













Figure 1: The level of knowledge regarding HBV infection among youth in IRC



**Note. Source:** primary data, September 2022.

### Level of Attitude Toward HBV Infection

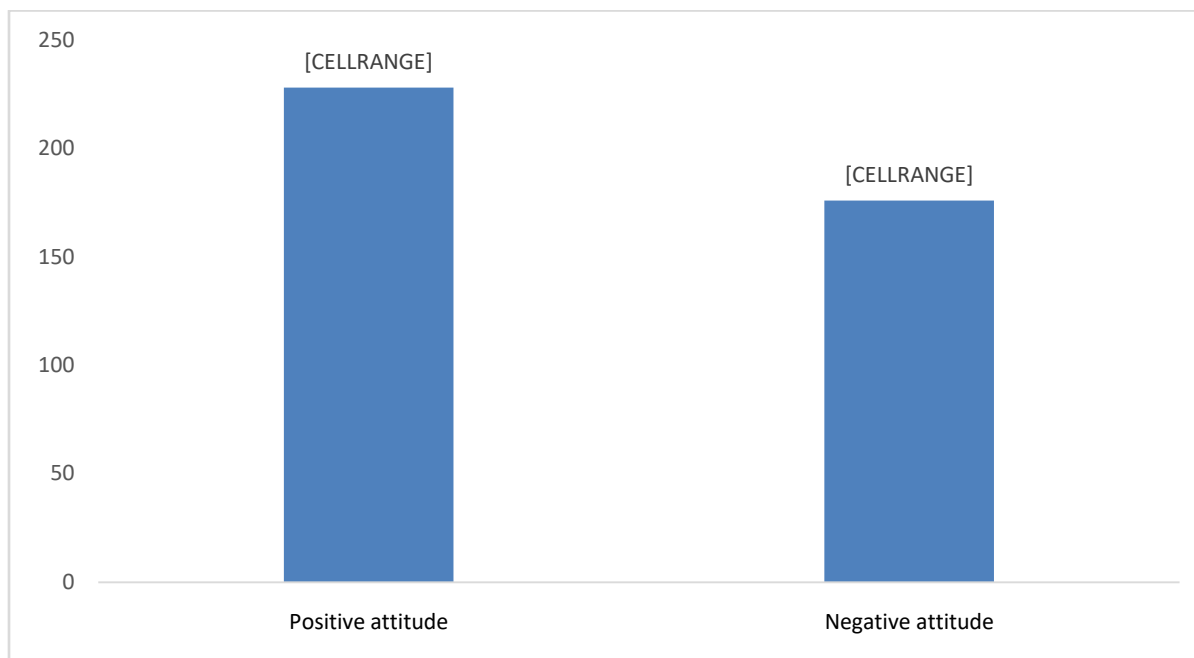
The second objective of this study was to assess attitude towards HBV infection among youths admitted in IRC. It was addressed through nine Likert's scale items comprising beliefs, feelings and behaviors towards HBV infection. Responses to the attitude toward HBV infection items are demonstrated in Table 3. Over 90% gave responses that indicate positive attitudes in most of the attitude items. They were concerned about being infected with HBV and agreed that being HBV-positive would make them sad. They said that it is important to know their HBV status. They also agreed that they would take prophylaxis after a suspected exposure and would pay 15,000 Rwf for the HBV vaccine. Over 80% of respondents agreed that it is important to know the HBV status of your sex partner and that the HBV vaccine is safe and effective. However, only 53.6% of the respondents agreed that they would share a dining table with an HBV-infected person. Attitude scores ranged from 20 to 45 with a mean attitude score of 39.01 ( $SD = 4.96$ ). A score of 39 was taken as the cut-off value for categorizing respondents as having negative attitudes ( $<40$ ) or positive attitudes ( $\geq 40$ ). Figure 2 displays the levels of respondents' attitudes. Positive attitudes were demonstrated by 228 (56.4%) whereas 176 (43.6%) showed negative attitudes.

