

# Factors Associated with Completion of Hepatitis B Vaccination Doses among Adults in Kikuube District, Western Uganda.

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DOI: <https://doi.org/10.51584/IJRIAS.2024.908027>

Received: 18 July 2024; Accepted: 30 July 2024; Published: 06 September 2024

## ABSTRACT

The Hepatitis B virus is one of the most serious human health problems, causing thousands of deaths per year. The disease is prevented by the administration of 3 doses of vaccine over an 18-month period. Completion of Hepatitis B vaccine doses has been challenging. The study assessed the trends of Hepatitis B virus infection in Kikuube District, vaccination completion rates among those who initiated vaccination and the factors associated with completion of vaccination. This was a cross-sectional study with qualitative and quantitative data collection approaches. A total of 377 persons who had initiated Hepatitis B vaccination in the last 6 months were randomly sampled for interviews. A total of 15 key informant interviews were conducted with in-charges of health facilities on the subject matter. Health facility records were reviewed to assess the trends in Hepatitis B virus infection those who tested for Hepatitis B. The prevalence of Hepatitis B virus infection was 2.87% in the year 2020 and 4.4% in 2021. 31.3% of those who initiated Hepatitis B vaccination completed all the three doses. Factors associated with Hepatitis B vaccine completion were; Sex; male (AOR=0.542 CI=0.348-0.842), being married (AOR 4.645, CI 1.325-16.290), Anglican (AOR 0.470, CI 0.263-0.841), having no education (AOR 3.114, CI 1.676-5.787), primary level of education (AOR 10.162, CI 3.302-31.272), earning less income less than 250,000 (AOR 2.716, CI 1.169-6.313) and also between 300,000 to 600,000 (OR 9.507, CI 1.931-46.80), living a distance less than 5km (AOR 5.27, CI 2.103-13.20) and being sensitized about Hepatitis B vaccination (AOR 0.162, CI 0.040-0.647). The prevalence of Hepatitis B virus infection among the people in Kikuube District still remains high at 4.4% with low Hepatitis B vaccination completion rate (31.3%). There is need for the Ministry of Health and other donor agencies to create more awareness to the public and community members so as to increase on the level of uptake and completion of Hepatitis B vaccination.

**Key words;** Hepatitis B, Vaccination, Completion, doses, uptake, and factors associated

## INTRODUCTION

The human Hepatitis B virus causes acute and chronic hepatitis and is considered one of the most serious human health issues by the World Health Organization, causing thousands of deaths per year (Souza et al., 2014).

Across the globe, Hepatitis B has been considered to be a major public health problem. It is also a life threatening disease which affects the liver which in 2019 resulted into an estimated 820,000 deaths across the globe (World Health Organization, 2021). In Africa about 6.1% adults live with Hepatitis B, 11.4% in East Africa and in Uganda the prevalence is up to 10% (Sarah, 2018). In Uganda, Hepatitis B infection is high among adults aged 18 years and above than in children because children receive Hepatitis B vaccine before the age of 1 year. The adults stand high chances of infections if not vaccinated against Hepatitis B and completed the Hepatitis B vaccination.

Across the entire world, Hepatitis B vaccination has been seen the only way to prevent against Hepatitis B infections among individuals and adults but the rate at which infections continue to rise is worrying. Most

people have managed to take the first dose of the vaccine but do not complete all the 3 doses. When compared to young people, these are vaccinated at birth and in their early age (WHO, 2019) but the completion rate in adults is still low (Lwanga, 2018). The Hepatitis B vaccine is mainly administered as an injection that is generally given in the arm as a three-dose series at 0, 1, and 6-month schedule. When one completes all the 3 doses, it means that the person has completed the vaccination.

The factors associated with the completion of all the 3 doses of Hepatitis B vaccine have been listed in different studies which can be grouped into Individual factors such as age, income (Harris et al., 2016) (Centers for Disease Control, 2016), institutional factors such as inadequate supply of vaccines, limited accessibility to nearby health facilities to (Kesieme et al., 2011). Most of these factors have been studied elsewhere in the world and not known in Kikuube District in particular. It was important to study these factors to find out the factors that could be leading to low completion rate in order to design appropriate measures to increase on the completion rate for Hepatitis B vaccination among people.

Globally, 3 doses of Hepatitis B vaccination are recommended. In the US 3 doses are recommended and these are taken within 6 months and these are; Recombivax HB (Merck), Engerix-B (GlaxoSmithKline) and Twinrix (GlaxoSmithKline) (Hepatitis B foundation, 2020).

The WHO also provides guidelines and recommend Hepatitis B testing and vaccination in all adults with high risk of infection such as health workers, gays, sex workers, people who inject drugs among others and particularly those with elevated alanine aminotransferase (ALT) (WHO, 2013).

