COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

Thesis Report

Assessing HIV clinics outcome and factors associated: Adult-patients enrolled in program at least ten years in Rural-settings, cross-sectional study, Rwanda

Peter BAREBWANUWE 218014266

Supervisors:

Professor Cyprien MUNYANSHONGORE

Dr Bernard Ngabo RWABUFIGIRI

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Executive summary

Background

HIV is pandemic issue as it is among top cause morbidity and mortality globally especially in low and middle income countries. It is also problematic because all people who are HIV+ don't know their status, not all people living with HIV enrolled in program, and also all patients in program don't increase their CD4. Rwanda had done significant improvement through decentralizing HIV care to health centers, HIV integration in other programs and many others. Also, HIV prevalence remains consistent over 10 years. Despite all those interventions HIV remains a public health problem and it is always on table.

There is limited information on HIV program outcomes and associated factors in Rwanda.

The study aims at assessing HIV program outcome and factors associated with the outcome.

Methods

Secondary data from Electronic Medical Record collected were: baseline, and most currently CD4, BMI, Viral load. Primary data were collected from patients after consenting. Before collecting data, tools were validated and tested. During collection of data privacy and confidentiality were ensured, and there was no harm to participant as voluntary and no direct benefit to participants. Data were managed in excel spreadsheet, analyzed in STATA and numerous tests such as T-test, Chi, and logit were used to measure outcomes and factors associated with outcome. Study approval was obtained from IRB.

Results

Findings show that there were positive CD4 trends as 81% of patients increased CD4 (before and after) whereas 19% did not increase. Moreover 73% are over 500 CD4 standards whereas 13% were under 500 CD4. No educated patients were less likely in increase CD4 (OR: 0.54, CI: 0.35, 0.98, pv-0.006). Furthermore patients from Kabarondo HC are less like to increase CD4 (OR: 0.19, CI: 0.39, 0.98, pv-0.04). Also, patients who have knowledge on balanced diet were 7.9 times likely to increase CD4 compared to those without diet knowledge (OR: 7.9, CI: 2.33, 9.09, Pv: 0.004). Lastly, patients moderately satisfied were less like to increase CD4 (OR: 0.10, CI: 0.01, 0.62, pv-0.01.

Conclusion

The assessment of HIV program through CD4 increase and factors associated showed high increase in CD4 as 81% of patients increased their CD4 count and 73% of all patients were over 500 CD4 standards. Level of education, health facility where patients receive care, knowledge on balanced diet, and satisfaction of health services were associated with CD4 increase in this study.

Résumé

Contexte

Le VIH est un problème de pandémie car il figure parmi les principales causes de morbidité et de mortalité dans le monde, en particulier dans les pays à revenu faible et intermédiaire. C'est également problématique car toutes les personnes séropositives ne connaissent pas leur statut, toutes les personnes vivant avec le VIH inscrites au programme et tous les patients participant au programme n'augmentent pas leur taux de CD4. Le Rwanda a considérablement amélioré la situation en décentralisant les soins du VIH vers les Centres de Santé, en intégrant le VIH dans d'autres programmes et bien d'autres. En outre, la prévalence du VIH reste constante sur 10 ans. Malgré toutes ces interventions, le VIH reste un problème de Santé Publique et il est toujours à la table. Malgré une attitude proactive et agressive à l'égard du VIH, les informations sur les résultats des programmes VIH et les facteurs associés au Rwanda sont limitées. L'étude ambitionne à évaluer les résultats du programme VIH et les facteurs associés à ces résultats.

Méthodes

Les données secondaires collectées à partir des dossiers médicaux électroniques étaient: la ligne de base, et la plupart des cellules CD4, l'IMC, la charge virale. Les données primaires ont été recueillies auprès de patients après avoir consenti. Avant de collecter des données, les outils ont été validés et testés. Au cours de la collecte des données, la confidentialité des données a été assurée, et il n'y a eu aucun préjudice pour le participant en tant que volontaire et aucun avantage direct pour les participants. Les données ont été gérées dans un tableur Excel, analysées dans STATA et de nombreux tests tels que le test T, le chi et le logit ont été utilisés pour mesurer les résultats et les facteurs associés aux résultats. L'approbation de l'étude a été obtenue à l'IRB.

Résultats

Les résultats montrent qu'il y avait des tendances positives en CD4 puisque 81% des patients ont eu une augmentation de CD4 alors que 19% n'ont pas augmenté. De plus, 73% ont plus de 500 CD4 standard et 13% moins de 500 CD4. L'augmentation du nombre de CD4 était moins probable chez les patients éduqués (OR: 0,54, IC: 0,35, 0,98, pv-0,006). En outre, les patients de Kabarondo HC ont moins tendance à augmenter le nombre de CD4 (OR: 0,19, IC: 0,39, 0,98, pv-0,04). En outre, les patients qui connaissaient l'alimentation équilibrée avaient 7,9 fois plus de chance d'augmenter le taux de CD4 que ceux qui ne le savaient pas (OR: 7,9, IC: 2,33, 9,09, Pv: 0,004). Enfin, les patients moyennement satisfaits étaient moins enclins à augmenter le nombre de CD4 (OR: 0,10, IC: 0,01, 0,62, pv-0,01).

Conclusion

L'évaluation du programme VIH par l'augmentation du nombre de CD4 et les facteurs associés ont montré une augmentation importante du taux de CD4 puisque 81% des patients ont augmenté leur nombre de CD4 et que 73% de tous les patients avaient plus de 500 CD4 standard. Le niveau d'éducation, l'établissement de santé où les patients reçoivent des soins, les connaissances en matière d'alimentation équilibrée et la satisfaction des services de santé ont été associés à une augmentation de CD4 dans cette étude.

Dedication

This research is dedicated:

- ➢ To my supervisors
- ➢ My friends,
- ➢ My entire family who encouraged me during the period of my study especially my wife.
- ➢ Everyone who contributed to my studies included but not limited to my class mates, all MPH lecturers at University of Rwanda, Partners In Health staff and financial support.

Declaration

I do hereby declare that this research study submitted in partial fulfillment of the requirement for the Master's degree in Public health, at University of Rwanda,College of Medicine and Health Sciences, School of Public Health is my original work and has not previously been submitted elsewhere.

In addition, I do declare that a complete list of references provided indicating all the sources of information cited.

Student Name: Peter BAREBWANUWE

Sign ………………………………   Date………………………………

Declaration by the Supervisor(s)

This research has been submitted with our approval as The University of Rwanda Supervisor(s)

Name: Professor Cyprien MUNYANSHONGORE

Professor of Public Health, Department of Community Health, University of Rwanda

Sign…………………………………………. Date…………………………………..

Name: Dr Bernard Ngabo RWABUFIGIRI

Lecturer, Public Health Department, University of Rwanda

Sign……………………………………………….. Date………………………………….

Acknowledgement

Abbreviations and Acronyms

- AIDS: Acquired Immunodeficiency Syndrome
- ART: Antiretroviral Therapy
- ANC: Antenatal Care
- BMI: Body Mass Index
- CD4: Cluster of Differentiation 4
- CHWs: Community Health Workers
- Co-infection: having two infections (HIV and TB)
- DH: District Hospital
- EMR: Electronic Medical Record
- FSW: Female Sex Workers
- FP: Food package
- FS: Food security
- HP: Health posts
- HC: Health Centers
- HCP: Health Care providers
- HF: Health facilities
- HIV: Human Immunodeficiency Virus
- RDHS: Rwanda Demographic and Health Survey
- RN: Registered Nurse
- MoH: Ministry of Health
- MSM: Men Having Sex with Men
- MD: Medical Doctor
- OR: Odd Ratio
- PLWH: People Living With HIV
- PMTCT: Prevention of Mother-To-Child Transmission of HIV
- PIH: Partners In Health
- LMIC: Low and Middle Income countries
- SSA: Sub-Saharan Africa
- STI: Sexually Transmitted Infections
- SW: Social workers
- TB: Tuberculosis
- UK: United Kingdom
- USA: United States of America
- UNAIDS: United Nations for HIV/AIDS
- WHO: World Health Organization

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Chapter I: Introduction

1.1.Definition of key concepts

HIV

The human immunodeficiency virus (HIV) is a retrovirus that infects cells of the immune system, destroying or impairing their function. As the infection progresses, the immune system becomes weaker, and the person becomes more susceptible to infections (1).

The most advanced stage of HIV infection is acquired immunodeficiency syndrome (AIDS). It can take 10-15 years for an HIV-infected person to develop AIDS; antiretroviral drugs can slow down the process even further (1).

HIV is transmitted through unprotected sexual intercourse (anal or vaginal), transfusion of contaminated blood, sharing of contaminated needles, and between a mother and her infant during pregnancy, childbirth and breastfeeding (1).

AIDS

Acquired Immune Deficiency Syndrome, better known by its acronym AIDS, results from, and is the final stage of infection with the blood-borne Human Immunodeficiency Virus (HIV). AIDS occurs when a person's immune system is so damaged it cannot fight diseases and certain cancers.

HIV Co-infection

Persons infected with HIV may also be infected with Hepatitis B virus (HBV), Hepatitis C Virus (HCV), or with tuberculosis (TB). Injection drug users are especially at risk for HBV or HCV. Co-infection of HIV with another disease complicates each individual disease process and can greatly affect treatment courses and outcomes

Signs and symptoms of HIV

The only way to know if someone is truly infected with the HIV virus is to be tested. Persons who are HIV positive have been known to be asymptomatic for ten (10) or more years.

The CDC has listed a number of physical signs that may be signs of advanced HIV infection, but are not specific to HIV:

- Dry cough
- Rapid weight loss
- Recurring fever
- Profuse night sweats
- Profound and unexplained fatigue
- Swollen lymph glands in the armpits, groin, or neck
- Diarrhea lasting more than a week
- White spots or unusual blemishes on the tongue, or in the mouth or throat
- Pneumonia
- Red, brown, pink, or purplish blotches on or under the skin, or inside the mouth nose or eyelids
- Memory loss, depression, and other neurological disorders

Post-Exposed Prophylaxis (PEP)

The National Institute for Occupational Safety and Health (NIOSH) estimates that there are between 600,000 to 800,000 needle stick injuries each year, and that about half of these go unreported. Fortunately, the risk of HIV infection following needle stick is less than 1% (0.3% or 1 in 300 per CDC data), and the risk of infection from exposure in ways other than needle stick (such as a body fluid splash onto skin) is less than 0.1% (approximately 0.09% per CDC data). Nonetheless, seroconversion to HIV following occupational exposure is a possibility, and healthcare workers must protect themselves in all possible ways.

