MAGNITUDE OF OPPORTUNISTIC INFECTION AND ASSOCIATED FACTORS AMONG HIV INFECTED INDIVIDUALS ATTENDING CARE AND TREATMENT CLINICS IN DAR ES SALAAM REGION.

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School of Public Health and Social Sciences

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By

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A Dissertation submitted in (Partial) Fulfillment of the Requirement for the Degree of Master of Science in (Epidemiology and Laboratory Management) of Muhimbili University of Health and Allied Sciences

October, 2020

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Allied Sciences a dissertation entitled: "***Magnitude of opportunistic infection and associated factors among HIV infected individuals attending care and treatment clinics in Dar es Salaam region*****"** in (partial) fulfilment of the requirement for the Master of Science in (Epidemiology and laboratory management) degree of Muhimbili University of Health and Allied Sciences

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Dr Agricola Joachim (MUHAS supervisor)

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Date

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Dr Rogart Kishimba (FELTP supervisor)

.....

Date

DECLARATION AND COPYRIGHT

I **Doris Andrew Njelekela,** declare that this **dissertation** is my own original work and it has not presented and will not be presented to any other University for a similar or any other degree award.

Signature……. Date…….

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DEDICATION

This dissertation is dedicated to my lovely husband Venkat Narsinga Rao, My sons Isaac, Prince and my lovely daughter Angel.

ABSTRACT

Background: Opportunistic infection is an infection caused by pathogens (bacteria, viruses, fungi, or protozoa) that affect a host with a weakened immune system. Human immunodeficiency virus (HIV) is the most common cause of immunosuppression which exposes individuals to opportunistic infections (OIs). OIs remain the major driver of HIV-associated morbidity and mortality. About 90% of HIV-related morbidity and mortality are caused by OIs.

Objective: This study aimed to determine the magnitude and spectrum of OIs and associated factors among HIV infected individuals attending care and treatment clinics in Dar es Salaam region.

Methodology: A cross-sectional study was conducted among people living with HIV attending care and treatment clinics in Dar es Salaam region. Structured questionnaires were used to collect social demographic information, while check list were used to extract clinical characteristics from client's CTC2 card/file. Data were entered, cleaned and analyzed by Epi Info. version7, SPSS version 20 and Stata software version 15.

Results: A total of 382 HIV infected individuals were enrolled in this study, the majority 232 (43.19%) were aged between 31-45 years and the mean age was 40 ± 13 years. Sex was disproportionately distributed with female predominance 220 (57.59 %). The overall prevalence of OIs was 89 (23.3%). The leading OI observed in this study was tuberculosis 58(15.2 %), CD4 [aOR = 13.61: 95% CI 6.09 – 30.38] p<0.001, IPT prophylaxis [aOR= 4.10: 95% CI 1.97-8.53] p<0.001, WHO stage 4 [aOR = 6.37: 95% CI 1.47-27.61] p=0.013, Divorced individuals [aOR= 3.57: 95% CI 1.43- 8.90] p=0.006, male [aOR= 3.04: 95% CI 1.50-6.17] p=0.007, hemoglobin level <11.0 g/dl [aOR=2.25: 95 CI 1.14–4.47] p=0.020, Education of primary and below [aOR=4.31: 95% CI 1.8-10.32] p=0.001 showed significant association with OIs.

Conclusions: There was still remarkable prevalence of OIs observed in this study which need to be addressed. CD4 count of ≤ 200cells/uL, advanced WHO clinical stages, not use of IPT prophylaxis, anemia and low education level were found to be predictors of OIs.

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ABBREVIATION

ART	Antiretroviral Therapy
AIDS	Acquired Immunodeficiency syndrome
CD4	T-lymphocyte bearing CD4 receptor
CPL	Central Pathology Laboratory
CI	Confidence Interval
CDC	Centers for Disease Control and Prevention
GPYC	Gram Positive Yeast Cell
HVL	HIV Viral Load
IPT	Isoniazid Preventive Therapy
LMICs	Low and Middle Income Countries
MUHAS	Muhimbili University of Health and Allied Sciences
MN	Mwananyamala
OIs	Opportunistic Infections
PLHIV	People Living with HIV
PCR	Polymerase Chain Reaction
PCP	Pneumocystis carinii pneumonia
POC	Point of Care
SDA	Sabouraud Dextrose Agar
TMK	Temeke
RRH	Regional Referral Hospital

DEFINITION

Opportunistic infection is an infection caused by pathogens (bacteria, viruses, fungi, or protozoa) that take**s** advantage of an opportunity not normally available, such as a host with a weakened immune system, an altered microbiota (such as a disrupted gut microbiota), or breached integumentary barrier.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Opportunistic infection (OI) is an infection caused by pathogens (bacteria, viruses, fungi, or protozoa) that take**s** advantage of an opportunity with a weakened immune system, an altered microbiota (such as a disrupted gut microbiota), or breached integumentary barriers of an infected individual (1,2). Human immunodeficiency virus (HIV) infected individual**s** are more at risk of acquiring OIs due to immunosuppression (3). Opportunistic infections (OIs) remain the major driver of HIV-associated morbidity and mortality, accounting for the substantially higher mortality observed in Low and Middle Income Countries (3). About 90% of HIV-related morbidity and mortality are caused by OIs (5). More than 40% of HIV infected patients develop OIs at some stage (5,6). Most of these infections are curable and early prevention, diagnosis and treatment will improve quality and duration of life of people living with HIV (PLHIV) (7). The antiretroviral treatment (ART) impact on specific OI has not been well documented in our settings (8). Reliable data on the relative burden of different OIs among PLHIV who are on ART in different geographic regions is critical for planning of health services, including procurement of relevant drugs and diagnostics (8).

Test and treat helped to increase life span and decreases the incidence of OIs in PLHIV through reducing of the viral load and increasing CD4 cells/uL (6,9). In Low and Middle income country CD4 count found to be major predictor of OIs and most of the clients who have CD4 <200cells/uL were presenting with WHO stage III and IV and were prone to OIs (5). WHO recommended treating all HIV-infected individual upon diagnosis regardless of their disease stage. Tanzania adopted the test and treat strategy which was in cooperated in National Guideline for management of HIV and AIDS in 2017 (10). This efforts have resulted into drop of HIV incidence rates from 0.93% in 2016 to 0.28% in 2017 (10,11).

OIs like Candida esophagitis, *Pneumocystis carinii* pneumonia (PCP), active pulmonary tuberculosis, *Mycobacterium avium* complex (MAC), cytomegalovirus (CMV), Cryptococcal meningitis, Kaposi's sarcoma (KS) and Herpes zoster are prevalent in HIV patient globally.

However in Tanzania the most common OIs are oral candidiasis, candida esophagitis, *Mycobacterium tuberculosis*, bacteria pneumonia and *Pneumocystis carinii* pneumonia (5,7,13)

1.2 Problem statement

Tanzania is among the seriously HIV/AIDS affected countries in sub-Saharan Africa, with more than 1.5million people living with the virus. The prevalence of HIV among adult in Tanzania was estimated at 4.5% in 2017 (14). Despite the HIV burden, Tanzania has manage to control the epidemic by scaling up access to ART thus minimizing the impact by reducing number of new infection as well as AIDS related illness (14). Even with the effort made, OIs still remain the major driver of HIV-associated morbidity and mortality, accounting for the substantially higher mortality observed in Low and Middle Income Countries including Tanzania (8).

Treat all strategy which started in 2017 recommended initiation of ART within 7 days after confirming that client is HIV infected. This strategy aimed to reduce the risk of OIs among PLHIV, knowingly people will test while their immune are still good, but people don't have habit of medical checkup. They show up to treatment centers when they are already affected with OIs. They test for HIV after being advised, by clinician while seeking treatment for OIs.

Study done in Low and Middle income countries in 2019 showed that; one third of clients enrolled to care and treatment when their condition already is in advanced stage with severe immunosuppression with CD4 count of <200cell/uL (15)**.** These late presenters are prone to OIs, hence testing of CD4 and OIs screening at baseline is very important, however difficulties in implementing guideline increase risk of OIs as well as morbidity and mortality among PLHIV(15).

The overall magnitude of OIs in our setting is not well documented. However there are several studies done that focused only on single type of OI among PLHIV.