Based on the prevalence of Hepatitis B surface antigen (HBsAg), different areas of the world are classified as having high ( $\geq 8\%$ ), intermediate (2%–7%), or low ( $< 2\%$ ) HBV endemicity (Puri, 2014). Hepatitis B is highly endemic in developing regions coupled with large population for example in South East Asia, China, sub-Saharan Africa and the Amazon Basin, where at least 8% of the population are HBV chronic carrier. In order to curb the spread of Hepatitis B, vaccination against the virus has been looked at as the safest way to prevent against Hepatitis B by World Health Organization.

In the Developed countries such as United States, vaccine coverage among adults is low, and the overall prevalence of Hepatitis B vaccine-induced immunity was 25% during the period from 2007 to 2012 (Harris et al., 2016). In 2015, reported Hepatitis B vaccination coverage ( $\geq 3$  doses) among adults was approximately 25% for adults aged  $\geq 19$  years, 32% among adults aged 19 to 49 years, and 17% among adults aged  $\geq 50$  years (Harris et al., 2016) (Centers for Disease Control, 2016). Every year in the United States about 22,000 new Hepatitis B infections occur and about 2,000 people die from their infections.

In the Western Pacific region, Hepatitis B prevalence has been reported to be the highest in those respective regions with 6.2% of the adult population. In the Eastern Mediterranean Region, the South-East Asia Region and the European Region, an estimated 3.3%, 2.0% and 1.6% of the general population is infected, respectively (WHO, 2017). The western pacific has been considered by the WHO to have the world's highest prevalence rate of Hepatitis B infection. Since 2005, the vaccination rate in western pacific for the 1<sup>st</sup> dose increased from 63% up to 85% and these were mainly new borne. The completion rate for Hepatitis B vaccine in western pacific is high among children than adults (WHO, 2019). Factors associated with completion of the Hepatitis B vaccine was administering the vaccine at birth or at early age.

In the African region 6.1% of the adult population has been reported to be with Hepatitis B. Prevalence of the virus is high in Africa. Approximately, 50 million people who are chronic carriers have of Hepatitis B infection have been reported in Africa with 25% mortality risk. In sub-Saharan Africa alone, the carrier rate is within 9% to 20% (Kiire, 1996). The factors associated with the increasing rate of infection in Africa has been attributed to limited completion of the Hepatitis B vaccine and the factors associated with completion of the vaccines were; availability of resources. Sub-Saharan Africa has also been reported to fall under the endemicity category.

In East Africa, Hepatitis B infections have also been reported in Kenya with about 11.4% of the population positive, Mozambique 14.6%, Ethiopia 11.0% and Burundi 11.0% (Kiire, 1996). In Uganda, the prevalence is

also high at 10% and the infection rate is also distributed across regions. Sarah (2018), estimated that at least 3.5 million people are living with Hepatitis B in Uganda, accounting for 10% of the population. The regional prevalence of Hepatitis B in Uganda is as follows; Northeast (21.7%), North central (19.4%), West Nile (18.7%), Western (10%), Kampala (5.8%), Central (5.5%) while Southwest has (2.9%). The prevalence is seen to be high in the Northern parts of the country. HB is one of the highly endemic disease in Uganda, with 52% life time exposure of the population, while 9 out of every 10 people do not know their status (Sarah, 2018).

Uganda also adopted the policy guideline by WHO in 2013 and follows the same guidelines in delivery of Hepatitis B services. Following these guidelines, Ministry of Health Uganda rolled out the free screening and vaccination campaign in the year 2018 and also at birth but still the completion rate for the vaccines is still low with increase in the infections among adults (Lwanga, 2018). A cross sectional study done in Uganda found out that individual factors were associated with Hepatitis B vaccination completion rate; income, sex and community factors such as beliefs, had an impact on Hepatitis B vaccination and completion (Ohemeng-Tinyase, 2020).

In Uganda, annual investments estimated at US\$ 3 million have been earmarked for massive, free Hepatitis B screening programme and vaccination since 2015 which is characterized by widespread community mobilization and awareness-raising actions. This has resulted to more than four million people screened alongside more than 30% of the population aware of their status in regard to Hepatitis B infection with access comprehensive treatment services, including free medication surpasses this year's target of 20% and vaccination of those found negative (WHO, 2020b). Whereas this makes Uganda, the first country in Africa where targets are surpassed, such actions are not without vaccination component which is known to improve Health Related Quality of Life in individuals (Dillner et al., 2011). Less attention has been given to completion rate of Hepatitis B vaccines among individuals and its associated factors. Although these statistics exist in health records, the associated factors with non completion are not taken.

In Kikuube District, Hepatitis B vaccination is offered in all health facilities with cold chain system and is often free of charge since the services provided are for the public. People who receive the first dose are given specific days which are noted down on the vaccination card to enable them recall their return date to receive other doses. They are often also reminded on the radio stations in the neighboring districts and also by the church leaders and Village Health Teams to adhere to the completion of the doses. However as much as the services are free of charge in the entire district, the completion of Hepatitis B vaccine was still low (3.9%) with a high burden of Hep B infection (4.4%) (DHIS2-2020). Statistics from Health facilities in Kikuube District shows that only 545 (3.9%) people managed to complete the three doses of Hepatitis B vaccine compared to 17534 people who enrolled on the first dose between January and December 2020. Many people who initiate the first dose of the vaccine do not complete the vaccine doses and the underlying factors are not documented. The completion rate was still far below the national target of Hepatitis B vaccination of 80% of the population by 2030 (Coalition for Global Hepatitis Elimination, 2019).