Prevention of mother-to-child transmission (PMTCT)

It is composed of all possible interventions that are put in place to prevent new HIV-infection from mothers to the newborn. As nearly all young children newly infected with HIV are infected through mother-to-child transmission (MTCT); about 90% of the estimated 110 000 children who newly infected with HIV in 2017 were in the WHO African Region. Globally, there were still 1.4 [1.1 -1.7] million pregnant women with HIV in 2017 (all of whom needed interventions for PMTCT of HIV), of which an estimated 80% [61->95%] received ART drugs for preventing

mother-to-child transmission (PMTCT) of HIV. As of mid-2018 almost all of low- and middle-income countries are fully implementing lifelong ART treatment, beginning immediately at diagnosis (1, 2).

Medication adherence

The extent to which the patient follows medical instructions from Medical Doctor or other health care provider. And this leads to achieving viral suppression and positive health outcomes in HIV-infected individuals (1,2).

HIV outcome

The primary treatment outcome, virology success, was defined as attaining an undetectable HIV viral load within 16–32 weeks of initiating ART. The secondary treatment outcome was immunologic success (achieving a 100 cell/mm^3 CD4 increase within 48 weeks).

1.2. Background

HIV is among the leading causes of deaths for adult in Sub-Saharan Africa (SSA) and the number of HIV infected people who are in HIV program and on ART has been increasing day per day. It continued to spread worldwide and it is one of serious health challenges become continued(1,2). 2013, HIV was estimated to kill more persons comparing any other single cause in SSA(2). Several strategies to end or reduce HIV/AIDs occurrence and severity include significance reduction of new transmission, access health care and improve the outcomes of people living with HIV(3). There is meaningful life improvement for people living with HIV (PLWH) who regularly get antiretroviral therapy (ART)(3). In United States (US) there were 1.2 million people living with HIV but only 39% were under medical care, in HIV program, 36% were prescribed ART and only 30% experienced viral-load suppression(3). ART was recognized to improve the quality of life for PLWH and tests were available for people use in order to know their HIV status. In 2011, number of 96,000 people estimated to be living with HIV in United Kingdom (UK) and about 24% didn't know their HIV status. Same year, 48% of diagnosed HIV positive were among men who have sex with men (MSM), 2% are for people injected drugs and the half was for heterosexually black African individuals. Researchers advocated to these highlighted groups for improving preventive measures(4).

UNAIDs has revealed that there was huge increase in people living with HIV as they were 33.3 million in 2010 and 36.7 million in 2015 worldwide(5).

To respond to severity of HIV, the patients should be in program and be on ART. But refer to Figure 1; there is shortage number of people who were on treatment and HIV program across the globe. Among 33.3 million HIV patients in 2010, less than half (7.501.100 patients) were on ART and 17.025.900 HIV patients were on ART in 2015 amongst 36.7 million. PLWH and on ART have lower risks of dying comparing to those who are not on ART. There was meaningful reduction in AIDS-related deaths as 1.5 million in 2010 and only 1.1 million HIV related deaths occurred in 2015.0.4 million people living with HIV were saved in 5 (5).

Figure1 indicates that there was huge progress in improving number of PLWH who were on ART though the journey still long to run.

In 2010, only 7.5 million of PLWH were on medication but in five years it was more than double as the number shifted from 7.5 million to 17.0 million(5).

Figure 1.

Number of people living with HIV on antiretroviral therapy, global, 2010–2015
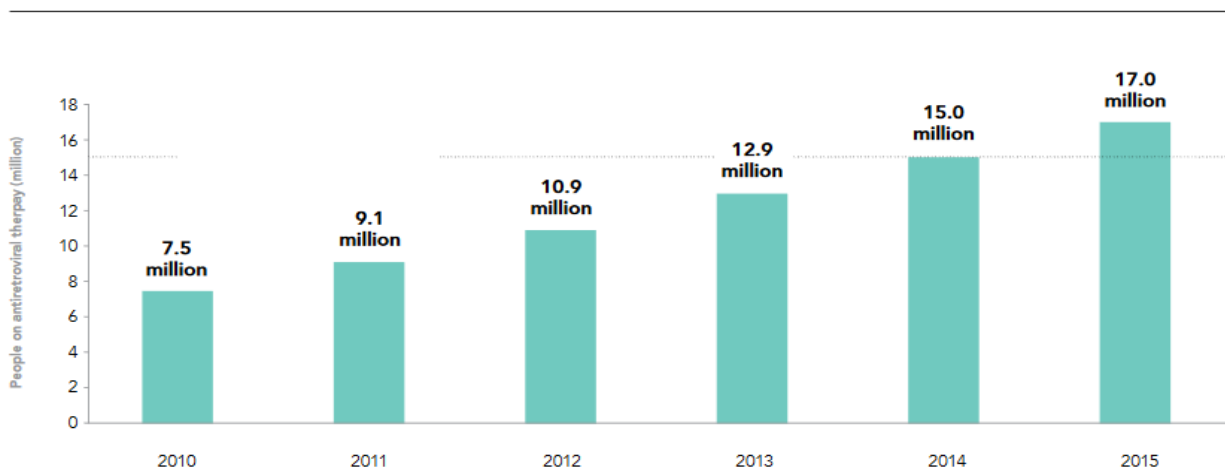
(5)

Researchers proved that routinely HIV medication can lead to reduction of mortality related to HIV/AIDS. Countries like S/Africa has had ART more than a decade and more than 3.4 million of people have been initiated on ART and HIV care, and this led to momentous reduction of HIV related deaths(5).

There was higher mortality in people with resource-limited settings, who are limited to the first one or two years on ART, and those differences in patients focusing on demographic, social-economic, biological and health service factors(3).

HIV/AIDS is mostly worsened by other conditions like TB where in 2014, WHO estimated 9.6 million new TB cases across the globe with 12% (1.2 million) being co-infected with HIV. Even if the scale up to ART has been high, only about one-third (392,000 or 77%) of TB cases and known HIV infected were put on ART. These two big friends help each other to spread across the globe and attach big number of people. In countries like S/Africa, it has been huge challenge to integrate HIV and TB programs as were systematically separated for numerous years. The objective of integrating these programs was focused on three domains: functional, organizational and clinical integration for these co-epidemics(6). Mixture of initiating ART during TB therapy improved survival of TB-HIV co-infected patients by 56% and initiating ART early during TB treatment with 2-4 weeks increased AIDS-free survival at 34-68% and mortality was three times higher in the co-infected patients compared to HIV negative TB patients in S/Africa(6).

Social factors such as age, gender, marital status, level of education, size of family were reported to contribute to HIV outcome. Inadequate and unstable housing, homelessness, and non-utilization of HIV care lead to reduction of treatment effectiveness and increases the risk of being infected. By only improving and availing housing to PLWH leads to improved access and retention in care, clinical and other outcomes. Literature supports that considering housing status is a factor that influences consistent, appropriate HIV medical care, adherence to ART, viral-load suppression, reducing HIV-related disparities and this can lead to closure of the epidemic(7). To tackle HIV epidemics requires multi-sector approach as only ART therapy itself can't end HIV. Therapy can only help us decline the HIV related deaths, improving quality of life, and preventing new infections. So, treatment itself will not end the epidemic.

HIV prevalence differs from population to another. Transgender was notified to have high HIV prevalence compared to other population. Several reasons were found by researchers including but not limited community stigmatization, low-income, unemployment, homelessness, and all these lead to development of mental health disorders like depression, anxiety and suicide all

which are discrete predictors of poor health. All above push transgender women to become sex workers and puts them on risks of HIV, sexual transmitted infection (STI), violence and others(8).

At global level, there is much progress in tackling the issue of HIV, and the nations are working hard to achieve the UNAIDS 90-90-90 goals by 2020. There are still some challenges persisting in laboratory systems particularly in Sub-Saharan Africa (SSA). Governmental and private sector partnership would greatly improve and help in mitigating the HIV/AIDS globally(9). In achieving the UNAIDS goals, researchers identified some barriers related to health system including lack of awareness of test offering, non-standardized collection practices, weak system, frequent equipment breakdown, and the weak supply chain, delayed/inconsistent delivery of test results; limited data management. At patients level, some barriers were explored among them are social demographic characteristics, movement of patients(9).

Rwanda has done a lot to implement the interventions to address the issue of HIV across the country. Mostly interventions have being focusing on preventions of new HIV infection through HIV and ANC programs integration, voluntary male circumcision, and free HIV test and treatment for PLWH. Even if Rwanda implemented all those interventions, HIV remains a big issue for country as HIV prevalence was reported to be 3% in 2015. It has been constant since 2005. According to RDHS published in 2015, the HIV prevalence was different in people and age groups, residency, and socio-demographic characteristics. HIV prevalence in adult aged 15-46 was reported higher in women than men, (4% in women and 2% in men). Geographically, HIV is higher in city than rural and very low in the children aged 0-14 as it was reported to be less than 1%. Level of education, age, economic status, marital status (widow and separated women were reported to have higher HIV prevalence than women living with their husbands), HIV was reported to be higher among polygamous partners, sex workers, people with low-socioeconomic status, settings were identified that they can either be factors to be a risk to increase or down-wording the HIV prevalence of concerned group(5).

To achieve 90-90-90 target by 2020 and global goal to end HIV by 2030, there is a need to global effort and increased investment to this epidemic as Rwanda has grown from 557 to 569

(91%) health facilities that offer ART. Effort should be mostly focusing of stopping new adult infections, ending mother to child transmission and treating those already infected.

HIV pandemic is a huge problem worldwide as there are still new infections occurring among both sexes and ages. In 2015, the highest new infections were observed among males who were 25+ years old as reported to be 39% compared to global new infections in 2015. Lowest infection was among 15-24 ages females worldwide. HIV epidemic is huge in Sub-Saharan Africa. It was also equal across the genders as both sexes for population of 25+ years percentage was 31% in 2015(5,10).

If aiming to end HIV by 2030, we would also think about key population as they highly increase number of new infections worldwide as they contributed 40% to 50% of global new infections in 2015. Worldwide key population were found everywhere around the world: Sex workers, People who inject drugs, men who have sex with men, transgender people, clients of sex workers and other sexual partners of key populations(5,10).

HIV prevalence in Rwanda has remained consistent since 2005 at 3% and treatments are available at Health centers and Rwandese reported high supportive to people living HIV as 80% of women and 86% of men reported that it is right of women to refuse the sex with husband, 97 of women and 98 of men reported willing to support a family member who is HIV+. Integrating HIV testing in other program like ANC is a key way to tackle HIV burden for nation and improve data towards global targets (1) 90-90-90 by 2020 and ending HIV by 2030. Any person living with HIV is considered be health when he has 500 or more CD4, and has worse health if below then. Anyone has less than 200 CD4, shift to stage 3 World Health Organization according to Rwanda HIV guideline. More than 9 in 10 women coming for ANC are tested HIV. Although stigma, discrimination and violence were less reported we still have HIV as a national program considering the high prevalence among sex workers and other key population(11,12).