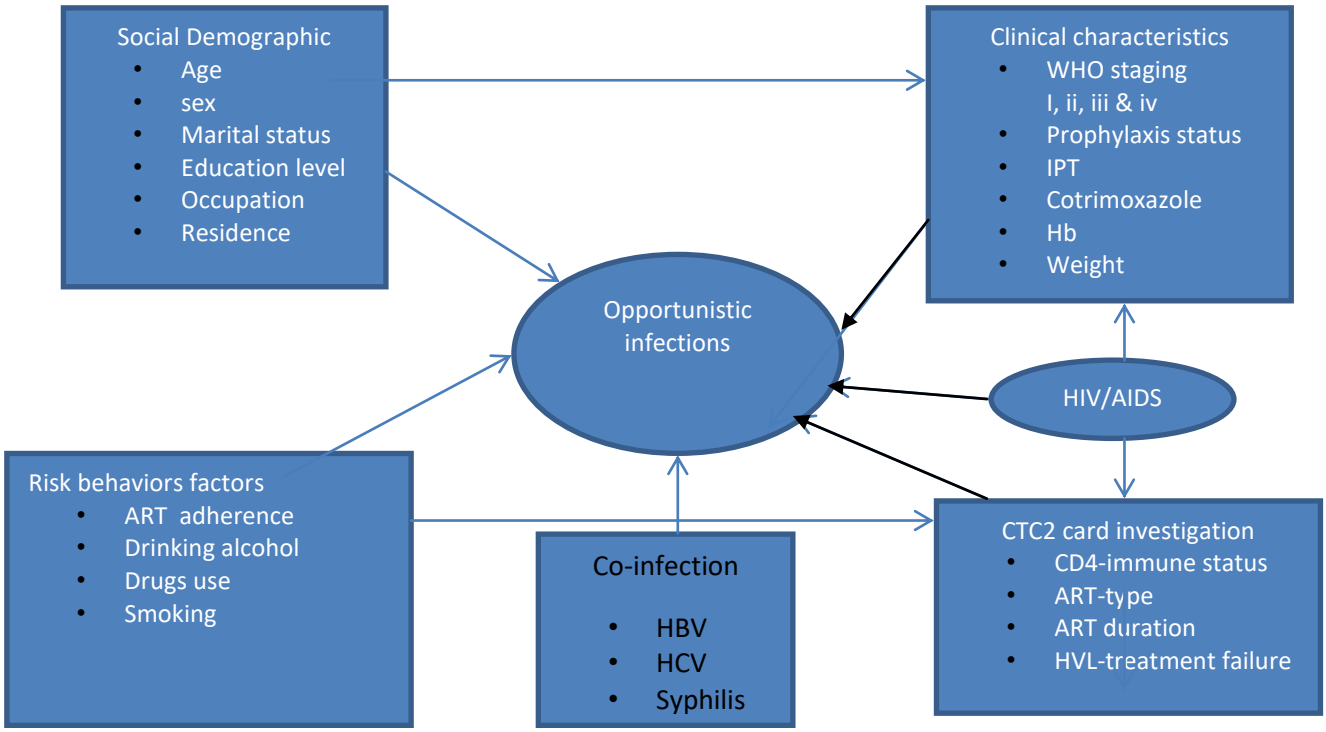
A study done on Cryptococcal infection among PLHIV in advanced stage in Kilombero and Ulanga Districts revealed that 3.7% tested positive for CrAg of which 75% of them died (16). Similarly, the study done by Kalolella et al which assed the prevalence of OIs and associated pregnancy complication among HIV positive women giving birth in hospitals of Dar es

Salaam Tanzania, showed that among 105 participant 63 (60%) were diagnosed with OIs (17). In a study done in Bukoba among 391 adult receiving ART showed that 43(11%) developed TB (18). Laboratory play major role in monitoring the responses to ART including testing of CD4 count, and viral load to insure early detection of indicators associated with OIs as well as early screening of OIs for early intervention.

1.3 Conceptual framework

This conceptual framework summarises the study on Magnitude of opportunistic infection and the factors associate with OIs in PLHIV where by there are two types variables dependent variable and independent variables. Where by dependent variables are OIs and Independent variables are CD4 counts, WHO staging, ART type, Hemoglobin level, IPT and Cotrimoxazole Prophylaxis, Age, Sex, Marital status, Residence, ART Adherence, Occupation, Education level, Smoking and Alcohol Drinking are thought to have effect on OIs by direct or indirect efects on it. (Figure: 1)

Figure 1: Conceptual frame work



Additionally, co-infection variables were also assessed since have impact on patient's management although wasn't the focus of this study.

1.4 Rationale

Data obtained from this study will be used to guide the planning of health services including procurement of relevant reagents for diagnosis and drugs for patient management of OIs, because these infections are treatable and they can be well monitored in various level of linkage to care and during care and treatment (7).

This will enable CTC in Dar es Salaam to plan well on prevention, diagnosis, care and treatment of PLHIV and thus reducing opportunistic infections attributable morbidity and mortality.

1.5 Research question:

1. What is the magnitude of opportunistic infections among PLHIV attending care and treatment clinics in Dar es Salaam region?
2. What are the associated factors among PLHIV attending care and treatment clinics in Dar es Salaam region?
3. What is spectrum of opportunistic infection among PLHIV attending care and treatment clinics in Dar es Salaam region?

1.6 Broad objective

To determine magnitude and spectrum of opportunistic infection and associated factors among HIV infected individuals attending care and treatment clinics in Tanzania.

1.6.1 Specific objectives

1. To determine magnitude of opportunistic infections among PLHIV attending care and treatment clinics in Dar es Salaam.
2. To assess factors associated with opportunistic infections among PLHIV attending care and treatment clinics in Dar es Salaam.
3. To identify and characterize opportunistic infections among PLHIV attending care and treatment clinics in Dar es Salaam.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Magnitude of opportunistic infection

OIs occurs as result of depletion of immune system especially CD4+ T cells and this occur commonly to PLHIV which is causing approximately 90% morbidity and mortality to PLHIV (6)**.** The extensive use of (ART) have the most intensive impact on reducing opportunistic infection related mortality on HIV infected individuals in the countries where ART are accessible and cheap. All over the word it has been proved to prevent a lot of deaths due to increased use of ART (6). However mortality of PLHIV is still high compared to general population because some clients do not have constant response on ART for several reasons including poor adherence, loss to follow up, drug toxicities, drugs interaction, drug resistance and strain of HIV-1 (6). In the United states the incidence of OIs among PLHIV has decreased dramatically due to the receiving routine outpatient care by giving effective OIs prophylaxis and most important is the use of combination of antiretroviral therapy (19). It is very hard to find OIs among PLHIV attending care and treatment in USA. OIs in America occur in HIV infected individual who are unware that they have HIV infection, they present emergence care with OIs as initial indicator of late stage of disease and those who are unable to take ARV due to several reasons (19). In Nigeria the prevalence of OIs is (22.4%) this is due to introduction of Highly Active Therapy (HAART) which led decline of OIs among HIV infected individuals in high income setting including Nigeria (20). In Ethiopia retrospective cross-section study was done by reviewing patient's cards and ART registry by using prepared checklist, where by 744 information of HIV infected individuals were collected. Out of 744, 658 (88.4%) develop opportunistic infection (5). In Tanzania the overall magnitude of OIs is not done however the study is done in single region, special group and in single OIs. For example in Dar es Salaam among 105 pregnant women living with HIV 63(60%) had OIs (17). So this study done in single region in single population of pregnant mothers, likewise in northern Tanzania 11% of HIV infected individuals who are in ART developing TB (18). Nevertheless in Kilombelo 3.7% of PLHIV found to have Cryptococcal infection and 75% died (16).

2.2 Associated factors between HIV/AIDS and opportunistic infections

There are many associated factors between AIDS and OIs, but mostly mentioned factors in many literatures are as follows: CD4, WHO staging, ART adherence, age, education level, occupation, place of resident and weight. However, WHO staging, CD4 and ART adherence showed significant association with opportunistic infections (5, 7, 9, 14). In Low and Middle income countries, CD4 count found to be major predictor of OIs and most of the clients who have CD4 <200cells/uL were presenting with WHO stage III and IV and were prone to OIs (5). The study done in Ethiopia showed that there were no much different of infection of OIs between male and female, more OIs were found in the age group 30-39, secondary school level and the rural dwellers, but it was not statistically significant. Client who presented with WHO stage III and IV were more likely to develop OIs compared to those presented with WHO stage I. And the client who had CD4 count <200 cells/uL were more likely to develop OIs than those clients with the higher CD4 count. Not only that but also client who were bedridden and ambulatory were likely to develop OIs compared to client at work during ART initiation. In addition to that clients who were not given cotrimoxazole and INH prophylaxis were more likely to develop OIs compared to those who were on cotrimoxazole and INH prophylaxis (23). The study done in Uganda reveled that OIs were more in woman, clients with low education level of none or primary and to clients with very low social economic status (24).