Many awareness campaign programs have been run on media for free vaccination and screening such as on TVs, social media and other channels encouraging people to complete the vaccination process by the Ministry of Health (MoH, 2018) and other bodies. If this trend continues, communities are likely to suffer the negative consequences which include morbidity related to; cancer, liver diseases and even worsen mortality rates.

The factors behind this had not been studied in Kikuube District. Therefore, this study found out the factors associated with completion of the 3 doses of Hepatitis B vaccination among the Adults in Kikuube District.

## **METHODS**

### **Study area and setting**

This study was conducted in Kikuube District. Kikuube District is located in the Western Region of Uganda. It is named after its main municipal Centre, Kikuube. The district is bordered by Kagadi in the South, DR Congo in the West, Hoima district in the North and Kakumiro district to the East. The district headquarter is located at

Kikuube, approximately 25 kilometres (16 mi), southwest of the city of Hoima, the largest urban centre in the Bunyoro sub-region. Kikuube is located approximately 215 kilometres (134 mi), by road, northwest of Kampala, Uganda's capital and largest city.

Up until 30 June 2018, Kikuube District was part of Hoima District. On 1 July 2018, the southwestern portion of Hoima District was carved off to create Kikuube District. The Uganda Bureau of Statistics (UBOS, 2020), estimated the mid-year population of the district at approximately 358,700 people, with about 184,200 (51.4%) males and 174,500 (48.6%) females. The district population grew at an estimated 5.15% average annual rate, between 2014 and 2020. Approximately 89.5% of the district population is rural and 10.5% of the population is urban.

The community practice fishing and subsistence agriculture and grow both cash crops (sugarcane, coffee) and food crops (maize, beans and vegetables) on small scale. The languages commonly spoken include Runyoro, Rukiga, Runyankole, Kinyarwanda and Alur among others.

Kikuube District has 29 Government health facilities, of these 17 are Health centre IIIs, 11 HC IIs and 1 HC IV (Ministry of Health, 2018).

### **Study design**

This study employed a cross-sectional research design. Qualitative and quantitative approaches were employed for data collection. The qualitative aspect entailed the use of Key informant interviews with health workers in Kikuube District while the quantitative aspect involved people in Kikuube District who had received at least a single dose of Hepatitis B vaccine. Both primary and secondary sources of information were utilized.

### **Study population**

The study population consisted of both male and females aged 18 years above who had initiated Hepatitis B vaccination in Kikuube District (N=17,534).

### **Inclusion Criteria**

1. All people aged 18 years and above who had received at least 1 dose of Hepatitis B vaccine so as to follow up on whether they completed the vaccine or not.
2. Those who had taken at least 6 months after getting the first dose of hepatitis vaccine. This gives an interval to assess whether all the doses were completed.
3. Provision of written informed consent.

### **Exclusion criteria**

1. Those people who were very sick or had health condition problems for example COVID-19 signs were excluded from the study
2. Those who were not available in their homes after 3 consecutive appointments.

### **Sample size**

The sample size was based on a known population of people who had received at least a single dose of Hepatitis B vaccine dose from January to July 2020 in Kikuube Health facilities. Therefore, this study based on 17,534 people who initiated their first dose of Hepatitis B vaccine in January 2020 and expected to complete the dose in June 2020.

The sample size was calculated using the sample size determination table by (Krejcie and Morgan (1970)) (see appendices). According to the table, for a population of 17,534 people, the sample size of 377 respondents was appropriate for the study. Therefore, this study considered a population of 377 respondents for quantitative methods. A total of 377 respondents were selected basing on proportionate distribution basing on the

population of people who had at least initiated their first dose of Hepatitis B vaccine from the selected health facilities where the sum above was derived from. The table for sample size distribution was provided upon confirmation of the population from the respective health facilities. The sample size was distributed to the respective health facilities basing on the population distribution as seen in **Table 1**.