Table 3: Responses of youth in IRC to HBV attitude items

Attitude items	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	n	%	n	%	n	%	n	%	n	%
1. I am concerned about being infected with HBV.	11	2.7	13	3.2	9	2.2	110	27.2	264	64.6
2. It is important to know my HBV status.	5	1.2	4	1.0	4	1.0	135	33.4	256	63.4
3. I would share a dining table with HBV-infected people.	68	16.8	118	29.2	9	2.2	75	18.6	134	33.2
4. It is important to know the HBV status of your sex partner.	14	3.5	28	6.9	13	3.2	113	28.0	236	58.4
5. I would take prophylaxis after a suspected exposure to HBV infection.	7	1.7	9	2.2	6	1.5	121	30.0	261	64.6
6. Being infected with HBV would make me sad.	4	1.0	10	2.5	7	1.7	121	30.0	262	64.9
7. I would seek treatment after testing HBV-positive.	1	0.2	2	0.5	3	0.7	125	30.9	273	67.6
8. HBV vaccine is effective and safe.	14	3.5	16	4.0	37	9.2	105	26.0	232	57.4
9. I would pay 15,000 Rwandan francs for the HBV vaccine.	11	2.7	18	4.5	11	2.7	121	30.0	243	60.1

**Note. Source:** primary data, September 2022.

Figure 2: The level of attitude toward HBV infection among youth in IRC



**Note. Source:** primary data, September 2022.



### Level of Practice Towards HBV Infection

The third objective of this study was to determine preventive practices. It was addressed through five items comprising actual actions taken to prevent HBV infection. Responses to HBV preventive practice items are presented in Table 4. Around 96% do not share toothbrushes with others, whereas 81.2% do not share sharp objects with others. However, 65.8% have never taken an HBV test, 73.5% have never got vaccinated, and only 12.6% have completed all doses of the HBV vaccine. For the five practice items, answers that reflect good practice were scored 1, while the response that reflects poor practice scored 0. Practice scores ranged from 0 to 5 with a mean score of 2.51 ( $SD = 1.12$ ). The mean practice score of 3 was considered as the cut-off value for categorizing respondents into good ( $\geq 3$ ) or poor practice ( $< 3$ ). Figure 3 displays levels of HBV preventive practices. A hundred and fifty respondents (37.1%) had good practice whereas 254 (62.87%) showed poor practice.

Table 4: Responses of youth in IRC to HBV preventive practice items

Practice items	Yes		No	
	<i>n</i>	%	<i>n</i>	%
Do you share a toothbrush with others?	13	3.2	391	96.8
Do you share sharp instruments with others?	76	18.8	328	81.2
Have you ever tested for HBV?	138	34.2	266	65.8
Have you ever got an HBV vaccine?	107	26.5	297	73.5
Have you taken three doses of the HBV vaccine?	51	12.6	353	87.4

**Note. Source:** primary data, September 2022.

Figure 3: The level of preventive practice against HBV infection among youth in IRC.



**Note. Source:** primary data, September 2022.

### Factors Associated With Preventive Practice Against HBV Infection

The fourth objective of the present study is to determine factors associated with preventive practice against HBV infections among youths in IRC. Bivariate analysis was conducted by using Chi square tests, while the multivariate analysis was conducted by using binary logistic regression analysis. Table 5 presents factors associated with the level of preventive practice against HBV infection. Age group and knowledge were significantly associated with the level of practice. Respondents aged between 18 and 25 years were more likely to have poor practice than respondents in the 26 to 35 years of age group ( $\chi^2 (1, N = 404) = 10.34, p < .05$ ). Similarly, respondents with poor knowledge were more likely to have poor practice than those with good knowledge ( $\chi^2 (1, N = 404) = 10.13, p < .05$ ). The level of attitude was not significantly related to the level of practice.

