

Hepatitis B vaccination coverage and associated factors among medical students: A Cross-Sectional Study in Bosaso, Somalia 2021

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Abstract

Background

Hepatitis B virus infection is considered a serious health problem in developing countries since it causes chronic liver cirrhosis, hepatocellular carcinoma, and hepatic failure. The risk of acquiring HBV is four times higher in HCWs compared to non-HCWs. Medical students are also considered a high-risk group for HBV infection for their exposure to body fluids and blood during medical training in health facilities. The purpose of this study is to evaluate HBV vaccination coverage and associated factors among medical students in Bosaso universities, Somalia.

Methodology:

An institutional-based cross-sectional study has been conducted in four universities. The online raosoft sample size calculator has been used to calculate the sample size. A stratified sampling method is employed to draw participants from the four universities. In each university, the research participants were selected using a simple random sampling technique. Self-administered questionnaires have been distributed among 247 medical students. Data were analyzed by using the SPSS version 21, and findings were presented in tables, and proportions.

Results

Only 2.8% were fully vaccinated, while 5.3% have ever started taking the HBV doses. The main reasons for not getting vaccinated against Hep B included unavailability of the vaccines (32.8%), high vaccine cost (26.7%), fear of vaccine side effects (12.6%), lack of trust in vaccine quality (8.5%), lack of awareness of the vaccine whereabouts (5.7%), and lack of time (2.8%). Occupation, monthly income, marital status, and availability of testing policy in the workplace were associated with HBV vaccine uptake with a correlation coefficient of 0.3, 0.2, 0.13, and 0.2, respectively (P-value < 0.05). 73.7% of the respondents scored higher than the average knowledge score regarding knowledge of HBV.

Conclusion

The vaccination coverage among medical students in Bosaso was very low (2.8%) and sheds light on the urgent importance of a National HBV infection elimination policy to be developed with Hep B vaccines being available and easily accessible to those at high risk including medical students. Expansion of the sample size to include multiple cities for increased representativeness plus Hepatitis B titer tests is recommended.

Keywords

Medical students: Medical students are those who may have contact with syringes, needles, and patients' blood, and body fluids during their training period in health facilities, and these are medical students in departments of Medicine, Nursing, Midwifery, Clinical officers, Medical Laboratory and Dentistry.

Vaccination status: HCWs who received three and more doses of the HBV vaccine are considered fully vaccinated. Those who took one and two doses of the Hep B vaccine are considered not fully vaccinated and those who did not receive any dose of the Hep B vaccine are considered as not vaccinated at all.

Knowledge: Knowledge of medical students about HBV infection was categorized into "knowledgeable" if the respondents were able to answer 6 or more knowledge questions correctly, and "Poor knowledge" if the respondent answered less than 6 knowledge questions correctly

Background

Hepatitis B is a serious infection and major public health problem caused by the hepatitis B virus (1). Nearly 2 billion people (30% of the world population) have serological evidence of infection with the hepatitis B virus (HBV) (2). 350 million of these people have chronic HBV infection, of which about one million die each year from chronic liver disease, such as hepatocellular carcinoma and cirrhosis (2). HBV is reported to cause 80% of liver cancer cases and could be the second most important human carcinogen after tobacco (3). Chronic hepatitis B infection prevalence is low (< 2%) in most developed countries and it is high (> 8%) in all countries in Africa (4).

Hepatitis B virus is transmitted by exposure to infected blood or other body fluids (5) HBV can also be transmitted in the setting of a percutaneous injury that involves an instrument that contains HBV-infected blood (4). The Hepatitis B virus lives for prolonged periods outside the body(6), it can survive in dried blood for at least 7 days (7) and thus may be transmitted via discarded needles or fomites, even days after initial contamination (4). HBV is also 100 times more infectious than HIV (8). Healthcare workers including medical students are considered a high-risk group due to high occupational exposure (9). Global studies demonstrated that, depending on location, 10–40% of healthcare providers may show serologic evidence of hepatitis B infection (10). The risk of getting HBV infection is related to the degree of contact with infected blood or other body fluids; the risk is 1% – 6% for acquiring hepatitis B virus from a needle stick injury if the source patient is only HBsAg-positive. However, the risk increases to 22% – 40% when the source patient is both HBsAg-positive and HBeAg-positive (4). Medical students are among those at high risk of acquiring hepatitis B infection in the hospital when they are attending clinical training as they are relatively inexperienced (11), and may be less aware than other healthcare providers (4). Medical students are also less likely to follow universal precautions consequently accidental needle-stick injuries and mucocutaneous blood exposure may occur while performing invasive procedures and handling high-risk fluids (12).