In Tanzania factor associated with OIs are not well documented, nevertheless CD4 count and WHO staging were mentioned in study done on Cryptococcal infection among PLHIV in advanced stage in Kilombero and Ulanga Districts (16). It is important to note that dealing with these factors, early diagnosis, early treatment and documentation of OIs in PLHIV will help to improve their life span (8)

2.3 Characterizations of opportunistic infections

The spectrum of opportunistic infection differs between High income country and Middle and Low income countries. The studies shows that in developed countries the common opportunistic infections are well documented which lead to increase in survival of PLHIV however there is shift in pattern of comorbidities with an increase of chronic liver diseases due

to hepatitis B and C, cardiovascular disease and Non AIDS malignancies (8). In Middle and Low income countries OIs remain major driver of HIV related morbidity and mortality (15). In several studies the Oral candidiasis, Pulmonary tuberculosis, Cryptococcus meningitis and pneumonia are the commonest OIs, however bacterial meningitis and Pulmonary Tuberculosis found to be leading cause of deaths in PLHIV (5). Likewise in East china Pneumocystis pneumonia and bacterial infection found to be leading by 42.1% followed by Tuberculosis 31.4% (21). However the study done in India showing that the leading OI is Pulmonary tuberculosis accounting for 28.07 % followed by oral candidiasis 18.79 % (22). Nevertheless in a meta- analysis studies from Middle and Lower income countries revealed the leading OIs among people living with HIV is Pulmonary tuberculosis, *Pneumocystis carinii* pneumonia and Oral candidiasis (8). In Tanzania the commonest OIs among PLHIV are TB, Upper respiratory tract infection, meningitis, diarrhea and septicemia (7).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study design

A cross-section study was conducted among HIV infected individuals attending care and treatment clinics in Dar es Salaam region

3.2 Study area

This study was conducted in Dar es salaam region which is situated at eastern side of Tanzania. Region have five districts namely Ilala, Temeke, Kinondoni, ubungo and kigamboni. Study was done in three districts representing Dar es Salaam region, namely Ilala, Temeke and Kinondoni and each district one referral hospital was selected to present district where by MNH from Ilala district, Temeke Regional Referal hospital (RRH) presenting Temeke district and Mwananyamala RRH representing kinondoni district.

HIV care and treatment clinic at MNH usually run six days in a week, receiving clients from Ilala district and other district as referral clients, as well as referral from all over Tanzania with approximately 100 clients in attendance per day, making approximately a total of 600 clients attending CTC per week. Mwananyamala RRH receiving clients from Kinondoni district running six days in the week and each day receive approximately 50-60 clients which make a total of 300-360 clients attending CTC per week. Temeke RRH situated at Temeke district receiving clients from Temeke districts also run six days in the week, in average receives 50-70 clients per day makes total of 300-420 clients per week.

3.3 Study population

HIV infected patients both adult and children attending care and treatment clinics in Dar es Salaam region.

3.4 Sample size determination

From calculation using prevalence of 30% obtained from different related study in Tanzania and nearby countries where it ranges from 20% to 60% then the average is 30% (17,25,26).

By using prevalence formula and power of study of 80% with 95% confidence interval sample size was 323 clients 15% refusal then sample size was 380 clients as shown in section 3.4.1 sample size calculation.

3.4.1 Sample size calculation

$$N = \frac{Z^2 P(1-P)}{d^2}$$

N = Sample size

Z = Z Statistic for level of confidence

P=Expected prevalence of OIs is 30% prevalence P=0.3

d=Precision if 5% d=0.05

For 95% confidence interval Z=1.96

$$N = \frac{1.96^2 \times 0.3 \times (1-0.3)}{0.05^2} = 323 \text{ sample size}$$

15% of refusal =100-15=85%=85/100=0.85

323/0.85=380

N= 380 Clients

Prevalence of OIs is ranging from 20% to 60%. Average prevalence is 30%.

3.4.2 Inclusion criteria

HIV infected individuals attending care and treatment clinics and newly enrolled clients at facility in Dar es Salaam, region.

3.4.3 Exclusion criteria

Those who are dumb, deaf and psychotic were excluded from the study.

3.5 Sampling technique

The sampling technique was systematic random sampling. The district and hospitals were pre-selected conveniently which were Ilala, Temeke and Kinondoni districts which present Dar es Salaam region. In each district one hospital was selected conveniently.

Proportional to size was used to calculate sample size for each hospital. In each hospital systematic random sampling were done whereby a list of all HIV infected individuals attending clinic and newly enrolled clients were obtained in each selected hospital, in order to determine the cumulative population (N). We divided the total population with sample size (n) to determine the sampling interval (k). So in each hospital interval was known then first client was selected randomly from first client to k^{th} client. There after every k^{th} client in the list was selected until we got the desired sample size (n).

Information was collected from patient by using standard questionnaire as well standard check list prepared in English and Swahili, then social demographic variables was provided by clients where we had face to face talk, then other information of OIs and associated factors were obtained from CTC2 card as well as patient file. Some samples of OIs screening were collected based on clinical diagnosis during consultation and findings on patient file. More clarification on kind of samples collected is provided in the section of sample collection.

3.6 Variables

There were two types of variables dependent and independent variables as follows**;**

3.6.1 Dependent variable

Dependent variable in this study was Opportunistic infections (OIs) ; OIs which in total made dependent variable in this study include; Candida esophagitis, oral candidiasis, *Pneumocystis carinii* pneumonia (PCP), Active pulmonary tuberculosis, *Mycobacterium avian* complex (MAX) Cytomegalovirus (CMV), Cryptococcal meningitis, Kaposi's sarcoma (KS), Herpes zoster, sepsis, bacterial pneumonia, PCP and Lymphoma.

3.6.2 Independent variable

Age, sex, ooccupation, education level, ART type, ART duration, ART adherence, clinical (WHO) staging, CD4 count, HVL status, weight, ART type, Hemoglobin level, IPT and Cotrimoxazole Prophylaxis, marital status, residence, Occupation, and alcohol drinking are thought to have effect on OIs by direct or indirect efects on it.

3.6.3 Data collection methods

Potential study participants were recruited, randomly selected and interviewed. Their CTC2 card/file were reviewed for opportunistic infection in the past six (6) months and other independent variables like CD4 count, WHO staging, weight, marital status, age, occupation, place of resident and ART adherence.

3.6.4 Sample collection

Clinical characteristics variables were extracted from clients CTC2 cards/files for past six months. Some CTC2 cards/files were missing some variables. Samples were collected from clients whose information was missing from CTC2 cards/files. Some of the tests done were: CD4, HVL, Hemoglobin level and OIs. OIs samples were collected for test if clinician on duty during consultation found any symptom and sign of any OI like oral candidiasis, Candida pharyngitis, TB and PCP. For the variables like CD4, HVL, TB, PCP, Cryptococcal meningitis and oral/esophageal candidiasis results relied on laboratory findings while Kaposi's sarcoma and Herpes zoster results relied on clinical manifestation as observed by clinician during consultations visit on care and treatment. The containers and type of samples and amount are shown in table.1 below**;**

Table.1 Sample collection from eligible PLHIV attending care and treatment clinics in Dar es Salaam region in 2020.

Test type	Type of Container	Type of Sample	Sample handling
CD4	EDTA bottle	5ml whole blood	Samples were taken to Laboratory and tested by using BD FACS Presto™ (BD, Belgium)
HVL	EDTA tube	5ml whole blood	Samples were taken to Microbiology unit and separated to obtain plasma within six hours which were stored in 2-8^{o}C for 24 hours or -20^{o}C for 5weeks or -80^{o}C for longer time and were tested using COBAS AmpliPrep 4800 (CAMP/CTM 4800) (Roche, Switzerland)
TB	Wide mouth sterile container	Sputum	Samples were collected to all screened patient who had signs and symptoms of TB infection samples collected were treated as infectious and samples were taken to microbiology unit were tested for TB in gene expert machines (Cepheid, France).
Pneumocystis carnii pneumonia	Wide mouth sterile container	Sputum	Samples were taken to microbiology Laboratory unit at where modified Gram stain was done to search for *Pneumocystis carinii* bodies.
Candida pharyngitis	Transport media (Stuart)	Throat swab	Samples were taken to microbiology laboratory where Gram stain was done as well as culture in SDA was done to isolate *Candida albicans.*
Oral candidiasis	Sterile container	Lesion scraping	Sample was taken to microbiology Laboratory where Gram stain was done as well as culture in SDA was done to isolate *Candida albicans.*

Quality control

All samples were checked for quality and completenes of information in sample's container and forms, then qualified samples were accepted and tested. The samples which were missing the quality were rejected and, then new samples were collected. During testing quality of testing were assured by including Sample Processing Control (SPC) in each test procedure.
Note! All samples were treated as infectious.