Table 5: Factors associated with HBV preventive practice among youth in IRC

Characteristics	Practice against HBV infection				$\chi^2$ value	p value
	Good		Poor			
	n	%	n	%		
<b>Age groups</b>					<b>10.34</b>	<b>0.001</b>
18 – 25	65	30.0	152	70.0		
26 – 35	85	45.5	102	54.5		
<b>Marital status</b>					1.99	0.158
Single	105	35.1	194	64.9		
Cohabitant	45	42.9	60	57.1		
<b>Educational attainment</b>					4.47	0.107
Illiterate	16	25.4	47	74.6		
Primary school	95	39.7	144	60.3		
Secondary school	39	38.2	63	61.8		
<b>Knowledge</b>					<b>10.13</b>	<b>0.001</b>
Poor	45	27.8	117	72.2		
Good	105	43.4	137	56.6		
<b>Attitude</b>					0.815	0.367
Negative	61	34.7	115	65.3		
Positive	89	39.0	139	61.0		

**Note. Source:** primary data, September 2022.

Table 6 demonstrates a binary logistic regression model to identify independent predictors of the level of preventive practice toward HBV infection. Factors that were significantly associated with practice in bivariate analysis were considered in multivariate analysis. Respondents aged 26 to 35 had an 80% (1.80 – 1) higher probability of performing preventive action against HBV than the younger age group (AOR = 1.80,  $p = 0.005$ , 95% CI = [1.19, 2.73]). Similarly, respondents with a good level of knowledge had 1.84 times more likely to have good practice than those with poor knowledge (AOR = 1.84,  $p = 0.006$ , 95% CI = [1.19, 2.84]).

Table 6: Logistic regression model of predictors of practice against HBV infection among youth in IRC

Variables	Adjusted Odds Ratio	95 C.I.	p
<b>Age</b>			
18 - 25	Reference		
26 - 35	1.80	[1.19, 2.73]	<b>0.005</b>
<b>Knowledge</b>			
Poor	Reference		
Good	1.84	[1.19, 2.84]	<b>0.006</b>

*Note. Source:* primary data, September 2022.

## Discussion

This study has examined the levels of knowledge, attitude, and preventive practice towards HBV infection. This study has also investigated factors associated with preventive practices against HBV infection. Most of the respondents in this study demonstrated a satisfactory positive attitude toward HBV infection. However, they lack enough knowledge to effectively execute preventive practices. Results of this study showed that 60% respondents had overall good level of knowledge. this proportion is lower than that obtained in a study among market traders in Lagos , Nigeria, where 80% showed good knowledge (Adejimi et al., 2021). Lower proportion of respondents with good knowledge were obtained among households in Malaysia (36.9%) (Rajamoorthy et al., 2019), patients and their attendant in Bangladesh (22.1%) (Sultana & Imtiaz, 2020), and internet users in Saudi Arabia (20.5%) (Elbur et al., 2017). The variation in proportion of respondents with good level of knowledge may be attributed to the difference in study populations and locations. Although, 60% of respondents obtained at least 11 knowledge score out of 19 score in this study, multiple misconceptions regarding HBV were found. For example, around 70% believed that HBV transmits through sharing clothes and utensil, or shaking hands, and over 50% thought that infected people can be recognized with a naked eye. Additionally, over 80% believe that there is a cure for HBV. These findings indicate the incompleteness of HBV-related knowledge among youth in Iwawa Rehabilitation Center (IRC). These gaps were also found among high school students in Hohoe, Ghana (Amedonu et al., 2020), and Sudanese population in Khartoum (Kheir et al., 2022). The incompleteness of knowledge is of a great concern as it affects the efficacy in performing preventive practices including early diagnosis and vaccination. In this study, slightly higher than half (56.4%) of respondents showed positive attitude. Similar results were obtained among waste collectors in Penang Island, Malaysia (53.6%) (Maiden et al., 2020), market traders in Nigeria (51.8%) (Adejimi et al., 2021), and pregnant women in Gondar, Ethiopia (54%) (Gebrecherkos et al., 2020). More satisfying results were obtained among pregnant women in Kumasi, Ghana (Nsiah et al., 2020), and among healthy population in Saudi Arabia, where over 60% showed good attitude (Wedhaya et al., 2017). It is important to emphasize that, only 53.6% of respondents in this study agreed that they would share a dining table with an HBV-infected person. This finding indicates the social

