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Incidence Density and Risk Factors of Hepatitis B and Hepatitis C Co-infection Among Newly Enrolled HIV Patients at the Treatment Hub in a Tertiary Government Hospital

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Abstract

Introduction: *Individuals who are at high risk of acquiring human immunodeficiency virus (HIV) are also considered high risk of other sexually transmitted infections including hepatitis B and hepatitis C infection. Worldwide, there have been 10.6 million cases recorded for hepatitis B alone and 615,000 for hepatitis C, with total chronic cases of more than 11 million people for the year 2022. This study aimed to determine the incidence density and risk factors of Hepatitis B and/or Hepatitis C coinfection among HIV patients enrolled at the treatment hub of Eastern Visayas Medical Center (EVMC).*

Methods: *A retrospective cross sectional study was conducted among newly enrolled HIV patients at EVMC for the last 3 years. Data collection form was used to extract pertinent information. Chi-Square test of independence was used to analyze the association of variables in the socio-demographic and clinical profile to the occurrence of hepatitis B and/or C co-infection.*

Results: *Included were 65 patients. The incidence density of Hepatitis B Co-infection was generally low at 7.69%, Hepatitis C Co-infection at 1.54%, and both Hepatitis B and C coinfection at 1.54%. Educational attainment and the history of intravenous illicit drug use had statistically significant correlation with the occurrence of hepatitis co-infection (p value=0.001).*

Conclusion: *Based on the results of this study, it can be concluded that the incidence density of Hepatitis B, Hepatitis C, and Hepatitis B and C co-infection are low. The results however only depended on the available laboratory results upon enrollment hence some cases with incomplete Hepatitis profile were excluded. It can also be concluded that educational attainment remains to be significant risk factor that can affect the occurrence of Hepatitis B, Hepatitis C co-infection or both while history of Illicit drug use is a significant risk factor for Hepatitis C co-infection alone.*

Keywords: Human Immunodeficiency Virus, Hepatitis B Coinfection, Hepatitis C Coinfection, Incidence Density.

Introduction

Background

Individuals who are at high risk of acquiring human immunodeficiency virus (HIV) are also considered high risk of other sexually transmitted infections including hepatitis B and hepatitis C infection. HIV, hepatitis B and C all share a common epidemio-

logical nature such as the mode of transmission through sexual contact, sharing of needles during recreational intravenous drug use and even through transplacental transmission during pregnancy. Hepatitis B and C infection are not uncommon among people living with HIV (PLHIV).[1]

In the Philippines, there have been 10.6 million cases recorded for hepatitis B alone and 615,000 for hepatitis C, with total chronic cases of more than 11 million people. Cirrhosis and hepatocellular carcinoma remain to be the most common complications of these infections and may occur in 30% of the infected individuals. 2 According to World Health Organization (WHO), 37.5 million people were estimated to be living with HIV at the end of 2020. Because of shared routes of transmission, hepatitis B coinfection among PLHIV is common. In some regions, over two-thirds of HIV-infected persons have been reported with a history of Hepatitis B virus (HBV) infection, which means 2–4 million people have HBV-HIV coinfection. 3 According to various reports, approximately 21% of adults with HIV turned out positive with Hepatitis C virus (HCV) infection. Besides percutaneous drug exposure, coinfection can also be seen in hemophiliacs who received contaminated blood without routine serological screening.[4]

Currently, with respect to our region and institution, there is still no published data regarding the risk factors and prevalence of Hepatitis B and C coinfection in patients with HIV. This study emphasizes the importance of awareness on the risk factors of acquiring hepatitis B and C among HIV patients to facilitate early intervention and prevent complications [1].

Objectives

General Objective:

This study aimed to determine the incidence density and risk factors of Hepatitis B, Hepatitis C coinfection or both among HIV patients enrolled at the treatment hub of Eastern Visayas Medical Center (EVMC).

Specific Objectives:

1. Determined the number of newly enrolled HIV patients annually from January 1, 2020, to December 31, 2022
2. Described the socio-demographic profile of HIV patients
   a. Age
   b. Sex
   c. Sexual orientation
   d. Marital status
   e. Educational attainment
   f. Occupation
   g. History of intravenous illicit drug use
   h. Number of sexual partners
3. Described the clinical history of HIV patients
   a. History of blood transfusion
4. Determined the baseline laboratory profile of HIV patients
   a. CD4 count
   b. Alanine aminotransferase (ALT)
   c. Aspartate aminotransferase (AST)
5. Determined the baseline Hepatitis profile of HIV patients
   a. Hepatitis B surface antigen (HBsAg)
   b. Hepatitis C antibody (anti-HCV)
6. Determined the antiretroviral therapy (ART) regimen of patients with Hepatitis B and/or C coinfection
7. Determined the association of socio-demographic and clinical profile to the presence of Hepatitis B and/or Hepatitis C coinfection

Hypotheses

Null Hypothesis

At 0.05 p value, statistically there was no significant association of the socio-demographic and clinical profile to the presence of Hepatitis B and/or Hepatitis C coinfection.

Alternative Hypothesis

At 0.05 p value, statistically there was a significant association of the socio-demographic and clinical profile to the presence of Hepatitis B and/or Hepatitis C coinfection.

Conceptual Framework

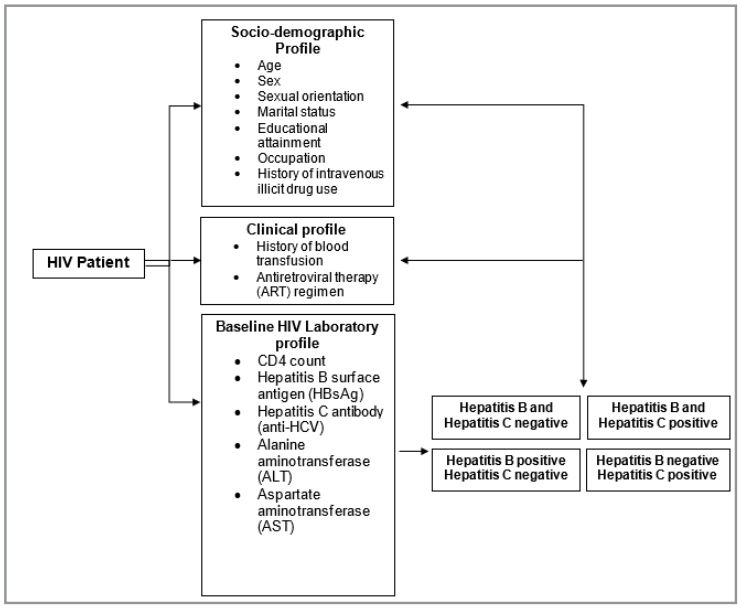


Figure 1: Schematic Diagram

The figure shows that this study will describe the socio-demographic (age, sex, sexual orientation, marital status, educational attainment, occupation, history of intravenous illicit drug use, number of sexual partners), clinical profile (history of blood transfusion) and baseline HIV laboratory profile (CD4 count, alanine aminotransferase, aspartate aminotransferase) and Hepatitis profile (Hepatitis B surface antigen and Hepatitis C antibody) of HIV patients. The antiretroviral therapy regimen of patients with Hepatitis B coinfection will be determined. The association of the socio-demographic and clinical profile to the occurrence of Hepatitis B and Hepatitis C will also be determined.

Scope and Limitations

This study included newly enrolled patients at the treatment hub of Eastern Visayas Medical Center from January 1, 2020 to December 31, 2022.

Due to the retrospective nature of the study, some data was missed due to unavailability of some results [2].

Significance of the Study

The results would help benefit the following:

Patients

Patients with high-risk behavior regardless of HIV status would be aware of the risk factors of hepatitis B and C. This would highlight the need for screening for hepatitis profile among high-risk individuals, hence facilitate early medical intervention and furthermore prevent the sequelae or adverse outcomes. Early diagnosis of hepatitis B among HIV patients will also aid in the proper selection of antiretroviral therapy regimen in accordance with guidelines on the management of HBV-HIV coinfection.

Internists

Knowledge that internists would be gained in this study will help them understand the importance of screening for hepatitis B and C among HIV patients. Awareness of the value of screening for Hepatitis B in antiretroviral regimen selection would facilitate early referral of general internists to respective subspecialties for appropriate management. This would also improve interventions for primary prevention such as health education as results of the study will also emphasize on the risk factors of hepatitis B and C.

Internal Medicine Department

This study would provide baseline data on the prevalence and risk factors of hepatitis B and C coinfection among HIV patients. The department would be able to utilize the of this study as a leverage in pursuing other studies on HIV.

Other Clinicians and Medical Practitioner

Data would increase their awareness on the risk factors that may influence the development of hepatitis B and C coinfection among HIV patients. Knowledge on risk factors would gear them in developing different approaches in primary prevention of the disease.

EVMC and other Institutions

The output of this study would be utilized by the EVMC and other institutions to reinforce the adherence to guidelines in the management of HIV patients most especially those with Hepatitis B and C coinfection.

Researchers

Results of the study would be used as a baseline data for other research on HIV and Hepatitis B and C infection.