Also, in Rwanda 70% of men aged 15-45 were not circumcised. Rwanda is working hard to promote 90-90-90 program, and there are significant outcome as there was increase of people who were tested from 2010.

Women who were tested and received results improved from 76% in 2010 to 82% in 2015 while for men it increased from 69% to 78% in that period. Mostly women are likely to be tested when women visit health facility for ANC visit, 9 in 10 women were tested for HIH during ANC, 6% received results but not counseled.

Rwinkwavu District Hospital started HIV program in 2005 and some its health centers in catchment area started immediately the program but others started some years later. HIV program started with EMR to record patient's information. OpenMRS was adopted by Rwanda Ministry of Health and started EMR in most all health facilities that why Rwinkwavu District Hospital and all health centers in catchment area have EMR as tool to store patients' information. Since the start of HIV program up to now, there is no evidence of the success of the program. Therefore, the research question of this study is as follows:

- What are the HIV clinics outcomes in Rwinkwavu District Hospital catchment area?
- What are the associated factors with HIV clinics outcomes?

1.3. Study objectives

1.3.1. Main objective

Assessing HIV program outcome and factors associated with that outcome at Rwinkwavu District Hospital catchment area for adult patients who have been in program for 10 years or beyond.

1.3.2. Specific objectives

✓ To assess adult HIV patients CD4 and Viral-load status at Rwinkwavu District Hospital and health centers in catchment area.

✓ To identify factors associated with HIV program outcome.

1.4. Literature review

HIV has continued to be a global burden due to huge increase in people living with HIV as they were 33.3 million in 2010 and 36.7 million in 2015. To respond to severity of HIV, the patients should be in program and be on ART. Statistically, only 7.501.100 patients were on ART in 2010 and 17.025.900 HIV patients were on ART in 2015. There were significant reduction in AIDS-related deaths as 1.5 million occurred in 2010 and only 1.1 million HIV related deaths occurred in 2015(5). WHO, reported that HIV prevalence in much different from key people and others.

Worldwide new infections in 2016 among key personswere40% to 50%(5,10) This was quite different across the countries and the group of people. UNAIDS estimate more than half of new infections occurring in Asia, Central Asia and Eastern Europe from 53to 60% among key people(10).

UNAIDS set in 2015 of ending AIDS epidemic by 2030, to achieve this goal billions of dollars have been invested and collective effort of health care workers, social workers, Non-Governmental organizations and researchers was required. There was estimate of 21.7 million people living with HIV globally in 2017 receiving ART. This was five and half more times than a decade ago.

UNAIDS target of 90-90-90 targets by 2020: 90% of people living with HIV should know their status, 90% of people living with HIV are accessing treatment and 90% of people ling with HIV have suppressed viral loads.

Figure 2 indicates that 75% of PLWH in 2017 knew their status, 79% among people who knew their HIV status were on ART, and 81% of people who were on treatment suppressed their viral-loads.

Figure 2.
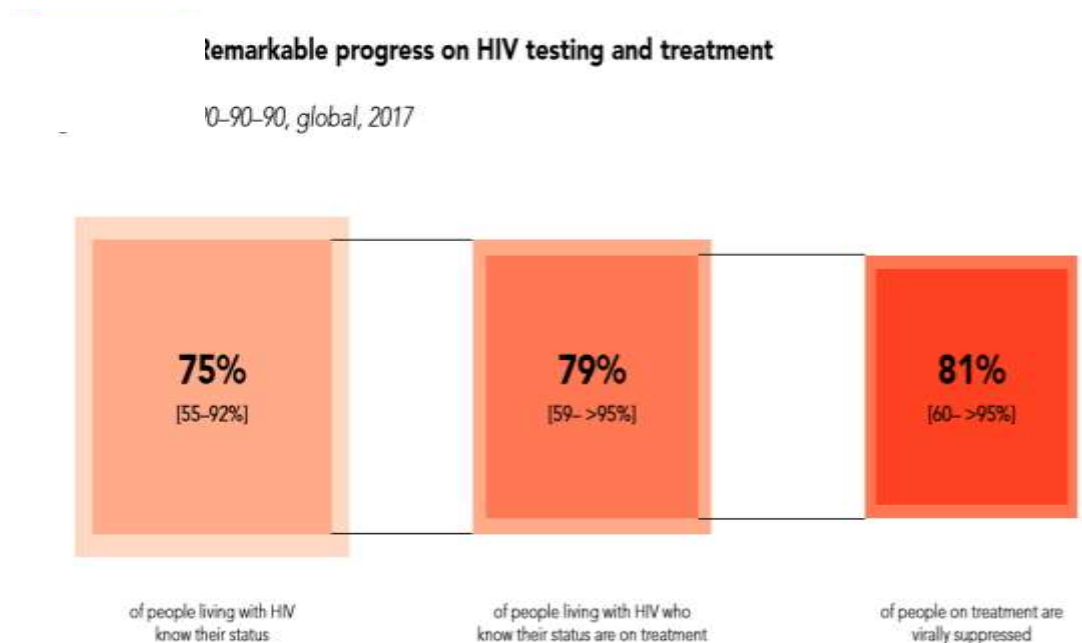
Remarkable progress on HIV testing and treatment

0-90-90, global, 2017

75%
[55-92%]

79%
[59- >95%]

81%
[60- >95%]

of people living with HIV
know their status

of people living with HIV who
know their status are on treatment

of people on treatment are
virally suppressed

Source: UNAIDS special analysis, 2018; see annex on methods for more details.

9

Knowing HIV status for people, who don't know, is key way to manage and help these patients improve the quality of life. At the end of 2017, 36.9 million of people were living with HIV, 59% were on treatment and only 47% had suppressed viral loads. Figure 3 is demonstrating the gaps(5,10,13).

Figure 3 is indicating global statistics about three 90s in 2017, 75% of PLWH know their status, 59% of PLWH were on treatment, and only 47% of PLWH suppressed their viral-load. There were huge gap for first 90 as 5.7 million don't know their HIV status. For second 90, 8.2 millions of PLWH were not on treatment, and third 90, 9.4 million of HIV+ didn't suppress their viral-load

Figure 3.

HIV testing and treatment cascade, global, 2017
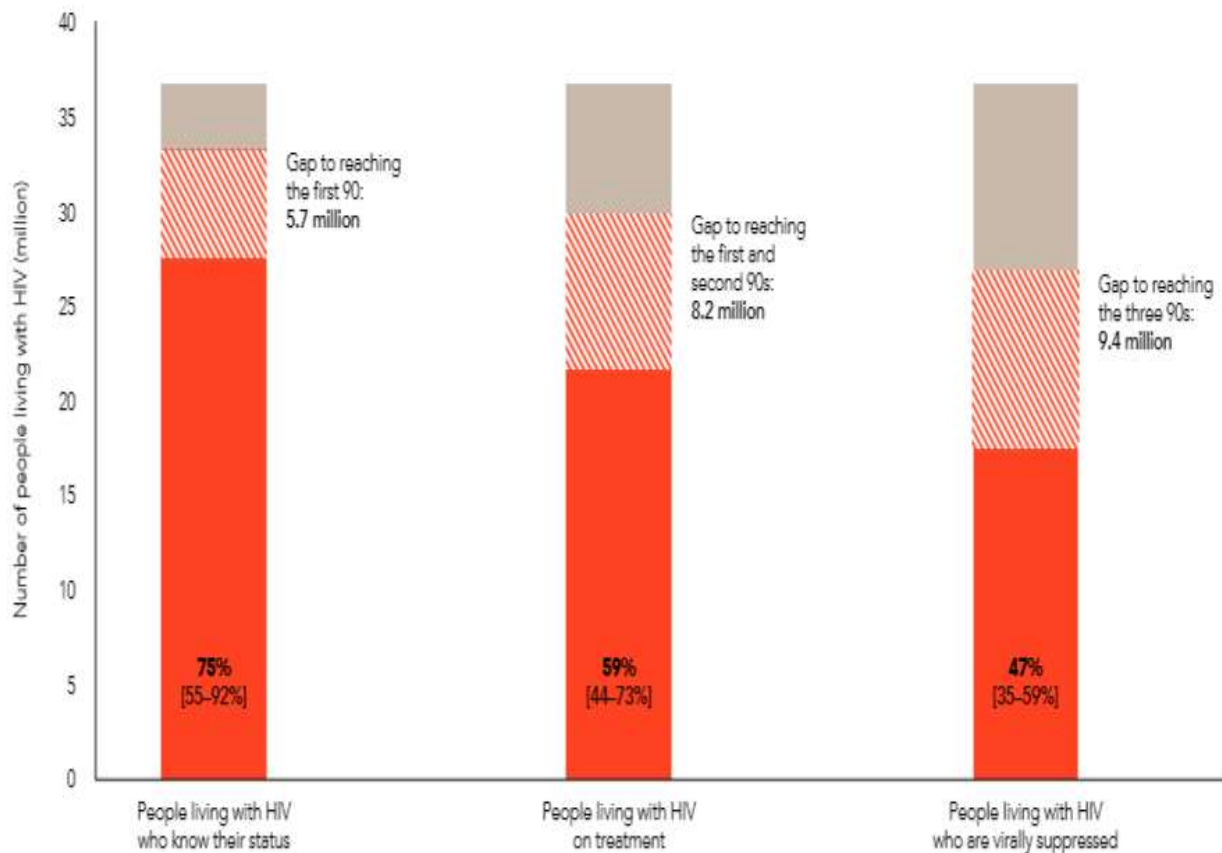
Source: UNAIDS special analysis, 2018; see annex on methods for more details

Integration of HIV program in other programs was found as key to improve health for patients living with HIV and prevention of new infections in various ways. Also this will lead to meaningful reduction of stigma across the society. This mostly can be effective when integrated in existing program like reproductive, maternal, new born care, and child health(14).

Researchers and UNAIDs discovered some reasons that cause HIV to still being global issue: (1) Stigma and discrimination have been reported as a barrier to end HIV across the globe. (2) Violence, (3) Marginalization, (4) Laws and Policies. Laws and policies should be in place to protect people living with HIV but in some countries are not enough so, there is a need of enforcing policies and laws, and people must have resource to an accessible and effective legal system. Death penalty applied in 29 among 100 countries where UNAIDS surveyed in 2017 for people who do sex with same gender. This penalty can lead to high new infections among men who have sex with men as they will intend to do hidden and unprotected sex. And (5) Poverty and inequalities(8,9,13,15,16)

1.5. Conceptual framework

The study aims to study Rwinkwavu District Hospital and surrounding health centers HIV clinics outcomes and the associated factors. We expected the outcome to be negative or positive by comparing before and after. The outcome concluded by looking at CD4, Viral-loads, and BMI, also we identified the factors associated with the outcomes. The three variables were used to compare before and after as baseline and after intervention. Data were collected from EMR in order to help us compare and state the conclusion. Dependent variable was HIV program outcome and the independent variables were in four categories (1) Social demographic factors, (2) Clinical factors, (3) Social economic factors, and (4) environmental factors.