3.6.5 Laboratory procedures

Structured questionnaires were used to interview clients, and CTC2 cards were reviewed to extract required information. Laboratory testing was done in case of the missed lab test results, and other information relied on client presenting with, on the day of interview. The missing variables which needed laboratory testing, samples were collected from clients and tested as follows;

3.6.5.1 CD4 count testing

CD4 count was measured by using BD Presto (BD, Belgium) which is Point of care (POC) machine. Sample processed in BD presto (BD, Belgium) machine by using Standard operating procedure (SOP) prepared from machine insert. Results printed were CD4 count in cells/uL. Normal range for CD4 count was 500-1500cell/uL (27)**.**

3.6.5.2 HIV viral load

Samples from MNH, Mwananyamala and Temeke hospitals were sent to PCR subunit within microbiology unit of respective hospitals then sample were tested for HVL by using CAMP/CTM 4800 (Roche, Switzerland). The COBAS® AmpliPrep/COBAS® TaqMan® HIV-1 Test, v2.0 permits automated specimen preparation followed by automated reverse transcription, PCR amplification and detection of HIV-1 target RNA and HIV-1 Quantitation Standard (QS) Armored RNA. Machine gave result in form of copies/mL. Result interpreted as; if results were < 20 copies/mL it was recorded as Target not detected. If procedure was not followed properly result were released as invalid (28,29)**.**

3.6.5.3 *Mycobacterium tuberculosis*

Mycobacterium tuberculosis was detected in the sputum sample by using Gene xpert machine (Cepheid, France). The tests were done by preparing samples by adding equal amount of buffer then solution was incubated for 15 minutes. Samples were kept in cartilages there after cartilages were loaded in Gene xpert machine (Cepheid, France). The machine detected presence of *M. tuberculosis* by method of semi-quantitative real time PCR and had capability to detect drug resistance of rifampicin, if it is resistance to *M. tuberculosi*s or not. Results were expressed as *M. tuberculosis* present with or without rifampicin resistance or *M.tuberculosis* not detected (30).

3.6.5.4 *Pneumocystis carinii* pneumonia

Pneumocystis carinii was detected from sputum samples collected from patients. Sputum samples were stained by the routine Gram stain procedure. In gram-stained *P. carinii* cysts appeared as spherical gram-negative structures approximately 5um to 7um diameter when observed under microscope by using 100x objective with oil immersion (31–33)

3.6.5.5 Oral candidiasis / Candida pharyngitis

Samples from throat or oral cavity were cultured on SDA in order to isolate *Candida spp*. Identifacation of *C.albican* were done based on observation of gram positive yearst cell in gram stain from culture and confimation by germ tube test (32,34).

3.6.6 Data analysis

Data were entered, cleaned and analyzed by Epi Info. Version 7, SPSS version 20 and Stata software version 15. Frequency and proportion for categorical variables were calculated. Means and standard deviations for continuous variables were used as a measure of central tendency. Bivariate analysis was conducted primarily to check association of each independent variable (e.g., CD4, WHO stage …) with dependent variable (OIs). Variable found to have the association with P-value ≤ 0.2 between the dependent and independent variables in bivariate analysis were subjected to multivariate logistic regression.

In multivariate logistic regression p-value of < 0.05 were considered as significant, 95% confidence intervals were used to assess the strength of the association.

3.6.7 Ethical clearance

Ethical and research clearance was sought from MUHAS – IRB (MUHAS Senate Research and Publication committee), before beginning of the study. After establishing the eligibility of enrollment into the study, the study purpose, risks (risk of disclosure of the confidentiality of client's information), and benefits were explained and a written informed consent obtained. The data was protected and was only found in principle investigator and if any necessary transfer of information of clients the permission was given by PI. The participants wishing to decline in OIs study were respected, although attempts were made to ascertain the reasons for refusal. For children their guardian/ parents were given consent and children themselves were given assent prior of commencing of investigation. Permission to conduct the study to all participating care and treatment clinics were requested from the respective hospital's authorities. The information that was obtained from this study was kept strictly confidential. At the end of the study, a brief report was prepared and sent to the Director of Muhimbili national hospital and regional medical officer and the respective health facility manager of the saving catchment area to ensure proper treatment of OIs.

CHAPTER FOUR

4.0 RESULTS

A total of 382 HIV infected individuals were enrolled in this study. The majority 232 (43.19%) were aged between 31-45 years with the mean age of 40 years and standard deviation (SD) of 13 years. Sex was disproportionately distributed with female predominance 220 (57.59 %). Regarding level of education, 264 (69.11%) had primary and below level of education, while one third 126 (32.98%) were married and 219 (57.33%) were self-employed. Table 2: shows social demographic characteristics of the study participants

Table 2: Social demographic characteristics of PLHIV attending care and treatment in Dar es Salaam region in 2020.

Variable	Frequency (n)	Percentage (%)
Age (years)		
≤15	22	5.76
16 – 30	56	14.66
31 – 45	165	43.19
46 – 60	72	18.8
> 60	12	3.14
Sex		
Male	162	42.41
Female	220	57.59
Level of education		
Primary and below	264	69.11
Secondary and above	118	30.89
Marital status		
Married	126	32.98
Single	55	25.39
Divorced	82	21.47
Widowed	55	14.40
Cohabiting	22	5.76
Living together with spouse		
Yes	124	86.11
No	20	13.89
Occupation		
Self employed	219	57.33
Employed	69	18.06
Jobless	62	16.23
Student &children	32	8.40

Alcohol use		
Yes	97	25.39
No	285	74.61
Having sex in last six months		
Yes	152	41.64
No	213	58.36
Condom use		
Yes	78	55.71
No	62	44.29
Number of sexual partners		
One	190	58.82
Two	44	13.62
More than two	14	4.33
None	75	23.22
Drug use		
Yes	91	24.27
No	284	75.73

Clinical characteristics of study participants

Concerning clinical characteristics of clients 97(25.39%) were using alcohol, 91(24.27%) were using drugs like marijuana, khat and cocaine. About half of study participants 196 (51.31%) were classified as WHO clinical stage 3 and 75 (19.6 %) had CD4 count of ≤ 200 cells/uL, while 14 (3.43 %) had hemoglobin < 11.0 g/dl (anemia) based on WHO anemia classification. Most 339 (88.74%) of the client's had good adherence to ART, and 361 (94.50%) were on first line regimen of ART. Most 322 (84.29%) of participants had been in ART for more than six months. Majority 335 (87.9 %) of them had suppressed viral load (≤ 1000copies/mL). More than two third 274 (71.92%) of the patients were using cotrimoxazole prophylaxis and about half 198 (51.83%) used IPT. Table 3 summarizes the clinical characteristics of study participants.

Table 3:Clinical characteristics of PLHIV attending care and treatment clinics in Dar es Salaam region in 2020.

Variable	Frequency (n)	Percentage (%)
WHO clinical stages		
1	45	11.78
2	86	22.51
3	196	51.31
4	55	14.40

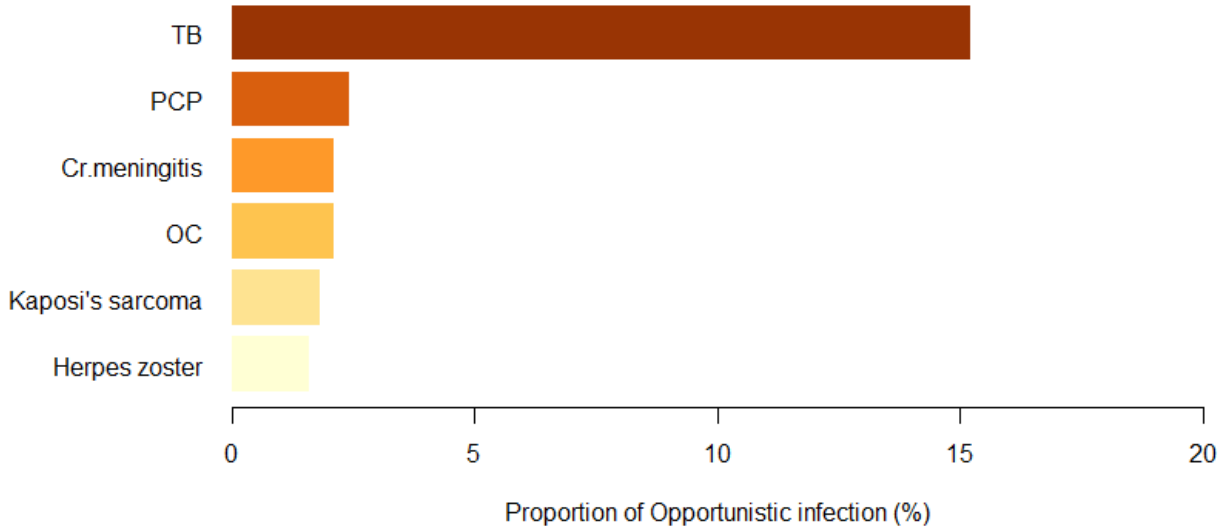
Hemoglobin (g/dl)		
< 11.0 (Anemia)	138	36.41
≥ 11.0 (No anemia)	241	63.59
CD4 (cells/uL)		
≤ 200	75	19.6
201-350	61	16.0
>350	246	64.4
HVL Status		
Suppressed (≤1000cps/mL)	335	87.9
Unsuppressed **(>**1000cps/mL)	46	12.1
ART adherence		
Good	339	88.74
Poor	43	11.26
ART regimen		
First line	361	94.50
Second line	21	5.50
ART duration		
≤ 6 months	60	15.71
> 6 months	322	84.29
Cotrimoxazole prophylaxis use		
Yes	274	71.92
No	107	28.08
IPT use		
Yes	198	51.83
No	184	48.17
Screened/tested OIs		
Yes	218	57.07
No	164	42.93
Laboratory tested OIs		
Yes	224	58.64
No	158	41.36
Proportion of Client found to have OIs out of those tested n=224		
Yes	89	39.73
No	135	60.27
Proportion of Lab confirmed OIs n=382		
Yes	89	23.30
No	293	76.70
Spectrum of OIs n= 382		
Tuberculosis	58	15.20
Kaposi's sarcoma	7	1.80
Cryptococcal meningitis	8	2.10
Oral/esophageal candidiasis	8	2.10
Herpes zoster	6	1.40
PCP	9	2.40

Key: PCP: *Pneumocystis carinii* pneumonia

Magnitude and spectrum of opportunistic infection

The prevalence of OIs was estimated at 23.3% 95% CI (19.3 - 27.8). Tuberculosis 58 /382 (15.2 %) was the commonest while herpes zoster 6 (1.4%) was the least (Figure 2). Participants with OIs were treated according to the facility treatment guidelines.