Definition of Terms

Antiretroviral Therapy (ART) Regimen – is the combination of anti-retroviral drug used by the patient

Baseline HIV Laboratory profile – includes CD4 count, alanine aminotransferase, and aspartate aminotransferase of the patient upon enrollment at treatment hub as baseline

CD4 Count (cells/mm3) – measures the number of CD4 T lymphocyte in a sample of blood; the baseline result done upon diagnosis of HIV will be used

Alanine Aminotransferase/ALT (U/L) – a specific marker for hepatic inflammation wherein an elevated result would mean a possible liver injury; baseline ALT will be used in this study

Aspartate Aminotransferase/AST (U/L) – an enzyme in the liver but may also be found in other areas of the body hence a less specific marker for hepatic damage or inflammation; baseline AST will be used in this study [3].

Clinical Profile – includes history of blood transfusion and antiretroviral therapy regimen

History of Blood Transfusion – any history of transfusion of blood products

Hepatitis B Coinfection – HIV patient with reactive hepatitis B surface antigen (HBsAg)

Hepatitis C Coinfection – HIV patient with reactive hepatitis C antibody (anti-HCV)

Human Immunodeficiency Virus (HIV) – a virus that targets the CD4 T lymphocytes thus causing impairment of the body's immune system

Human Immunodeficiency Virus (HIV) Patient – an individual diagnosed with HIV through a reactive HIV antibody test, with or without the confirmatory test result

Hepatitis Profile - includes hepatitis B surface antigen, hepatitis C antibody

Hepatitis B Surface Antigen (HBsAg) – a serum marker measured as baseline upon diagnosis of HIV which when detected, means that the person is infected with hepatitis B

Hepatitis C Antibody (anti-HCV) – a serum marker measured as baseline upon diagnosis of HIV which when detected, means that the person is infected with hepatitis C

Incidence – the number of new cases of Hepatitis B and or Hepatitis C coinfection in newly enrolled HIV patients from January 2020 to December 2022

Risk Factors – conditions that predispose the HIV patient to develop hepatitis B and/or C infection

Socio-Demographic profile – includes age, sex, marital status, sexual orientation, educational attainment, occupation, history of intravenous illicit drug use
Age – how old the patient is from his/her date of birth; expressed in years

Sex – either male or female; assigned at birth

Marital Status – legally defined marital state of the patient; Single, Married, Widowed, or Separated

Sexual Orientation – the patient's pattern of romantic or sexual attraction; may be heterosexual, homosexual, bisexual

Educational Attainment – the highest level of education that a patient has successfully completed

Occupation – the patient's most recent job or work

History of Intravenous Illicit Drug Use – patient's recent or remote history of use of intravenous recreational drugs

Number of Sexual Partners – patient's number of sexual partners from coitarche to present

Review of Related Literature and Studies
Related Literature
Human immunodeficiency virus belongs to family Retroviridae under subfamily Lentivirus. Among the 2 identified types of HIV, the HIV-1 remains to be the most prevalent and has been shown to have caused the acquired immunodeficiency syndrome (AIDS) pandemic. HIV affects the host's white blood cells, specifically the CD4+ T lymphocytes by direct infection and destruction, immune clearance of the infected cells and immune exhaustion leading to cellular dysfunction. All these would lead to decreased number of CD4+ T lymphocytes, rendering the host susceptible to infections. The terminal stage of HIV infection is AIDS and is defined by the development of certain infections, cancer, or other sequelae. 1

The pathologic mechanism of HIV infection and its progression to AIDS are a result of the properties of the infecting virus isolate and the immune response of the host towards the inciting virus. The interaction of these two aspects determines the clinical outcome of the infection from progression to AIDS to long-term survival. 2

There World Health Organization estimated 37.7 million people living with HIV at the last quarter of 2020. According to the recent study conducted by Global Burden of Disease, almost one million (954,000) people died from HIV/AIDS in 2017. 3

According to the DOH briefer on the Philippine HIV estimates 2020, the Philippine has the fastest growing HIV epidemic both in Asia and the Pacific with calculated increase of 237% in terms of annual new HIV infections from 2010 to 2020. AIDS-related deaths in the country have also increased by 315% during the same period. The projected number of people living with HIV is estimated to reach over 330,000 by 2030. 4

In a recent report published by HIV/AIDS & ART Registry of the Philippines (HARP), there were 890 confirmed HIV-positive individuals in January 2021, that is 1% of the total diagnosed cases since January 1984. Among those who tested positive, 19% had clinical manifestations of advanced HIV at the time of testing. 5

Hepatitis B is a vaccine-preventable hepatic infection caused by hepatitis B virus (HBV), a DNA virus transmitted through blood, semen and other body fluids. Hepatitis B infection may be self-limited but may progress to chronic infection that can lead to sequelae like liver cirrhosis and cancer. Because of shared mode of transmission, HBV coinfection among HIV-positive persons is not uncommon. In some regions, over two-thirds of HIV-infected persons have been reported with a history of HBV infection, which means 2–4 million people have HBV-HIV coinfection.6

Hepatitis C is caused by hepatitis C virus (HCV) and is spread through contact with blood from an infected host. Hepatitis C compared with B infection tend to progress to chronic infection hence greater prevalence of complications such as cirrhosis and cancer. HCV is estimated to have a 10 times higher risk of transmission than HIV through percutaneous routes; hence coinfected individuals are usually first infected by HCV [9]. HCV is spread less efficiently by sexual transmission than HIV. The number of HIV-infected people chronically infected with HCV worldwide is recorded at about 2.3 million. 7

Consistent with general recommendations for the assessment of both HIV- and HCV-infected patients, all patients initiating HCV direct-acting antiviral (DAA) therapy should be assessed for HBV coinfection with HBsAg, anti-HBs, and anti-HBc testing. HIV-infected patients with evidence of HBV infection should be on antiretroviral agents with activity against HBV, preferably tenofovir disoproxil fumarate or tenofovir alafenamide. For patients who are only anti-HBc positive and not on tenofovir-based ART, subsequent monitoring for HBV reactivation should be conducted. 8

Related Studies
In a cross-sectional study conducted at Nepal by Ionita et al involving 800 PLHIV aged 17 years and over, HCV and HBV co-infection among the 677 PLHIV was found to be 19% (95% confidence interval (CI) 16.6–22.7%) and 4.4% (95% CI 3.1–6.6%), respectively. The eastern region had the highest percentage of HCV infection (48%). The age group with the highest rates of co-infection was 30–39 years (58% and 70%, respectively, for HCV and HBV co-infection). 9 In a systematic review and meta-analysis done by Yu et al, the pooled HBsAg prevalence in HIV-positive patients was 13.7% (95% CI 12.3-15.3%), with variations found in terms of age and geographic region. The meta-HCV prevalence was 24.7% (95% CI 19.3-30.5%), which varied over the study period and age. The pooled HBV-HCV coinfection prevalence was 3.5% (95% CI 2.4-4.8%), with variations found in terms of age and geographic region.10 In another meta-analysis by Hashiani et al, the pooled estimates of HBV/HCV, HCV/HIV, HBV/HIV and HBV/HCV/HIV were 1.3% (95%CI: 0.5-2.1), 16.3% (95%CI: 1.1-31.6), 0.5%

(95%CI: 0-1.4) and 0.5% (95%CI: 0.2-0.8), respectively.11 A prospective, observational study conducted at Khushal Medical center and Hayatabad Medical Complex Between February 2019 and April 2020 has shown that coinfection HIV/HBV and HIV/HCV are common in developing countries. Out of the total of 650 HIV patients, 78 (12%) had coinfection with hepatitis virus. Another study conducted by Sharma, et. Al, has shown that HBV and HCV co-infection was found to be significantly higher in HIV-positive individuals in comparison to normal population. HBV infection (11%) was found to be less in contrast to HCV (13%) amongst the HIV seropositive.12 In another study, 80.77% patients had coinfection with hepatitis B virus infection while 19.23% had hepatitis C coinfection.13 A study conducted by Chen et al, revealed that coinfection with Hepatitis B and C is common in China with a total of 978 HIV-infected patients. The rates of HIV/HCV were high, recorded at 50.2% compared with HIV mono-infection, HBV/HIV dual infection and HBV/HCV/HIV triple infection.[14]

According to Ionita et. Al., males were more likely to have HBV co-infection than females (adjusted odds ratio (AOR) 4.61, 95% CI 1.42–14.98). Similarly, PLHIV who were male (AOR 5.7, 95% CI 2.06–15.98), had a secondary level of education (AOR 3.04, 95% CI 1.06–8.70), or who were drug users (AOR 28.7, 95% CI 14.9–55.22) were significantly more likely to have HCV co-infection.9 In a study conducted at India, it was found that patients infected with HIV/HBV were more frequent in the age group of 30 to 45 years (36; 85.71%) while the HIV/HCV patients were older, i.e., 72.72% were older than 45 years ($p<0.001$).13 According to Sharna et al, age group between 21 and 40 was significantly associated with HBV and HCV infection. Heterosexual contact was the leading mode of acquiring HBV and HCV infection.12

The prevalence of anti-HCV in HIV-positive intravenous drug users was 93.6%. Hepatitis B e antigen (HBeAg) and sexual transmission were independent risk factors for active HBV replication. Intravenous drug use and male sex were independent risk factors, but old age and presence of HBeAg were independent protective factors for anti-HCV.14 The sexual route was strongly associated with HIV/HBV group compared to HIV/HCV group [51 (89.47%) vs. six (10.53%); $p<0.0001$].15 Seven of 89 patients (7.9%) had elevated ALT, indicative of liver cell injury. Of these with liver cell injury, one positive for HBsAg and another one individual tested positive for HCV specific antibodies. This study reveals a high prevalence of liver cell injury among HIV positive individuals although the injury due to HBV or HCV infection was lower than that which has been documented.16 Coinfection of HBV and HCV was found in 15 of 109, and in controls, it was 2 of 15. Age group between 21 and 40 was significantly associated with HBV and HCV infection. Heterosexual contact was the leading mode of acquiring HBV and HCV infection. As compared with the current study, it did not account for the AST and ALT levels. The results highlighted that HCV/HIV co-infection in Iranian high-risk groups including injection drug users (IDUs) and prisoners is common.9

