



HIV and Ageing in the City of Kigali



A Healthy People. A Wealthy Nation



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List of Acronyms

AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral
BMI	Body Mass Index
EMR	Electronic Medical Record
EPP	Epidemiological Population and Projection
HBsAg	Hepatitis B Antigen
HCVAb	Hepatitis C Antibody
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
NCD	Non Communicable Diseases
PAWH	people aging with HIV
PLHIV	People Living With HIV
UNAIDS	The Joint United Nations Programme on HIV/AIDS

1. Background

The good news is that people with HIV are living much longer than they used to. An increasingly significant trend in the global HIV epidemic is the growing number of people aged 50 years and older, who are living with HIV. Very few HIV strategies in low- and middle-income countries currently address this previously hidden dimension of the HIV epidemic, yet populations 50 years and older hold important implications for HIV responses.

Because both age and HIV increase the risk for many health conditions, aging with HIV presents unique challenges for preventing neurocognitive disorders and other diseases.

As effective antiretroviral therapies (ART) become more available, people living with HIV (PLHIV) are living longer and experiencing fewer HIV-related medical conditions. However, this longer life expectancy means that PLHIV now face more aging challenges such as chronic diseases, the need for multiple medications, and physical and cognitive decline.

HIV and Aging in Rwanda

Rwanda has achieved remarkable progress at responding to the HIV epidemic. There is high retention of patients on treatment and previous studies show that people living with HIV have increased the life expectancy by 26 years due to the initiation of ART among PLHIV. However, this shift in the epidemic towards aging populations has brought new challenges that include the emergence of a dual epidemic with non-communicable diseases and more information is needed to respond effectively.

Therefore, the aim of this project is to collate data sources on people aging with HIV in Rwanda, triangulate them and conduct analyses to better inform a more effective and appropriate HIV response in line with the Fast-Track agenda.

This document, in partnership with the Rwanda Biomedical Center, Institute of HIV/AIDS Disease Prevention and Control, Division of HIV/AIDS, STIs and Viral Hepatitis, presents findings of the in-depth data analysis conducted with support from UNAIDS, to triangulate a number of data sources to inform the national HIV program for all populations, disaggregated by age, sex, and region.

2. Objective

The main objective of this project is to consolidate and analyze data from multiple data sources, including electronic medical records (EMR), health management information system (HMIS), and annual reports to inform the Fast-Track goals of the national HIV program in Rwanda related to aging populations living with HIV.

3. Methods

This is a cross sectional data analysis of available data on HIV and Ageing in the city of Kigali. Data was extracted from different sources below:

- **Epidemiological Population and projection Spectrum, Aids Impact Module** is a software developed by Avenir Health and supported by UNAIDS. The software uses HIV surveillance, survey and program data, combined with demographic data, to generate historical trends and short-term projections of key indicators. These indicators, including the number of people living with HIV, the number of new infections, and AIDS deaths by age and sex; as well as the new cases of tuberculosis and AIDS orphan. This analysis used the Spectrum file for 2019.
- **Health Management Information System (HMIS)**; used by all health facilities offering HIV services to report aggregated number on monthly basis. Health management information system was used to extract data for end June 2019 on patients on ART and the sero-positivity (Clients tested for HIV and those tested HIV positive) in the city of Kigali.
- **Recency application** is the application developed by Center for Disease Control to record recent infections database. In the city of Kigali data were collected from 34 health facilities from 2018 to June 2019. Demographics and results of recent infection was recorded.
- **Electronic Medical Record (EMR)**; is an individual database that collects demographic and clinical data of the patients on ART. EMR database were collected from 29 health facilities of Kigali. However, given that Health facilities in the city of Kigali have a high volume, data collected represent 20.1% percent of patients on ART in Rwanda. EMR backups used were extracted in June 2018.
- **Health Facility registers**; were reviewed in September-October 2019 to collect data on non-communicable diseases. In total 701 patient's files from 25 health facilities of Kigali were reviewed. Data collected included demographics, time on ART, last viral load, body mass index, glycaemia, diastolic and systolic creatinine.
- **Hepatitis campaign database** from the systematic screening for HBsAg and HCVAb among HIV-positive individuals enrolled at public and private HIV facilities across Rwanda. This campaign was conducted between January 2016 and June 2016.

4. Results

I. Profile of older population and coverage in the city of Kigali

1. Trend of HIV epidemic and older population in Rwanda

Since last decade Rwanda HIV prevalence has been stable at 3% in the general population with a high pick among moving toward older population (Figure 1). The demographic health survey results show the high prevalence of 7.9% among females aged 35-39 in 2010. Five years later, in DHS 2015 the peak of 7.8% has shifted to females aged 40-44 years. Similarly, the high prevalence was highest among male aged 40-44 in 2010. It has shifted to the next age group 45-49 in 2015.

Figure 1: HIV Epidemic among older population

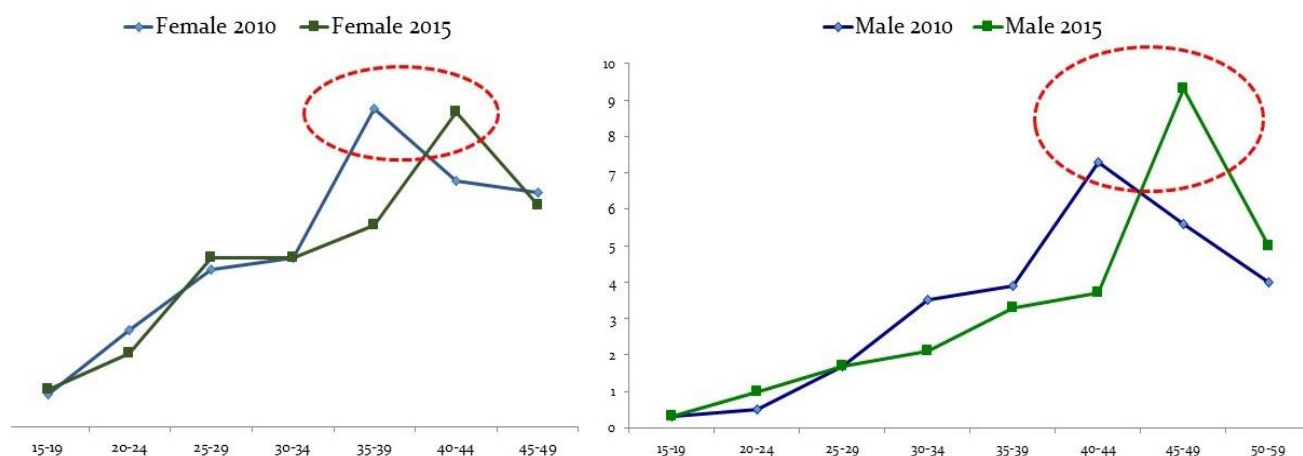
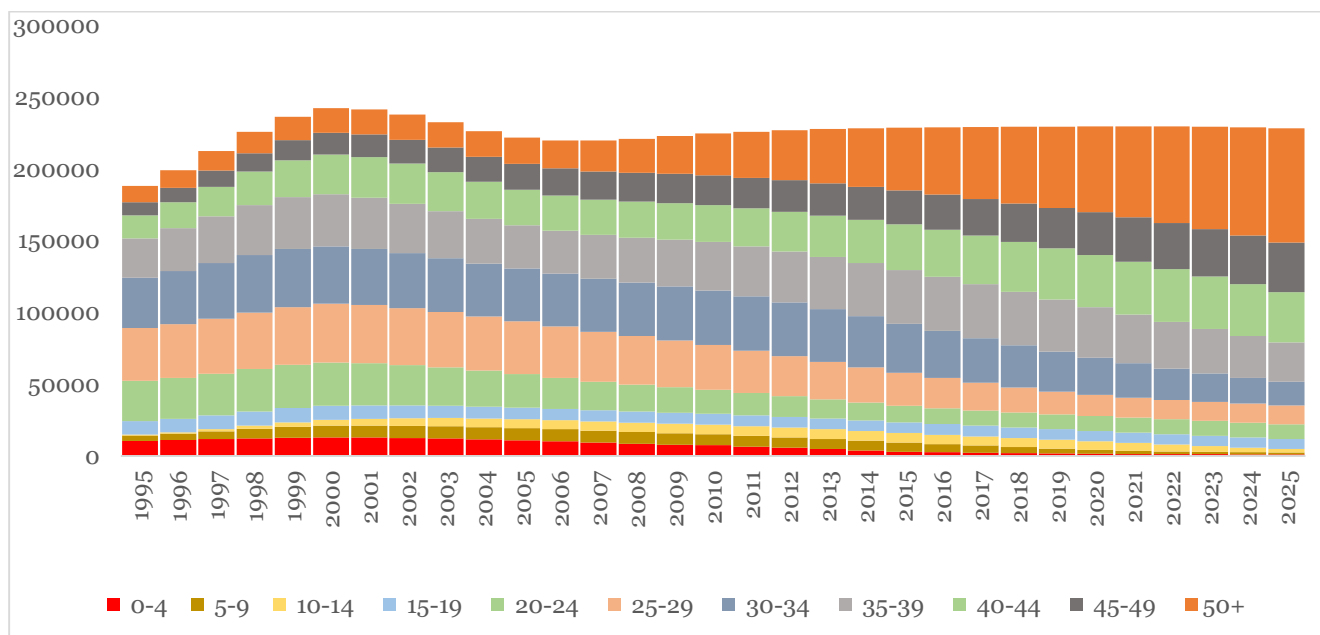


