



# Seroprevalence of Hepatitis B and Hepatitis C Viral Infections in Port Harcourt, Nigeria

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## Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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## ABSTRACT

**Introduction:** Viral hepatitis which includes five the main strains of hepatotropic viruses, hepatitis A (HAV), hepatitis B (HBV), (HBA), hepatitis C (HCV), hepatitis D(HDV), and hepatitis E (HEV), are leading causes of morbidity and mortality globally. Much public health attention is however focused on the two blood-borne hepatitis viruses HBV and HCV, due largely to their high prevalence and pervasive rates of morbidity and mortality. This study was thus aimed at determining the prevalence of HBV and HCV.

**Materials and Methods:** This retrospective study was conducted in Diobu, a high-density group of urban communities situated in the heart of Port Harcourt metropolis in the Niger Delta of Nigeria. The medical laboratory records 206 patients, including 123 males and 83 females of various ages, residing in Diobu and closely adjoining urban communities of Port Harcourt metropolis were reviewed; to extract data on the HBV and HCV tests.

**Results:** The mean age in years was  $37.04 \pm 12.06$  the median age: 36, mode: 33, while the minimum and maximum ages were 12 and 69 years, respectively. The seroprevalence of hepatitis

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B in the study area was found to be 5.8%, while that for hepatitis C was 0.5%. The males had a seroprevalence of 7.3% and females 3.6% for hepatitis B. Among the age groups, the highest prevalence was found in the 31-40 years age bracket at 10.6%, followed by 11-20 years (59%), 21-30 years, (5.0%) and 41-50% (3.6%)

**Conclusion:** The prevalence of 5.8% for HBV in this study, represents an intermediate level of transmission on the WHO criteria of endemicity, while the 0.5% is low level of transmission. There is need for concerted public health policy makers and all stakeholders to put more efforts curtail the menace of viral hepatitis.

*Keywords: Blood-borne infections; Hepatitis B; Hepatitis C.*

## 1. INTRODUCTION

Hepatitis is an inflammation of the liver which may be caused by a number of viruses and noninfectious factors including excessive use alcohol, drugs, toxins and autoimmune disorders; the commonest type of hepatitis however, are the viral hepatitis. The viral hepatitis infections are caused by five main strains of hepatitis viruses namely, hepatitis A, B, C, D, and E viruses [1,2]. Though all the hepatitis viruses cause liver diseases, they vary in modes of transmission, nature and severity of the illness, geographical distribution and prevention methods. While types A, B and C are the most prevalent, types B and C attracts more public health attention because they cause chronic disease in hundreds of millions of people and together are the most common cause of liver cirrhosis, liver cancer and viral hepatitis-related deaths worldwide [1,2].

About 354 million people across the globe are living with hepatitis B or C, and most of them are ignorant of the condition and could not access treatment [2]. The global prevalence hepatitis B virus (HBV) or hepatitis C virus (HCV) infections are put at 296 million and 58 million persons, respectively [3,4,5]. While hepatitis B is estimated to cause 780,000 deaths annually, the estimate for hepatitis C is about 400,000 deaths every year [1]. In Nigeria, it is estimated that about 20 million people are chronically infected with hepatitis B and C; with prevalence of 8.1% and 1.1% respectively [6].

Hepatitis B is spread through contact with infected body fluids including infected blood and blood products, saliva, vaginal fluids and semen. It can also be transmitted from a mother to her to child during pregnancy, childbirth or breastfeeding [7]. Over 95% of immunocompetent adults infected with the virus are able to have it cleared from the system even without knowing about the infection [8]. The infection is preventable by a safe and effective

vaccine. The vaccine gives almost full protection against the virus, and is usually given soon after birth with boosters within few weeks [7].

Hepatitis C is a bloodborne infection, transmitted through contact with infected blood, which may be through the sharing needles or syringes, or from unsafe medical procedures such as unsafe blood transfusions and blood products [9]. The symptoms of HCV infection may include fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, dark urine and jaundice. Though there is no vaccine for hepatitis C, but it can be treated with antiviral medications; early detection and treatment are important to prevent serious liver damage and wellbeing [9]. Though the prevalence of HCV infection in Nigeria is considerably low, some scholars opined that the prevalence is on the increase [10]. This is an indication for concerted efforts in the monitoring and control of the spread of the virus.