In a case control study by Suan et., al., at Malaysia, multivariable analysis revealed that having a history of transfusion of blood or blood products had adjusted odds ratio of 6.99, signifying that it is a risk factor independently associated with Hepatitis C infection. These findings demonstrate that hepatitis C risk is multifactorial. Having a history of blood or blood product transfusion before 1992, injection drug use, imprisonment, tattooing, having more than one sexual partner, piercing, and having only secondary education were associated with increased odds of hepatitis C.[8]

In a multicenter study conducted by Hoffmann et., a., it revealed that in those patients receiving long term ART, HBV status did not influence HIV suppression or CD4 improvement. It has shown however that mortality was greater among patients with chronic hepatitis b coinfection and was implicated to liver disease despite HBV-active ART.17 In a multicenter study by Slujis et., al., it revealed that tenofovir disproxil fumarate (TDF), administered as part of antiretroviral therapy, is a potent anti-HBV agent with a good resistance profile throughout 5 years of therapy. 92% of patients positive for HBe antigen showed positive response to the treatment and 100% among HBe antigen negative. Only small nonprogressive decreases in renal function were observed. According to the latest guidelines by the CDC, because efavirenz (FTC), lamivudine (3TC), tenofovir disoproxil fumarate (TDF), and tenofovir alafenamide (TAF) have activity against both HIV and HBV, an ART regimen for patients with both HIV and HBV should be include TAF or TDF plus 3TC or FTC as the nucleoside reverse transcriptase inhibitor (NRTI) backbone of a fully suppressive antiretroviral regimen.17

Methodology

Study Design

A Retrospective cross-sectional analytic research design was used in this study.

Study Locale

The study was conducted at the HIV and AIDS Core Team (HACT) clinic of Eastern Visayas Medical Center (EVMC).

The EVMC today is a modern, tertiary level four teaching and training hospital in Region VIII. It has opened its new EVMC Main Building at Barangay 93 Bagacay, Tacloban City last May 22, 2018. Despite the challenge on the hospital's resources, the hospital stayed true on its mission to render a globally competitive, evidence-based healthcare services and to lead the evolution of healthcare through research and trainings [4].

To date, the Eastern Visayas has 11 treatment hubs that caters outpatient and inpatient HIV care and treatment, which includes EVMC. The EVMC treatment hub is located at the third floor of the outpatient department building.

Duration of the Study

This research was formulated last March 2022 and was finished by April 2023 with a total budget of P16,550 (see Appendix A and B).

Study Population and Sample

The study included all newly enrolled HIV patients enrolled at the EVMC HIV treatment hub from January 1, 2020, to Dec 31, 2022.

Inclusion Criteria:

- Patients > 18 years old

- With HBsAg and anti-HCV results documented in the patient's file

Exclusion Criteria:
Patients with incomplete baseline laboratory results was excluded from the study.

Data Gathering Procedure
Upon ethical approval of the proposal, a review of the census of the EVMC HACT clinic was done to identify population sample based on the inclusion criteria. Once a list of patients with their hospital numbers are made, a letter to the Medical Chief was submitted for permission and forwarded to the chairperson of HACT to retrieve the charts of patients included in the study.

A data collection form (Appendix C) was utilized for each patient that contains data necessary in the conduct of the study. Data that were collected include socio-demographic profile: age, sex, marital status, sexual orientation, educational attainment and occupation; clinical profile: history of intravenous illicit drug use and history of blood transfusion; baseline HIV laboratory profile: CD4 count, alanine aminotransferase, aspartate aminotransferase; hepatitis profile: Hepatitis B surface antigen, Hepatitis C antibody, and the ART regimen among patients with hepatitis B coinfection [5].

Data Analysis
All data collected was processed using dummy tables (Appendix D). The socio-demographic, clinical and laboratory profile will be summarized accordingly using frequencies, percentages, mean, and standard deviation.

Chi-Square test of independence was used to analyze the association of variables in the socio-demographic and clinical profile to the occurrence of hepatitis B and/or C infection. Results are considered statistically significant if the p value is <0.05.

Ethical Considerations
The primary purpose of this study was to highlight the importance of screening hepatitis B and hepatitis C among high-risk individuals. This would benefit the patients, the internists, other medical practitioners, and even health institutions in terms of health promotion, disease prevention, treatment regimen selection, and policy formulation. The study was submitted for ethical review and was approved last September 2022 An assessment of risks and benefits was undertaken for this study. There was a risk for potential invasion of patient's privacy as medical records are to be viewed for collection of relevant data. This risk was however rated low and minimal. Only the data stated in the data collection plan and data collection form were collected. All the data gathered remained confidential and protected for record keeping by the principal investigator and co-investigator.

To ensure confidentiality and anonymity, the patient names were assigned numbered codes for the purposes of data collection. Data collected were stored as an encrypted file for up to 10 years from completion of the study.

Conflict of Interest
There were no known conflicts of interest associated in the conduct of the study.

Results and Discussion
There were 65 newly enrolled HIV patients from the year 2020 to 2022 included in the study. It described the socio-demographic profile, clinical history, baseline laboratory profile, baseline hepatitis profile, and the antiretroviral therapy regimen of the newly enrolled HIV patients at EVMC treatment hub. This study also identified the association of these profiles to the presence of Hepatitis B and or Hepatitis C coinfection.

Table 1 shows the newly enrolled HIV patients from the year 2020 to 2022 per annum. The year 2022 has the greatest number of enrollees with 32 patients or 49% of the total study population. The data depicts that there is an increasing trend on the number of enrollees per year [6].

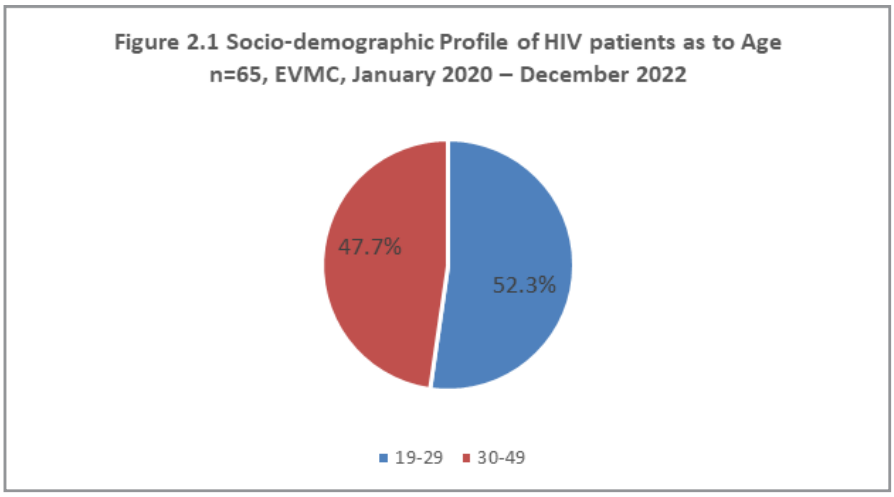
Table 1: Newly Enrolled HIV Patients from 2020 to 2021 per Annum n=65, EVMC, January 2020 – December 2022

Year	Frequency (N)	Percentage (%)
2020	10	15.40
2021	23	35.40
2022	32	49.20
Total	65	100.00

This is congruent with the current data by the UNAIDS revealing a steady increase in the number of HIV cases in the Philippines.1

Socio-Demographic Profile
Figure 2.1 to 2.8 shows the socio-demographic profile of the respondents in terms of age, sex, sexual orientation, marital status, educational attainment, occupation, history of intravenous drug use and number of sexual partner.

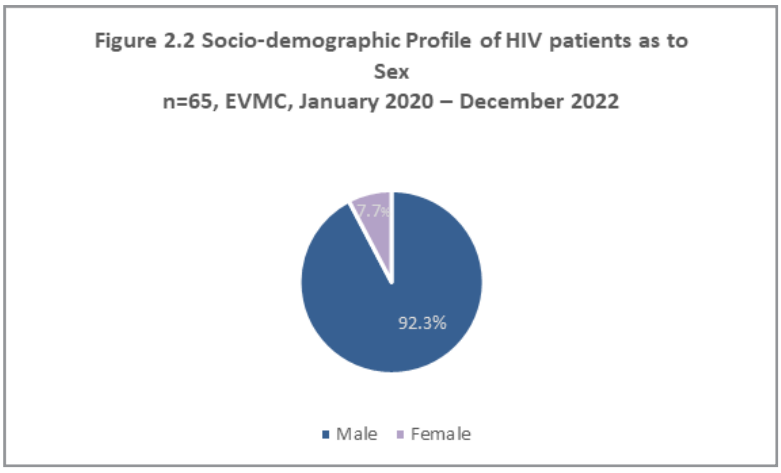
Age
Figure 2.1 demonstrates the frequency distribution of the respondents as to age. More than half of the respondents belong to the age group of 19-29 years old or 52.30% of the study population, closely followed by 30-49 at 47.7%. The mean age was at 29-30years old.