Figure 2 illustrates the trend of PLHIV by age group since 1995. The share of all age groups categories has significantly decreased except old population aged 50 and above. Older population of PLHIV has increased from 11,305 (6%) in 1995 to 29,162 (13%) in 2010 and 56,488 (24.6%) in 2019. The projection shows that by 2025 older population living with HIV will increase to 79,488 (34.8%) yielding an annual estimated increase of 3,833.

Figure 2: Trend of PLHIV in Rwanda from 1995-2025

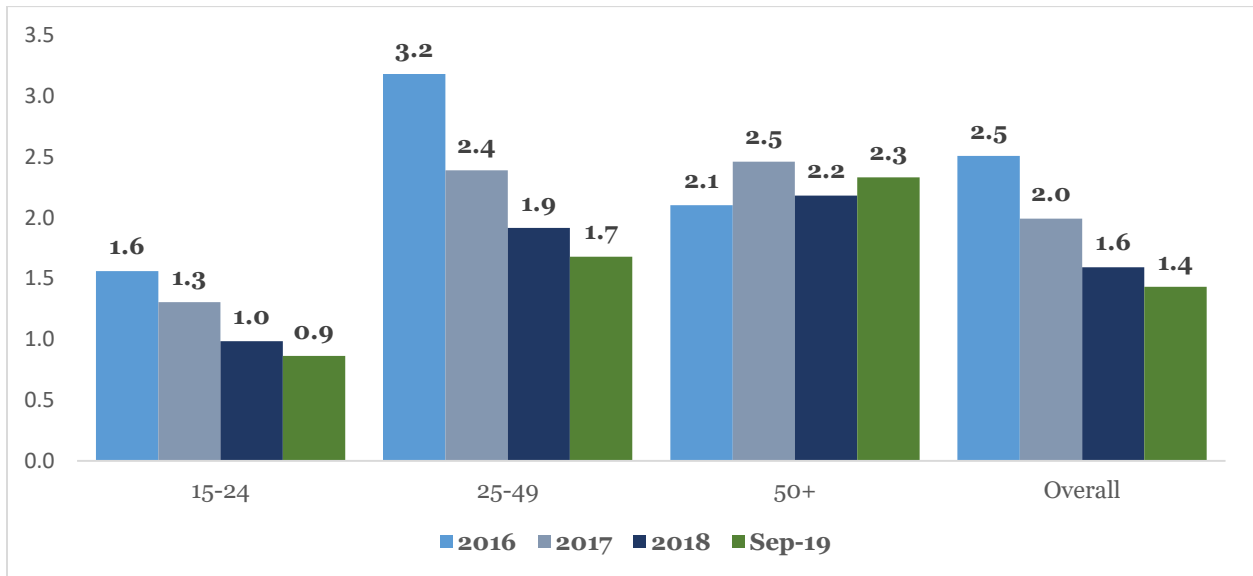


II. HIV Continuum of Care among Older Population

II.1 HIV testing and diagnosis among older population

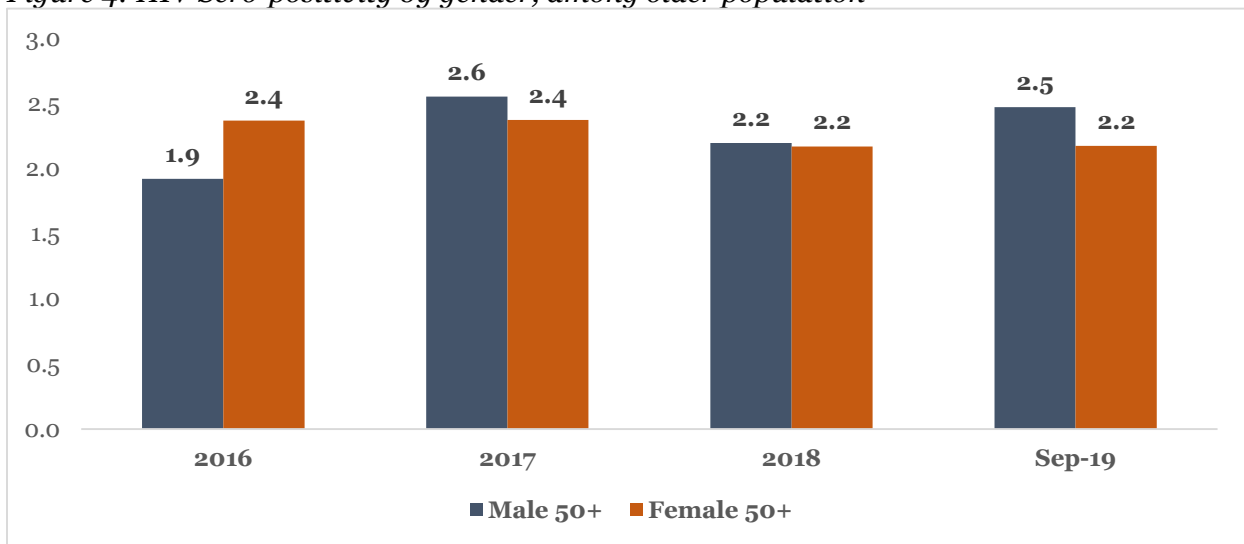
Since 2015, the trend of HIV sero-positivity rate among adults in the city of Kigali has gradually decreased in all age groups except older population (Figure 3). It was reduced from 2.5% to 1.4% in all adult's population and from 3.2% to 1.7% among adults aged 25-49 years. Nevertheless, it has varied from 2.1% to 2.3% among older population aged 50 and above. (Figure 3).