Figure 2: Showing Spectrum of opportunistic infection among PLHIV in Dar es Salaam region in 2020.



Keys: TB – Tuberculosis; **PCP:** *Pneumocystis carinii* pneumonia**; OC:** Oral/esophageal candidiasis

Factors assosciated with OI

Bivariate analysis

In bivariate analysis, WHO clinical stages, CD4 count, anemia, IPT prophylaxis, ART duration, HVL status, level of education, sex and marital status showed significant association with OIs. After subjecting variables to multivariate analysis and after controlling for counfounders, the variables which remain significant to OIs were as follows;

Multivariate analysis

Among the variables assessed in this study, WHO clinical stages, CD4 level, hemoglobin level, IPT prophylaxis, level of education, sex and marital status showed significant association with OIs. PLHIV who had CD4 $\leq$ 200 cells/uL were 13 times more likely to

develop OI than those who have CD4>350 cells/uL [aOR = 13.61: 95% CI 6.09 – 30.38] p<0.001. Odds of developing OI among those individual who didn't get IPT prophylaxis was 4 times higher than those who had IPT prophylaxis [aOR= 4.10: 95% CI 1.97-8.53] p<0.001. The odds of developing OI among those individual with WHO stage 4 was 6 times higher than those individual with WHO stage 1 [aOR =6.37: 95% CI 1.47-27.61] p=0.013. Similary, marital status found to have significant associated with OI whereby the odds of divorced people to develop OI was 3 times more likely to develop OI compared to married individuals. [aOR= 3.57: 95% CI 1.43 - 8.90] p=0.006. The odds of developing OI among male clients was 3 times more likely to develop OI compared to female [aOR= 3.04: 95% CI 1.50-6.17] p=0.007. Client who had hameglobin < 11.0g/dl was 2 times more likely to develop OI compared to individuals with hemoglobin level ≥ 11.0 g/dl [aOR=2.25: 95 CI 1.14 – 4.47] p=0.020, Last but not least level of education became predictor of OI where by individuals who have level of education of primary and below were 4 times more likely to develop OI compared to those individuals who have education level of secondary and above [aOR = 4.31: 95% CI 1.8-10.32] p=0.001 (Table 4)

Table 4: Bivariate and Multivariate analysis of factors associated with OIs among PLHIV attending care and treatment clinics in Dar es Salaam region in 2020.

Variable	OI		Univariate			Multivariate		
	Yes (%)	No (%)	cOR	95% CI	p-value	aOR	95%CI	p-value
Age (years)								
≤ 15	9 (75.0)	3 (25.0)	0.47	0.08 – 2.83	0.412	1.85	0.12-28.40	0.658
16 -30	44 (78.6)	12 (21.4)	0.82	0.19 – 3.50	0.787	2.04	1.96-21.80	0.551
31 -45	122 (91.0)	12 (9.0)	1.06	0.27 – 4.09	0.94	2.40	0.29-19.31	0.409
46 – 60	99 (78.0)	28 (22.0)	0.85	0.22 – 3.35	0.814	1.63	0.26-13.03	0.645
>60	9 (75.0)	3 (25.0)		Ref		Ref		
Sex								
Male	54 (33.3)	108 (66.7)	2.64	1.62 – 4.30	**< 0.001**	3.04	1.50 – 6.17	0.002
Female	35 (15.9)	185 (84.1)		Ref		Ref		
Education level								
Primary and below	70 (28.0)	190 (72.0)	2.64	1.44 – 4.83	**0.002**	4.31	1.80 – 10.32	**0.001**
Secondary and above	15 (12.7)	103 (87.3)		Ref		Ref		

Marital status								
Cohabiting	9 (40.9)	13 (59.1)	3.46	1.31 – 9.14	**0.012**	6.56	1.48 – 28.98	**0.015**
Widowed	17 (30.9)	38 (69.1)	2.24	1.07 – 4.69	**0.033**	1.98	0.71 – 5.48	0.189
Divorced	27 (32.9)	55 (67.1)	2.46	1.27 – 4.74	**0.007**	3.57	1.43 – 8.90	**0.006**
Single	15 (15.5)	82 (84.5)	0.92	0.44 – 1.88	0.809	1.43	0.45 – 4.62	0.547
Married	21 (16.7)	105 (83.3)		Ref		Ref		
WHO clinical stages								
4	26 (47.3)	29 (52.7)	9.19	2.89 – 29.17	**<0.001**	6.37	1.47 – 27.61	**0.013**
3	49 (25.0)	147 (75.0)	3.42	1.16 – 10.03	**0.025**	2.03	0.55 – 7.52	0.292
2	10 (11.6)	76 (88.4)	1.35	0.39 – 4.57	0.631	1.15	0.27 – 4.94	0.854
1	4 (8.9)	41 (91.1)		Ref		Ref		
HVL Status								
Unsuppressed (>1000cps/mL)	70 (20.9)	265 (79.1)	2.66	1.40 – 5.07	**0.003**	1.97	0.78 – 4.99	0.15
Suppressed (≤ 1000cps/mL)	19 (41.3)	27 (58.7)		Ref		Ref		
CD4(cells/uL)								
≤ 200	48 (64.0)	27 (36.0)	15.04	8.07 – 28.03	**<0.001**	13.61	6.09 – 30.38	**< 0.001**
201 – 350	15 (24.6)	46 (75.4)	2.76	1.36 – 5.62	**0.005**	2.52	1.06 – 6.01	**0.036**
>350	26 (10.6)	220 (89.4)		Ref		Ref		
IPT								
No	65 (35.3)	119 (64.7)	3.96	2.35 – 6.68	**<0.001**	4.10	1.97 – 8.53	**< 0.001**
Yes	24 (12.1)	174 (87.9)		Ref		Ref		
ART duration								
≤ 6 months	24 (40.0)	36 (60.0)	2.61	1.45- 4.67	**0.001**	1.21	0.52 - 2.81	0.663
>6 months	65 (20.2)	257 (79.8)		Ref		Ref		
Hemoglobin(g/dl)								
< 11.0 (Anemia)	50 (36.2)	88 (63.8)	2.94	1.81- 4.78	**< 0.001**	2.25	1.14 - 4.47	**0.020**
≥11.0 (No anemia)	39 (16.20	202 (83.8)		Ref		Ref		

CHAPTER FIVE

5.0 DISCUSSION

This study was able to evaluate the magnitude of OIs among HIV infected individuals attending care and treatment clinics in Dar es Salaam. The overall prevalence in the current study is 23.3% which is in harmony with previous prevalence of 22.4% in Nigeria (20), but lower than the finding from Ethiopia and Dar es Salaam where prevalence were (88.4% and (60% respectively (5,17). Prevalence of OIs has reduced by 36.7% from 2017 to 2020, this may be due to test and treat strategy which was initiated in 2017 allowing patients to seek care early when immunity is still stable. PTB is common among PLHIV in high TB burden countries including Tanzania (7). In this study, PTB was the most prevalent OI observed, which is similar to the studies conducted in Ethiopia and in systemic review done in HIV infected adult in Low and Middle income countries (5, 8). Likewise study done in northern Tanzania in 2018 among 391 PLHIV who were in ART 43(11%) developed TB (18). Similarly study done in India showed that the leading OI was PTB accounting for 28 % followed by oral candidiasis 18.79% (22).

PCP was the next leading OI in the current study (2.4%) which was in harmony with study done in Uganda and Ethiopia in which both had the prevalence of 2.1% respectively (24,26). Not only that but also the systemic review done in HIV infected adult in Low and Middle income countries reveled that second commonest OI among PLHIV was PCP (8) but higher findings reported in Ethiopia 8.4% (6).