The data revealed that majority of the newly enrolled HIV patients are adolescents and middle aged. This data is congruent with the latest Findings of the HIV/AIDS and ART Registry of the Philippines (HARP) which revealed that majority of the newly enrolled HIV patients were at 24-34 age group. This trend has been persistent since the year 1984 up to 2021.2

Sex

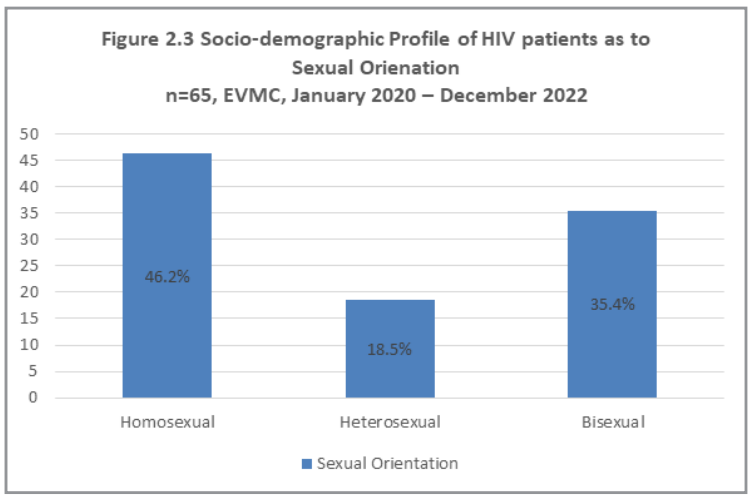
The data below depicts the frequency distribution of the respondents as to Sex. Majority (92.3%) or 60 patients were male and only 5 were female.



This implies that there were more males who were diagnosed with HIV. The predominance of the male sex among the newly enrolled HIV patients were also similar with that of the national registry. According to the HIV/AIDS and ART Registry of the Philippines, the proportion of yearly diagnosed cases among males were more than 93% for the past 10 years majority of the HIV cases were males for the past 10 years (2011-2021).2

Sexual Orientation

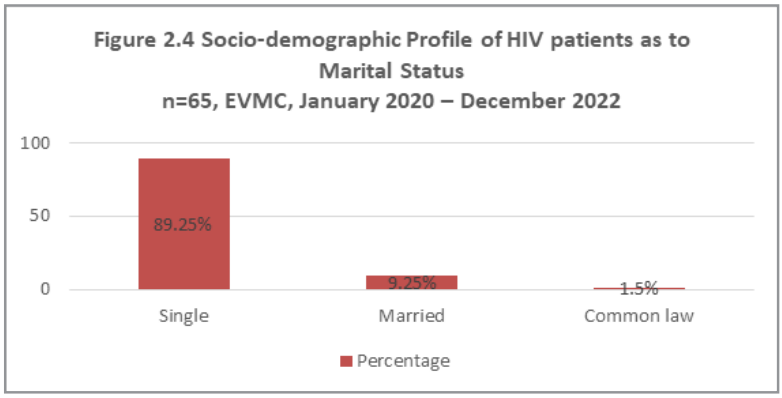
The data revealed that majority of the new HIV enrollees identify themselves as homosexuals with 30 patients or 45% of the total population, 23 were bisexual at 35.4% and 12 were heterosexual at 18.5%.



The results were similar in a study conducted by the Center for Disease Control, USA, where majority of the newly diagnosed cases in the US identified themselves as homosexuals estimated at almost 70% for the year 2017 to 2021. According to HARP, with data from 1984 to 2021 rates as high as 59% identified themselves as homosexuals and 27% for bisexuals.3 A research by Zuckerman et al., revealed that anal intercourse both insertive and receptive confers a high risk of transmission due to high levels of HIV in the rectal mucosa and as well as semen. This explains the high number of HIV infection among homosexuals or those men who have sex with men.4

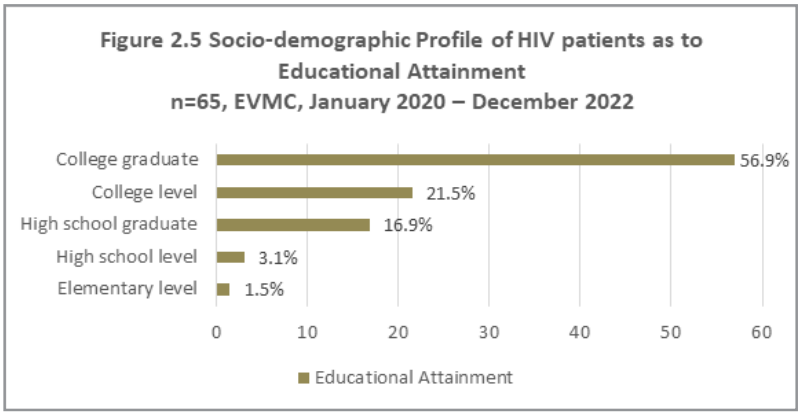
Marital Status

The data demonstrates that majority (89.25%) of the respondents were single, 9.25% were married, and 1.5% was common law.



Educational Attainment

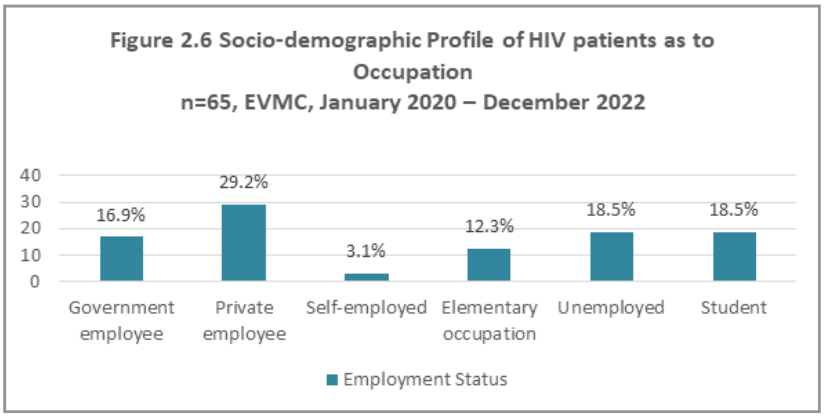
More than half of the respondents or 56.9% were college graduate, 21.5% were college level, 16.9% were high school graduate, 3.10% were high school level, and only 1.5% was elementary level.

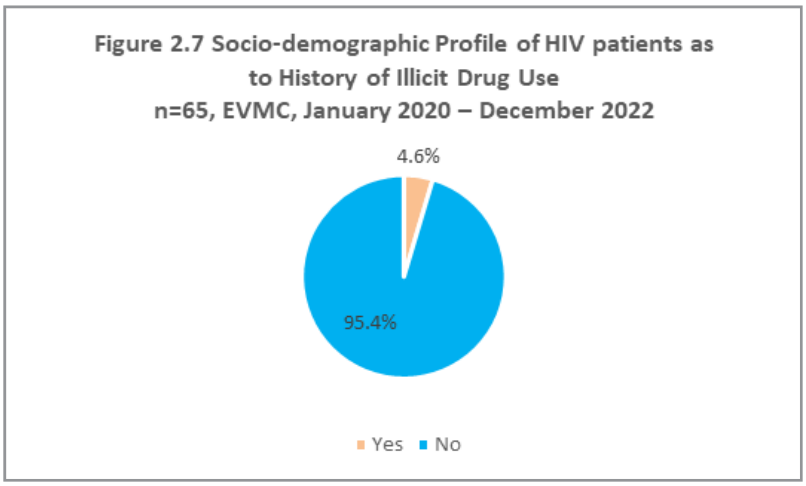


This depicts that most of the newly enrolled HIV patients were literate. Similar results were noted in a study conducted by Hargreaves et al in Africa, it revealed that higher educational attainment was associated with a greater risk of HIV infection. Large studies in four areas in Africa showed an increased risk of HIV-1 infection among the more educated respondents.5 Furthermore, a study at Ethiopia by Bradley et al., revealed that more than 50% of their HIV patients had educational attainment at least secondary education. This depicts that majority of HIV patients belong to the literate group.6

Occupation

The figure below demonstrates that majority of the respondents were employed. Among these, majority (29.20%) works as a private employee and 16.9 were government employees, 12.3% had elementary occupation, 3.10% were self-employed and 1 or 1.5% was an overseas worker. On the other hand, 18.6% were students, 18% were unemployed.

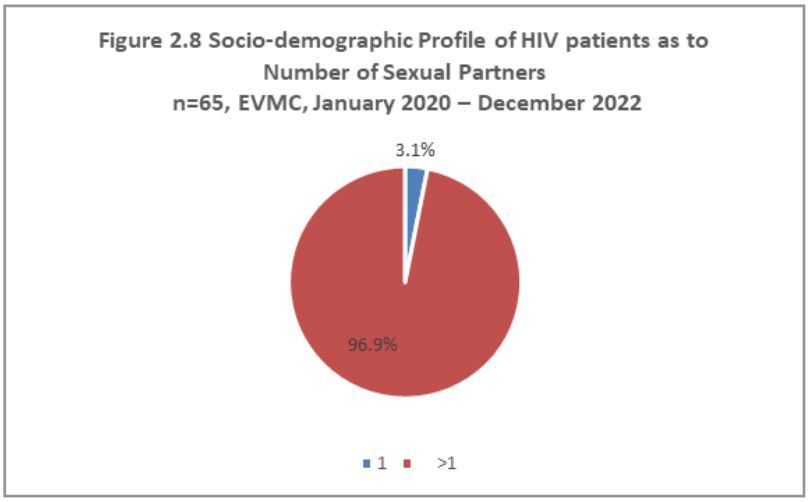




The data shows that majority of the respondents had a source of income.