stigmatization against HBV-infected people among youth in IRC. The stigma towards HBV-infected people is due to the fear of being infected, usually inflamed by the lack of knowledge on HBV transmission (Smith-Palmer et al., 2020). Comparable results were obtained in Lagos, Nigeria (Adejimi et al., 2021), among market traders, where only half of the study respondents agreed that HBV patients should be allowed in markets. These are also in line with results obtained in Cameroon, where only 21% agreed that they would share cooking utensils with HBV-infected people (Okonkwo et al., 2018). Only 37.13% showed good preventive practice against HBV infection in this study. These results indicate poor practice among the study respondent. This result is comparable to a study by Wedhaya et al. (2017) and Abdi & Salleh (2019), 34% and 32.4% had good practices, respectively. Lower proportions of respondents with the good practice were also obtained in the reviewed literature (Abongwa et al., 2016; Adejimi et al., 2021; Sultana & Imtiaz, 2020). Different results were obtained in the study conducted in Ghana, where 60% of the respondents showed good practice (Nsiah et al., 2020). The poor practice among respondents in this study was manifested through low HBV vaccination rate. Only 26.8% took at least one dose of the HBV vaccine while only 10.6% completed all doses. A significant number of respondents (91%) were found to be vaccinated in a study that was conducted among nursing students in Rwanda (Umuhoza et al., 2021). However, the higher vaccination rate among these students is the result of expanded program of HBV immunization by the Ministry of Health that targeted all health care workers and medical students in Rwanda. In 2018, 96% of healthcare workers in a tertiary hospital in Rwanda had already received all three doses of HBV vaccine (Muvunyi et al., 2018). The same types of initiatives, should also be designed to include youths in rehabilitation centers. Findings from this study also reinforced the influence of knowledge on preventive practice against HBV infection. Respondents with good level of knowledge were 1.84 times more likely to have good preventive practice than respondents with poor knowledge. These findings are also in line with KAP model theory. KAP model asserts that the only obstacle to adopting healthy behaviors is ignorance, and correcting this lack of knowledge can directly influence behaviors (Hou, 2014). A significant association between knowledge and practice was also found in studies conducted in Nigeria (Adejimi et al., 2021), Cameroon (Okonkwo et al., 2018), and in Saudi Arabia (Mubaraki et al, 2019). In the KAP model, “knowledge is the basis of behavior change, and attitude is the motivation power of behavior change” (Fan et al., 2018). The influence of attitude on HBV preventive behavior was documented by a study among market traders in Lagos, Nigeria (Adejimi et al., 2021). Contrastingly, the present study has failed to establish the significant relationship between attitude and preventive practice against HBV infection. The lack of association may have resulted from the significant skewness of the attitude score to the positive side. Attitude scores in this study ranged from 20 to 45 with a mean score of 39.01 ( $SD = 4.96$ ). This implies a satisfactory level of positive attitude toward HBV infection among youths in IRC. Despite the level of attitude, marital status, and education level were also not significantly related to practice. Delinquent youth at the street are usually hard to be reached by public health programs. Public health institutions should take advantage of youth in rehabilitation center and provide disease

prevention services to the youth. Findings from this study pointed out the incompleteness of knowledge and inadequate level of preventive practices towards HBV among youth in IRC. The data also suggest the need for increasing HBV-related knowledge and providing HBV screening and vaccination services to the youths. To the best of the researcher's knowledge, this study was the first to investigate HBV infection among youth in a Rehabilitation Centers. However, the generalization of findings from this study is limited to only male delinquent youth in Rwanda. Therefore, a KAP study HBV infection among female youth admitted a Rwandan rehabilitation center is recommended. Nevertheless, a large scale studies with larger sample size are still needed to investigate the levels of knowledge, attitude and preventive practice related to HBV infection among youth in Rwanda.

## **Conclusion**

Youth In Iwawa Rehabilitation Center generally demonstrated a partial knowledge regarding HBV infection. Despite the stigma against HBV-infected people, attitude towards HBV infection is generally good. They have also showed poor preventive practice against HBV infection. Based on the study results, the lack of knowledge is the major obstacle to the execution of healthy practices against HBV infection.

## **Acknowledgment**

I deeply present my thankfulness to my research supervisors, **Dr. Erigene RUTAYISIRE** and **Dr. Monica MOCHAMA** (Senior lectures in department of Public health, Mount Kenya University) for their accommodative supervision and passionate motivation throughout the period of this research study. My humble appreciation also goes to the managing authorities of the **National Rehabilitation Service** for their unparalleled support during the data collection period.