This study showed that Cryptococcal meningitis prevalence of 2.1% which is lower than 3.7% prevalence of Cryptococcal angemia in a study done at Kilombelo Tanzania (16). Prevalence found in this study corroborate with study done in Nigeria 2.4% (20) but higher than the study done in Ethiopia 0.5% (26). The difference may be due to different in study population, study area, study time and methodologies. For example methodology used in Ethiopia was OI prevalence from adult PLHIV taking ART with a minimum of 5 years and a maximum of 7 years (26). Oral/esophageal prevalence in this study was 2.1% which corroborate with

prevalence found in Ethiopia 2.1% (26) but lower than the prevalence reported in study done in Nigeria 8.6 % (20).

AIDS defining illness like Kaposi's sarcoma and Herpes zoster were also identified in this study. Prevalence of Kaposi's sarcoma observed was comparable with findings reported in Uganda 1.2 % (24), however slightly high prevalence (2.3%) has been reported in a meta-analysis studies from Middle and Lower income countries (8).

CD4 count ≤ 200 cells/uL were found to be independent predictor for developing OIs. This finding is in agreement with studies conducted in Ethiopia and Nigeria which reported high risk of developing OIs among clients with low CD4 count (5, 8, 20). This is due to the fact that; CD4 cells play a central role in activation of cellular mediated immunity to fight against infection.

Study done elsewhere has reported anemia as strong independent predictor of OIs and death in PLHIV (5). This study revealed significant association between anemia and OIs which corroborate with study done Tanzania and Nigeria (5, 17). Advanced baseline WHO stage was also another factor associated with OI in this study which was also observed in different studies in country and elsewhere (5-8, 24, 26). Last but not least education level was also factor found to be associated with OIs in this study which corroborate with study done in Nigeria (20).

Low finding of OIs in this study could be attributed by the initiation of test and treat strategy in the country which started 2017, in which clients starts ART when their immune still strong thus reducing the chance of developing OIs (10, 13).

5.1 Study limitations

Due to limited funds some of information about OIs and associated factors relied on patient CTC2 card/file. Example Kaposi's sarcoma and Harpes zoster information relied in clinical finding observed by clinician this might be the cause of overestimation or underestimation of prevalence of the OIs in this study. Also due to limited fund and time we couldn't asses the antiretroviral treatment (ART) impact on specific OIs; kindly request other studies to work on that area.

CHAPTER SIX

6.1 Conclusions

There was still remarkable prevalence of OIs observed in this study which needed to be addressed. Tuberculosis being leading OI among other OIs among PLHIV attending care and treatment clinics in Tanzania, CD4 count of ≤ 200 cells/uL, advanced WHO clinical stages, not use of IPT prophylaxis, anemia and low education level were found to be predictors of OIs.

6.2 Recommendation

Proper diagnosis and management of OIs are mandatory, provision of adequate and sustainable treatments and close monitoring follow-up are of critical importance.

Promptly implementation of test and treat protocol while individual immune is still good, baseline CD4 testing is of critical importance and proceeding monitoring CD4 count in every six months to those clients whose baseline CD4 count are ≤ 350 cells/uL regardless of HVL status**,** is the key for monitoring of OIs to PLHIV. Screening and characterization of OIs to all PLHIV attending care and treatment clinics, whose CD4 counts are ≤ 200cells/uL is of great importance.

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APPENDICES

Appendix I: Consent form Informed Consent (English version)

Consent to participate in this study

Greetings, my name are Doris Andrew Njelekela. I am pursuing the Masters of Science in Epidemiology and Laboratory Management at Muhimbili University of Health and Allied Sciences, Dar es Salaam. At the moment, we are carrying out a study to determine magnitude of opportunistic infection and associated factors among HIV infected individuals attending care and treatment clinic at Muhimbili National hospital, Temeke and Mwananyamala Regional referral hospitals Dar es Salaam, Tanzania.

Purpose of the study

The study aims to determine magnitude of opportunistic infection and associated factors among HIV infected individuals attending care and treatment clinic at Muhimbili National hospital, Dar es Salaam. If you agree to join this study, you will be required to answer a series of questions that have been prepared for the study in an interview in order to obtain the intended information. As part of this study, we are requesting people to give a small amount of blood (about 10ml), throat swab, oral scraping and sputum to test conditions which I will mention soon. This information will help the Dar es Salaam, region, stakeholders and the Ministry of Health, Community Development, Gender, Elderly and Children to plan the intervention for the specific group like PLHV.

Procedure

If you agree to take part, you will be asked to provide about 10ml of venous blood, throat swab, oral scraping and sputum. Specimens will be tested for HVL, CD4, M. tuberculosis, Candidiasis and Pneumocystis carnii pneumonia at CPL at MNH Dar es Salaam.

Confidentiality

I assure you that all the information collected from you will be kept confidential. Only people working in this research study will have an access to the information. We will ensure that any information included in our report does not identify you as respondent as we will not put your name or other identifying information on the records of the information you provide. I will put a study number, but not your name on the blood sample.

Risks of taking part in the study

The risk to you if you take part in testing is minimal. All instruments that will be used to collect samples are sterile and safe. They have not been used before and will be safely destroyed after a single use. You may experience small pain when blood is being drawn. If you have any pain, bleeding, or swelling from taking blood, please contact our study staff or your health worker. We do not anticipate that any harm will occur to you.

Rights to withdraw and alternatives

Your participation in this study is completely voluntary. If you choose not to participate in this study no harm will come to you. Refusal to participate or withdraw from the study will not involve loss of any benefit to which you are otherwise entitled.

Benefits from the study

If you wish to know your OIs status, information can be obtained from doctor in next visit or if OIs will be diagnosed you will be informed by phone call so that you should come back to attend treatment. You will also get educational information on how to prevent OIs transmission. Once results on Viral load, CD4, and OIs are available you can freely get the information regarding those tests.

Compensation

There will be no compensation of time spent during the interview.

Who to contact

If there is any question about this study please don't hesitate to communicate to the **Director of Research and Publication Dr. Bruno Sunguya,** the Muhimbili University of Health and Allied Science (MUHAS), P. O. Box 65001, Dar es Salaam, Tel. no 2150302-6. Or Dr. Agricola Joachim, the study Supervisor (Mobile: 0717874791)

Dr. Rogarth Kishimba the study Supervisor (Mobile: 0784724330)

Doris Andrew Njelekela –Principal Investigator (Mobile 0765009582)**.**

Participant agree ☐ Participant disagree ☐

Signature of Participant/Thumb print _____

Signature of the interviewer_____ Date consent signed _____

Appendix II: Consent form Informed Consent (Swahili version)

Fomu ya ridhaa (Toleo la kiswahili)

Hati ya kukubali kuhojiwa na kutolewa damu

Namba ya utambulisho

Habari, Jina langu naitwa Doris Andrew Njelekela, Ninasoma katika chuo Kikuu Cha Tiba na sayansi shirikishi Muhimbili. Tumekuja kufanya utafiti juu ya Magonjwa nyemelezi kwa watu waishio na virusi vya ukimwi wanaokuja klinick Hospitali ya Taifa Muhimbili, Mwananyamala na Temeke hospitali ya Rufaa ya mkoa, Dar es salaam.

Matokeo ya utafiti huu yataisaidia serikali ya M

mkoa wa Dar es salaam na Tanzania kwa ujumla. katika kupanga mikakati ya kuboresha huduma za kuzuia na kupambana na magonjwa Nyemelezi kwa watu waishio na virus vya Ukimwi hapa Dar es Salaam. Wale ambao vipimo vitaonyesha kuwa magonjwa Nyemelezi watapewa matibabu stahiki bure.

Mazungumzo yetu yatachukuwa kama dakika kumi na tano mpaka ishirini hivi kukamilika, zitatumika namba na sio jina wala hakutakuwa na kitu kingine chochote cha kutambua ushiriki wako. Taarifa utakazozitoa zitakuwa ni siri na zitatumika kwa ajili ya utafiti tu na si kwa kitu kingine chochote.

Kama sehemu ya utafiti huu,tutakapokagua kadi yako kwa kipindi cha miezi sita nyuma na tukibaini kuna vipimo ambavyo ulistahili kupima vinakosekana ama hukufanyiwa upimaji wowote wa magonjwa nyemelezi basi utaombwa kutoa kiasi kidogo cha damu kwa ajili ya kupima vipimo vinavyokosekana kama uwingi wa VVU, uwingi wa damu, kiasi cha Kinga Mwilini na magonjwa Nyemelezi. Damu itachukuliwa na mtalaamu wa maabara na vifaa vitavyotumika viko salama, havijatumika kwa mtu mwingine na baada ya kutumika viatatupwa kwa kufuata taratibu. Tutatumia namba na siyo majina, hivyo hakuna mtu ataweza kujua majibu yako. Utasikia maumivu kidogo wakati wa kuchukua damu. Tukipima na kukukuta na magonjwa nyemelezi au tatizo lolote kuhusiana na afya yako, kwa kushirikiana na madaktari wako tutahakikisha huduma stahiki hapahapa Hospitali ya Taifa Muhimbili. Mwananyamala, Temeke Hospitali za rufaa za mkoa wa Dar es Salaam.