History of Illicit Drug Use

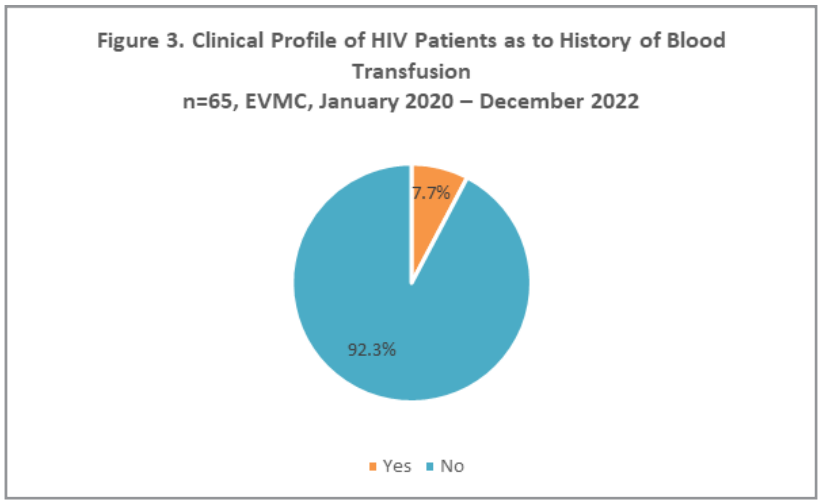
Most (95%) of the respondents denied illicit drug use, and 3 or 4.6% had history of drug use.



Among the drug users, one had reactive result to both HBsAg and Anti-HCV and the others were non-reactive to either of the two [7].

Number of Sexual Partners

The data shows that almost all of the respondents (96.905%) have more than 1 or have multiple sexual partners.



History of Blood Transfusion

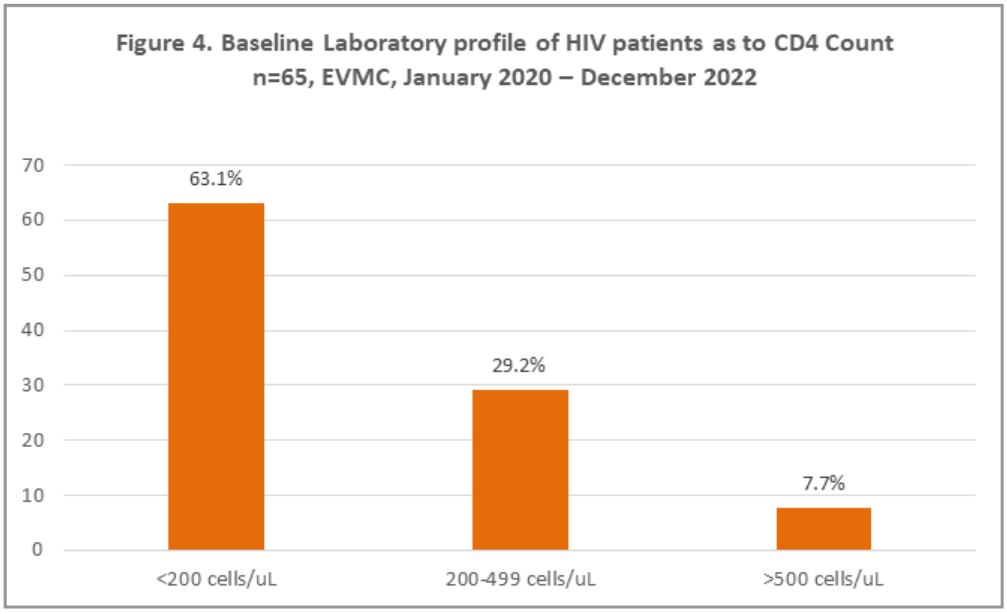
Figure 3: demonstrates the clinical profile of the HIV patients as to the history of blood transfusion. Only 5 patients have had previous history of blood transfusion accounting to 7.70% of the total population.

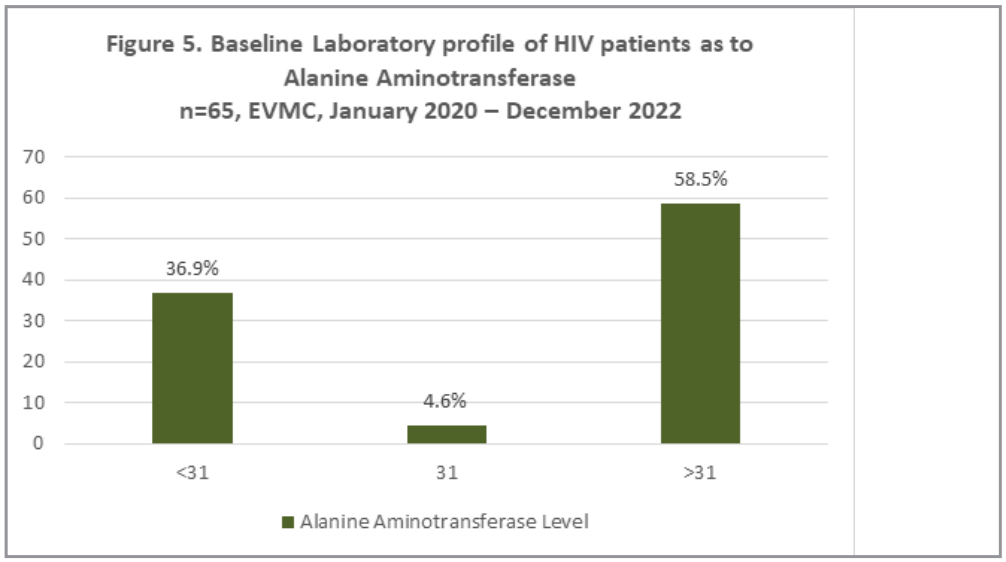
Baseline Laboratory Profile

Figures 4 to 7 show the baseline laboratory profile of HIV patients as to CD4 count, Alanine aminotransferase and aspartate aminotransferase levels.

CD4 Count

Figure 4 shows that majority (63%) of the newly enrolled HIV patients at the treatment hub had a CD4 cells less than 200 cells/uL, some (29.20%) had CD4 at 200-499 cells/uL, and a few (7.7%) had CD4 at >500 cells/uL. The mean CD4 count was 183 cells/uL. The data depicts that majority of the newly enrolled HIV patients had below normal levels of CD4 count upon first consult at the treatment hub.



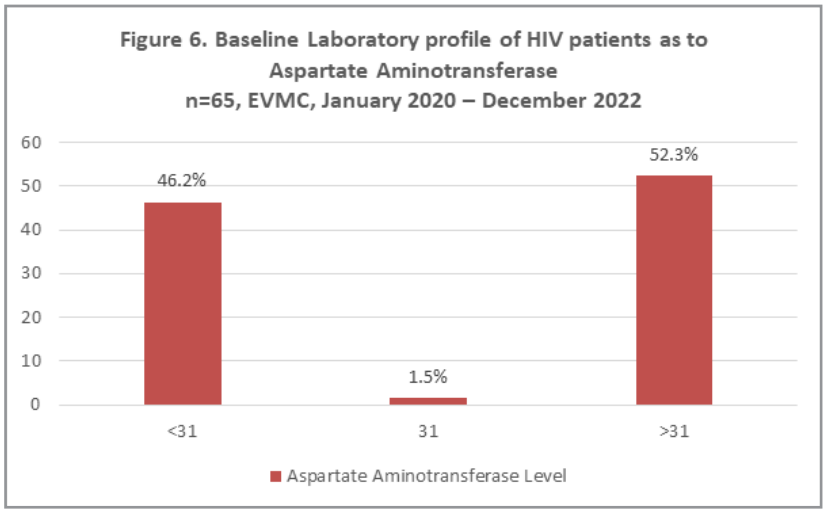


Alanine Aminotransferase

Figure 5 shows the baseline laboratory of respondents as to Alanine Aminotransferase. Majority (58.50%) of the study population had elevated levels of alanine aminotransferases (>31), 36% had values less than the normal limit, and 1.50% had a value equal to the limit of 31 with a mean ALT value of 53.34. This shows that majority of newly enrolled HIV patients had associated liver injury at the time of consult or enrollment at the HACT clinic. Among those who had Hepatitis B coinfection, liver all had elevated liver enzymes. Furthermore, among the 2 cases of Hepatitis C coinfection one had liver injury [8].

Aspartate Aminotransferase

Majority (52.3%) or 38 of the respondents also had elevated levels of aspartate aminotransferases with values greater than 31, 30 or 46.20% enrollees had values less than 31, and 1or 1.50% had a value equal to 31 with a mean AST value was of 43.90.