Since Rwinkwavu District Hospital and eight health centers have started HIV programs, there were no any studies to state the success story, so, this was evidence to show the achievement of HIV programs. Figure 4 indicates how dependent variable connects with four independent variables.

Figure 4. Conceptual Framework

Social demographic factors

Age

Gender

Marital status

Size of family

Education level

Religion

Clinical factors

Treatment adherence

Symptoms

WHO stage

Food package

HIV program out-come

Social economic factors

Community stigma

Discordant couples

Family income

Source of income (daily work)

Ubudehe category

Number of meals per day

Environmental factors

Housing

Distance from home to HF

Means of transport

Distance from home to HF

Chapter Two Methods and materials

2.1. Study area description

This study was done in Rwinkwavu District Hospital catchment area. This means HIV adult patients seek service from Rwinkwavu District Hospital and all eight health centers around the hospital. Both DH and health centers are located in Kayonza District, Eastern Province. Kayonza District has two District Hospitals (1) Gahini District Hospital (GDH), and (2) Rwinkwavu District Hospital (RDH). GDH covers the north of district and RDH covers the south of district. This study will be conducted in the south of Kayonza District including RDH, and eight health centers: Rwinkwavu Health Center, Kabarondo Health Center, Karama Health Center, Ndego Health Center, Cyarubare Health Center, Ruramira Health Center, Nyamirama Health Center, and Rutare Health Center. Rwinkwavu District Hospital and health centers in catchment area started HIV program since 2005 with mostly Government and Partners In Health support. Since then, they started to use both electric record known as Electronic Medical Record (EMR) and paper based recording (Registers, patient's files). EMR enables the program to record and have easy access to both baseline and current information. So, it will be a great tool to help us having accurate data as it stores the individual data not aggregated dada. With EMR before and after research is applicable and easy to be done.

Figure5 locates the Rwinkwavu District Hospital and eight health centers in catchment area. Red Crosses are pointing where health centers are located and the blue H with blue background it locates where the Rwinkwavu District Hospital is located. Number in Kilometer displayed at each health center, indicates how many kilometers from the District Hospital to each health centers. Looking at map the farthest health center is Ndego that is located at 33.3 km from Rwinkwavu District Hospital.

Figure 5. Rwinkwavu District Hospital Catchment area Map
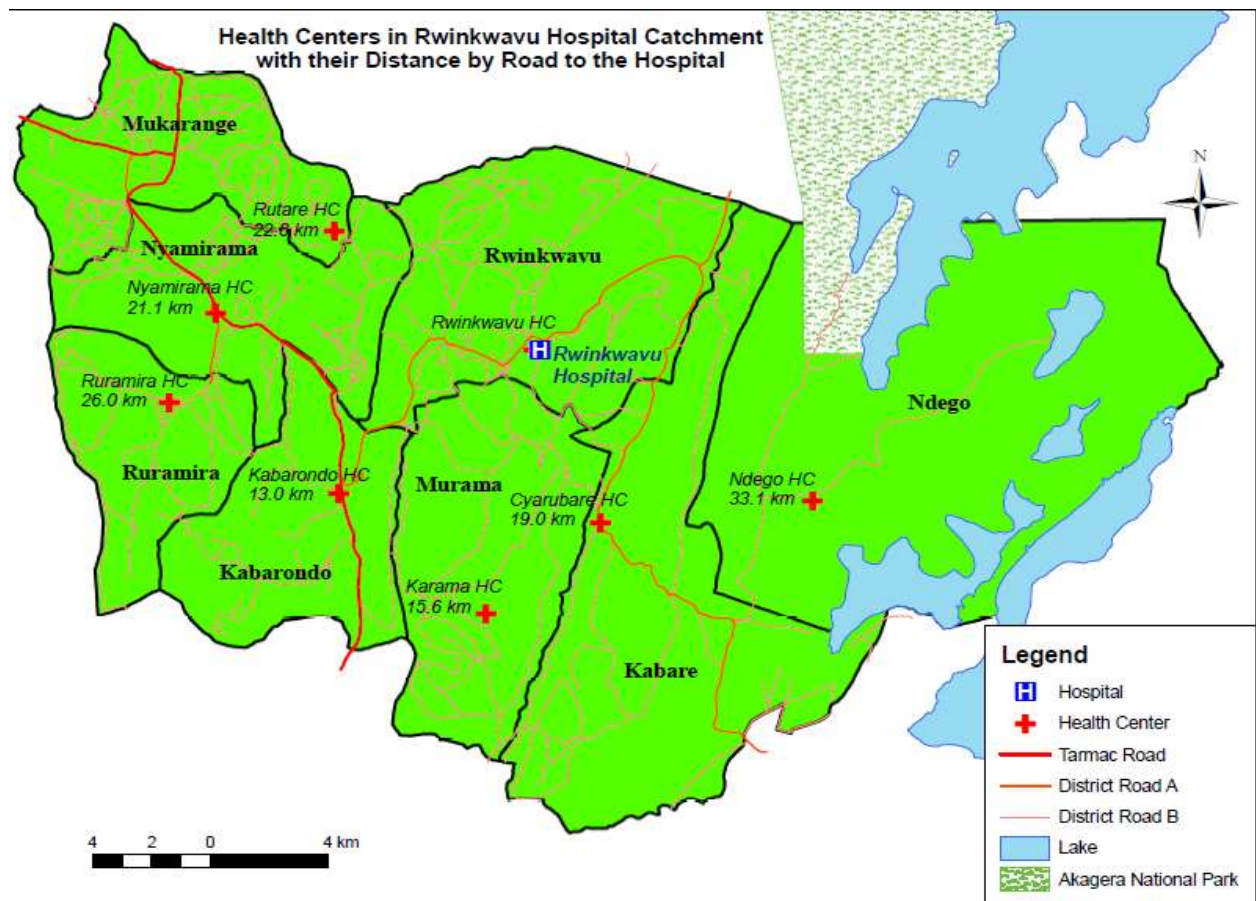
2.2. Study design

The study design was a cross-sectional design by nature looking back the progress of adult patients enrolled in HIV program for ten years or over.

2.3. Specific objectives achievement

✓ To assess adult HIV patients CD4 and Viral-load status at Rwinkwavu District Hospital and health centers in catchment area, we evaluated the success of program by comparing the recent CD4 count of the patients with standardized CD4 (500 CD4) of healthy people as well as HIV Viral load status. After the above, we tabulated and reported the difference and concluded to the outcome of HIV program.

✓ To identify factors associated with HIV program outcomes.

After descriptive analysis for independent variables and reporting, the next step was to perform bivariate analysis between dependent variable and all independent variables. All dependent variables with P-value less than 0.05 were reported and were used during multivariate analysis (backward). Within multivariate analysis, we confirmed the association between each independent variable and dependent variable. The association was confirmed by Odd Ratio (OR) as measure of association.

Study variables

- **Dependent variable**
- *HIV program outcome*
- **Independent variables**

Main independent variables are social demographic, socio-economic, clinical, and environmental factors.

✓ **Socio-economic and demographic factors**

a. Patients' age was recorded as a continuous variable.

b. Patients' gender was recorded as a binary variable.

c. Patients' education level was analysed as a three-category variable (no education + primary, secondary + higher).

d. Marital status of patients was grouped into never in union, married + live with a partner, divorced and widowed.

e. Patients' employment was categorized into farming, formal employment, business, and none "not working".

f. Religion of patients was analysed in five categories: Catholics, Protestants, Muslims, religions and none. In the category of Protestants, three categories were included: Protestants, Adventist and Jehovah witness.

g. Ubudehe category: economic class was grouped in four (1,2,3, and 4)

✓ **Environmental factors**

a. Housing: type of housing was grouped into two categories: (1) durable materials and non-durable materials.

b. Time used to reach a health facility: travel time had four groups: less than 30 min, 30-1 hour, 1-2 hours, 3 greater than

c. Means of transport had: walk, bike, moto, and car.

✓ **Clinical factors**

a. We had CD4, Viral-load and BMI as continuous variables and these were used to evaluate the adherence

+ **Data analysis**
  ➢ **ArcGIS software for georeferenced data**

  This georeferenced analysis was performed for accessibility and patients distribution reasons

  ➢ **STATA for univariate and bivariate analysis using STATA software**

  Simple mean was calculated

  ✓ T-test was used for hypothesis testing as our data be to compare before and after intervention (baseline and after intervention comparison)

  ✓ So, Pv was key demonstration to conclude if we reject or retain the H0.

  ✓ Odd ratio (OR) was calculated for measuring the association.

  ✓ Conclusion was drown basing on the results.

  ➢ Data analysis plan

  ✓ Is being in HIV program has positive outcome?

  My null hypothesis (H_0) was tested as follow

  $H_{01:}$ (BMI at Baseline) μ_0 = (BMI after intervention) μ_1

  $H_{02:}$ (CD4 at Baseline) μ_0 = (CD4 after intervention) μ_1

  $H_{02:}$ (Viral load at Baseline) μ_0 = (Viral load after intervention) μ_1

  ✓ What are the factors associated with positive or negative outcome? At this level, level of association was measured and as it is retrospective study, Odd Ratio was calculated to prove the causal and effect relationship.

  ✓ Multivariate analysis

  Correlation was observed and presented the linear regression.

2.4. Study population

HIV adult patients enrolled in Rwinkwavu Hospital, Rwinkwavu HC, Cyarubare HC, Kabarondo HC, Karama HC, Rutare HC, Ndego HC, Nyamirama HC, and Ruramira HC were included. Patient to be recruited must be in program for 10 years or beyond.

➢ **Inclusion criteria**

A patient to be part of this study must be enrolled in Rwinkwavu District Hospital and from among 8 HCs located in RDH catchment area in HIV program and must be adult which means 21 and over years. Secondly patients should have at least two clinical visits just for allowing our possible analysis as we compared before and after receiving treatment. The patients should have been in program for or more than 10 years. Only still live and not moved patients from Rwinkwavu catchment area were included.

➢ **Exclusion criteria**

All HIV patients who were under 21 years and HIV patients who were 21 years old or beyond enrolled in program who made one or none clinical visits were not included. HIV patients who died before June 2019 were excluded.

- **Sample size calculation**

    Two steps in calculating sample size were respected and used. Those two phases are as follow

    Phase one

    Step one is to decide the minimum sample size required for propositions with Sample Registration System (SRS)

    ➢ Formula: $n > Z^2(P)(1-P)/D^2$

    ➢ Illustration of calculation

    $1.96^2(0.5)(1-0.5)/0.05^2 = 385$

    Phase two

    As the number of patients was limited, below is the illustration that led to final sample size.