Hepatitis B is a vaccine-preventable disease and an effective HBV vaccine has been available since 1982 (13), which is effective in preventing infection when administered before or immediately after exposure

(14). Vaccination of infants during 24 hours of birth is reported to be 90–95% effective in preventing HBV infection (13).

As a part of occupational safety measures, all healthcare workers should be vaccinated. Medical students needed to be vaccinated too to ensure that future healthcare providers are adequately protected from HBV (4). Unfortunately, the World Health Organization reported that a significant proportion of healthcare workers do not receive the HBV vaccine. WHO reported that HBV vaccination coverage amongst health care providers is only 18–39% in low and middle-income countries compared to 67–79% in high-income countries (9).

In general, HBV is a significant public health problem in Somalia and it is an area of the world with a high prevalence of hepatitis B infection of less than 8% (15). HBV vaccination is currently part of the national routine immunization program for children in Somalia. Unfortunately, there is no published data on HBV vaccination coverage in Somalia and there is lack of a literature on HBV vaccination uptake among medical students in Somalia. Therefore this study aims to evaluate HBV vaccination coverage and associated factors among medical students in Bosaso universities.

Methodology

Study Design and Study setting

An institutional-based cross-sectional study was conducted at four universities in Bosaso city (East Africa University, University of Health Sciences, Red Sea University, and University of Bosaso) from March to June 2021. Bosaso is a coastal town located on the Gulf of Aden and it is the capital town of the Northeastern region of Bari, Somalia. A quantitative approach was used to identify HBV vaccination coverage among medical students, reasons for not taking the vaccine, and factors influencing HBV vaccination uptake.

Study Population

The study included all clinical students from all departments of health sciences at universities in Bosaso. These students came from such departments as Medicine, Nursing, Midwifery, Clinical Officer, Medical Laboratory, and Dentistry. They had close contact with patients during their training period in hospitals, health centers, and clinics. Medical students who were not in the university, freshman and second-year students, and those not willing to participate in the study during the data collection were excluded.

Sample Size determination and sampling methods

To determine the number of study participants to be included in the study, the online raosoft sample size calculator was used to calculate the sample size with a 5% margin of error, and 95% CI. The size of the target population was 683 clinical-level students from four different universities in Bosaso. The HBV vaccine coverage among clinical students is unknown therefore; a maximum variation of 50% was taken and the final sample size came out as 247. The sample population was distributed among the four

different universities using a stratified sampling method. The research participants were selected using a simple random sampling technique from every single university.

Methods of data collection and analysis

Data was collected by using self-administered questionnaires. The authors of the study were responsible for the data collection process. The questionnaire was first prepared in English language and then translated into the local language (Somali). The questionnaires were pretested for face validity and the two language versions were carefully cross-checked for reconciliation before the actual data collection. The questionnaire was designed in four sections and 31 questions. Section A consisted of 7 socio-demographic questions (Table 1); section B, 11 knowledge questions and 2 attitude questions; section C, 7 HBV infection exposure history and laboratory testing questions; and section D, 4 HBV immunization status questions.

All participants responded and the data entry was made in SPSS where variables were already created in English for data entry and analysis. Two of the researchers cross-checked the questionnaire data entered in the SPSS against the collected paper questionnaires for completeness, consistency, and correctness before the analysis started. Data were analyzed by using the SPSS program version 21. Descriptive analysis was conducted, where frequencies and percentages of the variables have been computed.

A correlation coefficient analysis was carried out with a P value of less than 0.05 to be considered statistically significant to measure the linear relationship between HBV vaccination status, as the dependent variable, and such independent variables as socio-demographic status; knowledge about HBV; and availability of Hep B vaccine. Data quality has been regularly assured throughout its journey. The findings of the study were presented in tables.