HIV causes liver damage through direct interactions with both parenchymal and non-parenchymal liver cells. These HIV-infected liver cells then cross-talk with uninfected cells, causing liver damage to spread. HIV's impact in causing liver inflammation and fibrosis can be attributed to a variety of processes. The most significant are HIV's pro-apoptotic effects on hepatocytes, as well as HIV-associated microbial translocation and microbiota alterations. ART causes liver injury due to drug toxicity and/or drug metabolism, mitochondrial damage, immunosuppression, and drug hypersensitivity reactions, in addition to the cytotoxic effects of HIV on hepatocytes and stimulation of non-parenchymal liver cells. While HIV alone raises liver transaminase levels, the worsening of liver injury is exacerbated when HIV patients are also infected with hepatotropic viruses hepatitis C virus (HCV) and hepatitis B virus (HBV).7

Hepatitis B, Hepatitis C Coinfection or Both per Year

Table 2 shows the proportion of HIV patients with Hepatitis b and Hepatitis C co-infection per year. The table shows that 7.69% had reactive HbsAg and 78.46% had non-reactive results from the year 2020 to 2022. There were 2 patients who had reactive HbsAg for the years 2021 and 2022 and 1 patient for the year 2021. Due to the unavailability of HbsAg reagents in the institution as well as failure to request for hepatitis profile some of the newly enrolled patients had no results for the Hepatitis B screening which accounted for 13.85% of the total respondents.

There were only 3.08% patients had reactive Anti-HCV results. One was from the year 2020 and the other from 2021. There were no recorded Hepatitis C coinfection during the year 2022. Furthermore there were 44.62% who were non-reactive to Anti-HCV. There was a high number of respondents having no results of the Hepatitis C screening which accounted for 25.15% of the total population. This is still due to unavailability of the tests as well as the omission of the Hepatitis profile during the indicated time period.

There were 31 respondents who had screening tests for both Hepatitis B and C coinfection. Among these, only 1 (1.5%) had a reactive result to both Hepatitis B and Hepatitis C which was recorded during the year 2020 [9].

Table 2: HIV Patients with Hepatitis B and Hepatitis C Infection per Year n=65, EVMC, January 2020 – December 2022

Year	Hepatitis B						Hepatitis C						HBV and HCV							
	Reactive		Non-Reative		Not Stated		Reactive		Non-Reative		Not Stated		Reactive to Both		Non-reactive to Both		Reactive to One		Not Specified	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
2020	2	3.08	5	7.69	3	4.62	1	1.54	0	0.00	9	13.85	1	1.54	0	0.00	0	0.00	9	13.85
2021	1	1.54	19	29.23	3	4.62	1	1.54	12	18.46	10	15.38	0	0.00	11	16.92	2	3.08	10	15.38
2022	2	3.08	27	41.54	3	4.62	0	0.00	17	26.15	15	23.08	0	0.00	16	24.62	1	1.54	15	23.08
Total	5	7.69	51	78.46	9	13.85	2	3.08	29	44.62	34	52.31	1	1.54	27	41.54	3	4.62	34	52.31

These data were not congruent with the other studies previously mentioned. In a study conducted by Yu et al., pooled HbsAg prevalence in HIV-patients was 13.7% while the HCV coinfection was higher at 24.7% with notable variations over age and study period. The prevalence of both Hepatitis B and Hepatitis co-infection was even lower at 3.5%. In a study conducted by Yu et al., pooled HbsAg prevalence in HIV-patients was 13.7% while the HCV coinfection was higher at 24.7% with notable variations over age and study period. The prevalence of both Hepatitis B and Hepatitis co-infection was even lower at 3.5%.8

Hepatitis B and Hepatitis C Co-Infection or both in terms of Socio-Demographic Profile

Table 3.1 to Table 3.9 demonstrates the proportion of Hepatitis B and Hepatitis C co-infection or both in terms of socio-demographic profile such as age, sex, sexual orientation, marital status, educational attainment, occupation, history of intravenous drug use and number of sexual partner.

Age

This table shows that almost all of the patients with Hepatitis B, Hepatitis C and both Hepatitis B and C co-infection belong to 19-29 age group.

Table 3: HIV patients with Hepatitis B and Hepatitis C infection as to Age n=65, EVMC, January 2020 – December 2022

Age Group	Hepatitis B						Hepatitis C						HBV and HCV							
	Reactive		Non-Reactive		Not Stated		Reactive		Non-Reactive		Not Stated		Reactive to Both		Non-reactive to Both		Reactive to One		Not Specified	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
19-29	4	6.15	27	41.54	3	4.62	2	3.08	15	23.08	17	26.15	1	1.54	13	20.00	3	4.62	17	26.15
30-49	1	1.54	24	36.92	6	9.23	0	0.00	14	21.54	17	26.15	0	0.00	14	21.54	0	0.00	17	26.15
Total	5	7.69	51	78.46	9	13.85	2	3.08	29	44.62	34	52.31	1	1.54	27	41.54	3	4.62	34	52.31

Note: The value for percentage as a whole per category.

In a study conducted by Ionita er al, the age group with the highest co-infection rates was 30-39 years.

Sex

Table 3.2 depicts that all patients with Hepatitis B and C co-infection were all males.

Table 4: HIV patients with Hepatitis B and Hepatitis C infection as to Sex n=65, EVMC, January 2020 – December 2022

Sex	Hepatitis B						Hepatitis C						HBV and HCV							
	Reactive		Non-Reactive		Not Stated		Reactive		Non-Reactive		Not Stated		Reactive to Both		Non-reactive to Both		Reactive to One		Not Specified	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Male	5	7.69	47	72.31	8	12.31	2	3.08	15	23.08	17	26.15	1	1.54	13	20.00	3	4.62	17	26.15
Female	0	0.00	4	6.15	1	1.54	0	0.00	14	21.54	17	26.15	0	0.00	14	21.54	0	0.00	17	26.15
Total	5	7.69	51	78.46	9	13.85	2	3.08	29	44.62	34	52.31	1	1.54	27	41.54	3	4.62	34	52.31

Note: The value for percentage as a whole per category.

This data is similar to the results of a study conducted by Ionita et al. at Nepal wherein majority of the HIV with Hepatitis co-infection were males.9

Sexual Orientation

Table 3.3 shows that almost all of the Hepatitis B co-infection identifies themselves as homosexuals. For Hepatitis B and Hepatitis B and C co-infection, all patients were homosexual [10].

Table 5: HIV patients with Hepatitis B and Hepatitis C infection as to Sexual Orientation n=65, EVMC, January 2020 – December 2022

Sex Orientation	Hepatitis B						Hepatitis C						HBV and HCV							
	Reactive		Non-Reactive		Not Stated		Reactive		Non-Reactive		Not Stated		Reactive to Both		Non-reactive to Both		Reactive to One		Not Specified	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)

Homosexual	4	6.15	22	33.85	4	6.15	2	3.08	13	20.00	15	23.08	1	1.54	11	16.92	3	4.62	15	23.08
Heterosexual	1	1.54	7	10.76	4	6.15	0	0.00	3	4.26	9	13.85	0	0.00	3	4.62	0	0.00	9	13.85
Bisexual	0	0.00	22	33.85	1	1.54	0	0.00	13	20.00	10	15.38	0	0.00	13	20.00	0	0.00	10	15.38
Total	5	7.69	51	78.46	9	13.85	2	3.08	29	44.62	34	52.31	1	1.54	27	41.54	3	4.62	34	52.31

Note: The value for percentage as a whole per category.

This is different from the study conducted by Sharma et al, wherein majority of their patients with co-infections were heterosexuals.10

Marital Status

Table 3.4 shows that almost all of the of the patients with co-infection were single at the time of their diagnosis. One patient with hepatitis B co-infection was married upon enrollment.

Table 6: HIV Patients with Hepatitis B and Hepatitis C Infection as to Marital Status, n=65, EVMC, January 2020 – December 2022

Martial Status	Hepatitis B						Hepatitis C						HBV and HCV							
	Reactive		Non-Reactive		Not Stated		Reactive		Non-Reactive		Not Stated		Reactive to Both		Non-reactive to Both		Reactive to One		Not Specified	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Single	4	6.15	46	70.77	8	12.31	2	3.08	26	40.00	30	46.15	1	1.54	24	36.92	3	4.62	30	46.15
Married	1	1.54	4	6.15	1	1.54	0	0.00	3	4.62	3	4.62	0	0.00	3	4.62	0	0.00	3	4.62
Widow	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Separated	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commo	0	0.00	1	1.54	0	0.00	0	0.00	0	0.00	1	1.54	0	0.00	0	0.00	0	0.00	1	1.54
Total	5	7.69	51	78.46	9	13.85	2	3.08	29	44.62	34	52.31	1	1.54	27	41.54	3	4.62	34	52.31

Note: The value for percentage as a whole per category.

Educational Attainment

This table depicts that majority(60%) of patients with Hepatitis B co-infection were College graduate. For patients with Hepatitis C co-infection, one was elementary level and one was a college graduate while the patient with both Hepatitis B and C co-infection had elementary level education.

Table 7: HIV Patients with Hepatitis B and Hepatitis C Infection as to Educational Attainment n=65, EVMC, January 2020 – December 2022

Martial Status	Hepatitis B						Hepatitis C						HBV and HCV							
	Reactive		Non-Reactive		Not Stated		Reactive		Non-Reactive		Not Stated		Reactive to Both		Non-reactive to Both		Reactive to One		Not Specified	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
None	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Elementary Level	1	1.54	0	0.00	0	0.00	1	1.54	0	0.00	0	0.00	1	1.54	0	0.00	0	0.00	0	0.00
Elementary Graduate	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
High School Level	0	0.00	2	3.08	0	0.00	0	0.00	0	0.00	2	3.08	0	0.00	0	0.00	0	0.00	2	3.08
High School Graduate	0	0.00	8	12.31	3	4.62	0	0.00	4	6.15	7	10.77	0	0.00	4	6.15	0	0.00	7	10.77
College Level	1	1.54	13	20.00	0	0.00	0	0.00	8	12.31	6	9.23	0	0.00	8	12.31	0	0.00	6	9.23
College Graduate	3	4.62	28	43.08	6	9.23	1	1.54	17	26.15	19	29.23	0	0.00	15	23.08	3	4.62	19	29.23
Total	5	7.69	51	78.46	9	13.85	2	3.08	29	44.62	34	52.31	1	1.54	27	41.54	3	4.62	34	52.31

Note: The value for percentage as a whole per category.