Figure 3: Trend of HIV Seropositivity in Kigali



Furthermore, the difference by gender in the older population with a higher trend among males (2.5%) compared to females (2.2%) in September 2019. (Figure 4)

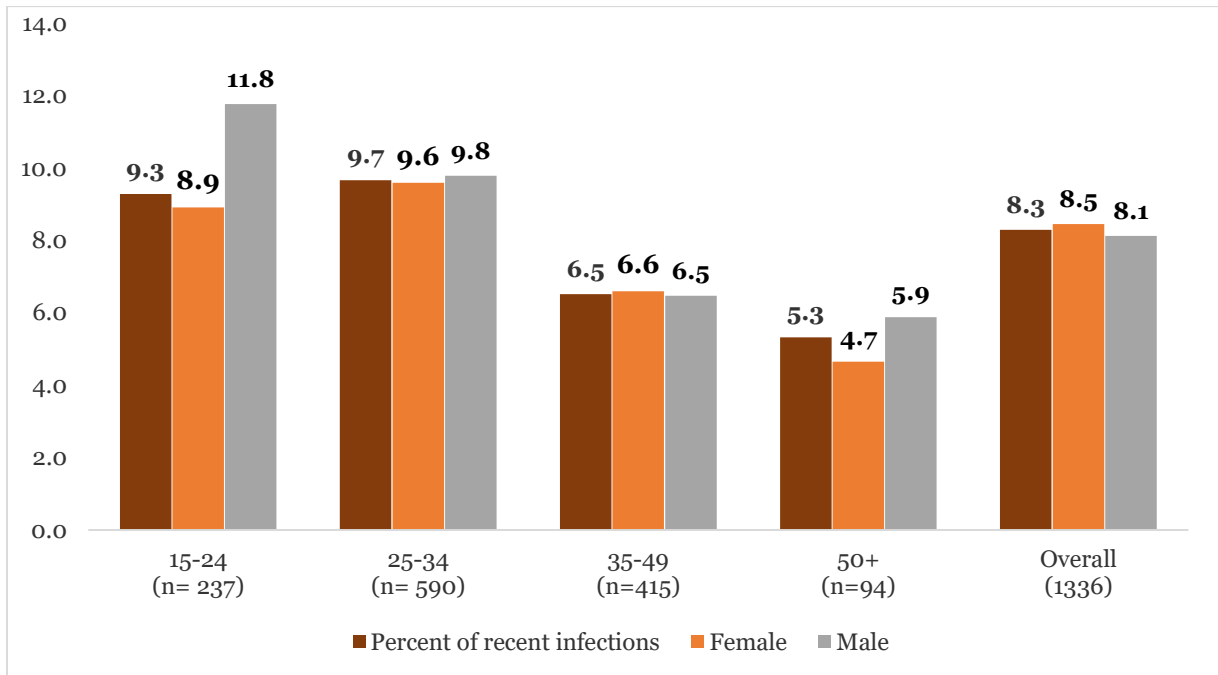
Figure 4: HIV Sero-positivity by gender, among older population



Since 2018, HIV recency testing among people diagnosed HIV positive was initiated in 23 health facilities of the city of Kigali. The Infection was defined as recent when it was acquired in the last 12 months prior HIV test.

The figure below summarizes data of recent infections by age group and gender. Overall, of 1336 tests conducted 8.3% were recent while of 94 tests conducted from older (50 years and above), 5.3% were recent with 4.7% among female and 5.9% among male. (Figure 5).

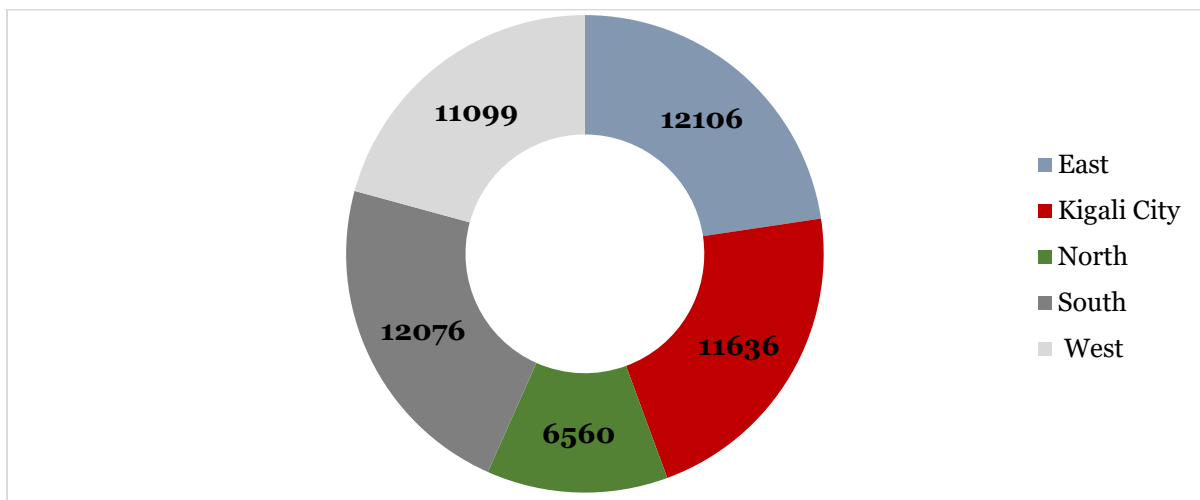
Figure 5: New HIV infections among Older Population



II.2 HIV treatment among older population

By end of September 2019 a total number of 197,086 PLHIV were enrolled into care and treatment. Among them 53,447 (26.3%) are aged 50 years and above. Twenty-two percent (22%) of older HIV population live in the city of Kigali (Figure 6).