There is currently inadequate data on the prevalence of Hepatitis B and Hepatitis C in Port Harcourt, Nigeria. This study was thus aimed at filling the gap by determining the prevalence of HBV and HCV in urban communities in Port Harcourt.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

This retrospective study was conducted in Diobu, a high-density group of urban communities situated in the heart of Port Harcourt metropolis in the Niger Delta of Nigeria. The notable urban communities are Mile I, Mile II and Mile III urban communities of Diobu. The coordinates of the area are: 4°47'24"N, 6°59'36"E (Latitude:4.772152; Longitude:6.994514). The communities are bordered on the north by the Port Harcourt New GRA, on the northeast by D-line, on the northwest Rivers State University, Nkpolu-Oroworukwu, Port Harcourt, on the east

by the Poth Harcourt Old GRA, on the southeast by Kidney Island, and on the southwest by Eagle Island. There are a number of public and privately-owned hospitals and other healthcare facilities in the area, including primary health centres, maternity homes, medical laboratory facilities and community pharmacy outlets patronized by many residents. On the other end, harsh economic climates and pervasive ignorance and economic have made many residents, particularly those in overcrowded area, who lack amenities like clean water and decent housing; such as water fronts to resort to self-medication and patronizing different kinds of purveyors of unregulated healthcare products.

## 2.2 Design of the Study

This study was conducted between January 2022 to December 2023 among 206 males and female of all ages, residents of Diobu and closely adjoining urban communities of Port Harcourt metropolis; attending public and private healthcare facilities within the area. The inclusion criteria include persons who live within mile I, mile II and mile III and closely adjoining neighborhoods such as Agip, Eagle Island, D-line etc.; and who within the study period, conducted serological laboratory investigations for HBV and HCV antibodies (SD Bioline, Korea) at Diagnostix and Scientifique Laboratories, Port Harcourt. Persons living far from Diobu or did not perform the two tests and those with incomplete records were excluded.

## 2.3 Data Collection

Patients' data were obtained by going through their medical laboratory records. The outcomes of the laboratory tests of HBV and HCV infections and relevant socio-demographic data about the ages, genders and areas of residence were extracted, coded and anonymously analyzed.

**Specimen collection and assay:** About 3 ml of venous blood was collected from each study participant, transferred to a test tube and allowed to stand until clotted the serum was separated from the clotted by centrifugation at 5000 revolutions per minute for 10 min and tested for HBsAg and anti-HCV using a one-step HBsAg test strip (SD Bioline) and a one-step HCV test strip (SD Bioline), respectively, following the manufacturer instructions. The sensitivity and specificity of rapid test kits of HBsAg and one-step HCV test strips were 99.1% and 99.6%, respectively.

## 2.4 Data Analysis

Data were analyzed with IBM SPSS Statistics version 25. Descriptive statistics were employed in presenting the data were in counts and percentages. Pearson chi-square test were employed to ascertain associations between the categorical variables.

## 3. RESULTS

In this retrospective cross-sectional study, we reviewed the laboratory records of 206 persons; 123 (59.7%) males and 83 (40.3%) females, attending public and private healthcare facilities in Port Harcourt who conducted serological investigations of hepatitis B and hepatitis C viral infections at Diagnostix and Scientifique Laboratories, Port Harcourt. The mean age in years was  $37.04 \pm 12.06$  the median age: 36, mode: 33, while the minimum and maximum ages were 12 and 69 years, respectively (Fig. 1).

### 3.1 Seroprevalence of Hepatitis B and Hepatitis C Viral Infections in Port Harcourt, Nigeria

The seroprevalence of hepatitis B in the study area was found to be 5.8%, while that for hepatitis C was 0.5%. The males had a seroprevalence of 7.3% and females 3.6%. Among the age groups, the highest prevalence was found in the 31-40 years age bracket at 10.6%, followed by 11-20 years (59%), 21-30 years, (5.0%) and 41-50% (3.6%) (Table 1).

In the residential areas, the highest prevalence of 7.0% was observed in Mile II Diobu, followed by Mile III Diobu (6.4%), Mile I Diobu (5.8%) and Adjoining communities (4.0%) (Table 1).