    Population size 900 patients

    $n = N*n'/ (N+n')$

    $n = 900*385/ (900+385) = 269.64 \sim 270$

Add 10% in order to have final sample size

270*10/100= 297

Minimum sample size was**297**

- **Sampling techniques**

Multi-stage sampling methodology was employed in order to have sample that is representative of population. And we only used probability sampling method.

- o Cluster sampling
- o Then participants were recruited basing on their presence to HIV clinics (during clinical visits).

- **Data collection procedures**

The routinely collected data and stored electronically in Electronic Medical Record, and hard copies such as registers and patients files were considered. Data were collected from EMR and registers or files, were related to clinical side and food packages or social support that may have been offered to patients during the course of sickness. To have complete data, we also collected primary data from HIV+ patients. The primary data were mostly related to social factors that affected patients' health changes. So, we used EMR to find out the patients in program that met criteria to be included in study and extract some patients' data such as: age, gender, location, at base-line and after intervention (BMI, CD4 and Viral-load). Primary data as stated were related to social factors like: marital status, religion, stigma, Ubudehe category, nutrition status, other family information, and number of family members. Single person structured **interview** was conducted as method of data collection. Patients were met at health facility on their medical appointment day. So, whoever met criteria and came to the clinic when data collector was there was interviewed.

2.5. Study materials

One by one structured interview was conducted using a **questionnaire guide**. After interviews data were entered in computer for data management by data collectors. To ensure the quality of questionnaire, back-translation from English to Kinyarwanda was ensured. Also consent forms were availed for every patient for agreeing or disagreeing to participate in research.

Questionnaires and other study tools were pre-tested as follow:

Prior to the data collection, a pilot testing exercise was conducted to ensure that the data collection tools were understandable. A one-day pilot study was conducted one week before the study. It was conducted on 20 HIV patients from Kirehe District. Data collections tools were adjusted and improved following the feedback and observations from the pilot study. It was helpful in revealing potential issues within the study plan and areas for improvement. Furthermore, piloting the tools allowed the researcher to review pilot data to determine its accuracy and decide whether a retraining session was necessary.

Also EMR data were collected to supplement primary data. Electronic (excel) database was generated to store and manage data.

2.6. Policy implication

This study will help all stakeholders in HIV related policy formation, decision making, and interventions to fight against this pandemic.

Scientists: other researchers will be able to have more readings and further their reference by having more papers available to refer to.

Politicians and decision makers: Decisions will be made using this paper and will lead to improve health of people living with HIV. Policies and other documents will be generated using this paper.

Professionals: health care providers and other health related workers will help patients adhering to their medication using findings.

Patients and care givers: whatever decision should be patient-centered so, the patients and their caregiver will be able to understand why any decision is being implemented.

2.7. Ethical considerations

Permission and ethical clearance was obtained from IRB College of Medicine and Health Sciences and a formal authorizing letter was presented to Rwinkwavu District Hospital, Partners in Health (PIH) leadership, and local leaders for obtaining approval to start data collection in HIV program.

At the hospital and health centers, the researcher explained to the participants the aim of the study and possible benefits. **Indirect** benefits were explained where to the participants and their participation was voluntary and no patient was pushed to participate in the study.

The participants participated **voluntarily** and could **withdraw** from the study any time and none was penalized for doing so.

Participants` **privacy and confidentiality** were considered by using patients PIH IDs and TRACNET ID instead of names. Privacy at health facility was ensured by identifying the private room before starting data collection. This means that the PI visited health centers and district hospital prior to the data collection for prior place setting and ensure privacy for interviewees. In order to ensure the confidentiality, the study team explained the interviewees that nobody will be shared the information; only study team will be sharing for research purpose. To ensure individual confidentiality, the participants' names were not to be recorded as we only used both PIH and TRACNET IDs to individual identification. There are **no risks** to the participants in this study, this means the study doesn't aim to harm the patients but to inform decision makers for improving health care. So, no any risks as the health facilities were shared only the general information not the individual picture. Also, the participants were informed that there is **no compensation**/ **direct benefit** from participating in this study. The benefit of this study is to improve health care and patients' health as the goal of palliative care is to improve patients' health not to treat. So, there were no physical incentives but there was benefit of improving frontline health care providers, health care leaders, and decision makers. Collected data were stored in pass-worded computer, computers access was only for researcher team nobody else had access to those computers. Some decisions were taken referring to the study findings. The researchers requested participants' consent to participate. Those who were able to read were given consent form and read for themselves and those who weren't able to read researcher or data collector read for them. Researcher/ data collector and patients signed consent form. Data collectors were trained on research ethics prior to data collection and also training was conducted for allowing them being familiar to study tools. Data collectors were fifth year medical students who were in their holidays.

(*Consent form* was *adapted from http://www.who.int/rpc/research_ethics/informed_consent*).

Chapter Three: Results

3.1. Socio-demographic characteristics of the study population

The sample size was 322 and 74.2% were females. All patients were adult as the youngest was 22 years old and the oldest was 77year old, the mean age was 48.6 years. Majority of study population were aged 41-50 years old representing38.80%of the sample size. Patients received HIV care from nine health facilities notably Rwinkwavu District Hospital, Rwinkwavu Health Center, Cyarubare, Kabarondo, Karama, Nyamirama, Ruramira, Rutare and Ndego Health Centres. There was no any patient from outside Kayonza District. Health facility with the highest proportion was Rwinkwavu Health Center, 28.6%. People with no level of education were 42.3%.

Almost half of patients (46.90%) were married and still in union. Households led by women were more (53.10%) compared to the ones led by men (46.4%). On average the household size was 4 members, smallest household was made of 2 members and the largest household was made of 8 members.

Almost all patients (96.89%) attend church and majority go to the protestant churches (64.60%).

Results for patients' behaviors were reported proportionally, 59.9% were not smokers. Among smokers, 40.04% stopped smoking and reasons to quit smoking were reported to be: health education from health care providers (43.80%), Voluntary (45.40%), church influence (10%), and combined health education and church influence that represented less than 1%. Majority of patients (72.36%) reported not drinking beer compared to those who drink beer, 27.6%. The reasons to stop drinking beer were reported to be similar to the reason to quit smoking. Patients having sexual intercourse with other persons rather than their spouses represented 18.33%.

Most of the respondents (65%) belong to Ubudehe category 1 and 2 as Ubudehe category 1 (28.00%), Ubudehe category 2 (37.00%), and Ubudehe category 3 (35.00%). Most of interviewed patients (99%) reported that they were farmers as their main family income.

Knowledge on balanced diet was another variable reported by the patients, 95% agreed to have knowledge on balanced diet, among them 88.80% reported to have got balanced food knowledge from health education provided by skilled health care providers. Patients described that they ate once per day, 59.90% and 39.20% ate twice per day.

The results illustrate that nearly 14% use less than 30 minutes traveling to the nearest health facility and majority of the patients (40.40%) use between 30 minutes and one hour, 17% of patients stated that they use three to four hours while traveling to the nearest health facilities to seek health care. It was reported that 94.4% of patients travel on foot to health facility and only two patients use car/ tax. Majority of patients (91.30%) announced that they were given food support during the course of the disease.

Follow-up through home visits was done for 76.10% of patients. Home visits were done by social workers (59.6%), nurses (27.10%), Community Health Workers (13.50%), and 23.90% were not ever visited at their home. Satisfaction was reported to be excellent by 86.30%, good by 11.20% and moderate by 2.50%. Both communication and decision involvement were reported to be excellent. 98.10% patients were involved in decision making and 93.50% reported that communication between health care providers and patients was excellent as detailed in Table1.

Table 1. Socio-demographic and other characteristics of the study population

Variable	Frequency	Percentage
Sex		
Female	239	74.2
Male	83	25.80
Age (in years)		
21-30	21	6.55
31-40	52	16.15
41-50	125	38.80
=>51	124	38.50
Level of education		
None	136	42.3
Primary school	171	53.1
Secondary school	15	4.6
Health Facility		
Cyarubare HC	43	13.4
Kabarondo HC	73	22.6
KaramaHC	25	7.8
Ndego HC	20	6.2
NyamiramaHC	22	6.8
Rutare	14	4.3
RuramiraHC	22	6.8

Rwinkwavu DH	11	3.4
Rwinkwavu HC	92	28.6

Marital status

Married	151	46.9
Widowed	91	28.26
Separated	55	17.08
Divorced	25	7.76

Household head

Husband	151	46.40
Women	171	53.10
Other	3	0.50

House hold size (members)

1-3	103	31.98
4-6	168	52.18
>=7	51	15.84

Religious status

Catholic	86	26.70
Protestant	208	64.60
Islam	16	5.00
Other	2	0.60
None	10	3.00

Smoking

Yes	20	6.00
No	300	94.00

Drinking beer

Yes	89	27.64
No	233	72.36

In last six months did you have unprotected sex with other person rather than your spouse

Yes	59	18.33
No	263	81.67

Ubudehe category

Ubudehe cat 1	90	28.00
Ubudehe cat 2	119	37.00
Ubudehe cat 3	113	35.00

Occupation

Farming	320	99.00
Business	1	0.40
Student	2	0.60
Total	322	100.00

Number of meal per day

Once per day	193	59.90

Twice times	126	39.13
Three times	3	0.97

Knowledge on balanced diet

Yes	307	95.00
No	5	5.00

Source of knowledge on balanced diet

Health education	299	93.00
School	12	3.50
Parents	5	1.50
Other family members	6	2.00

Means of transportation

Walk	304	94.40
Bikes	12	3.70
Moto	4	1.30
Car or tax	2	0.60

Time to reach the nearest health facility

Less than 30 min	45	14.00
30 min – one hour	130	40.40
One – two hours	90	28.00
Two –three hours	55	17.00
Four and more hours	2	0.60

Food support

Yes	294	91.30
No	28	8.70

Home visit

Yes	245	76.10
No	77	23.90

Who did home visit (Who visited patients)

Social worker	146	59.6
Nurse	66	27.10
CHW	33	13.50

Involved in decision

Yes	316	98.10
No	6	1.90

Satisfaction with service

Excellent	278	86.30
Good	36	11.20
Moderate	8	2.50

Communication with healthcare provider

Excellent	301	93.50
Good	15	4.50
Moderate	6	2.00

3.2. HIV program assessment

Table2 details results about before and after intervention. There was increase in CD4 count, as at base line mean CD4 count was364.18 (CI: 334.16, 394.19) and after intervention mean CD4 was almost doubled 670.78 (CI: 637.63, 703.93) with pv 0.000.The mean Viral-load at baseline was 3081.75(-160.37, 6323.88)and after intervention the Viral-load was 700.00(-214.35, 1614.37) with pv 0.0813. BMI was 19.70 (19.39, 20.01) at baseline, and was 20.45 (CI: 20.12, 20.79) after 10 years or beyond with pv 0.0002. CD4 count trends were continuous positive as81 % of patients increased their baseline mean CD4. Analysis was performed using CD4 standard that equals to 500 according to Rwanda Ministry of Health; results showed that 27.0% were below 500 CD4 whereas 73% were greater than 500 CD4as detailed in Table 3.