Hatutarajii kutokea madhara ya aina yoyote kwako yatakayosababishwa na utafiti huu, hata hivyo kama yatakuwepo, hakutakuwa na fidia ya namna yoyote

Kushiriki kwako katika utafiti huu ni hiari, unaweza kuamua kukataa au kutoshiriki katika utafiti huu na hakuna adhabu itakayofanyika kwa kutoendelea kushiriki katika mazungumzo. Hata hivyo ni mategemeo yangu kuwa utashiriki kikamilifu katika utafiti huu kwani maoni yako ni muhimu sana.

Kama kuna swali kuhusianan na utafiti huu itakubidi kuwasiliana na

Mkurugenzi wa Utafiti na Uchapishaji Dr Bruno Sunguya - Chuo Kikuu cha Afya na Sayansi ya Tiba Muhimbili, S.L.P. 65001 DSM. Simu namba 2150302-6. Kama una maswali zaidi unaweza kuwasiliana na

Dr.Agricola Joachim- Msimamizi wa Utafiti (namba ya simu: 0717874791)

Dr Rogart Kishimba –Msimamizi wa utafiti (namba ya simu 0784724330)

Doris Andrew Njelekela–Mtafiti Mkuu (namba ya simu 0765009582)

"Nimesoma na nimeelewa ombi lako, kwa hiari yangu, bila ya nguvu wala ahadi zozote nakubali kushiriki katika utafiti huu".

"Samahani, sipo tayari ☐ Nipo tayari Kushiriki ☐

Sahihi ya mshiriki/Alama ya dole gumba……..... Tarehe.....

Sahihi ya muulizaji..... Tarehe .....

Appendix III: Questionnaire

Questionnaire

Structured questionnaire (English version)

To the PLHIV attending care and treatment at MNH, Mwananyamala and Temeke Regional referral Hospital at Dar es salaam, region, Tanzania.

Introduction

Thank you for accepting to be interviewed. The interview should not take more than half (½) hour. However, you can stop the interview at any time. You are also not obliged to answer all the questions. I'll start by asking you some general questions about yourself. Let me assure you that this information will be treated with utmost confidentiality.

Section 1: Identifier information

Questionnaire number ……. Date Interview……./……/……...

Patient name/ID……phone number…….

Region……,

District……Ward……...,

Village/Street……,

Section 2: Socio-demographics information

1. How old are you (age in complete years) …….?
2. Sex of the study participant
   a) Male
   b) Female
3. Which level of education did you attend?
   a) None
   b) Primary
   c) secondary
   d) Tertiary

4. What is your Occupation?
    a) Fishermen
    b) Fishmonger/trader
    c) Farmer
    d) Businessman
    e) Housewife
    f) Farmer
    g) Teacher
    h) HCW
    i) Military
    j) Other (mention)……
5. What is your tribe?

(Mention)……

6. What is your current religion domain?
    a) Christian
    b) Muslim
    c) Others (mention)…….
7. What is your current marital status?
    a) Married
    b) Single
    c) Divorced
    d) Widowed
    e) Cohabiting
8. If married, how many numbers of wife/ husband doyou have?
    a) One
    b) Two
    c) More than two (mention)……..

9. If married, is your wife/husband living with you or she/he is elsewhere?

a) Yes

b) No

c) Don know

10. Is wife inheritance practiced in your community?

a) Yes

b) No

11. Have you ever experienced an unusual cough for more than 2 weeks in last six months?

a) Yes

b) No

c) Don't remember

12. Have you ever had any fever/sickness in last six months?

a) Yes

b) No

c) Don't remember

13. In the past six months did you ever screened/tested OIs?

a) Yes

b) No

14. If yes, did you receive the results

a) Yes

b) No

15. If yes did you obtain treatment for identified OI above?

a) Yes

b) No

c) Don't know

16. If yes, where did you get the treatment?

a) Self
b) Health facility (private)
c) Health facility (government)
d) Herbalist
e) Traditional healer
f) Others (specify)……

17. How long have been in ART treatment?

a) One month
b) Three months
c) Six months
d) Others (specify)……..

18. Where were you living before you came here? ----------(State)

18. In the last six months, did you become sick?

a) Yes
b) No
c) Don't know

19. What is the maximum duration you were sick?

……

Section three (3): Behavioral factors

20. Have you had sex in the last six months?

a) Yes
b) No
c) Don't know

21. If yes, did you use a condom?

a) Yes

b) No

22. On average, how many sexual partners do you have?

a) One

b) Two

c) More than two

d) Others (mention) …….

23. For how long did you spent with your primary partnership

a) Less than one month

b) Three months

c) Six months

d) More than six months …….

24. For the last six months have you use any alcohol

a) Yes

b) No

25. If yes, how often

a) Every day

b) Occasionally

c) Once per week

26. While you're drunk have you had sex with anyone?

a) Yes

b) No

c) Don't remember

27. If yes, did you use protective?

a) Yes

b) No

c) Do not remember

28. If you are not drunk, do you use a condom?

a) Yes

b) No

29. How often did you use the condom in the last six months of sex

a) Consistency

b) Occasionally

c) Do not remember

30. In your life did you experience the use of any drug abuse like marijuana?

a) Yes

b) No

31. If yes, what kind of these did you use

a) Marijuana

b) Drugs

c) Mirungi

d) Others (specify)……

32. If yes, when was last time did you use?

a) <1month

b) 3months

c) 6months

d) >6months

33. Have you paid for the services of a commercial sex worker?

a) Yes

b) No

34. Have you ever been given a gift for sex

a) Yes

b) No

c) Do not know

35. If yes, what nature of gift did you receive?

a) Money
b) Fish
c) Household commodities like sugar, cooking oil
d) Meat
e) Favorable duty allocation
f) Others (specify)

36. Is circumcision practiced in your community?

a) Yes
b) No
c) Don't know

37. Are you circumcised? – Note:-Apply this question to male respondents only

a) Yes
b) No
c) Don't know

Section four (4): Availability and utilization of health services

38. Are there facilities that provide HIV services and other sexually transmitted infections in this area?

a) Yes
b) No
c) Do not know

39. Who provides these services?

a) Health facility(government)
b) Health facility (private)
c) Health facility (Church based)
d) Non-government organization

40. Do you always get the condoms when you need them?

a) Always

b) Sometimes

c) Never

41. What is the approximate distance to the nearest health facility?

a) Less than 5 kilometers

b) More than 5 kilometers

c) Do not know

42. Have you used these services in the last 6 months for your treatment?

a) Yes

b) No

43. If yes, how many times did you come for treatments in the last 6 months?

a) One

b) Two

c) More than two (mention)…….

44. Is there any non-government organization or government came to supply condom in the last six months?

a) Yes

b) No

Part four (4): Laboratory investigation

a) OIs status

Patient ID	Age	Sex	OIs type (name)

Name of Analyst …….Signature…….

b) CD4 count

Patient ID	Age	Sex	CD4 level

Name of Analyst …….Signature…….

c) **HIV viral load status**

Patient ID	Age	Sex	VL

Name of Analyst …… Signature……

d) **ART adherence**

Drug adherence detail will be obtained from CTC2 card where by during visit to clinic every month counselor count pills left by client then calculation made based on formulae to get percentage score. Questionnaires related to adherence will be asked by counselor to client then adherence status will be obtained and will be filled in CTC2 card every month, where by total score of ≥ 80% is good adherence and total score of ≤ 80% adherence is poor so adherence status will be filled in CTC2 card of clients.

Patient ID	Age	Sex	Good/poor

Name of Analyst …… Signature……

Appendix IV: Structured questionnaire (Swahili version)

Dodoso la muundo (Toleo la kiswahili)

Dodoso kwa jamii ya watu waishio na virus vya ukimwi wanaohudhuria clinic kwenye hospital ya taifa Muhimbili, Mwananyamala na Temke hospital za rufaa za mkoa, Dar es Salaam Tanzania.

Utangulizi

Asante kwa kukubali kushiriki katika utafiti huu kwa hiyo nitakuuliza maswali mbalimbali kuhusu utafiti huu. Mahojiano yetu hayatachukua zaidi ya dakika 15. Hata hivyo, maamuzi yako yataheshimiwa sana kuhusu aidha kuendelea na mahojiano au kutokuendea na mahojiano. Nitaanza kwa kukuuliza maswali ya jumla kuhusu wewe mwenyewe. Napenda kukuahakikishia kwamba taarifa hii itatendewa kwa siri zaidi.