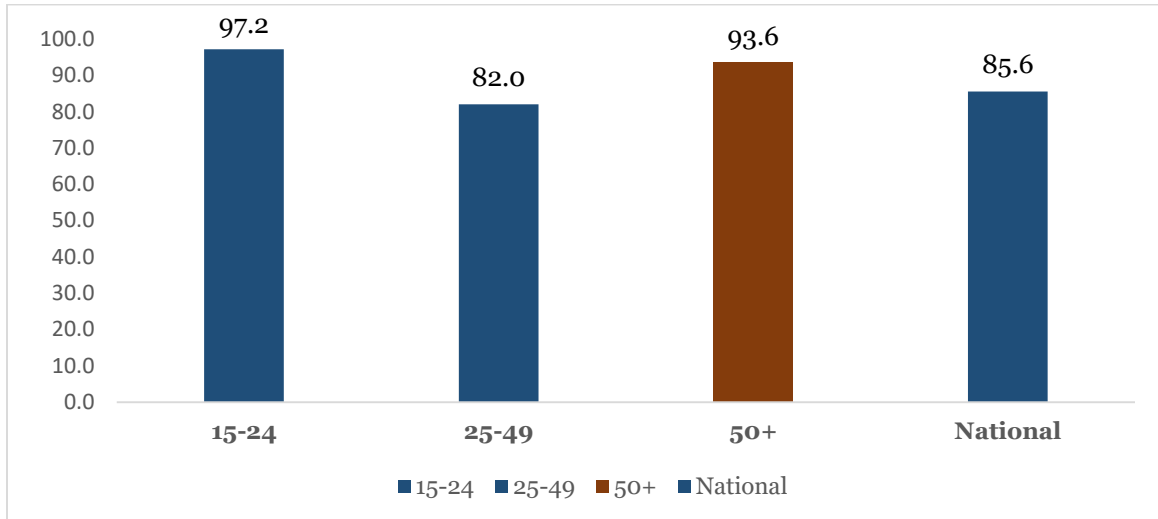
Figure 6: Number of older PLHIV on ART by Province



a. HIV Treatment Coverage

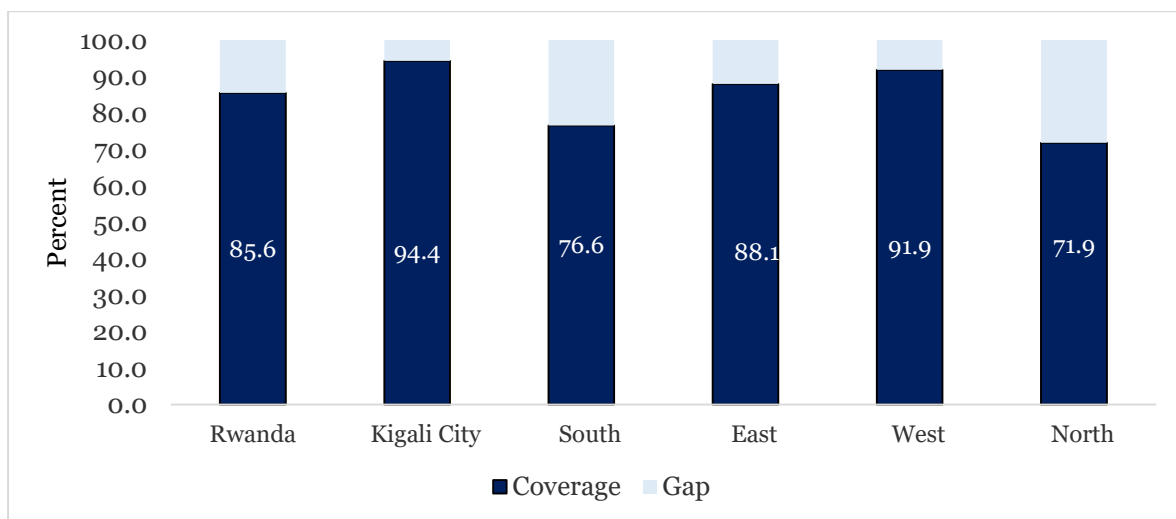
The HIV epidemiological population and projection (EPP) spectrum 2019 estimated that 93.4% of PLHIV aged 50 and above are on ART. This percent is higher compared to PLHIV aged 25-49 (82.3%) and the national coverage of 85.6%. (Figure 7)

Figure 7: HIV Treatment coverage in Rwanda, September 2019



The overall ART coverage is currently at 197086 (85.9% of all PLHIV). The figure below highlights Kigali with the best ART coverage compared to other provinces in the country (94.4% coverage). Although coverage is better in Kigali, it needs to remain strengthened and sustained in the line with the Fast Track cities initiative. (Figure 8)

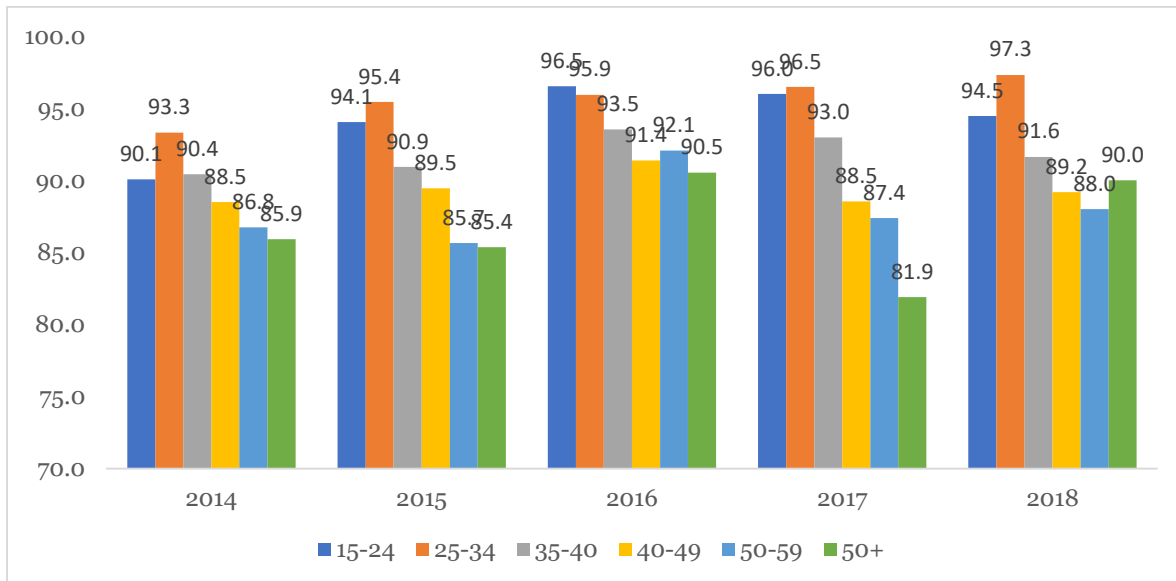
Figure 8: ART Treatment coverage by province



b. Engagement into Care

The effectiveness of engagement into care and treatment at early stage of HIV on the reduction of morbidity has been demonstrated by different studies. The table below illustrate that older population starting ART at stage one and two are lower compared to other age categories in the last 5 years. (Figure 9)