Table 2. HIV program outcome: before and after intervention

Variable	Mean	CI	p-value
CD4 (T-test analysis before and after)			
CD4_Baseline	364.18	(334.16, 394.19)	0.0000
CD4_after intervention	670.78	(637.63, 703.93)	
Viral-load			
Viral-load Baseline	3081.75	(-160.37, 6323.88)	0.0813
Viral-load after intervention	700.00	(-214.35, 1614.37)	
BMI			
BMI_Baseline	19.70	(19.39, 20.01)	0.0002
BMI_after intervention	20.45	(20.12, 20.79)	

Table 3. Trends in CD4: Before and after intervention

Status	Frequency	Percentage
Before and after		
Increase	260	81
Decrease	62	19
Trends in CD4 (reference #500)		
Less than 500	87	27.02
Greater than 500	235	72.98

3.3. Bivariate analysis: CD4 increase and socio-demographic characteristics of the study population

There is a higher proportion of CD4 increase in patients with primary education (45%) than in patients with no education (31%). Moreover there was higher CD4 increase in patients that get care at Kabarondo (20%) and Rwinkwavu (19%) Health Centers than other health centers such as Rutare (4%) and Ndego (5%) Health Centers. Furthermore there was higher proportion of patients with knowledge on balanced diet (79%) than in patients without knowledge of balanced diet (2%). Also, patients with excellent satisfaction in service (68%) than patients with moderate satisfaction with service (2.5%) had CD4 increase as detailed in Table 4.

Table 4. HIV outcome and socio-demographic variables

Variable	Increase %(Frequency)	Decrease %(Frequency)	Total	P-value
Sex				
Female	60.5 (195)	13.9(45)	74.4 (240)	0.644
Male	20.5(65)	5.1 (17)	25.6 (82)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	
Age (in years)				
21-30	3.2 (10)	0.6 (2)	3.8 (12)	0.150
31-40	13.0 (41)	3.4 (11)	16.4 (52)	
41-50	32.2 (104)	7.0 (23)	39.2 (127)	
=>51	32.6 (105)	8.0 (26)	40.6 (131)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	
Level of education				
None	31.0 (100)	11.8 (36)	42.8 (136)	**0.009**
Primary	45.0 (145)	8.2 (26)	53.2 (171)	
Secondary	5.0 (15)	0.00 (0)	5.0 (15)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Health Facility

Cyarubare	11.5 (37)	1.5 (5)	13(42)	**0.003**
Kabarondo	20.0 (64)	3.0 (9)	23 (73)	
Karama	7.6 (24)	0.3 (1)	7.9 (25)	
Ndego	5.0 (16)	1.2(4)	6.2 (20)	
Nyamirama	6.5 (21)	0.3 (1)	6.8 (22)	
Ruramira	5.4 (17)	1.5 (5)	6.9 (22)	
Rutare	4.0 (12)	0.5(2)	4.5 (14)	
Rwinkwavu DH	2.0 (7)	1.2 (4)	3.2 (11)	
Rwinkwavu HC	19.0 (62)	9.0 (30)	28 (92)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Marital status

Married	37.0 (119)	10.0 (32)	47.0 (151)	0.840
Separated	14.0(44)	3.0 (9)	17.0 (53)	
Divorced	6.0 (20)	1.5 (5)	7.5 (25)	
Widowed	24.0 (77)	4.5 (14)	28.5 (91)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Household head

Husband	37.5 (121)	9.0 (30)	46.5 (151)	0.643
Wife	43.5 (140)	10.0 (33)	53.5 (173)	
Other	1.0 (3)	0.0 (0)	1.0 (3)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Household size (members)

1-3	25.0 (80)	7.0 (23)	32 (113)	0.665
4-6	42.0 (138)	9.0 (29)	51 (167)	
>=7	13.0 (42)	3.0 (10)	16.0 (52)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Religious status

Catholic	21.5 (69)	5.0 (16)	26.5 (85)	0.571
Protestant	53.0 (170)	11.7 (38)	64.7 (208)	
Islam	3.5 (11)	2.0 (5)	5.5 (16)	
Other/ non church	1.0 (10)	0.3 (2)	1.3 (12)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Smoking

No	76.5 (245)	17.5 (57)	94 (302)	0.696
Yes	4.5 (15)	1.5 (5)	6 (20)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Drinking beer

No	59.0 (191)	13.0 (43)	72.0 (234)	0.468
Yes	22.0 (69)	6.0 (19)	28.0 (88)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

In last six months did you have unprotected sex with other person rather than your spouse

No	76.0 (245)	17.0 (55)	93.0 (299)	0.344
Yes	5.0 (15)	2.0 (7)	7.0 (22)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Ubudehe category

Ubudehe cat 1	20.5 (66)	7.0 (23)	27.5 (89)	0.050
Ubudehe cat 2	32.5 (104)	4.6 (15)	37.1 (119)	
Ubudehe cat 3	28.0 (90)	7.4.0 (24)	36.4 (114)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Occupation

Business	0.5 (1)	0.1 (1)	0.6 (2)	0.790
Farming	80.0 (258)	18.9 (61)	99.9 (319)	
Student	0.5 (1)	0.0 (0)	0.5 (1)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Number of meal per day

Once per day	47.0 (151)	12.5 (41)	59.5 (192)	0.309
Twice times	33.0 (107)	6.0 (19)	39 (116)	
Three times	1.0 (2)	0.5 (1)	1.5 (3)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Knowledge on balanced diet

No	2.0 (5)	3.0 (10)	5.0 (15)	**0.000**
Yes	79.0 (255)	16.0 (52)	95 (307)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Source of knowledge on balanced diet

Health care provider	75.0 (241)	18.0 (58)	93 (299)	0.649
Parents	4.0 (11)	0.5 (1)	4.5 (12)	
Schools	1.0 (3)	0.0 (0)	1 (3)	
Other member	1.0 (5)	0.5 (1)	1.5 (6)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Means of transportation

Walk	76.4 (246)	17.7 (57)	94.1 (313)	0.389
Bike	3.4 (10)	0.7 (2)	4.1 (12)	
Moto	0.6 (2)	0.6 (2)	1.2 (4)	
Car	0.6 (2)	0.0 (0)	0.6 (2)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Time to reach nearest health facility

Less than 30 min	11.5 (37)	2.3 (8)	13.8 (45)	0.182
30 min – one hour	24.5 (79)	3.4 (11)	27.9 (90)	
One – two hours	12.7 (41)	4.3 (14)	17 (55)	
Two –three hours	31.6 (102)	8.6 (28)	41.2 (130)	
Four and more hours	0.4 (1)	0.4 (1)	0.8 (2)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Food support

Yes	74.0 (239)	17.0 (56)	91 (294)	0.871
No	7.0 (23)	2.0 (5)	9 (28)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Home visit

Yes	61.0 (195)	15.3 (49)	76.3 (245)	0.380
No	20.0 (65)	3.7 (12)	23.7 (77)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Who did home visit (who visited patients)

Social worker	39.0 (127)	9.0 (29)	49 (156)	0.207
Nurse	17.5 (56)	3.0 (10)	20.5 (66)	
CHW	7.0 (23)	3.0 (10)	10 (33)	
Total	**85(166)**	**15 (49)**	**100 (245)**	

Involved in decision

No	2 (5)	0.5 (2)	2.5 (7) 0.883
Yes	79.0 (255)	18.5 (60)	97.5 (215)
Total	**81 (260)**	**19 (62)**	**100 (322)**

Satisfaction with service

Excellent	68.0 (218)	18.0 (59)	86 (277)	**0.029**
Good	10.5 (34)	1.0 (3)	11.5 (37)	
Moderate	2.5 (8)	0.00 (0)	2.5 (8)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

Communication with healthcare provider

Excellent	74.5 (240)	18.0 (60)	92.5 (300)	0.214
Good	5.0 (16)	1.0 (2)	6.0 (18)	
Moderate	2.0 (6)	0.0 (0)	2.0 (6)	
Total	**81 (260)**	**19 (62)**	**100 (322)**	

3.4. Multivariable analysis

The association between CD4 and significant variables from bivariate analysis were analyzed using multiple logistic regression model. Variables like level of education, health facility, knowledge on balanced diet, and health service satisfaction were recommended for multivariate analysis.

Multivariate analysis model, the results show that no educated patients were less likely to have an increase of CD4 (OR: 0.54, CI: 0.35, 0.98, pv-0.006).Patients from Kabarondo HC were less likely to have an increase of CD4 (OR: 0.19, CI: 0.39, 0.98, pv-0.04). Knowledge on balanced diet was positively associated with HIV outcome: Patients who have knowledge on balanced diet are 7.9 times likely to increase their CD4 counts compared to those who did not have knowledge on balanced diet (OR: 7.9, CI: 2.33, 9.09, pv-0.004). Furthermore, patients moderately satisfied with service were less likely to have CD4 increase than those with excellent satisfaction (OR: 0.10, CI: 0.01, 0.62, pv-0.01) as deailed in Table 5.

Table 5. Multivariate analysis: CD4 increase and other variables

Variable	OR	95% CI	P-value
Level of education			
Secondary	1.00		
None	0.54	(0.35, 0.98)	**0.006**
Health facility			
Rutare HC	1.00		
Cyarubare HC	2.03	(0.45, 9.02)	0.94
Kabarondo HC	0.19	(0.39, 0.98)	**0.04**
Karama HC	2.01	(0.51, 3.83)	0.31
Ndego HC	0.41	(0.07, 2.30)	0.31
Nyamirama HC	0.85	(0.17, 4.31)	0.85
Ruramira HC	0.65	(0.19, 2.23)	0.50
Rwinkwavu DH	4.54	(0.36, 3.60)	0.26
Rwinkwavu HC	4.50	(0.36, 3.97)	0.26
Knowledge on balanced diet			
No	1.00		
Yes	7.9	(2.33, 9.09)	**0.004**
Satisfaction with service			
Excellent	1.00		
Moderate	0.10	(0.01, 0.62)	**0.01**

Chapter Four: Discussion

4.1. CD4 increase

The objective of this study was to assess CD4 increase and factors associated for patients living with HIV and enrolled in HIV program in Rwinkwavu District Hospital catchment area. Program outcome was examined by comparing DC4 before, and after CD4 trends over. There was high increase in CD4 as mean at baseline was 364.18 and after intervention was 670.78, Viral load declined from 3,081.75 at baseline to 700.00, and also mean BMI at baseline was 19.39 and after intervention was 20.45.27% of patients were below 500 standardized CD4 whereas 73% were over 500.