Table 1: Sample size distribution per health facility in Kikuube District

Health facility	Population	Formula	Sample size	Interval
Bugambe HC III	1321	$=1321/17534*377$	28	47
Bugambe Tea HC III	954	$=954/17534*377$	21	45
Buhimba HC III	142	$=142/17534*377$	3	47
Buhuuka HC III	103	$=103/17534*377$	2	52
Bujalya HC III	697	$=697/17534*377$	15	46
Bujugu HC III	135	$=135/17534*377$	3	45
Kabwoya HC III	1365	$=1365/17534*377$	29	47
Kaseeta HC III	700	$=700/17534*377$	15	47
Kasonga HC II	582	$=582/17534*377$	13	45
Kikuube HC IV	1408	$=1408/17534*377$	30	47
Kisaaru Tea HC II	797	$=797/17534*377$	17	47
Kyangwali HC IV	696	$=696/17534*377$	15	46
Kyehoro HC III	679	$=679/17534*377$	15	45
Lucy Bisereko HC III	291	$=291/17534*377$	6	49
Malembo HC II	87	$=87/17534*377$	2	44
Maratatu HC III	777	$=777/17534*377$	17	46
Muhwiju HC III	903	$=903/17534*377$	19	48
Mukabara HC III	1493	$=1493/17534*377$	32	47
Munteme HC III	356	$=356/17534*377$	8	45
Ngurwe HC II	454	$=454/17534*377$	10	45
Nsozi HC III	349	$=349/17534*377$	8	44
Rwenyawawa HC III	908	$=908/17534*377$	20	45
Sebigoro HC III	61	$=61/17534*377$	1	61
Wambabya HC II	2276	$=2276/17534*377$	49	46
<b>TOTAL</b>	<b>17,534</b>		<b>377</b>	

The sampling interval was calculated by using the formula  $=N/n$



Where N=population per health facility and n=sample size per facility

A total of 15 Key informants were purposively sampled among health workers in Kikuube District based on saturation of data. These were selected because of their knowledge on Hepatitis B vaccination.

### **Sampling procedure**

Systematic and random sampling techniques were used. A list of people who initiated their first dose of Hepatitis B vaccination between January to July 2020 was generated from the health records in the respective health facilities in Kikuube District (**Table 1**). Proportionate distribution was applied to recruit individuals per health facility in Kikuube District. The sampling interval for every health facility was determined by the formula  $k=N/n$ . Therefore, from every health facility every  $K^{\text{th}}$  respondent was selected. For example from the table 1 above; taking an example of Bugambe HC III, the sampling interval was determined by  $k= 1321/28$  which is equal to 47. Therefore, to recruit 28 respondents from Bugambe HC III, every 47<sup>th</sup> person on the list from 1-1321 was recruited to participate in the study.

Purposive sampling technique was employed for the key informants. The key informants were health facility in-charges in the health facilities for at least 6 months.

### **Data collection**

#### **Qualitative data collection**

Qualitative data collection involved the collection of data from the key informants. The data was collected using key informant interview guides. The interview guide was arranged according to the study objectives. Data on the prevalence of Hepatitis B virus in Kikuube district was also collected from secondary sources. The data was got from Kikuube District Health office (DHIS2), 2022. The researcher had to retrieve the statistics for those who were screened for Hepatitis B vaccination from the available District Health information system 2 in Kikuube district data from 2019 to 2021. This data is readily available in the system.

#### **Quantitative data collection.**

Quantitative data collection was done with the help of the questionnaires. This method was preferred because it helps in collection of data from a larger population in a short period of time.

Questionnaires were administered by the researcher and the research assistants on a daily basis. Data collected on a daily basis was checked for completeness and correctness.

#### **Training of research assistants**

This study involved 3 research assistants who helped in data collection. These were research Nurses who were well versed with the Ethics and confidentiality. These were recruited from Hoima School of Nursing and Midwifery.

These were also oriented and trained on the actual research study. The training took approximately 2 days to enable them grasp the tools of data collection and to also make them user friendly. These were equipped with Knowledge on entry into the data collection stages and recording of information for accuracy and completeness in data collection.

#### **Data management and analysis**

Data from the field was entered into Microsoft excel sheets for cleaning and sorting before importation to SPSS version 20.0 for statistical analysis. The data was then exported to SPSS version 20 for further analysis.

Data analysis began with presentation of descriptive statistics such as frequencies and percentages. The quantitative variables were summarized by means (standard deviation) or median (Inter-quartile range)

depending on the distribution. Categorical variables were summarized by frequencies and percentages. The proportion of people that had received Hep B vaccination was computed based on self-reports.

Associations between the dependent and independent variable was estimated using odds ratios and 95% confidence intervals, and the Pearson or Fisher exact test. Binary logistic regression was used to determine factors associated with Hepatitis B vaccination. In all statistical tests, a p-value of <0.05 was assumed statistically significant. However, factors that had a p-value<0.2 were also subjected to logistic regression so as to determine the AOR.

Qualitative data from key- informant interviews were transcribed into topics, subsequently to themes which were presented as quotation, texts and narrations. These were used as supporting statements to the statistics obtained from quantitative data analysis.

### Ethical considerations

An introduction letter from Makerere University was used to seek for permission to carry out this research study in Kikuube District. Permission to carry out this study was got from Kikuube District Health office as well.

Upon introduction of the researcher to the study participants, the researcher all times explained the purpose of the study to the study participants. The respondents were assured of their right to withdraw from the study at any time they wished.

Written Informed consent was sought from the study participants before data collection. The contents of the consent form were explained to the study participants and their rights were clearly explained to them. Participants who were willing to participate in the study provided their signatures to the consent form as a proof that they had agreed to take part in the study.