### 3.2 Seroprevalence of Hepatitis C Viral Infections

The seroprevalence of Hepatitis C virus infection as determined in the study area was 0.5% as only one of the 206 tests recorded positive. The prevalence for males was 0.8%, while females was 0%. The 31-40 age group had a prevalence of 1.9% while the rest had zero prevalence (Table 2).

### 3.3 Statistical Analysis

Pearson's Chi-square test of independence and Fisher's exact test were performed to evaluate

the relationship between the residence, age and gender (independent variables) and results of HBV and HCV test results (dependent variable). The association between these variables were found not be significant, given that the p values were not less than 0.05, we therefore failed to

reject the null hypothesis which states that the variables are independent. In other words, there was no sufficient evidence to conclude that a significant association exists between the variable and the test results obtained for the hepatitis B and hepatitis C screening.

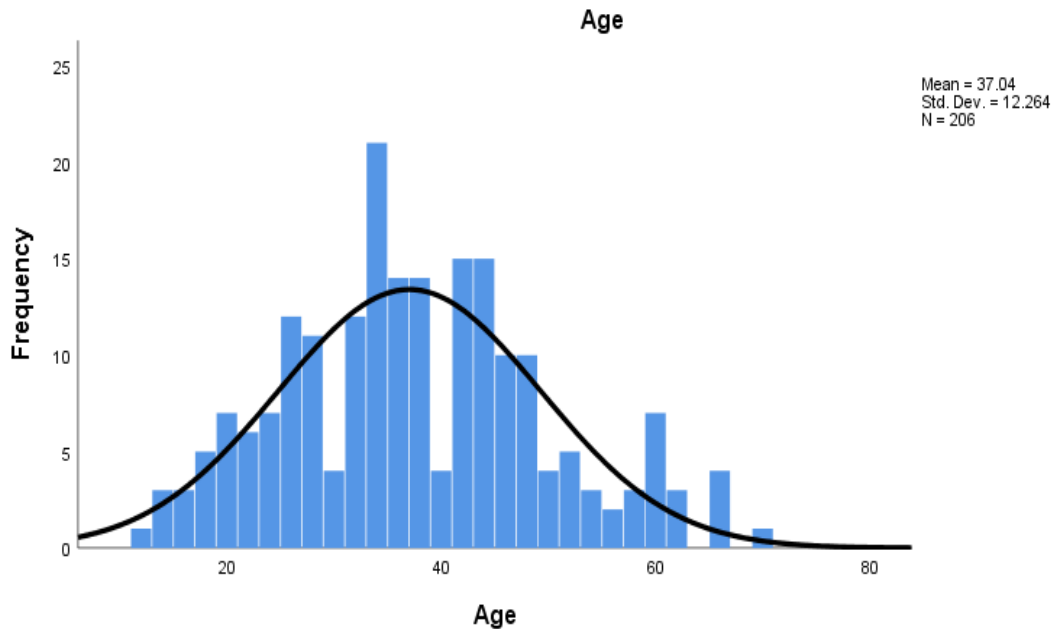


Fig. 1. Frequency distributions of the HBV and HCV specimens by age

Table 1. Seroprevalence of Hepatitis B viral infection

Characteristics	Number Tested	Positive Tests	Prevalence %
<b>Age Groups</b>			
11-20	16	1	5.9
21-30	38	2	5.0
31-40	59	7	10.6
41-50	53	2	3.6
51-60	17	0	0.0
61-70	11	0	0.0
Total	206	12	5.8
<b>Gender</b>			
Males	123	9	7.3
Females	83	3	3.6
Females	206	12	5.8
Total	206	12	5.8
<b>Residence</b>			
Mile I Diobu	49	3	5.8
Mile II Diobu	53	4	7.0
Mile III Diobu	44	3	6.4
Adjoining Communities	48	2	4.0
Total	206	12	5.8

**Table 2. Seroprevalence of Hepatitis C viral infections in Port Harcourt, Nigeria**

Characteristics	Number Tested	Positive Tests	Prevalence
<b>Age Groups</b>			
11-20	16	0	0.0
21-30	38	0	0.0
31-40	59	1	1.5
41-50	53	0	0.0
51-60	17	0	0.0
61-70	11	0	0.0
Total	206	1	0.5
<b>Gender</b>			
Males	123	1	0.8
Females	83	0	0.0
Total	206	1	0.5
<b>Residence</b>			
Mile I Diobu	49	1	1.9
Mile II Diobu	53	0	0.0
Mile III Diobu	44	0	0.0
Adjoining Communities	48	0	0.0
Total	206	1	0.5