## **Funding:**

No funding from any entity

## **Conflict of interest:**

None declared

## **Ethical approval:**

This study obtained ethical approval from the postgraduate department of Mount Kenya University and National Rehabilitation Service.

## References

- Abdi, A., & Salleh, M. (2019). Knowledge, attitude, and practice towards prevention of Hepatitis B Virus Infection among Somali immigrants in the state of Selangor, Malaysia, and their HBV infection status. *Journal of Bioscience and Applied Research*, 5(2), 198-211. <https://doi.org/10.21608/jbaar.2019.141365>
- Abongwa, L. E., Sunjo, N. S., & Afah, N. G. (2016). Assessment of knowledge, attitude, and practice towards Hepatitis B among two rural communities of anglophone regions in Cameroon. *IRA-International Journal of Applied Sciences*, 4(3), 490-505. <https://doi.org/10.21013/jas.v4.n3.p13>
- Adejimi, A., Bakare, A., Ogunyemi, A., & Adewole, A. (2021). Hepatitis B Virus Infection-related knowledge, attitude, and preventive practices among market traders in Lagos, Nigeria-A cross sectional study. *Journal of Clinical Sciences*, 18(1), 32-41. [https://doi.org/10.4103/jcls.jcls\\_38\\_20](https://doi.org/10.4103/jcls.jcls_38_20)
- Amedonu, E. K., Aniaku, J. K. & Fusheini, A. (2020). Assessment of High school student's knowledge, attitudes, and vaccination status of Hepatitis B Virus in Hohoe, Ghana: a cross-sectional study. *The Open Public Health Journal*, 13(1), 298-305. DOI: [10.2174/1874944502013010298](https://doi.org/10.2174/1874944502013010298)
- Bogler, Y., Wong, R. J., & Gish, R. G. (2018). Epidemiology and natural history of chronic hepatitis B Virus infection. In J. H. Kao & D. S. Chen (Eds), *Hepatitis B Virus and Liver Disease* (pp. 63-89). Springer Singapore. [https://doi.org/10.1007/978-981-10-4843-2\\_4](https://doi.org/10.1007/978-981-10-4843-2_4)
- Dan-Nwafor, Adeoye, I., Aderemi, K., Adebobola, B., Nguku, P., Ade-Yusuf, I., & Udom, E. (2018). Knowledge, serological markers and risk factors associated with Hepatitis B and C Virus Infection among Kuje Prison inmates, federal capital territory, Nigeria. *International Journal of Infectious Diseases*, 73, 374.
- Elbur, A. I., Almalki, N., Alghamdi, A., & Alqarni, H. A. A. (2017). Knowledge, attitude and practice on Hepatitis B: a survey among internet users in Taif, Kingdom of Saudi Arabia. *Journal of Disease and Epidemiology*, 3(3), 1-7. <https://doi.org/10.23937/2474-3658/1510036>
- Fan, Y., Zhang, S., Li, Y., Li, Y., Zhang, T., Liu, W., & Jiang, H. (2018). Development and psychometric testing of knowledge, attitude, and practices (KAP) questionnaire among students Tuberculosis (TB) patients (STBP-KAPQ) in China. *BMC Infectious Diseases*, 18(1), 1-10. <https://doi.org/10.1186/s12879-018-3122-9>
- Gebrecherkos, T., Girmay, G., Lemma, M., & Negash, M. (2020). Knowledge, attitude, and practice towards Hepatitis B Virus among pregnant women attending antenatal care at the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia. *International Journal of Hepatology*, 2020, 1-1. <https://doi.org/10.1155/2020/5617603>
- Gétaz, L., Casillas, A., Siegrist, C. A., Chappuis, F., Togni, G., Tran, N. T., Baggio, S., Negro, F., Gaspoz, J. M., & Wolff, H. (2018). Hepatitis B prevalence, risk factors, infection awareness, and disease knowledge among inmates: a cross-sectional study in Switzerland's largest pre-trial prison. *Journal of Global Health*, 8(2), 020407. <https://doi.org/10.7189/jogh.08.020407>
- Gomes, C., Wong, R. J., & Gish, R. G. (2019). Global perspective on Hepatitis B Virus infection in era of effective vaccines. *Clinics in Liver Disease*, 23(23), 383-399. <https://doi.org/10.1016/j.cld.2019.04.001>
- Hou, S. I. (2014). Health education: Theoretical concepts, effective strategies and core competencies. *Health Promotion Practices*, 15(5), 619-621. <https://doi.org/10.1177/1524839914538045>