Educational Attainment

This table depicts that majority(60%) of patients with Hepatitis B co-infection were College graduate. For patients with Hepatitis C co-infection, one was elementary level and one was a college graduate while the patient with both Hepatitis B and C co-infection had elementary level education.

Table 8: HIV patients with Hepatitis B and Hepatitis C Infection as to Occupation
n=65, EVMC, January 2020 – December 2022

Martial Status	Hepatitis B						Hepatitis C						HBV and HCV							
	Reactive		Non-Reactive		Not Stated		Reactive		Non-Reactive		Not Stated		Reactive to Both		Non-reactive to Both		Reactive to One		Not Specified	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
None	0	0.00	10	15.38	1	1.54	0	0.00	6	9.23	5	7.69	0	0.00	6	9.23	0	0.00	5	7.69
Elementary Level	1	1.54	15	23.08	3	4.62	1	1.54	8	12.31	10	15.38	0	0.00	7	10.77	2	3.08	10	15.38
Elementary Graduate	0	0.00	2	3.08	0	0.00	0	0.00	1	1.54	1	1.54	0	0.00	1	1.54	0	0.00	1	1.54
High School Level	1	1.54	5	7.69	2	3.08	0	0.00	3	4.62	5	7.69	0	0.00	3	4.62	0	0.00	5	7.69

Table 9: HIV patients with Hepatitis B and Hepatitis C Infection as to History of Illicit Drug Use
n=65, EVMC, January 2020 – December 2022

Martial Status	Hepatitis B						Hepatitis C						HBV and HCV							
	Reactive		Non-Reactive		Not Stated		Reactive		Non-Reactive		Not Stated		Reactive to Both		Non-reactive to Both		Reactive to One		Not Specified	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Yes	1	1.54	1	1.54	1	1.54	1	1.54	1	1.54	1	1.54	1	1.54	1	1.54	0	0.00	1	1.54
No	4	6.15	50	76.92	8	12.31	1	1.54	28	43.08	33	19.31	0	0.00	26	40.00	3	4.62	33	19.31

To-tal	5	7.69	51	78.46	9	13.85	2	3.08	29	44.62	34	52.31	1	1.54	27	41.54	3	4.62	34	52.31

Note: The value for percentage as a whole per category.

This result is also parallel with the study by Chen et al wherein almost all (93.6%) of their patients with Hepatitis B or C co-infection or both had history of illicit drug use.10

Number of Sexual Partners

This table shows that among all patients with Hepatitis B, Hepatitis C, and both had multiple sexual partners [12].

Table 10: HIV patients with Hepatitis B and Hepatitis C Infection as to Number of Sexual Partners
n=65, EVMC, January 2020 – December 2022

Martial Status	Hepatitis B						Hepatitis C						HBV and HCV							
	Reactive		Non-Reactive		Not Stated		Reactive		Non-Reactive		Not Stated		Reactive to Both		Non-reactive to Both		Reactive to One		Not Specified	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Yes	0	0.00	2	3.08	0	0.00	0	0.00	0	0.00	2	3.08	0	0.00	0	0.00	0	0.00	2	3.08
No	5	7.69	49	75.38	9	13.85	2	3.08	29	44.62	32	49.23	1	1.54	27	41.54	3	4.62	32	49.23
To-tal	5	7.69	51	78.46	9	13.85	2	3.08	29	44.62	34	52.31	1	1.54	27	41.54	3	4.62	34	52.31

Note: The value for percentage as a whole per category.

History of Blood Transfusion

This table shows that among those patients with Hepatitis B or C co-infection, none had history of blood transfusion.

Table 11: HIV patients with Hepatitis B and Hepatitis C Infection as to History of Blood Transfusion
n=65, EVMC, January 2020 – December 2022

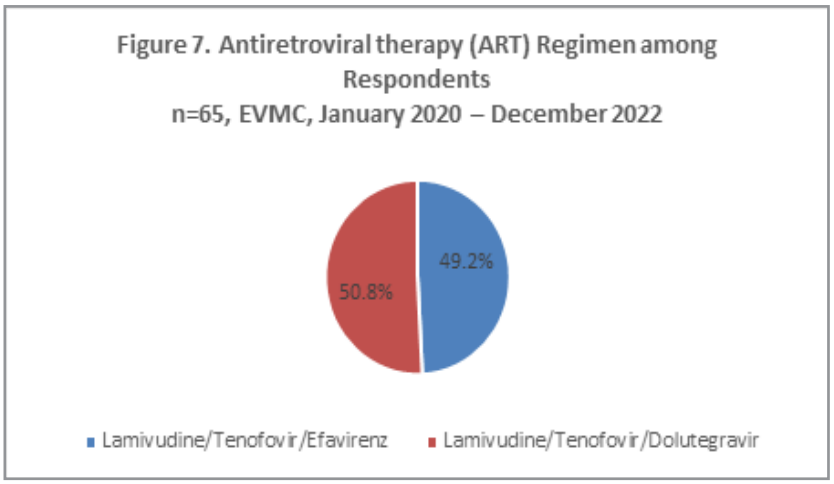
Martial Status	Hepatitis B						Hepatitis C						HBV and HCV							
	Reactive		Non-Reactive		Not Stated		Reactive		Non-Reactive		Not Stated		Reactive to Both		Non-reactive to Both		Reactive to One		Not Specified	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Yes	0	0.00	3	4.62	2	3.08	0	0.00	3	4.62	2	3.08	0	0.00	3	4.62	0	0.00	2	3.08
No	5	7.69	48	73.84	7	10.77	2	3.08	26	40.00	32	49.23	1	1.54	24	36.92	3	4.62	32	49.23

Total	5	7.69	51	78.46	9	13.85	2	3.08	29	44.62	34	52.31	1	1.54	27	41.54	3	4.62	34	52.31

Note: The value for percentage as a whole per category.

Antiretroviral Therapy

Figure 7 shows the antiretroviral regimen used among patients with Hepatitis B Coinfection. The antiretroviral therapy was almost equally distributed between Lamivudine/Tenofovir/Efavirenz and Lamivudine/Tenofovir/Dolutegravir at 49.2% and 50.80% respectively.



All patients who were reactive to Hepatitis B, Hepatitis C, and Both received a regimen containing Tenofovir Alfenamide/ Tenofovir Dispoxil Fumarate plus Lamivudine (3TC) or Efavirenz (FTC) as the nucleoside reverse transcriptase inhibitor. This implies that all patients accounted for had treatment based on the recommended guidelines by the CDC.11

Socio-Demographic Profile and Occurrence of Hepatitis B, Hepatitis C Co-Infection or Both

Table 4 shows the association between the sociodemographic and clinical profile to the occurrence of Hepatitis co-infection. Among the sociodemographic and clinical profile of the respondents, only the educational attainment and the history of intravenous illicit drug use had statistically significant correlation with the occurrence of hepatitis co-infection with p-values less than 0.05.

Table 12: Association between Socio-demographic and Clinical profile to the Occurrence of Hepatitis Co-infection n=65, EVMC, January 2020 – December 2022

Variables	Hepatitis B			Hepatitis C			HBV and HCV		
	X2	p-value	interpretation	X2	p-value	interpretation	X2	p-value	interpretation
Socio-demographic Profile									
Age (years)	2.844	0.241	Not Significant	1.900	0.387	Not Significant	3.907	0.272	Not Significant
Sex	0.566	0.753	Not Significant	1.696	0.428	Not Significant	1.732	0.630	Not Significant
Sexual orientation	9.399	0.052	Not Significant	5.665	0.226	Not Significant	8.426	0.209	Not Significant
Marital status	1.097	0.895	Not Significant	1.172	0.883	Not Significant	1.447	0.963	Not Significant
Educational attainment	17.382	0.026	Significant	35.300	0.0001	Significant	70.325	0.0001	Significant

Occupation	7.735	0.805	Not Significant	6.537	0.887	Not Significant	11.734	0.861	Not Significant
History of Intra-venous illicit drug use	4.367	0.113	Not Significant	9.664	0.008	Significant	21.079	0.0001	Significant
Number of sexual partners	0.566	0.753	Not Significant	1.881	0.390	Not Significant	1.881	0.597	Not Significant
Clinical Profile									
History of Blood transfusion	3.328	0.189	Not Significant	0.611	0.737	Not Significant	0.935	0.817	Not Significant

Table 12: Association between Socio-demographic and Clinical profile to the Occurrence of Hepatitis Co-infection n=65, EVMC, January 2020 – December 2022