Nevertheless study done by Alfonso C. Hernandeze-Romieuet el found that Viral load declined as patients enrolled in HIV program. Other study conducted by Ulisses Ramos Montarroyoset el and done in Brazil in Hospitals of CorreiaPicanco and the Oswaldo Cruz University Hospital concluded that CD4 and BMI increase since patients joined program.

4.2. Factors associated with CD4 increase

Education, knowledge on balanced diet for patients living with HIV, level of patients' satisfaction on healthcare service, and health facility were associated with CD4 increase as patients from Kabarondo HC were less likely to increase CD4.

However research done in Brasil by Oswaldo Cruz in University Hospitals found that schooling is associated with CD4 increase. Knowledge on balanced diet found to be associated with CD4 by researchers like de Albuquerque Mde F in Mexico. Patient's satisfaction reported to be associated with CD4 increase by some researchers like Bach Xuan Tran through study done in Vietnam.

Study limitations

This study has one limitation regarding record of data:

➢ The study was limited to not record crucial data such as WHO stages, patient's symptoms, and not updated medication.

Conclusion and recommendations

Conclusion

This study assessed CD4 increase among people living with HIV and factors associated with CD4 increase who were enrolled in HIV program in Rwinkwavu District Hospital catchment area health facilities.

Before and after interventions results showed that there was CD4increase, as mean of CD4 at baseline was 364.18, and 670.78 after ten years or beyond of enrolment in program. Also, analysis was performed using CD4 standard of 500 CD4 count according to Rwanda Ministry of Health and results showed that 27% of patients were below 500 standardized CD4 whereas 73% were over 500.Moreover Viral load declined from 3,081.75 at baseline to 700 after intervention, and furthermore mean BMI at baseline was 19.39 and after intervention shifted to 20.45.

Factors associated with CD4 increase were identified. Patients with no education level were less likely to increase their CD4, knowledge on balanced diet was positively associated with increase of CD4, patients with moderate service satisfaction were less increased CD4, and patients acquired health service from Kabarondo HC were less likely to increase their CD4.

Recommendations

Based on the results and discussion, below are recommendations from this study:

a. To educate people living with HIV on balanced diet and other health related topics that can drive to improved health. This recommendation is crucial to the health facilities that offer HIV services.

b. Assessing customer satisfaction through timely survey and improve customer service accordingly.

c. Individualized or needs based decision making is highly recommended with a comprehensive intervention of not leaving anyone behind.

To conduct a research comparing new patients and patients who have been in program for more than 10 years.

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Appendices

ANNEXE 1. PATIENT CONSENT FORM

I want to thank you for taking the time to meet with me today. My name is Peter BAREBWANUWE, a student pursing a Master's Degree in Public health from University of Rwanda: School of Public Health. I need to do a research as a requirement to fulfill this degree. My study is entitled "**Assessing HIV program outcome and factors associated: adult-patients in five years and over Rural Rwanda, cross-sectional study**".

It's in this regard that I am requesting you to participate in this study so you can share your views about yourself focusing on your status and when most events happened since you knew that you are HIV+. Results from this study will show how your health has become better or not and social factors associated to that change, and help generate evidence based solutions to continuously improve HIV+ patients' health.

Participation in this study is voluntary, that means you have a right to participate or not participate in this study. And this will not affect the care that seek from this hospital. Also, you are free to withdraw from the study at any time or decline to participate in the study and you will not be penalized if you decide to do so. I assure you that all responses will be kept confidential. This means that your responses will only be shared with research team members and we will ensure that any information we include in our report does not identify you as the respondent. Your name will not be recorded anywhere during the study or report findings. So please feel free to participate and answer the questions.

Remember, you don't have to talk about anything you don't want to. Also, there is no compensation/ direct benefit from participating in this study. In addition, apart from the extra time you will spend responding to the questionnaire, there are no risks expected you or your family members.

We will use questionnaire and ask you questions feel free to stop us or ask us to skip any questions that you don't feel comfortable to answer. This session take between 20-30 minutes. Feel free to ask any questions before or after the interview.

I (Interviewee) certify that:

- The above has read or red for me and I have understood it.
- I hereby do agree to participate in the study.
- I know that the information to be collected are around my HIV status and will not be shared to any other person and the information will not be matched with my personal identification such as name or my national ID
- I have accepted that my information will be kept in computer/ electronically by principle investigator or data collectors in his absence
- I was explained that there is no direct befits such as incentives (money) or any other physical motivation.
- I took enough time to read and or red for me, and I confirm that I accept to participate in this research. As this study aim to improve our health.

………

Interviewee's name   SignatureDate

………

Interviewers name SignatureDate

For more information about the study, please contact

Peter BAREBWANUWE on +250783487713

ANNEXE 2. GUSABA UMURWAYI UBUFATANYE MU BUSHAKASHATSI

Ndabashimiyekubamumpayeumwanyatugahurauyumunsi. NitwaPeter BAREBWANUWE, ndiumunyeshuriwiga mu cyicirocyagatatucyakaminuzamwishamiry' ubuzimarusangekurikaminuzayu Rwanda. Kimwe mu bisabwakugirangonsozeicyicyikirocyakaminuza, nugukoraubushakashatsi. Ndashakagukoraubushakashatsikubijyanye "Gusesenguraicyo service y'agakokogaterasitayagezehon'impamvuyateyeizompindukakubarwayibakurubamazeimyakaitan ucyagwairengabavurwamucyaro mu Rwanda".

Nishimiyekubasabwakugirauruharekuriububushakashatsimutangaamakuriaberekeyeyerekeyekuk ubanan'ubwandubw'agakokogatera SIDA. Mwitakubiheby'ingezibyabayeho mu meze kumenyakomwanduye.
Nyumay'ububushakashatsihazagaragazwakoubuzimabwanyumwazamutsecyagwantacyahindutse . Tuzagaragazaimpamvuzatayeizompindukazigendanyen'ubuzimabwanyubwaburimunsi. Ibyobizadufashagufataimyanzuroifiteishingirokandiifiteiremekugirangomuburyobuhoradutezeim bereubuzimabw'abantubabanan'akokogatera SIDA.

Kugirauruhare muri ububushakashatsin'ibushake, bivuzekoufiteuburenganzibwokujyamocyangwanujyemo.
Umwanzurowafatantacyowakwangizekuri service ufatahanokubitaro.
Ufiteuburenganzirabwoguhagarika, cyangwantewemerakujyamontabihanobizabahokukoutemeyekugiramouruhare.
Ibisubizobyawebizagirwaibanga, bivuzekoibisubizouzatangabizahererekanwa mu bakozib'ubushakashatsigusa.
Ntagotuzigeratugaragazaizinacyagwaikindikintucyosekikurangamugihetuzabadutangaraporoy'ub ushakashatsi. Ntituzigeratwandikacyangwangotugaragazeamazinayawe.
Rwosewagirauruharekandiugasubizaibibazobyateganyijwe. Mwibuke, ntampamvuyokuvugakunkintuudashakakuvugaho. Kandi nanone, ntabihembobbiteganyijwekugirangougireuruhare muri ububushakashatsi.
Kugihewamaragawivuzahariyongerahoikintucyogusubiza muri ububushakashatsi.
Ntangarukambikuriwowecyangwakubo mu muryangoziherekejwen'ububushakashatsi.

Tuzakoreshaurupapurorw'ubushakashatsi, ufiteuburenganzirabyoguhagarikaibazwaigiheicyaricyocyosecyangwaugasimbukaikibazoudashak agusubiza. Iribazwarimaraiminotahagati 20-30. Wabazaibibazomberacyangwanyumayokubazwa.

Ndemezeko:

- Nasomyecyangwanasomeweibyavuzweharugurukandinabyumvishe.
- Nemeyekugirauruharemubushakashatsi
- Nasobanuriwekoamakuruy'ububushakashatsiagendanyen'iby'ubuzimabwanjyenkumuntu ubandan'ubwandubw'agakokogatera SIDA. Kandi amakuruntangaatazigeraasangizwaundimuntuuwariwewese. Ntagobazakoreshaamazinayanjyecyangwaimibarey'indangamuntuyanjye.

- Nemeyekoamakuruazabikwa muri mudasobwa, akabikwan'umuyoboziw'ubushakashatsicyangwaumukoziushinzwegukusanyaamakurum ugiheumuyoboziadahari.
- Nasobanuriwekontandonkezakokanyazizabahonukuvugaamafarangacyangwaikindikintuc yosegifatika.
- Nafasheigihegihagijecyogusoma/ gusomerwa, nemeyekugirauruhare muri ububushakashatsi. Kukobugamijegutezaimbereubuzimabwacu.

………

Izinary'ubazwaUmukonoItariki

………

Izinary'ubazaUmukonoItariki

Mu giheugizeikibazocyangwaikifuzowahamagaraPeter BAREBWANUWEkuri+250783487 713

ANNEXE 3. BUDGET

HIV program outcome Budget project

#	Item	Description	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Total
1	Project proposal	Printings	3,000	-	3,000	12,000	-	-	-	-	18,000
		Transport	15,000		15,000	45,000	-	-	-	-	75,000
		Airtime	5,000	5,000	5,000	5,000	-	-	-	-	20,000
		Sub-Total									113,000
2	Testing tools	Printings	-	-	-	-	10,000	-	-	-	10,000
		Transport	-	-	-	-	50,000	-	-	-	50,000
		Airtime	-	-	-	-	20,000	-	-	-	20,000
		Data collector	-	-	-	-	50,000	-	-	-	50,000
		Sub-Total									130,000
3	Data collection	Printings	-	-	-	-	-	400,000	400,000	15,000	815,000
		Transport	-	-	-	-	-	200,000	200,000	45,000	445,000
		Airtime	-	-	-	-	-	50,000	50,000	25,000	125,000
		Data collector salary	-	-	-	-	-	200,000	200,000	-	400,000
		Sub-Total									1,785,000
		Total Budget									**2,028,000**

ANNEXE 4. PROJECT TIME-PLAN

Activity/Month	Jan 19	Feb 19	March 19	Apri 19	May 19	Jun 19	July 19	Aug 19	Sep 19	Oct 19	Nov 19
Project proposal	■	■	■	■	■	■					
Testing tools							■				
Communicating with DH, HCs, and identify interview rooms							■				
Data collectors training								■			
Data collection and date entry								■	■		
Data management, analysis and supervisors feedback									■	■	
Dissemination										■	■

ANNEXE 5. QUESTIONNAIRE

Questionnaire: **Assessing HIV clinics outcome and factors associated: adult-patients enrolled in program at least ten years in rural-settings, cross-sectional study, Rwanda**

District: Sector:Cell: Village:

