweza kuzuia haja ndogo ,kujikamua wakati wa kujisaidia haja ndogo ,haja kukatika kabla ya haja kuisha ,kuamka mara kwa mara usiku kwa ajili ya kujisaidia haja ndogo ,hisia ya haja ndogo kutoisha.....

a) Kama ndiyo ,je umewahi kutumia dawa ?.....

b) Ama kufanyiwa upasuaji kwa ajili ya matatizo hayo? .....

c) Ni aina gani ya upasuaji ndio uliyofanyiwa ?

Upasuaji wa endoskopia (TURP).....upasuaji ufunguaji (open surgery ).....

10) Tarehe ya kujiunga na kliniki .....

11) Unatumia dawa za kupunguza makali ya virusi vya ukimwi(ARVS)

Ndio .....hapana .....

12) Kama ndiyo , tarehe uliyo anza kutumia dawa .....

13) Je unahakikisha una hudhuria tarehe zote za kliniki ya virusi vya ukimwi bila kukosa na unatumia dawa bila kukosa ?

Ndio .....laa.....

14) Je unatumia dawa zipi za virusi vya ukimwi?.....

15) Je umewahi kuhisi dalili zozote zifwatazo ?

1. Unyogovu .....

2. Kupoteza hamu ya kufanya shughuli za kawaida na furaha.....

3. Kupoteza nishati ya kufanya kazi.....

4. Usumbufu katika kupata usingizi.....

5. Kupoteza furaha maishani .....

6. Mawazo ya kujiumiza au kujisababishia madhara .....

7. Mawazo ya kujiua .....

8. Kupoteza hamu ya kula .....

9. Kujithamini chini au kujiamini chini.....

10. Upungufu wa umakini unavyo vifanya .....

16) Je umewahi kuhisi upungufu wa nyege au ashiki mwilini.....

Ndio .....la.....



## APPENDIX C: IIEF QUESTIONNAIRE

These questions ask about the effects your erection problems have had on your sex life over the past 6 months. Please answer the following questions honestly and clearly as possible. In answering these questions, the following definitions apply:

### IIEF QUESTIONNAIRE

#### IIEF QUESTIONNAIRE

Over the Past 6 Months:	1	2	3	4	5
How do you rate your confidence that you could get and keep an erection?	Very low	Low	Moderate	High	Very high
When you had erections with sexual stimulation, how often were your erections hard enough for penetration?	Almost never or never	Much less than half the time	About half the time	Much more than half the time	Almost always or always
During sexual intercourse, how often were you able to maintain your erection after you had penetrated (entered) your partner?	Almost never or never	Much less than half the time	About half the time	Much more than half the time	Almost always or always
During sexual intercourse how difficult was it to maintain your erection to the completion of intercourse?	Extremely difficult	Very difficult	Difficult	Slightly difficult	Not difficult
When you attempted sexual intercourse, how often was it satisfactory for you?	Almost never or never	Much less than half the time	About half the time	Much more than half the time	Almost always or always

NOTE: The IIEF-5 score is the sum of questions 1 to 5. The lowest score is 5 and the highest score 25. Lower scores indicate higher perceived erectile dysfunction (Rosen, Cappelleri, Smith, Lipsky, & Pena, 1999).

**APPENDIX D: KISWAHILI VERSION OF IIEF  
UPUNGUFU WA NGUVU ZA KIUME .**

Katika kipindi cha miezi sita iliyopita: Unajilinganisha vipi kwamba ulijiamini kuwa na uwezo wa kusimamisha uume wako na kudumisha kuendeleza mdindo huo?	Kiasi kidogo sana 1	Kiasi kidogo 2	Kiasi 3	Kiasi kikubwa 4	Kiasi kikubwa Sana 5
Wakati uume wako umesimama kufuatia hamasa kutoka kwa mwenzi wako : Ni mara ngapi mdindo huo ulikuwezesha (ulikuwa na nguvu ya kutosha )kumuingia mwenzi wako?	Karibu haikuwezekana Haikuwezekana a 1	Mara chache chini ya nusu mara nilizojaribu 2	Mara nyingi ,nusu ya mara zote nilizojaribu 3	Nilifanikiwa mara nyingi zaidi ya nusu nilizojaribu 4	Karibu mara zote nilifanikiwa 5
Wakati wa tendo lenyewe (ngono ):Ni mara ngapi uliweza kudumisha mdindo (kuendelea kusimama) baada ya kumuingilia mwenzi wako?	Karibu haikuwezekana Haikuwezekana a 1	Mara chache chini ya nusu mara nilizojaribu 2	Mara nyingi ,nusu ya mara zote nilizojaribu 3	Nilifanikiwa mara nyingi zaidi ya nusu nilizojaribu 4	Karibu mara zote nilifanikiwa 5
Wakati wa tendo lenyewe (ngono ):je ni vigumu kiasi gani kudumisha uume uliyosimama (mdindo ) hadi mwisho wa tendo ?	Ni Vigumu kupata kiasi 1	Ni Vigumu kupata 2	Ni Vigumu 3	Ni Vigumu kiasi 4	Hakuna ugumu 5
Uipojaribu kufanya ngono (tendo la ndoa):Ni mara ngapi umeridhika na tendo hilo ?	Karibu haikuwezekana Haikuwezekana a 1	Mara chache chini ya nusu mara nilizojaribu 2	Mara nyingi ,nusu ya mara zote nilizojaribu 3	Nilifanikiwa mara nyingi zaidi ya nusu nilizojaribu 4	Karibu mara zote nilifanikiwa 5

To IIEF -5 score is the sum of the ordinal response to the five item. Thus ,the score can range from 5-25.severity categorization of ED :Score 5-10,severe ED; Score 11-15, moderate ED, Score 16-20,mild ED; Score 21-25 ,normal ED.