#### 4. DISCUSSION

The findings in this study indicate an intermediate prevalence for hepatitis B and low prevalence for hepatitis C. Majority of the people screened were those who wanted medical tests to ascertain their health status, while a few were referred based on presumptive diagnosis for viral hepatitis. Majority of the were collected from males (59.7%), who also recorded a higher prevalence of 7.3% than females (3.6%). The proportion of males to females was similar to that of a study in northern Nigeria with 60.4% males and 39.4% [11].

The prevalence of 5.8% obtained here for hepatitis B infection was higher than the 1.2% prevalence among members of a university community in Port Harcourt [12], it however aligned closely with the prevalence of 6.2% reported in a study among abattoir workers in Port Harcourt [13]. The discrepancy between this and the result from the university may be due to the nature of the population. The university community is populated by persons with good knowledge of the infections and the preventive measures, above what is obtainable in the general population. The prevalence of 0.5% observed here however aligned very closely with

the 0.6% prevalence in the university community [12].

The prevalence for both hepatitis B and C were lower than the prevalences of 12.6% and 15.2% for HBV and HCV respectively in a study in northern Nigeria for persons investigated due to ill-health; but aligned with 6.6% for HBV among healthcare workers in the same study, but lower than 6.5% for HCV among the healthcare workers [11]. Another study in northern Nigeria reported a seroprevalence of HBV infection of 14.0% and HCV infection (10.4%) [14]; these were higher than the outcomes of this study. The lower prevalence in this study may be attributed to a variety of factors such as geographical and cultural factors, level of awareness and compliance with preventive measures among others. It may also be as a result of reported decline in the prevalence of HBV infection [15]. The prevalence of 5.8% is the same as the pooled global prevalence of 5.8%, less than the prevalence of 7.8% for the WHO African region which bears the largest burden of global prevalence for HBV infection [16].

In the same northern Nigerian study, HBV seroprevalence of 9.1% for males was higher than that for females (4.9%), which was similar to the results in this study; conversely, the HCV seroprevalence for females (6.2%) was higher than that for males (4.2%) [14]. The HBV

prevalence for the young adults age group (10.2%), was the highest among age groups, while the highest prevalence for HCV was 6.2% observed with the middle-aged group [14]. These results for HBV had close semblance with the findings of this study where the males had a higher prevalence than females, and the highest prevalence was found the 30-40 age group. The results HCV were however different from the findings here, the only positive HCV result was from a male within the 30–40-year group. The incidence of HCV infection is reported by several studies to be driven by intravenous drug use, men having sex with men among other factors with the prevalence found in Eastern Mediterranean Region, South-East Asia Region and European Region [5,17,18,19,20]. These may therefore not the critical factors in Port Harcourt and the country as shown with low prevalence rates for HCV infection.

The limitations of the study like in retrospective studies, is based on secondary records. The samples were collected and analyzed without consideration for the study. The sociodemographic data are limited to those required for in the laboratory records, and there is no personal interaction with the participants. Some information that may enrich the study are therefore not captured. Tests carried out are limited to HBsAg and anti-HCV; without additional analysis like ELISA and the molecular analysis. Future studies may be designed to overcome these limitations.

## 5. CONCLUSION

The prevalence of 5.8% for HBV in this study, represents an intermediate level of transmission (2–8%) on the WHO criteria of endemicity, while the 0.5 % for HCV is a low level of transmission. The morbidity and mortality associated the viral hepatitis can be avoided if efforts are made to curtail the viral infections. This can be done by creating greater awareness among the all strata of the populations on preventive measures. Vaccination against HBV is an important tool in the fight against the menace of the virus and should be made available to everyone. Young people forty years and below are at the greatest risk of being infected with viral hepatitis. It is therefore advocated that social media and other modern means of communication should be utilized in passing the message on prevention and control of the infections.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

The study was reviewed and approved by ethical review committee of the Faculty of Medical Laboratory Science, Federal University Otuoke, Nigeria. Relevant approvals were sought and obtained from the management of Diagnostix and Scientific Laboratories.

## DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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