## RESULTS

A total of 377 respondents in Kikuube district Uganda participated in the study. Data was collected in March 2022. All the eligible study participants 377 (100%) as per the calculated sample size were interviewed.

### Socio-demographic characteristics of respondents

The socio-demographic characteristics of the respondents is summarized in Table 2. Majority 192/377 (50.9%) were aged 28-37 years. Most 224/377(59.4%) of the participants were females. About 185/377 (49.1%) of the participants were Anglicans, and majority 296/377(78.5%) were married/cohabiting.

Almost half respondents 184/377(48.8%) had no formal education and 275/377(72.9%) never earned any income.

Table 2: Individual characteristics of respondents in the study

Variable	Frequency (n=377)	Percent
<b>Age</b>		
18-27	122	32.4
28-37	192	50.9
38-47	37	9.8
Above 47	26	6.9

<b>Sex</b>		
Male	153	40.6
Female	224	59.4
<b>Religion</b>		
Anglican	185	49.1
Catholic	128	34.0
Muslim	21	5.6
SDA	18	4.8
Other	25	6.7
<b>Marital status</b>		
Married/cohabiting	296	78.5
Divorced/separated	11	2.9
Widowed	27	7.2
Single	43	11.4
<b>Education</b>		
None	184	48.8
Primary	124	32.9
Secondary	36	9.5
University	33	8.8
<b>Household income (Khan et al.)</b>		
None	275	72.9
<250, 000	69	18.3
300,000-600,000	24	6.4
700,000 and above	9	2.4
<b>Household size</b>		
< 5 people	261	69.2
5 to 10 people	111	29.4
More than 10 people	5	1.3

Source: Primary data, 2022

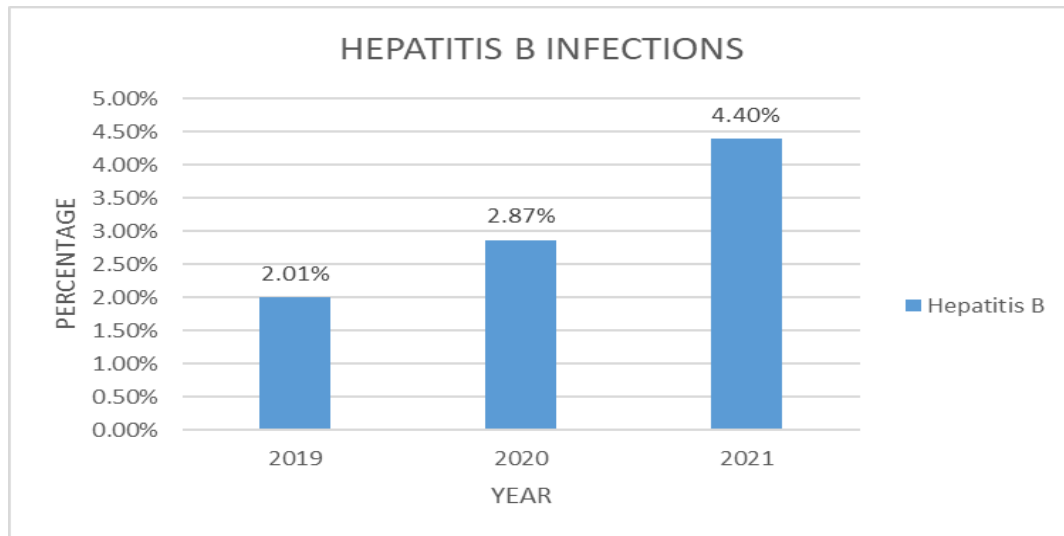
### **Trend of Hepatitis B virus infections in Kikuube District (2018-2021).**

Results in Figure 2 show the trend of Hepatitis B virus among community members from 2019 to 2021. In



2019, 22,009 people screened for Hepatitis B and 442 (2.01%) were found positive, in 2020 out of 18,755 people who screened for Hepatitis B, 539 (2.87%) were found infected. Results also showed that in 2021, 7,695 people screened for Hepatitis B virus and 337 (4.4%) of those were infected with Hepatitis B virus.