### ICD 10 Depression symptoms

SYMPTOM	SCORE
Depressed mood	1
Loss of interest	1
Reduction in energy	1
Inapropriate guilt	1
Suicidal ideation	1
Lack of concentration	1
Agitation	1
Sleep disturbance	1
Loss of appetite /loss of weight	1

### ICD 10 DEPRESSION SCORE

MILD	4
MODERATE	5-6
SEVERE	MORE THAN 7

**APPENDIX E: INFORMED CONSENT FORM (ENGLISH VERSION )**

MUHIMBILIN UNIVERSITY OF HEALTH AND ALLIED SCIENCES DIRECTORATE  
OF RESEARCH AND PUBLICATIONS ,MUHAS CONSENT FORM

CODE NO -----

CONSENT TO PARTICIPATE IN THE STUDY ON ERECTILE DYSFUNCTION IN HIV  
PATIENTS IN DARESSALAM IN 2020

Greetings ,

My name is Dr Tariq Esmail Essajee,

I am a post graduate student at urology department in MUHAS,

**PURPOSE OF THE STUDY :**

The study seeks to determine factors associated with erectile dysfunction among HIV patients in Dares salam.

**WHAT THE PARTICIPATION INVOLVES :**

If you agree to participate in the study ,you will be interviewed and detailed clinical history regarding your illness will be requested .

**CONFIDENTIALITY:**

The information you give in this research be treated great confidentially .all information collected in questionnaires will be entered into computer with an identification number .

The information will be used only for the purpose of this research alone .

**RIGHT TO WITHDRAW AND ALTERNATIVES:**

Taking part in this study is completely your choice .if you choose not to participate in the study ,you will continue to receive all services that you would normally get from the clinic.

**BENEFITS:**

If you agree to take part in this study ,and if you have erectile dysfunction ,you will receive professional advice on how to deal with the situation.

**RISK :**

There are no risks in participating In this study .

**Who to contact :**

If you have any question about the study ,you should contact Dr Tariq Essajee ,telephone number 0789714847.

Do you have any question ?

Signature

Do you agree?

Participant address .....participant doesn't agree

.....

I .....have read the consent form.

My questions have been answered .i agree to participate in this study

Signature of participant .....

Signature of witness.....

Date of signs consent .....

**APPENDIX F: INFORMED CONSENT FORM (KISWAHILI VERSION)**

**KUKUBALI KUSHIRIKI KWENYE UTAFITI.**

NAMBA YA SIRI .....

KUKUBALI KUSHIRIKI KATIKA UTAFITI WA NGUVU ZA KIUME KWA WAGONJWA WA VIRUSI VYA UKIMWI ,DARE SALAM 2020.

Salaam,

Mimi naitwa Dr Tariq Esmail .

Ni mwanafunzi wa uzamili katika idara ya upasuaji ,chuo kikuu cha tiba na sayansi cha afya Muhimbili.

**MADHUMUNI YA UTAFITI**

Kuchunguza tatizo la upungufu wa nguvu za kiume kwa wagonjwa wa virusi vya ukimwi.

**JINSI YA KUSHIRIKI.**

Kama utakubali kushiriki ,utafanyiwa usaili na kuulizwa maswali kuhusu historia ya ugonjwa wako.

**USIRI .**

Taarifa zote utakazotoa kwenye utafiti huu zitatunzwa kwa usiri mkubwa .Taarifa zitakazo kusanywa zitaingizwa kwenye tarakilishi ,zikiwa namba ya siri .taarifa zitatumika kwa ajili ya utafiti huu tu .

**HAKI YA KUJITOA KWENYE UTAFITI .**

Kushiriki kwenye utafiti ni hiari yako.

Kama utachagua kutoshiriki ,utaendelea kupata huduma za afya kama kutoka hospitalini kama awali.

**FAIDA .**

Iwapo utakubali kushiriki katika utafiti huu na iwapo una tatizo la upungufu wa nguvu za kiume ,utaweza kupata ushauri wa kitaalamu jinsi ya kukubaliana na tatizo hili .

**ATHARI .**

Hakuna athari zozote utakazozipata kutokana na ushiriki huu.

**NANI WA KUWASILIANA NAYE ?**

Endapo unahitaji kupata maelezo yoyote kuhusu utafiti ,wasilliana na Dr Tariq Esmail ,namba ya simu 0789714847,

**UNA MASWALI?**

Je unakubali kushiriki kwenye utafiti ?

Ndiyo ..... Hapana .....

Mimi .....nimeelezwa /nimesoma maelezo haya .maswali  
yangu yamejibiwa .

Nimekubali kushiriki kwenye utafiti huu.

Sahihi ya mgonjwa .....

Sahihi ya ndugu /shahidi .....

Sahihi ya mtafiti .....

Tarehe .....