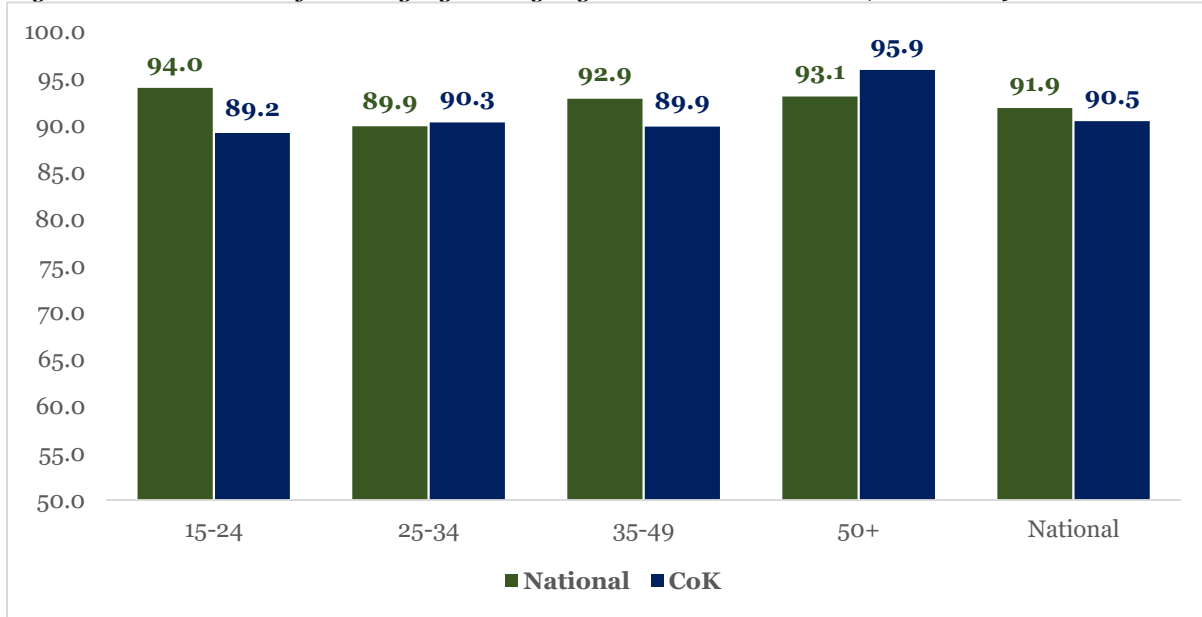
Figure 9: Percent of patients starting ART at WHO Stage one and two



c. Retention into Care and Treatment

Overall 91.9% and 90.5% of all patients on ART are retained in HIV program for a period of 12 months after initiation of ART at national level and the city of Kigali, respectively. Older population in the city of Kigali has shown a highest retention rate of 95.9%. (Figure 10)

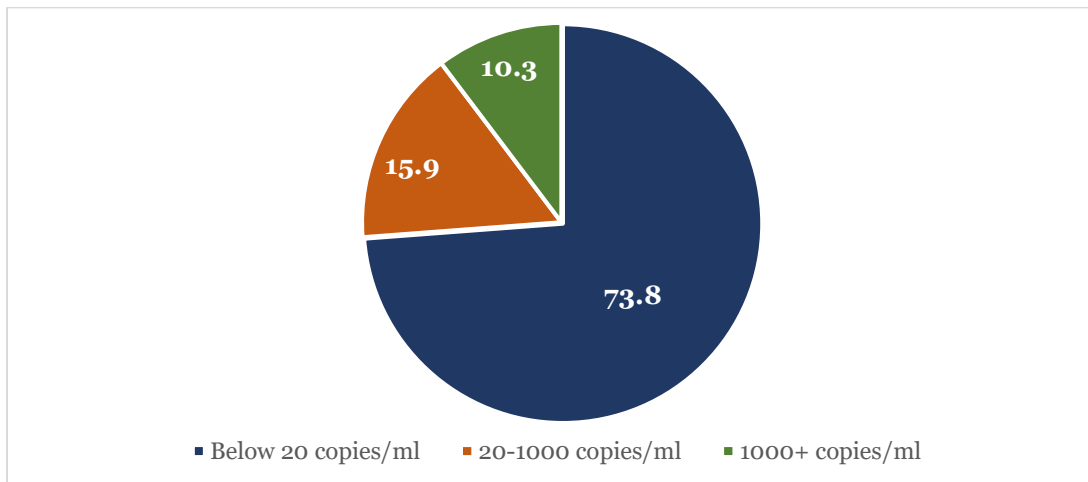
Figure 10: Retention of ART by age category in Rwanda and CoK , June 2019



d. Viral Suppression

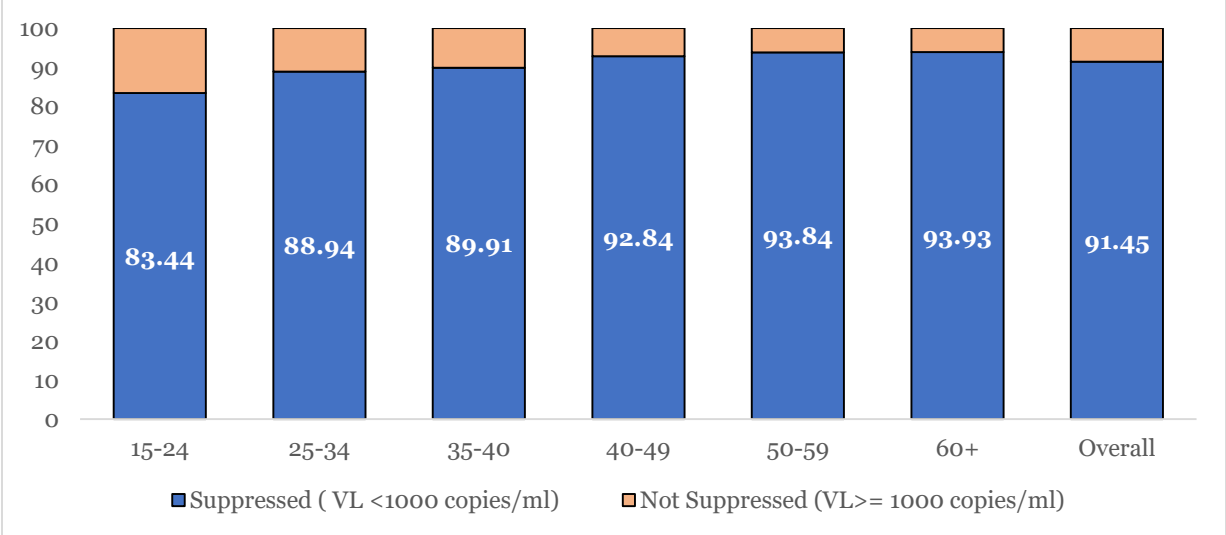
Electronic medical record database was exported to analyze viral load data for older population in the city of Kigali. Overall undetectable viral load (<20 copies /ml) was 73.9% and viral load suppression (<1000 copies/ml) was estimated at 89.7% in all age categories. (Figure 11)