- Kheir, O. O., Freeland, C., Abdo, A. E., Yousif, M. E. M., Altayeb, E. O., & Mekonnen, H. D. (2022). Assessment of hepatitis B knowledge and awareness among Sudanese population in Khartoum State. *Pan African Medical Journal*, 41. <https://doi.org/10.11604/pamj.2022.41.217.30390>
- Kilale, A. (2016). A critical review of the use of knowledge, attitude, and practice (KAP) studies to guide health communication: strengths and weaknesses. In *Presentation*. <https://doi.org/10.13140/RG.2.1.3248.7922>
- Machmud, P. B., Glasauer, S., Gottschick, C., & Mikolajczyk, R. (2021). Knowledge, vaccination status, and reason for avoiding vaccination against Hepatitis B in developing countries: a systematic review. *Vaccines*, 9(6), 625. <https://doi.org/10.3390/vaccines9060625>
- Maideen, S. F. K., Rahim, F. F., Rashid, A., & Abdulrahman, S. (2020). Seroprevalence of Hepatitis B among municipal waste collectors in Penang Island, Malaysia and their knowledge, attitude, and practice towards the prevention of Hepatitis B. *Global Journal of Health Science*, 12(7), 1-20. <https://doi.org/10.5539/gjhs.v12n7p20>
- Makuza, J. D., Rwema, J. O. T., Ntihabose, C. K., Dushimiyimana, D., Umutesi, J., Nisingizwe, M. P., Serumondo, J., Semakula, M., Riedel, D. J., & Nsanzimana, S. (2019). Prevalence of Hepatitis B surface antigen (HBsAg) positivity and its associated factors in Rwanda. *BMC Infectious Diseases*, 19(1), 1-10. <https://doi.org/10.1186/S12879-019-4013-4>
- Mubaraki, M. G., Alamir, S. A., Qohal, M. M., Alamir, O. H., & Quadri, M. F. (2019). Relation between Knowledge, Attitude and Practice of Hepatitis B among Dental Undergraduates in the Kingdom of Saudi Arabia. *The Journal of Contemporary Dental Practice*, 20(13), 1447–1455. PMID: 32381848
- Muvunyi, C. M., Harelimana, J. D. D., Sebatunzi, O. R., Atmaprakash, A. C., Seruyange, E., Masaisa, F., Manzi, O., Nyundo, M., & Hategekimana, T. (2018). Hepatitis B Vaccination coverage among healthcare workers at a tertiary hospital in Rwanda. *BMC Research Notes*, 11(1), 1-5. <https://doi.org/10.1186/s13104-018-4002-5>
- Nguyen, M. H., Wong, G., Gane, E., Kao, J. H., & Dusheiko, G. (2020). Hepatitis B Virus: advances in prevention, diagnosis, and therapy. *Clinical Microbiology Reviews*, 33(2), e00046-19. <https://doi.org/10.1128/CMR.00046-19>
- Nsiah, I., Danquah, C. B., Odame-Anto, E., Obirikorang, C., Owiredo, W. K. B. A., Acheampong, E., Obirikorang, Y., Adu, E. A., Donkor, S., & Odame-Anto, A. (2020). Factors associated with knowledge, attitude, and practice towards Hepatitis B infection among pregnant women attending antenatal clinic in Kumasi Metropolis, Ghana: a multi-Centre hospital based cross-sectional study. *PMJ-One Health*. 2(24), 1-16. <https://doi.org/10.11604/pamj-oh.2020.2.24.24716>
- Okonkwo, U., Otu, A., Ameh, S., & Okpara, H. (2018). Public awareness of Hepatitis B Virus Infection in Cross River State, Nigeria: a population-based survey. *West African Journal of Medicine*, 35(2), 79-84. PMID: 30027991
- Rajamoorthy, Y., Taib, N. M., Munusamy, S., Anwar, S., Wagner, A. L., Mudatsir, M., Müller, R., Kuch, U., Groneberg, D. A., Harapan, H., & Khin, A. A. (2019). Knowledge, and awareness of Hepatitis B among households in Malaysia: a community-based cross-sectional survey. *BMC Public Health*, 19(47), 1-11. <https://doi.org/10.1186/s12889-018-6375-8>
- Razavi-Shearer, D., Gamkrelidze, I., Nguyen, M. H., Chen, D. S., Van Damme, P., Abbas, Z., Abdulla, M., Abou Rached, A., Adda, D., Aho, I., Akarca, U., Al Ali, F. H., Lawati, F. A. L., Naamani, K. A. L., Alashgar, H. I., Alavian, S. M., Alawadhi, S., Albillos, A., Al-Busafi, S. A., ... Razavi, H. (2018). Global preva-