To measure the knowledge level of the respondents towards HBV, respondents were asked eleven questions to measure their knowledge level towards HBV. Selections of these questions, and the overall questionnaire, were adopted from the literature, and alignment with the study objectives was assured. To test the internal consistency of the knowledge measurement tool, Cronbach alpha has been computed which has shown good internal consistency with a score of 0.85. The respondents were asked to answer the 11 questions with either 'Yes' or 'No'. Respondents that correctly answered 6 or more questions were considered as 'knowledgeable', and those with correct answers of less than 6 were considered as having 'poor knowledge' towards HBV. Finally, the proportion of respondents in the 'knowledgeable' and 'poor knowledge' categories is calculated and presented in a separate table.

Results

To evaluate HBV vaccination coverage and associated factors among medical students in Bosaso, 247 self-administered questionnaires have been distributed among medical students in the city.

Table 1
Socio-demographic variables

Age		
Age group	Frequency	Percentage
20–25	229	92.7%
26–30	16	6.5%
31 and above	2	0.8%
Gender		
Gender	Frequency	Percentage
Male	71	28.7%
Female	176	71.3%
Occupational status		
Occupation	Frequency	Percentage
Working in the medical field	50	20.2%
Working in a non-medical field	27	10.9%
Unemployed	170	68.8%
Departments of respondents (Students)		
Department	Frequency	Percentage
Medicine	25	10.1%
Clinical Laboratory	81	32.8%
Nursing	58	23.5%
Midwifery	49	19.8%
Clinical officer	22	8.9%
Dentistry	12	4.9%
University year		
Year	Frequency	Percentage
Third year	91	36.8%
Fourth-year	132	53.4%
Fifth year	13	5.3%
Sixth year	11	4.5%

Age		
Age group	Frequency	Percentage
Monthly income		
Income	Frequency	Percentage
Less than 100 \$	91	37.1%
\$100–150	83	33.9%
\$ 151–250	37	15.1%
>\$250	34	13.9%
Marital status		
Marital status	Frequency	Percentage
Married	27	10.9%
Single	218	88.3%
Widowed	1	0.4%
Divorced	1	0.4%

The table above shows that the age group of almost all the respondents (99.2%) was between 21–30 years old, only 2(0.8) were above 30 years of age, while 92.7% ranged between 21 and 25. The majority 176 (71.3%) were females and 71 (28.7%) were males. Regarding employment status, 170 (68.8%) were unemployed full-time students while the remaining had part-time jobs in different fields; 50 (20.2%) were working in the medical field and 27 (10.9%) were in the non-medical field. Respondents were registered in such disciplines as 81 (32.8%) Clinical Laboratory, 58 (23.5%) Nursing, 49 (19.8%) Midwifery, 25 (10.1%) Medicine, 22 (8.9%) Clinical Medicine and Community Health, and 12 (4.9%) were registered in Dentistry. On the other hand, 91 (36.8%) of the study participants were in the third year of their university studies, 132 (53.4%) in their fourth year, 13 (5.3%) in their fifth year while 11 (4.5%) were in their sixth year of study. In terms of monthly income, 91 (37.1%) of the study participants received less than \$100, 83 (33.9%) \$100-\$150, 37 (15.1%) \$151-\$250 where 34 (13.9%) received >\$250 per month. Concerning marital status, the majority of the study participants 218 (88.3%) were single, 27 (10.9%) married, 1 (0.4%) divorced, and 1 (0.4%) widowed.