Health facility

Part one: Social demographic information		
1.1. Patients Identification		
1.1.1. Age of patient		
1.1.2. Gender of patient		
1.1.3. Patient IMB ID		
1.1.4. Patient TRACNET ID		
1.1.5. What is your level of education	Primary ⚪ Secondary ⚪ Tertiary ⚪ None ⚪	
1.2.1. Do you attend church	Yes ⚪ **If yes, go to question 1.2.2**	No ⚪ **If no, go to question 1.2.3.1**
1.2.2. If yes which one	If Yes, which one Catholics ⚪ Protestant ⚪ Islam ⚪ Other ⚪	
1.2.3.1 Do you smoke	Yes ⚪	No ⚪ **If no, skip go to question1.2.3.2**
1.2.3.2. Have you ever smoked	Yes ⚪ **If yes, go to question1.2.3.3.**	No ⚪ **If no, go to question1.2.4.1.**
1.2.3.3. If yes, why have you stopped	Health education ⚪ Voluntary ⚪ Church influence ⚪	
1.2.4.1. Do you drink beer	Yes ⚪	No ⚪ **If no, go to question1.2.4.2.**
1.2.4.2. Have you ever drunk beer	Yes ⚪ **If yes, go to question1.2.4.3.**	No ⚪
1.2.4.3. If yes why have you stopped	Health education ⚪ Voluntary ⚪ Church influence ⚪	
1.3.1.1 In last 6 months have you ever done unprotected sex with other person who is not your spouse	Yes ⚪	No ⚪ **If no, go to question1.3.1.2**
1.3.1.2. If No, WHY	Health education ⚪ Voluntary ⚪ Church influence ⚪	
Part Two: Socio-economic information		
2.1.0. Are you married	**Yes** ⚪ **If Yes, go to Q2.2.1**	**No** ⚪ If no, go to Q2.2.2
2.1.1. If Yes, still staying		**No** ⚪

with spouse?	**Yes** ◯ **If no, go to question2.1.2.**
2.1.2. If No, widowed, Widower, separated	Widowed ◯ Widower ◯ Separated ◯ Never married ◯
2.2.1. How is family leader	Husband ◯ Wife ◯ Child ◯ other ◯
2.2.2. Size of family	2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ Above ◯
2.2.3. After knowing HIV status how many children have gotten	1 ◯ 2 ◯ 2 ◯ 3 ◯ 3 ◯ Above ◯
2.3.1.0.Ubudehe category	1 ◯ 2 ◯ 3 ◯ 4 ◯ **If ubudehe 1, go to question2.3.1.1.**
2.3.1.1.If in Ubudehe category 1, is it because of diseases:	Yes ◯ No ◯
2.3.2. Income generating activity	Farming ◯ Business ◯ Employment ◯ Student ◯
2.3.3. In general how many meals per day	0 ◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯
2.3.4.0. Do you know balanced food	Yes ◯ No ◯ **If yes, go to question 3.3.4.1**
3.3.4.1. If yes, where have you gotten that knowledge	Schools ◯ Parents ◯ Other family member ◯ Healthcare provider ◯
Part Three: Health facilities accessibility and clinical information	
3.1.1. How many hours from home to health facility	>30 min ◯ 30-1 hr ◯ 1-2 hrs ◯ 2-3 hrs ◯ 4 and greater hrs ◯
3.2.2. means of transport	Walk ◯ bike ◯ moto ◯ car ◯
3.2.3. Do you feel with service given to you	Excellent ◯ Good ◯ moderate ◯ worse ◯
3.2.3. Was communication perfect to you	Excellent ◯ Good ◯ moderate ◯ worse ◯
3.2.3. Do health care providers involve in taking decision about you	Yes ◯ No ◯

3.2.4. No Do you feel happy with their decision	Yes ◯	No ◯
3.2.5. During course of disease, have you ever given food package	Yes ◯	No ◯
3.2.5. During course of disease, have you ever visited at home	Yes ◯	No ◯
3.2.5. If Yes, Were you ever visited by any health care provider	Medical doctor ◯ Nurse ◯ Social work ◯ CHW ◯ Other ◯	
3.2.6. Top three health threats	Food ◯ HF accessibility ◯ Social issues (Stigma) ◯ Others specify:	

ANNEXE 6. IBIBAZO MU KINYARWANDA

Ibibazo: **Gusesenguraicyo service y'agakokogaterasitayagezehon'impamvuyateyeizompindukakubarwayibakurubamazeimy akaitanucyagwairengabavurwamucyaro mu Rwanda**

Ibibibazoby'ubushakashatsi

Akarere: Umurenge: Akagari: umudugudu:

Ikigonderabuzima/Ibitaro:

Igicecyambere: Amakuruajyanyen'umurwayi		
1.2. Ibirangaumurwayi		
1.2.1. Imyaka		
1.2.2. Igitsina		
1.2.3. IMB ID y'umurwayi		
1.2.4. TRACNET IDy'umurwayi		
1.2.5. Amashuri wizeni ayahe?	Abanza ◯ Ayisumbuye ◯ Kaminuza ◯ Ntayo ◯	
1.2.1. Ufiteidiniusengeramo?	Yego ◯ **NibaariYego, komezakukibazo 1.2.2**	Oya ◯ **NibaariOya, komerezakukibazo 1.2.3.1**
1.2.2. Niba ari yego, ni irihe dini?	Gatolika ◯ Abaporoso ◯ Abayisilamu ◯ Irindidini ◯	
1.2.3.1 Unywa itabi?	Yego ◯	Oya ◯ **NibaariOya, Tarukaujyekukibazo1.2.3.2**
1.2.3.2. Wigeze unywa itabi?	Yego ◯ **NibaariYego, jyakukibazo 1.2.3.3.**	Oya ◯ **NibaariOya, jyakukibazo1.2.4.1.**
1.2.3.3. Niba ariYego, kuki wariretse ?	Inyigisho za muganga ◯ Kubushake ◯	

	Inyigishoz'idini ◯	
1.2.4.1. Unywa inzoga?	Yego ◯	Oya ◯ **NibaariOya, jyakukibazo1.2.4.2.**
1.2.4.2. Wigeze unywa inzoga?	Yego ◯ **NibaariYego, jyakukibazo1.2.4.3.**	Oya ◯
1.2.4.3. Niba ari Yego, kuki waziretse?	Inyigisho za muganga ◯ Ku bushake ◯ Inyigishoz'idini ◯	
1.3.1.1 Mu mezi atandatu ashize, wigezeukoraimibonanompuzabitsinaidakingiyen'undimuntuutariuwo mwashakanye?	Yego ◯	Oya ◯ **NibaariOya, jyakukibazo1.3.1.2**
1.3.1.2. NibaariOya, kubera iki?	Inyigisho za muganga ◯ Ku bushake ◯ Inyigishoz'idini ◯	
Igicecyakabiri: Ibijyanyenimibereho, imibaniren'ubukungu		
2.1.0. Warashatse ?	Yego ◯ Nibaariyego, jyakukibazo2.2.1	Oya ◯ Nibaarioya, jyakukibazo 2.2.2
2.1.1. NibaariYego, uracyabanan'uwomwashakanye?	**Yego**	**Oya** **NibaariOya, jyakukibazo2.1.2.**
2.1.2. Nibaari Oya, uriumupfakazi? Mwaratandukanye?	Umupfakazi ◯ Twaratandukanye ◯ Ntabwonigezenshaka ◯	
2.2.1. Nindemukuru w'umuryango?	Umugabo ◯ Umugore ◯ Umwana ◯ Undi ◯	
2.2.2. Umuryango ugizwe n'abantu bangahe?		

	2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ Hejuruya 6 ◯
2.2.3. Nyumayo kumenya ko wanduye Virus itera SIDA, wabyaye abana bangahe?	Ntanumwe 1 ◯ 2 ◯ 3 ◯ Hejuruya 3 ◯
2.3.1.0. Icyicirocy'ubudehe	1 ◯ 2 ◯ 3 ◯ 4 ◯ **Nibaariicyicirocya 1, Jyakukibazo2.3.1.1.**
2.3.1.1.Kubarizwa mu kicirocya 1 cy'ubudehewabawarabitewen'uburwayi?	Yego ◯ Oya ◯
2.3.2. Ibikorwabibyara inyungu	Ubuhinzin'ubworozi ◯ Ubucuruzi ◯ Mfite akazi ◯ Umunyeshuri ◯
2.3.3. Muri rusangeuryakangahekumunsi?	Ntanarimwe1 ◯ 2 ◯ 3 ◯ 4 ◯
2.3.4.0. Wabauziindyoyuzuye ?	Yego ◯ Oya ◯ **Niba ari Yego, jya ku kibazo3.3.4.1**
3.3.4.1. Niba ari Yego, ubwo bumenyi wabukuye he?	Ku ishuri ◯ Ku babyeyi ◯ Undi muntu wo mu muryango ◯ Umukozi wo kwa muganga ◯
Igicecyagatatu: Ibijyanye no kugerakwamugangan'imikorerey'abaganga	
3.1.1. Bigufataamasahaangahekugerakwamuganga?	munsiy'iminota 30 ◯ Hagatiy'iminoa 30n'isaha ◯ hagatiy'isahan'amasaha ◯ abirihagatiy'amasah 2 na 3 ◯ amasaha 4 cyangwahejuru ◯
3.2.2. Uburyobwokugerakwamuganga	Kugenzaamaguru ◯ Igare ◯

	Ipikipiki ⬭ Imodoka ⬭
3.2.3. Serivisiuhabwakwamugangauzakiraute?	Nezacyane ⬭ Neza ⬭ Biringaniye ⬭ nabi ⬭
3.2.3. Kuvugana na muganga	Nezacyane ⬭ Neza ⬭ Biringaniye ⬭ bibi ⬭
3.2.3. Ese waba ugira uruhare mu myanzuroigufatirwakwamuganga?	Yego ⬭ Oya ⬭
3.2.4. Imyanzuro yaboyaba igushimisha?	Yego ⬭ Oya ⬭
3.2.5. Mu gihecy'uburwayiwigeze uhabwa ibyo kurya kwamuganga?	Yego ⬭ Oya ⬭
3.2.5. Mu gihecy'uburwayi wigeze usurwa mu rugo?	Yego ⬭ Oya ⬭ **NibaariYego, jyakukibazo 3.2.5**
3.2.5. NibaariYego, wabawarigezeusurwan'umukozi wo mu rwegorw'ubuzima?	Dogiteri ⬭ Umuforomo ⬭ umusosiyali ⬭ umujyanamaw'ubuzima ⬭ Undi ⬭
3.2.6. Nibihebi bazobitatuby'ubuzimaufite?	IbiryoKugerakwamuganga ⬭ ibibazo mu mibaniren'abandi (kwiha akato/Kwiheza ⬭ Ibindi: bivuge:…

ANNEXE 7. SECONDARY DATA COLLECTION TOOL(Data from EMR)

Patients ID	HC/ Hospital	BMI		CD4		Viral-load		WHO stage	Treatment
		Baseline	Current	Baseline	Current	Baseline	Current		