Figure 1: Trend of Hepatitis B virus in 2019 up to 2021 in Kikuube District

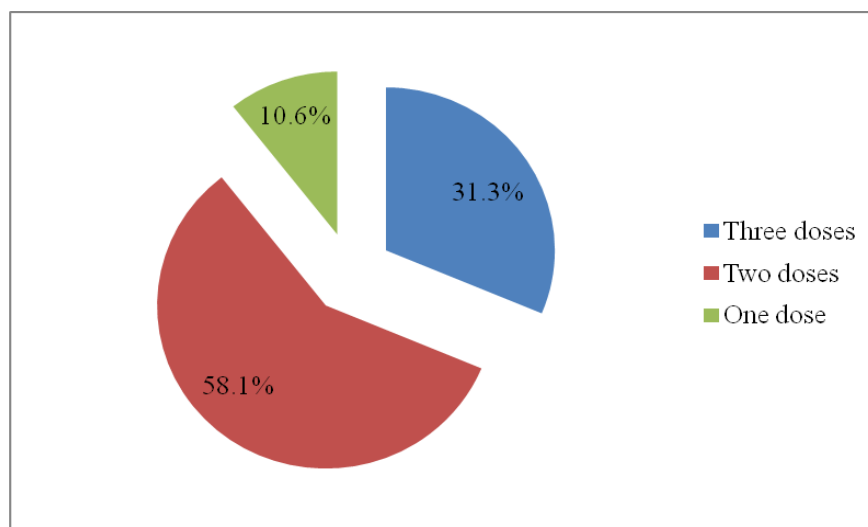


Source: Kikuube District Health office (DHIS2), 2022

### Hepatitis B vaccination uptake among people in Kikuube District.

About 58.1% (219/377) of the respondents had received at least 2 doses of Hepatitis B vaccine, 31.3% (118/377) had completed all the doses and 10.6% (40/377) had only obtained a single dose of Hepatitis B vaccine (Figure 2). The completion level of Hepatitis B vaccine in Kikuube district was at 31.3%.

Figure 2: Hepatitis B vaccination uptake among people in Kikuube District



### Factors associated with completion of Hepatitis B Vaccination

The association between the dependent and independent variable is shown in table 4. Anglicans were less likely to complete Hepatitis B vaccination (AOR 0.470, CI-0.263-0.841). Those who had no formal education (AOR 3.114, CI 1.676-5.787) and those whose highest level of education was primary level (AOR 10.162, CI 3.302-31.272) were more likely to complete Hepatitis B vaccination

Males were less likely to complete Hepatitis B vaccination (COR 0.542, CI 0.348- 0.842). At multivariate analysis, Anglicans were less likely to complete hepatitis vaccination (AOR 0.470, CI 0.263-0.841) when

compared to other religions such as catholic, Muslim and SDA. On marital status, at bi-variate analysis being married was associated with completion of Hepatitis B vaccine (COR 4.645, CI 1.325-16.290).

Table 2: Bivariate and multivariate analysis of individual factors associated with completion of Hepatitis B vaccination.

Variable	Hepatitis B vaccination completion		COR CI (95%)	AOR CI (95%)
	Never Completed	completed		
<b>Sex</b>				
Male	93 (24.7)	60 (15.9)	<b>0.542(.348-.842) *</b>	0.587(0.330-1.042)
Female	166 (44.0)	58 (15.4)	1	
<b>Religion</b>				
Anglican	118(63.8)	67(36.2)	<b>0.587(0.356-0.968) *</b>	<b>0.470(0.263-0.841) *</b>
Catholic	96(75.0)	32(25.0)	1.084(0.427-2.748)	1.362(0.480-3.864)
Muslim	13(61.9)	8(38.1)	0.352(0.98-1.261)	0.290(0.064-1.319)
SDA	15(83.3)	3(16.7)	0.829(0.340-2.023)	1.331(0.469-3.780)
Other	17(68.0)	8 (32.0)	1	
<b>Marital status</b>				
Married	215(72.6)	81(27.4)	<b>4.645(1.325-16.290) *</b>	4.177(0.834-20.926)
Divorced	4(36.4)	7(63.6)	1.561(0.686-3.552)	1.392(0.490-3.958)
Widowed	17(63.0)	10(37.0)	2.308(1.203-4.428)	2.202(0.917-5.285)
Single mother	23(53.5)	20(46.5)	1	
<b>Education level</b>				
None	155(82.1)	33(17.9)	<b>2.793(1.656-4.712) *</b>	<b>3.114(1.676-5.787) *</b>
Primary level	77(62.1)	47(37.9)	<b>10.399(4.659-23.21)</b>	<b>10.162(3.302-31.272) *</b>
Secondary level	11(30.6)	25(69.4)	<b>2.974(1.345-6.575)</b>	2.072(0.534-8.040)
University	20(60.6)	13(39.4)	1	
<b>Household income</b>				
None	201(73.1)	74(26.9)	1.543(0.883-2.698)	0.636(0.293-1.381)
< 250,000	44(63.8)	25(36.2)	<b>2.716(1.169-6.313) *</b>	0.545(0.132-2.241)

300,000-600,000	12(50.0)	12(50.0)	<b>9.507(1.931-46.80) *</b>	7.003(0.901-54.410)
700,000	2(22.2)	7(77.8)	1	1.354(0.803-2.283)

P<0.05

Those who lived less than 5 km to the health facility were more likely to complete Hepatitis B vaccination (AOR 5.27, CI 2.103-13.20) compared to those who moved a distance greater than 5kms. Results also showed that those who were not sensitized about Hepatitis B services were less likely to complete the Hepatitis B vaccination (AOR 0.162, CI 0.040-0.647) compared to those who were sensitized about Hepatitis B vaccination (table 5).

Table 3: Bivariate and multivariate analysis of health-related factors associated with completion of Hepatitis B vaccination.