Figure 11 : Undetectable viral load in the city of Kigali



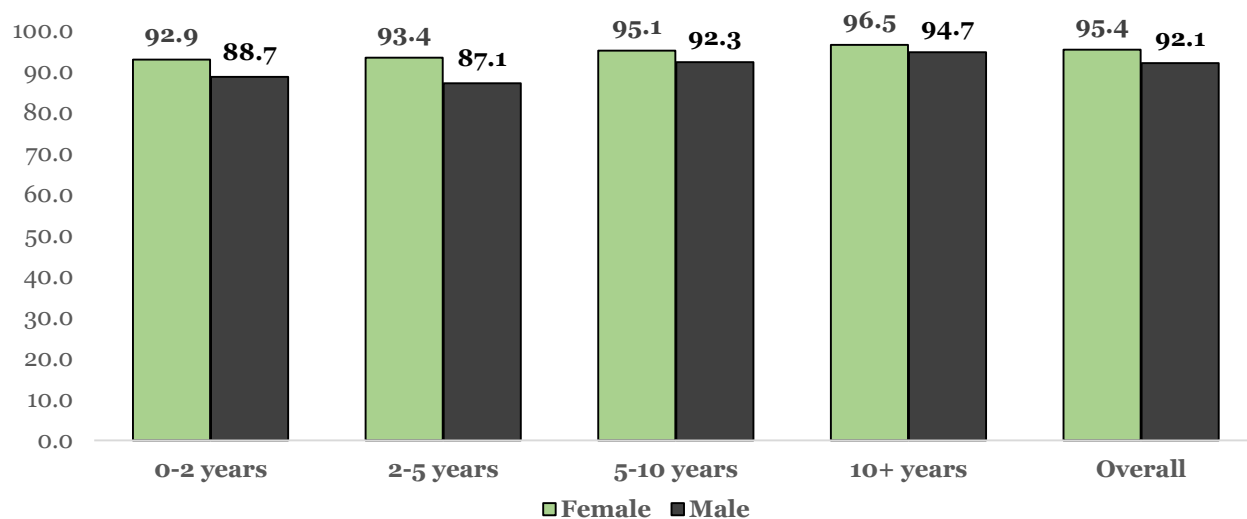
Compared with other age categories, PLHIV aged 50 and above have the best viral load suppression rate of 93.8% and 93.9% among those aged 50-60 and 60 and above, respectively. Adolescents and young adults have shown a lower viral load suppression of 83.4%. (Figure 12)

Figure 12 : Viral load suppression by age group in the city of Kigali



Further analysis was done to compare the viral load suppression among older population in the city of Kigali by gender. The figure below shows that the viral load suppression increases with the time a patient has been on ART. However, there is a significant difference between male and female. Overall 95.4% female and 92.1% male aged above 50 years have suppressed their viral load. Those who have been 10 years and more on treatment have a higher suppression of 96.5% and 94.7% among female and male respectively. (Figure 13)

Figure 13: Viral load suppression among older population, by the time on ART in the city of Kigali



II.3 HIV comorbidity among older population

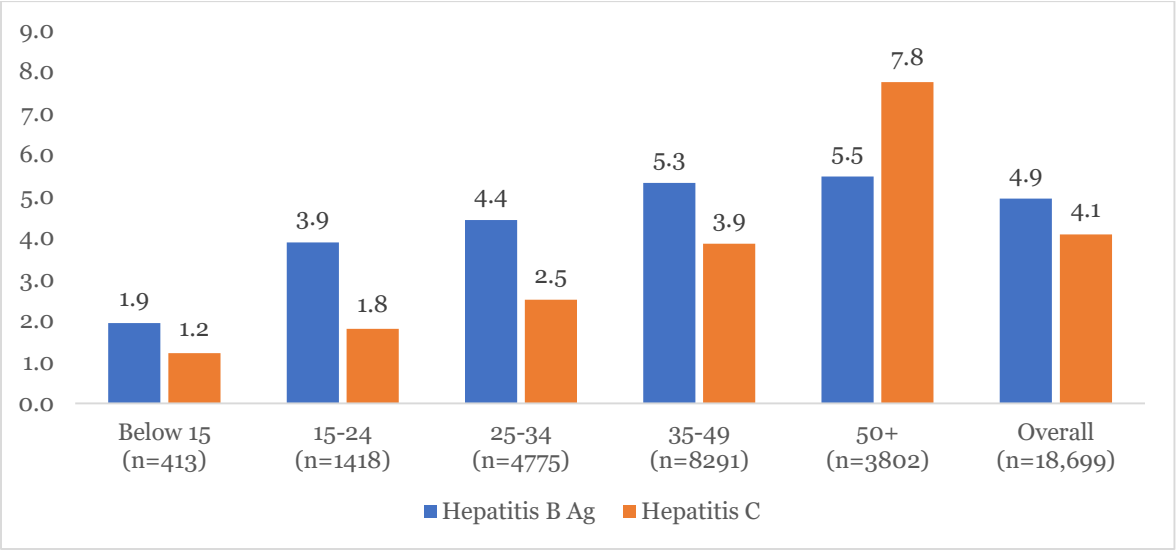
a. HIV and hepatitis B and C

In 2016, Rwanda Biomedical Centre / HIV, STIs and Viral Hepatitis have conducted the hepatitis campaign for Hepatitis screening among PLHIV. The figure 13 displays result for the city of Kigali. Overall the prevalence of hepatitis B and C in the city of Kigali is estimates at 4.9% and 4.1% respectively.

Both hepatitis prevalence increases by age group. Hepatitis B prevalence increased from 1.9% among PLHIV aged below 15 to 5.5%. Similarly, hepatitis C prevalence increases from 1.2% among PLHIV aged below 15 to 7.8% among those aged 50 years and above.

Hepatitis B is higher in all PLHIV age groups except those aged 50 years and above, where hepatitis C prevalence is reported at 7.8% compared to 5.5% prevalence of hepatitis B. (Figure 14)

Figure 14: Prevalence of Hepatitis Ag and Hepatitis C among PLHIV in the city of Kigali by age group



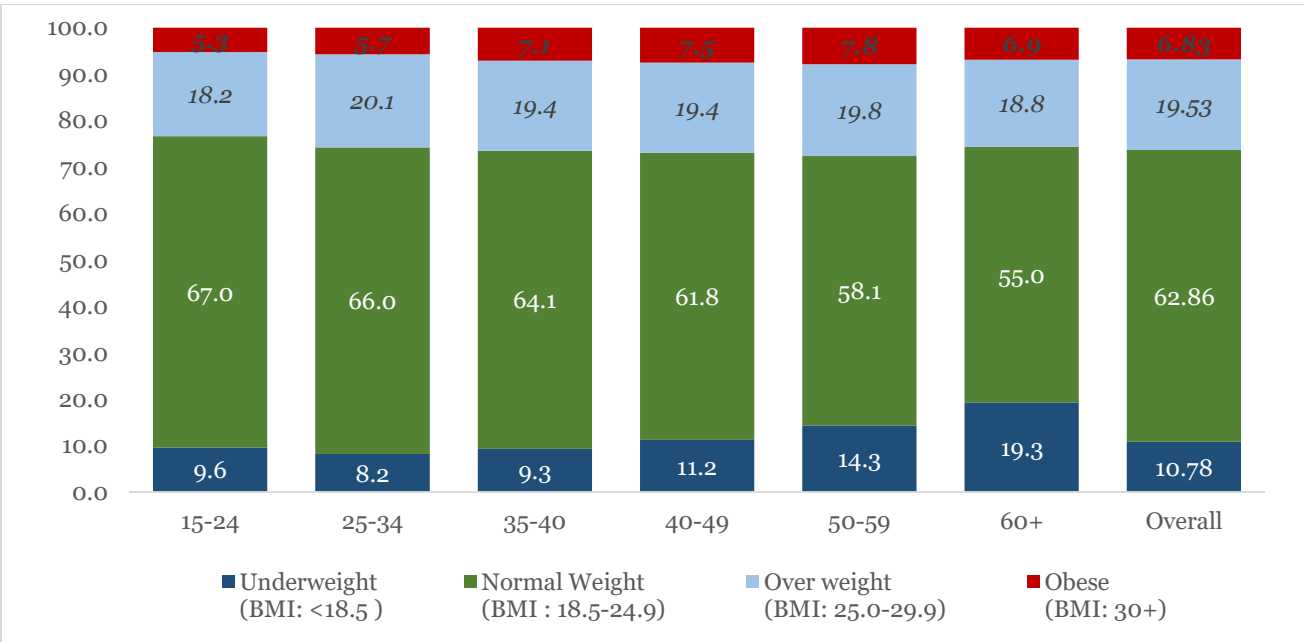
b. HIV and non-communicable diseases among older population

1. Body mass Index

The electronic medical record database was used to analyze the body mass index of adults PLHIV on ART in the city of Kigali. Overall, 62.9% of PLHIV on ART in the city of Kigali have a normal weight (BMI: 18.5-24.9).