Variables	Hepatitis B			Hepatitis C			HBV and HCV		
	X2	p-value	interpretation	X2	p-value	interpretation	X2	p-value	interpretation
Socio-demographic Profile									
Age (years)	2.844	0.241	Not Significant	1.900	0.387	Not Significant	3.907	0.272	Not Significant
Sex	0.566	0.753	Not Significant	1.696	0.428	Not Significant	1.732	0.630	Not Significant
Sexual orientation	9.399	0.052	Not Significant	5.665	0.226	Not Significant	8.426	0.209	Not Significant
Marital status	1.097	0.895	Not Significant	1.172	0.883	Not Significant	1.447	0.963	Not Significant
Educational attainment	17.382	0.026	Significant	35.300	0.0001	Significant	70.325	0.0001	Significant
Occupation	7.735	0.805	Not Significant	6.537	0.887	Not Significant	11.734	0.861	Not Significant
History of Intra-venous illicit drug use	4.367	0.113	Not Significant	9.664	0.008	Significant	21.079	0.0001	Significant
Number of sexual partners	0.566	0.753	Not Significant	1.881	0.390	Not Significant	1.881	0.597	Not Significant
Clinical Profile									
History of Blood transfusion	3.328	0.189	Not Significant	0.611	0.737	Not Significant	0.935	0.817	Not Significant
Antiretroviral therapy regimen									
	2.805	0.246	Not Significant	0.019	0.990	Not Significant	1.355	0.716	Not Significant

This table shows the association between the sociodemographic and clinical profile to the occurrence of Hepatitis co-infection. Among the sociodemographic and clinical profile of the respondents, only the educational attainment and the history of intravenous illicit drug use had statistically significant correlation with the occurrence of hepatitis co-infection with p-values less than

0.05 [13].

Furthermore, educational attainment had shown statistically significant relationship to the occurrence of Hepatis B (p-value 0.026), Hepatitis C (p-value 0.0001), and Hepatitis B and C coinfection (p-value 0.0001). The history of illicit drug use revealed significant correlation to Hepatitis C (p-value 0.008) and Hepatitis B and C coinfection (p-value 0.0001) but failed to show significance to Hepatitis B infection alone (p-value 0.113).

Summary of Findings, Conculsion and Recommendation

Summary of Findings

From 2020-2022, the year 2022 had the most (49.2%) number of newly enrolled cases. Among the 65 respondents, most belong to age group 19-29 years. Majority (92.3%) of the respondents were males. Many (46.2%) respondents identify themselves as homosexuals. Majority (89.2%) of them were single. More than half of the respondents were College graduate and majority (63%) were employed. Majority (63%) of the newly enrolled HIV patients at the treatment hub had a CD4 cells less than 200 cells/uL, and more than half (58.50%) of the study population had elevated levels of alanine aminotransferases (>31). Only 7% had history of blood transfusion while only 4.6% had history of illicit drug use. The antiretroviral therapy utilized was almost equally distributed between Lamivudine/Tenofovir/Efavirenz and Lamivudine/Tenofovir/Dolutegravir at 49.2% and 50.80% respectively. All patients who were reactive to Hepatitis B, Hepatitis C, and both received a regimen containing Tenofovir Alafenamide/Tenofovir Dispoxil Fumarate plus Lamivudine (3TC) or Efavirenz (FTC) as the nucleoside reverse transcriptase inhibitor.

There were a total of 8 (12%) patients who had Hepatitis B, Hepatitis C co-infection or both. 7.69% had reactive HbsAg from the year 2020 to 2022. There only 3.08% patients had reactive Anti-HCV results. There were 31 respondents who had screening tests for both Hepatitis B and C coinfection. Among these, only 1 (1.5%) had a reactive result to both Hepatitis B and Hepatitis C which was recorded during the year 2020.

Among the sociodemographic and clinical profile of the respondents, only the educational attainment and the history of intravenous illicit drug use had statistically significant correlation with the occurrence of hepatitis co-infection with p-values less than 0.05. The history of illicit drug use revealed significant correlation to Hepatitis C (p-value 0.008) and Hepatitis B and C coinfection (p-value 0.0001) but failed to show significance to Hepatitis B infection alone (p-value 0.113).

Conclusion

Based on the results of this study, it can be concluded that the incidence density of Hepatitis B, Hepatitis C, and Hepatitis B and C co-infection are low. The results however only depended on the available laboratory results upon enrollment hence some cases with incomplete Hepatitis profile were excluded. It can also be concluded that educational attainment remains to be significant risk factor that can affect the occurrence of Hepatitis B, Hepatitis C coinfection or both while history of Illicit drug use is a significant risk factor for Hepatitis C coinfection alone [14].

Recommendations

Recommendations for a larger scale study involving the whole region to be able to come-up with the incidence of Hepatitis B and or Hepatitis C co-infection among HIV patients that could serve as a baseline data for future studies. A prospective study is recommended to be able to explore the risk factors of Hepatitis B and or C coinfection in the local setting. Furthermore, it also recommended that screening for Hepatitis B and or Hepatitis C coinfection among newly enrolled HIV patients should be strictly adhered since management for these special population may vary [15].

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Appendices

Appendix A: Gantt Chart

	2022										2023				
Protocol preparation	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
Technical review															
Protocol Re-vision															
Ethical re-view															
Data collec-tion															
Data analysis and manu-script prepa-ration															
Manuscript sub-mission															

Appendix B: Budget Plan

Item	Number of Units	Cost per Unit	Subtotal
Personnel Services Statistician			P 15,000
A. Maintaining Operation Office supplies Bond paper Printer ink Pens Sliding Folder	1 ream 1bottle 5 pcs 20 pcs	P 300 P 500 P 10 P 10	P 300 P 500 P 50 P 200
A. Miscellaneous Photocopy			P 500
TOTAL			P 16,550.00

Appendix C: Data Collection Form
Patient Code:

I. Socio-Demographic profile
Age _____ Sex _____
Marital status ( ) Single ( ) Married ( ) Widow ( ) Separated
Sexual orientation ( ) Homosexual
( ) Heterosexual
( ) Bisexual
Educational attainment
( ) None
( ) Elementary graduate
_____
( ) High school graduate
( ) College graduate
Occupation
( ) None
( ) Specify
History of intravenous illicit drug use
( ) Yes ( ) No
Number of sexual partners
( ) 1 ( ) >1

II. Clinical Profile
History of blood transfusion
( ) Yes ( ) No
Antiretroviral therapy (ART) regimen
( ) Lamivudine/Tenofovir/Efavirenz
( ) Lamivudine/Tenofovir/Dolutegravir
( ) Lamivudine/Zidovudine + Efavirenz
( ) Others _____

III. Laboratory Profile
CD4 count (cells/uL): _____
HBsAg ( ) Reactive ( ) Nonreactive
Anti-HCV ( ) Reactive ( ) Nonreactive
ALT (U/L): _____ AST (U/L): _____

Appendix D: Dummy Tables
Table 1: Newly Enrolled HIV Patients From 2020 to 2021 per Annum

Year	Frequency (N)	Percentage (%)
2020		
2021		
2022		
Total		

Table 2: Socio-Demographic Profile of HIV Patients

Socio-demographic profile	Frequency (N)	Percentage (%)
Age (years) 19-29 30-49 50-69 Total		
Sex Male Female Total		
Marital Status Single Married Widow Separated Common law		
Total		
Sexual orientation Homosexual Heterosexual Bisexual Total		

Educational attainment None Elementary level Elementary graduate High school level High school graduate College level College graduate Total		
Occupation		
History of Intravenous Illicit Drug Use Yes No Total		
Number of sexual partners 1 >1 Total		

Table 3: Clinical Profile of HIV Patients

Clinical profile	Frequency (N)	Percentage (%)
History of blood transfusion Yes No Total		

Table 4: Baseline Laboratory Profile of HIV Patients

Baseline Laboratory profile	Frequency (N)	Percentage (%)
CD4 count <200 cells/uL 200-499 cells/uL >500 cells/uL Total		
Alanine aminotransferase		
Aspartate aminotransferase		

Table 5: Proportion of HIV Patients with Hepatitis B and Hepatitis C Infection per Annum

Laboratory profile	Hepatitis B and Hepatitis C Negative		HIV + Hepatitis B		HIV + Hepatitis C		HIV + Hepatitis B + Hepatitis C	
2020	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)	Frequency (N)	Percentage	Frequency (N)	Percentage (%)
2021								
2022								
Total								

Table 6: Antiretroviral Therapy (ART) Regimen Among Patients with Hepatitis B Co-Infection

ART regimen	Frequency (N)	Percentage (%)
Lamivudine/Tenofovir/Efavirenz		
Lamivudine/Tenofovir/Dolutegravir		
Lamivudine/Zidovudine + Efavirenz		

Table 7: Cross Tabulation of socio-Demographic and Clinical Profile to the Occurrence of Hepatitis Co-Infection

Variables	Hepatitis B			Hepatitis C			Hepatitis B and Hepatitis C		
	OR	95% CI	p value	OR	95% CI	p value	OR	95% CI	p value
Socio-demographic Profile									
Age (years) 19-29 30-49 50-69									
Sex Male Female									
Marital status Single Married Separated Widow									
Sexual orientation Homosexual Heterosexual Bisexual									
Educational attainment None Elementary graduate High school graduate College graduate									
Occupation									
History of Intravenous illicit drug use Yes No									
Number of sexual partners 1 >1									
Clinical Profile									
History of Blood transfusion Yes No									
Antiretroviral therapy regimen Lamivudine/Tenofovir/Efavirenz Lamivudine/Tenofovir/Dolutegravir Lamivudine/Zidovudine + Efavirenz									