Variable	Hepatitis B vaccination completion		COR CI (95%)	AOR CI (95%)
	Never Completed	Completed		
<b>Distance to hospital</b>				
<5 kms	252(71.8)	99(28.2)	<b>6.91(2.81-16.94) *</b>	<b>5.27(2.103-13.20) *</b>
5 kms & above	7(26.9)	19(73.1)	1	
<b>Sensitization</b>				
Not Sensitized	231(66.8)	115(33.2)	<b>0.232(0.069-0.782) *</b>	<b>0.162(0.040-0.647) *</b>
Sensitized	26(89.7)	3(10.3)	1	

P<0.05

Findings from qualitative study showed that sometimes the health facilities lacked some equipment which was used in provision of Hepatitis B services. The key informants mentioned that vaccine supply and other logistics like syringes were not constant for example facilities never had testing kits. Bujugu HCIII reported the lack of test kits even by the time the data collection took place. Some community members therefore could not enroll for vaccination since the test kits were not available and sometimes vaccine supply is not constant.

*“At Bujugu HC III, vaccines are around but up to now they have not yet been consumed; this is because the test kits are not available. It is a necessity to test and then vaccinate, we cannot vaccinate people without testing for presence of Hepatitis B virus” (KI 9 Bujugu HC III, 2022)*

*“Vaccine supply is not constant and when you call at the district, they also tell you we haven’t got vaccines. This has been the biggest challenge in vaccination as people come to the facility and find when vaccines are out of stock and when they miss the doses it means they will not come back” (KI 8 Bujalya HC III, 2022)*

*“It is not constant, we have been with stock outs, test kits for Hepatitis B virus are also out of stock” (KI 14, Wambabya HC III, 2022)*

*“Vaccine supply is not constant; we sometimes get stock outs of vaccines and sometimes vaccines are available. This makes the vaccination process very difficult” (KI 15 Kikuube HC IV, 2022)*

Qualitative study findings further showed that the community members were aware of the vaccination services on Hepatitis B provided in the district. The in charges of health facilities mentioned that the community was

made aware through radio messages, Village Health Teams (VHTs) and also through health education in churches and congregations in the community.

*“The community has been sensitized by our health workers who offer routine health education, provide outreaches at service entry points, also in different departments in the health facilities such as at outpatient department (OPD), in-patient department (IPD), nutrition department. All this information about vaccination is provided to the people” (KI 2 Kyangwali HC IV, 2022)*

*“Yes the community has been sensitized through the use of VHTs, health assistant also used to communicate with VHTs” (KI 1 Nsozi HC III, 2022)*

*“We offer health education at the health facility at OPD and also to other department.” (KI 4 Buhimba HC III, 2022)*

The study showed that individual factors and health related factors had an influence on the completion of Hepatitis B vaccine while there was no community factor associated with completion of Hepatitis B vaccine.

## DISCUSSION

The study assessed factors associated with the completion of Hepatitis B vaccination in Kikuube District, Uganda. In 2021, 7,695 people screened for Hepatitis B virus and 337 (4.4%) of those were infected with Hepatitis B virus. About 58.1% of the respondents had taken at least 2 doses of Hepatitis B vaccine and 31.3% had completed all the doses of Hepatitis B vaccine. Key factors associated with completion of vaccination were having no education or primary level of education, and living a distance of less than 5km from the nearest health facility.

The prevalence of Hepatitis B virus infection among those who were tested at health facilities in Kikuube district increased from 2.01% in 2019 to 4.4% in 2021. The prevalence increased despite progressively screening fewer people. This shows that transmission is likely increasing in the community. The trend of Hepatitis B virus in Kikuube was higher than that reported in the Southwestern region (2.9 %) (Sarah, 2018).

The trend of Hepatitis B virus still stands high in the district when compared to the one reported by the World Health Organization (Clinical and Laboratory Standards Institute (CLSI) (2017): Performance standards for antimicrobial susceptibility testing; Twenty-seventh informational supplement. CLSI document M100-S27. Wayne) in the Western Pacific region-6.2%, the Eastern Mediterranean Region (3.3%), the South-East Asia Region (2.0%) and the European Region (1.6%). However, these regions have a low prevalence because of their improved health service system and also their trends of computations were based on the total population.

At least 58.1% of the respondents had taken 2 doses of Hepatitis B vaccine and 31.3% had completed all the doses of Hepatitis B vaccine. The vaccination completion rates are very low and implies that many of those who initiated vaccination are only partially protected from future infections. The completion rate is still far below the national target of Hepatitis B vaccination of 80% of the population by 2030 (Coalition for Global Hepatitis Elimination, 2019). Completion rate was also lower than reported rates in other parts of the country. A study by Ssekamatte et al. (2020) reported 57.8% completion rate of Hepatitis B vaccination among health workers in Wakiso District. This low vaccination completion rate is concerning because health workers have a higher risk of getting Hepatitis B infection and are aware of the importance of completing vaccination for effective protection. A study done in Juba showed a lower completion rate of Hepatitis B vaccination of 22.1% (Bosco Alege et al., 2020). A lower completion rate of 14.3% was also reported in a study by LaMori et al. (2022) among US adults.