Sehemu ya kwanza (1): Utambulisho binafsi

Namba ya dodoso .....tarehe ya Mahojiano ...../ ..... / .....

Jina la mteja.....Kitambulisho ..... namba ya simu .....Mkoa ....., Wilaya ...., Kijiji.....

Mtaa.....

Sehemu ya pili (2). Taarifa binafsi

1. Je, wewe ni umri gani (umri katika miaka kamili) .....
2. Jinsia ya mshiriki wa utafiti
   a) Kiume
   b) Kike
3. Ni kiwango gani cha elimu ulihudhuria?
   a) Hakuna
   b) Msingi
   c) Sekondari
   d) Elimu ya vyuo

4. Unafanya shughuli gani?

a) Mvuvi
b) Muuza samaki
c) Mkulima
d) Mfanya biashara
e) Mama wa nyumbani
f) Mfanyakazi kwenye kitengo cha afya
g) Idara ya ulinzi na usalama
h) Nyingine (taja) .....

5. Je, we ni kabila gani ?

(Taja) .....

6. Wewe ni dini gani?

a) Mkristo
b) Muislam
c) Nyingine (taja) .....

7. Hali ya ndoa ya mshiriki wa utafiti

a) Umeolewa/Umeoa
b) Hujaolewa/Hujaoa
c) Talaka
d) Mjane
e) Kukaa pamoja bila kufunga ndoa

8. Kama umeoa/umeolewa unawake/waume wangapi??

a) Moja
b) wawili
c) Zaidi ya wawili (taja) ....

9. Kama umeoa/umeolewa unaishi na mume/mke pamoja ama yupo mahali pengine?

a) Ndiyo
b) Hapana

10. Je, mwenza wako ni wa urithi?

a) Ndiyo

a) Hapana

11. Je!Kwa miezi sita iliyopita ulishawahi kupata homa ya kikohozi zaidi ya wiki mbili?

a) Ndiyo

b) Hapana

c) Sikumbuki

12. Je! Umewahi kuwa na homa yeyote kwa miezi sita iliyopita?

a) ndiyo

b) Hapana

c) Sikumbuki

13. Katika kipindi cha miezi sita iliyopita ulishawahi kupima magonjwa nyemelezi?

a) Ndiyo

b) Hapana

14. Kama ndiyo, matokeo yalikuwaje je ulikutwa na ugonjwa nyemelezi wowote??

a) Ndio

b) Hapana

15. Kama ndiyo je, uliwahi kutibiwa ?

a) Ndiyo

b) Hapana

c) Sikumbuki

16. Ni wapi ulitibiwa?

a) Mwenyewe

b) Kliniki binafsi

c) Mitishamba/mizizi

d) Mganga wa jadi

e) Wengine (taja)……

17. Kwa muda gani umekuwa ukihudhuria klinick ya kupunguza makali ya VVU?

a) Mwezi mmoja

b) Miezi mitatu

c) Miezi sita

d) Zaidi ya miezi sita

18. Ulikuwa wapi kabla ya kuja hapa? …… (taja mahali)

19. 2. Katika miezi sita iliyopita, ulishawahi kuumwa?

a) Ndiyo

b) Hapana

c) Sikumbuki

20. Kama ndio kwa wastani wa muda gani? ------ (taja siku)

Sehemu ya tatu (3): Sababu za kitabia.

21. Je! Umewahi kushiriki tendo la ndoa ukiwa safarini au mbali na nyumbani kwako kwa miezi sita iliyopita miezi sita iliyopita?

a) Ndiyo

b) Hapana

c) Sijui

22. Kama ndiyo umetumia kinga?

a) Ndiyo

b) Hapana

c) Sikumbuki

23. Kwa wastani una wapenzi wangapi uliofanya nao mapenzi kwa miezi sita iliyopita?

a) Moja

b) Mbili

c) Zaidi ya mbili

24. Je, mahusiano yenu yalidumu kwa muda gani kwa rafiki wa kwanza?

a) Chini ya mwezi mmoja

b) Miezi mitatu

c) Miezi sita

d) Zaidi ya miezi sita

25. Kwa miezi sita iliyopita umetumia pombe yoyote

a) Ndiyo

b) Hapana

26. Kama ndiyo, mara ngapi

a) Kila siku

b) Kwa mara chache

c) Mara moja kwa wiki

27. Unapokuwa umelewa umefanya ngono na mtu yeyote?

a) Ndiyo

b) Hapana

28. Ikiwa ndio, je, umetumia kinga?

a) Ndiyo

b) Hapana

c) Sikumbuki

29. Ni mara ngapi umetumia kondomu katika miezi sita iliyopita ya mapenzi

a) Mara kwa Mara

b) Mara chache

c) Sikumbuki

30. Kama hujalewa huwa unatumia condomu wakati unapofanya ngono?

a) Ndiyo

b) Hapana

31. . Katika maisha yako ulishawahi kutumia dawa yeyote ya dawa za kulevya

c) Ndiyo

d) Hapana

e) Sijui

32. Kama ndiyo aina gani uliyotumia?

a) Mirungi

b) Bangi

c) Unga

d) Nyingine (taja).....

33. Ikiwa ndiyo, ulikuwa wakati gani uliopita?

a) Chini ya mwezi mmoja

b) Miezi mitatu

c) Miezi sita

d) Zaidi ya miezi sita

34. Je, ulishawahi kushiriki biashara ya ngono?

a) Ndio

b) Hapana

c) Sikumbuki

35. Je! Umewahi kupewa zawadi kwa ajili ya ngono

a) Ndiyo

b) Hapana

c) Sijui

36. Kama ndio, ni aina gani ya zawadi uliyopokea ?

a) Fedha

b) Samaki

c) Bidhaa za kaya kama sukari, mafuta ya kupikia

d) Nyama

e) Ugawaji wa wajibu unaofaa

f) Mengine (taja).....

37. Je, shughuli za kutahiri wanaume huwa hufanyika katika jamii yako?

a) Ndiyo

b) Hapana

d) Sijui

38. Je, wewe umetahiriwa? **Hili swali kwa ajili ya wanaume tu**

a) Ndiyo

b) Hapana

c) Sijui

Sehemu ya nne (4): Upatikanaji na matumizi ya huduma za afya

39. Je! Kuna vituo vinavyotoa huduma za VVU na magonjwa mengine ya ngono katika eneo hili?

a) Ndiyo

b) Hapana

c) Sijui

40. Nani hutoa huduma hizi?

a) Kituo cha afya (serikali)

b) Kituo cha afya (binafsi)

c) Kituo cha Afya (Kanisa)

d) Shirika lisilo la serikali

41. Ni umbali gani kwa wastani kutoka hapa mpaka kwenye kituo cha afya kilichopo karibu zaidi??

a) Chini ya kilomita 5

b) Zaidi ya kilomita 5

c) Sijui

42. Je, unapata huduma za katika kituo chochote kwa miezi sita iliyopita?

a) Ndiyo

b) Hapana

43. Kama jibu ni ndiyo ni mara ngapi umepatiwa matibabu katika hivi vituo kwa miezi sita iliyopita?

a) Mara moja

b) Mara mbili

c) Zidi ya mara mbili (taja) .....

44. Je! Kuna shirika lisilo la serikali au serikali ilikuja kutoa kondomu katika miezi sita iliyopita

a) Ndiyo

b) Hapana

Sehemu ya tano (5): Uchunguzi wa maabara

a) Upimaji wa magonjwa nyemelezi

Namba ya utambulisho wa mteja	Umri	Jinsia	Aina/Jina la ugonjwa nyemelezi

Jina la Mchunguzi…..…… saini…….

b) Kiasi cha kinga ya Mwili

Namba ya utambulisho wa mteja	Umri	Jinsia	CD4

Jina la Mchunguzi ……saini…….

c) Uwingi wa virusi vya Ukimwi

Namba ya utambulisho wa mteja	Umri	Jinsia	Uwingi wa virusi vya Ukimwi

Jina la Mchunguzi…… saini…….

d) Hali ya ufuasi

Taarifa ya hali ya ufuasi wa dawa hunapatikana kwenye kadi ya kiniki (CTC2 card) ya mteja. Hii inatokana na ujazwaji unaofanyikaa kila mwezi pindi mteja anapohudhuria kliniki, huenda na kopo la dawa ndipo mshauri nasaa huhesabu vidonge vilivyobaki na huuliza maswali kulingana na ufuansi ndipo mahesabu hufanyika ili kujua asilimia za ufuasi kwa ujumla. Mteja aliepata asilimia zaidi ya themanini hujaziwa kuwa ni mfuasi mzuri na yule aliepata asilimia chini ya themanini hujaziwa kuwa ni mfuasi mbaya.

Namba ya utambulisho wa mteja	Umri	Jinsia	Mzuri/mbaya

Jina la Mchunguzi …..……..saini…….