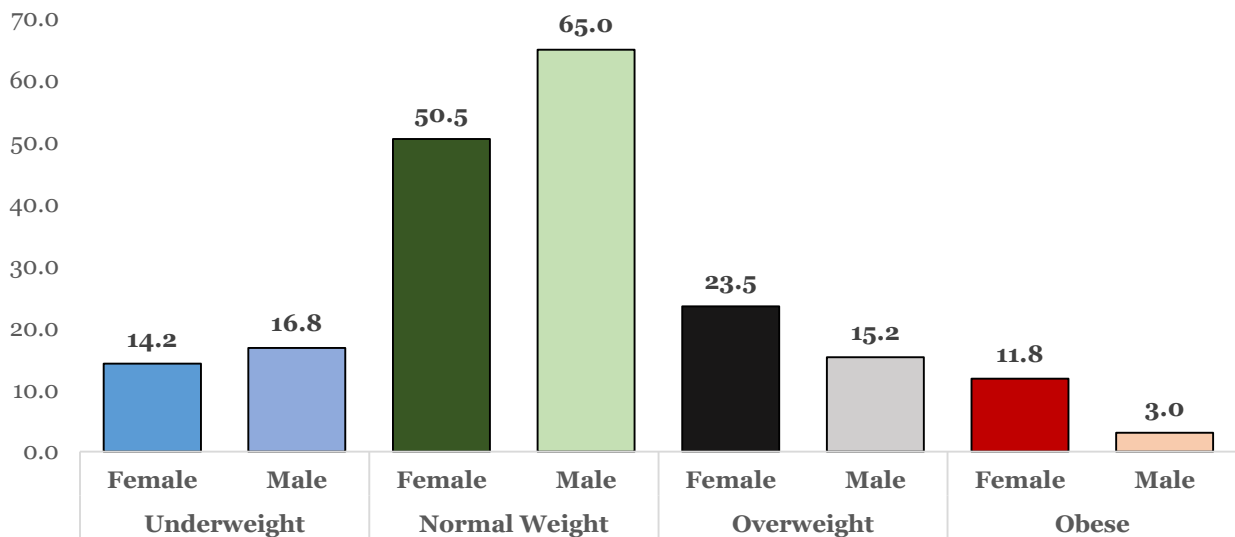
Both underweight (BMI <18.5) and Obese (BMI: 30+) categories increases over years. Underweight increases from 9.6% among patients aged 15-24 to 19.3% among patients aged 50 years and above, while obese prevalence increases from 5.3% to 6.9% in the same age categories. (Figure 15).

Figure 15: Body Mass Index by age group in the city of Kigali



The Figure 16, display the body mass index categories by gender. In the underweight category male have a higher percent of 16.8% versus 14.2% female on one hand. On the other hand, female have a higher percent in the overweight and obese categories of 23.5% versus 15.2% and 11.8% versus 3.0% respectively. (figure 16)

Figure 16: BMI by gender among population aging with HIV (50 years and above)



2. Diabetes

Data on non-communicable disease from patient's files have been collected in 25 health facilities of Kigali. A list of all patients aged 50 years and above was used to select 30 patients at every site. In total data were extracted from 701 participants were reported from 25 health facilities. Of them 537 had data on glycaemia. Thus national guideline for non-communicable diseases was used to categorize patients in three categories according to the glycaemia: No diabetes (<126 mg/dl), Diabetes likely (126-200 mg/dl) and diabetes confirmed (>200mg/dl).

Diabetes likely was estimates at 5.8% while diabetes confirmed is 1.3% among older population. Male have a high risk of having diabetes likely of 7.2% compared to 4.6% of female. In addition, the diabetes likely is linearly increasing with the time on ART from 3.0% for those who have been on ART below 3 years to 8.3% among those who have been treatment for 7 to 9 years. Similarly, patients in normal body mass index category were less exposed to diabetes compared to underweight and overweight/obese. (Table 1)

Table 1: Prevalence of Diabetes among older population in the city of Kigali

	N	No Diabetes	DIABETES LIKELY	Diabetes confirmed
Overall	537	92.9	5.8	1.3
Age group				
50-54	241	93.4	6.2	0.4
55-59	170	91.2	6.5	2.4
60+	126	94.4	4.0	1.6
Gender				
Female	303	93.4	4.6	2.0
Male	236	92.4	7.2	0.4
Time on ART				
<3 years	101	95.0	3.0	2.0
4-6 years	132	93.2	6.8	0.0
7-9 years	181	90.6	8.3	1.1
10 years and more	123	94.3	3.3	2.4
Body Mass Index				
Underweight	80	90.0	8.8	1.3
Normal weight	319	93.7	5.3	0.9
Over weight /Obese	118	89.8	6.8	3.4
Viral load suppression				
Suppressed	517	92.6	5.8	1.5
Not Suppressed	23	91.3	8.7	0.0

3. Cardiovascular diseases

Patients on ART receive cardio vascular diseases screening every clinical visit at the health facility. Systolic and diastolic measurements for the last screening were collected amongst patients aged 50 years and above. Hypertension classification used the international standards.

- STAGE 1 or Prehypertension is 120/80 to 139/89.
- STAGE 2 or Mild Hypertension is 140/90 to 159/99.
- STAGE 3 or Moderate Hypertension is 160/100 to 179/109.
- STAGE 4 or Severe Hypertension is 180/110 or higher.

Only 59.7% had normal measures, 10.7% had mild hypertension, 13.4% had moderate hypertension and 1.3% have severe hypertension. Hypertension increases with the age and the body mass index. (Table 2)

Table 2: Hypertension prevalence among older population in the city of Kigali

	N	Normal	Pre Hypertension	Mild Hypertension	Moderate Hypertension	Severe Hypertension
Overall	449	59.7	14.9	10.7	13.4	1.3
Age group						
50-54	194	62.9	16.5	9.3	9.8	1.5
55-59	155	60.0	12.9	11.0	15.5	0.6
60+	100	53.0	15.0	13.0	17.0	2.0
Gender						
Female	251	59.0	14.3	11.6	14.3	0.8
Male	199	60.8	15.6	9.5	12.1	2.0
Time on ART						
<3 years	80	58.8	15.0	13.8	12.5	0.0
4-6 years	103	64.1	18.4	7.8	8.7	1.0
7-9 years	152	55.9	14.5	12.5	15.8	1.3
10+ years	113	61.9	12.4	8.0	15.0	2.7
Body Mass Index						
Underweight	65	63.1	24.6	6.2	6.2	0.0
normal weight	277	61.4	13.4	10.1	13.4	1.8
Over weight	60	56.7	10.0	15.0	18.3	0.0
Obese	24	29.2	20.8	20.8	25.0	4.2
Viral load suppression						
Suppressed	427	59.5	15.5	10.3	13.6	1.2
Not Suppressed	21	71.4	9.5	4.8	9.5	4.8