The completion rate of Hepatitis B vaccination was significantly lower among males than females. This has also been proven in other studies that men have a poor health seeking behavior than women. Men tend to naturally believe in their strength. Women have a higher health seeking behavior than men (Thompson et al., 2016). A study by Okwara et al., 2012 in Nigeria also showed that there were low coverage rates of Hepatitis B vaccination among males than in females. Trevisan and Giuliani (2020) in their study also revealed that

males had lower chances to complete the vaccination.

Those who had no formal education and those who had completed primary level were more likely to complete vaccination. This means that as education level increases up to primary level, the number of people vaccinated against Hepatitis B virus increases. The findings showed that those with primary level of education were more likely to complete the vaccination than those with no education. This contrasts with findings from a study by Okwara *et al.* 2012 in Nigeria that showed that vaccination completion rates were higher among those who completed tertiary education compared to primary education. The findings of this study are different because the study involved fewer participants who had secondary level of education and above. Many of the respondents in this study were had no education and others had completed primary level of education.

Anglicans were less likely to complete hepatitis vaccination compared to other religions. In this study a lower number of Anglicans had completed the Hepatitis B vaccination compared to other religions. People are likely to go for Hepatitis B Screening and vaccination based on religious beliefs. A study done by Shelton, Snavey, De Jesus, and Allen (2013) showed that religion influences decision on Hepatitis B vaccination. A study by Ruijs *et al* (2013) showed that religious leaders have big influence in vaccination. Some religions have beliefs that may hinder vaccination.

Those who lived a distance of less than 5km from the nearest health facility were more likely to complete vaccination. This could be because of easier access to the vaccination sites in the nearby health facilities. Distance has an influence on accessibility to health services. A study done in Nigeria by Awomyemi *et al* (2010) revealed that distance to the health facility affects the utilization of Government and private hospitals and also increases the total cost of transport to the health facility. Another study done in Filipino showed that distance has an influence on local-level vaccine efficacy (Root *et al.*, 2014). A study done in Nigeria by Awoyemi *et al.* (2010) revealed that distance affected the utilization of government and private hospitals. Therefore, distance affects health seeking behavior of people.

Those who were sensitized on vaccination were less likely to complete vaccination. Sensitized individuals are normally believed to have more knowledge on the vaccination but fewer completed vaccination than their counterparts. This finding is surprising and warrants further investigation. In a study at the University of Yaounde in Cameroon, the uptake of the HBV among surgical residents was also reported to be constrained by inadequate information concerning the vaccine (Noubiap *et al.*, 2014).

## CONCLUSION

From the foregoing, the following conclusions are made

The prevalence of Hepatitis B virus infection among the people in Kikuube District was high estimated at 4.4% in 2021 and this had increased from 2.87% in 2020.

The level of completion of Hepatitis B vaccination in Kikuube District is still poor and below the average of 50%.

The individual factor associated with completion of Hepatitis B vaccination were; sex; being female, religion; being an Anglican, education level; having completed primary level of education, household income and marital status; being married.

The health system factors associated with completion of Hepatitis B vaccination were sensitization by the health workers and the distance to the health facility.

## Study Limitations

Majority of the respondents would not recall when they were vaccinated but the researcher had to ask for the Hepatitis B vaccination cards to confirm whether they completed the doses for hepatitis B vaccine.

There was also Hawthorne effect whereby most participants tried to prove that they had completed the

vaccination process against Hepatitis B virus yet they had not yet. Other participants thought that they would be treated differently because they had completed the Hepatitis B vaccine.

## RECOMMENDATIONS

There is need to create awareness to the public and community members in Kikuube District so as to increase on the level of uptake and completion of Hepatitis B vaccination.

There is need for Ministry of Health Uganda to strategize ways of improving on the level of vaccine ordering and storage in the health facilities. Health facilities should also be brought nearer to the people so as to improve on service delivery.

## FUNDING SOURCES

This study was entirely self-funded by the principal investigator, with no external financial support from donors or organizations. The decision to undertake this research independently underscores the commitment to addressing gaps in knowledge regarding Hepatitis B vaccination completion/Uptake.

Despite the absence of external funding, this study is crucial in shedding light on the factors influencing vaccine uptake in marginalized communities and informing targeted interventions to improve vaccination coverage. The self-funded nature of this research emphasizes the intrinsic value and dedication to advancing public health understanding and addressing pressing issues even in resource constrained settings.

## Conflict of Interest

The authors declare no conflicts of interest regarding the publication of this research.

## ACKNOWLEDGEMENTS

I express my deepest appreciation to all those who provided me with the possibility to complete this report. A special gratitude goes to Kikuube District officials, Makerere University supervisors; Dr. Adoke Yeka and Mrs. Kisakye and Mr. Kwesiga Justus for the statistical analysis, guidance and support which helped me accomplish my research on time and writing this report.

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