- lence, treatment, and prevention of Hepatitis B Virus infection in 2016: a modelling study. *The Lancet Gastroenterology and Hepatology*, 3(6), 383-403. [https://doi.org/10.1016/S2468-1253\(18\)30056-6](https://doi.org/10.1016/S2468-1253(18)30056-6)
- Schillie, S., Vellozzi, C., Reingold, A., Harris, A., Haber, P., Ward, J. W., & Nelson, N. P. (2018). Prevention of Hepatitis B Virus Infection in the United States: recommendations of the Advisory Committee on Immunization Practices. *MMWR Recommendations and Reports*, 67(1), 1-31. <https://doi.org/10.15585/MMWR.RR6701A1>
- Smith-Palmer, J., Cerri, K., Sbarigia, U., Chan, E. K. H., Pollock, R. F., Valentine, W. J., & Bonroy, K. (2020). Impact of stigma on people living with chronic Hepatitis B. *Patient Related Outcome Measures*, 11, 95 - 107. <https://doi.org/10.2147/PROM.S226936>
- Sultana, R., & Imitaz, K. S. (2020). Knowledge and practices towards Hepatitis B among patients and their attendants in a primary healthcare facility in Bangladesh. *International Journal of Community Medicine and Public Health*, 8(1), 97-103. <https://doi.org/10.18203/2394-6040.ijcmph20205682>
- Tesi, F. (2020, January 17). "From Saul to Paul"; A story of Iwawa's relentless drug rehabilitation path. [https://www.rba.co.rw/post.php/Saul-to-Paul-Iwawas-drug-rehabilitation-path?url\\_title=Saul-to-Paul-Iwawas-drug-rehabilitation-path](https://www.rba.co.rw/post.php/Saul-to-Paul-Iwawas-drug-rehabilitation-path?url_title=Saul-to-Paul-Iwawas-drug-rehabilitation-path)
- Umuhzoza, A., Nkurunziza, A., Mukashema, J., Mukarugenga, M. C., Ndayisenga, J. P., & Rugema, J. (2021). Knowledge, attitudes, and practices towards Hepatitis B Virus prevention among nursing students at a selected campus in Rwanda. *Research Journal of Health Sciences*, 9(1), 44-51. <https://doi.org/10.4314/rejhs.v9i1.5>
- Umutesi, J., Klett-Tammen, C., Nsanzimana, S., Krause, G., & Ott, J. J. (2021). Cross-sectional study of chronic Hepatitis B Virus Infection in Rwanda high risk groups: unexpected findings on prevalence and its determinants. *BMJ Open*, 11(12), e054039. DOI: 10.1136/bmjopen-2021-054039
- Wedhaya, M. A., Mohammed, A. K., Abyadh, D. A., Alshamrani, A. S. R., Alzahrani, G. S., Alhabib, H. A., Alrehaily, S. S., Alqahtani, A. M., Mansi, M. H., & Mofareh, A. S. (2017). Assessment of knowledge, attitude, and practice towards Hepatitis B among Healthy population in Saudi Arabia, 2017. *The Egyptian Journal of Hospital Medicine*, 69(2), 1973-1977. DOI: 10.20959/wjpr201711-9634