4. Chronic kidney disease

Chronic kidney disease is defined as a reduced glomerular filtration rate, increased urinary albumin excretion, or both, and is an increasing public health issue. The manifestations of HIV infection in the kidney are multiple and varied, highlighting the complexity of the disease process. Creatinine clearance was calculated using the national Non-Communicable Diseases (NCD) guideline using Cockcroft-Gault Equation that takes into consideration age, weight and sex using the formula below:

Cockcroft-Gault Formula for Estimating Creatinine Clearance

$$\text{CrCl (mL/min)} = \frac{(140 - \text{age}) \times \text{Lean Body Weight (kg)}}{\text{Serum Creatinine (mg/dL)} \times 72} \quad (\times 0.85 \text{ if female})$$

Overall, 37.1 percent people aging with HIV have a normal creatinine clearance, while 23.7%, 36.4% and 2.9% had mild, moderate and severe renal failure respectively.

Renal failure increased with age where 7.9% of PAWH had a severe renal failure. Similarly, of PAWH who have been on ART for more than 10 years, 4% had severe renal failure.

Table 3: Renal failure among *older population in the city of Kigali*

	N	Normal	Mild Renal Failure	Moderate Renal Failure	Severe Renal Failure
Overall	596	37.1	23.7	36.4	2.9
Age group					
50-54 years	262	42.4	27.5	29.8	0.4
55-59 years	195	39.5	17.9	40.0	2.6
60+ years	139	23.7	24.5	43.9	7.9
Sex					
Male	256	34.0	24.2	39.5	2.3
Female	340	39.4	23.2	34.1	3.2
Time on art					
<3 years	109	28.4	22.9	45.9	2.8
4-6 years	99	40.4	21.2	37.4	1.0
7-9 years	136	35.3	21.3	41.2	2.2
10+ years	251	40.6	26.3	29.1	4.0
Body mass Index					
Underweight	412	32.8	22.3	41.3	3.6
Normal weight	129	44.2	26.4	27.9	1.6
Over weight/ Obese	54	51.9	27.8	20.4	0.0
Viral load suppression					
Suppressed	562	36.3	24.4	36.5	2.8
Not Suppressed	25	52.0	12.0	32.0	4.0

5. Discussion

This report describes HIV and Ageing in the city of Kigali and different outcomes: retention on treatment, Viral suppression and co-morbidities. Data show that a peak of HIV prevalence is moving toward older population and that the number of People Aging with HIV increased over years. Over the past years, data show a remarkable decline of newly diagnosed PLHIV in all age groups excepts older population (50 years and above). In addition, nevertheless the prevalence is higher among adult females compared to males, older males have a high rate of recent infections of 5.9% compared to 4.7% among females in the same age category. This report has shown a good treatment coverage (85.6%), retention on treatment (>90%), viral suppression (91.5%) and a rising risk of acquiring co-morbidities including Hepatitis B and C (5.5% and 7.8% respectively), and non-communicable diseases (diabetes, cardiovascular diseases and renal failure) among PAWH.

The life expectancy of Rwandan population has increased from 48 years in 2000 and to 63years in 2012(1) and 68.75 in 2019(2) . Furthermore, due to ART treatment in Rwanda life expectancy of PLHIV on treatment has increased by 23 addition years of life. UNAIDS-EPP spectrum showed that by 2025, the percent of PLHIV aged 50 and above in Rwanda will be 35%. A study published in 2012 stated that by 2015, half of HIV-infected U.S. patients will be older than 50 years of age(3). As antiretroviral therapy coverage expands globally, the aging of the epidemic will be mirrored in developing countries. Yet the world is unprepared to deal with an aging population with HIV.(3)

Due to treatment coverage and scale up of HIV services across the country, combined with high retention in care and high viral load suppression rates, new patients diagnosed decrease over years. Nevertheless, older population get into care late compared with other age categories.

Similarly, a study published in 2014 assessed the relationship between age and late diagnosis and found that older people, age ≥ 50 were positively associated with late diagnosis, whereas female gender was negatively associated with late. (4)

In the last decade HIV prevalence is higher among adult's female (3.7% versus 2.2%), similar to the sero positivity rate among newly identified PLHIV (2.5% females versus 2.2% males)

A study conducted in south Africa assessed the sexual behaviour of older HIV concluded that older HIV-negative adults report sexual behaviours consistent with high HIV acquisition risk(4). Prevention initiatives tailored to the particular prevention needs of older adults are urgently needed to reduce HIV risk in this and similar communities in sub-Saharan Africa.

Index testing and partner notification has been initiated in Rwanda as new strategy to identifier new HIV positive. Results of the first year show a higher percent of recent infections among male

(5.9%) population compared to females (4.7%) in older population (aged 50 years and above). This may be due to the fact that males are much more sexually active and the early initiation of menopause among female living with HIV. Different studies have shown that HIV is related to early pre-menopause. (5),(6).

With the advent of effective antiretroviral therapy (ART), HIV is becoming a chronic disease. HIV seropositive (+) individuals on ART can expect to live longer and, as a result, they are at risk of developing chronic non-communicable diseases related to factors such as aging, lifestyle, long-term HIV infection, and the potential adverse effects of ART. Though data are incomplete, evidence suggests that even in low- and middle-income countries (LMICs), chronic cardiovascular and pulmonary diseases are increasing in HIV+ individual.

This report presented a high prevalence of hypertension was 1.3% among older population. Similarly, results were reported in a study conducted in Cameroun, whereby the prevalence of hypertension in the HAART group was 36.44%.(7) The same study has reported that HIV regimen was associated with hypertension(7). Another study conducted in Cameroun reported the association between age and hypertension. Numerous studies have reported the association between HIV and diabetes(8),(9),(10),(11) and the latter is also associated with age. The modelling study published in 2015 suggests that the median age of HIV-infected patients on combination antiretroviral therapy (ART) will increase from 43.9 years in 2010 to 56.6 in 2030, with the proportion of HIV-infected patients aged 50 years or older increasing from 28% in 2010 to 73% in 2030. In 2030, we predict that 84% of HIV-infected patients will have at least one NCD, up from 29% in 2010, with 28% of HIV-infected patients in 2030 having three or more NCDs. 54% of HIV-infected patients will be prescribed co-medications in 2030, compared with 13% in 2010, with 20% taking three or more co-medications. Most of this change will be driven by increasing prevalence of cardiovascular disease and associated drugs. Because of contraindications and drug-drug interactions, in 2030, 40% of patients could have complications with the currently recommended first-line HIV regimens.(12)

6. Conclusion

Findings of this analysis show a continuous increase of HIV older population due to treatments scale up. However, people aging with HIV display heterogeneous health conditions. The development of programs for aging HIV-infected populations is a critical medical and public health challenge.

New programming and service integration need to be reinforced to address the issue of co morbidity and non-communicable diseases among PAWH. In addition, we recommend prospective studies to get more data for evidence based planning.

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