Table 2
Knowledge of HBV among medical students in Bosaso Universities

	Correct Answers	
	N	Percent
Mode of transmission		
HBV can be transmitted through contact with the blood and body fluids of an infected person	215	87.8%
HBV can be transmitted through sexual contact	171	69.8%
HBV can be transmitted from mother to baby during delivery	144	58.8%
HBV can be transmitted through needle stick injury	163	66.5%
Complications of HBV		
HBV can cause Chronic hepatitis	204	83.6%
HBV can cause Liver Cirrhosis	151	61.9%
HBV can cause Hepatocellular carcinoma	155	63.5%
HBV can cause Hepatic failure	169	69.3%
Prevention Methods		
HBV can be prevented through immunization	236	95.9%
HBV can be prevented by wearing appropriate Personal Protective Equipment (PPE)	158	64.2%
HBV can be prevented by avoiding unsafe sex	155	63.0%

The above table indicates that the majority of the respondents 215 (87.8%) knew that HBV can be transmitted through contact with the blood and body fluids of an infected person, and 171 (69.8%) stated that it can be transmitted through sexual contact in addition to that, 163 (66.5%) and 144 (58.8%) stated that it can be transmitted through needle stick injury and mother to baby during delivery, respectively. Regarding complications of HBV infection, most of the respondents 204 (83.6%) were aware that HBV might cause Chronic hepatitis, 169 (69.3%) responded that it can cause Hepatic failure, 152 (61.9%), and 169 (69.3%) of the students agreed that liver cirrhosis and Hepatocellular carcinoma were complications of HBV disease, respectively. According to prevention measures for HBV, the majority of the respondents, 236 (95.9%) respondents knew that immunization can prevent HBV infection, 158 (64.2%) wearing appropriate personal protective equipment can prevent it while the rest 155 (63%) said that it might also be averted by avoiding unsafe sex.

Overall, the study analysis has shown that 73.7% of the respondents answered 6 more questions correctly (above the average knowledge score).

Table 3
Perception of HBV among medical students in Bosaso universities

Effectiveness of Hep B Vaccine		
	Frequency	Percent
Effective	233	94.3%
less effective	2	0.8%
Not effective	1	0.4%
I don't know	11	4.5%
Total	247	100.0%
Risk of acquiring HBV during their routine medical activities		
	Frequency	Percent
Danger	190	76.9%
No Danger	57	23.1%

The above table presents that an overwhelming number of the students 233(94.3%) believed that the Hep B vaccine is effective against HBV infection, whereas 2 (0.8%) and 1 (0.4%) indicated that the vaccine is less effective and not effective, respectively. The rest 11 (4.5%) were unaware of whether the Hep B vaccine is effective against HBV infection or not. On the other hand, 190 (76.9%) of the students believed that they are in danger of acquiring HBV during routine medical activities, while 57 (23.1%) did not.

Table 4
Students' risky exposure history at health facilities and HBV testing status

Accidental needle injury		N = 247
	Frequency	Percent
Yes	75	30.4%
No	172	69.6%
Accidental blood exposure		N = 247
	Frequency	Percent
Yes	86	34.8%
No	161	65.2%
HBV testing status		N = 247
	Frequency	Percent
Yes	92	37.2%
No	155	62.8%
HBV testing reasons		N = 92
	Frequency	Percent
Was donating blood	20	21.7%
Wanted to know my HBV status	60	65.2%
Institutional requirement	6	6.5%
I was in the labor	2	2.2%
other reason	4	4.3%

This table reveals that 30.4% of the students experienced accidental needle injury during medical training, and 65.2% had accidental exposure to blood. The above table also shows that majority of students (62.8%) had never been tested for HBV infection, while 37.2% took HBV testing. Of those tested, 65.2% reported that they did so just to know their HBV status, 21.7% because of blood donation to another person, six students (6.5%) because of institutional requirements, and the minority (4.3%) tested for other reasons.

Table 5
HBV vaccination status among respondents and reasons for incomplete
and no immunization

Hepatitis B vaccination status		
	Frequency	Percentage
Yes	13	5.3%
No	234	94.7%
HBV Vaccination fee		
	Frequency	Percentage
Self-paid	7	54.%
Free	6	46%
Number of doses taken		
	Frequency	Percentage
One dose	4	1.6%
Two doses	2	0.8%
Three doses	7	2.8%
Reasons for being not vaccinated against HBV		
	Frequency	Percentage
The vaccine is not available	81	32.8%
High vaccine cost	66	26.7%
Afraid of vaccine side effects	31	12.6%
No trust in vaccine quality	21	8.5%
I don't know where to go and receive	14	5.7%
Lack of time	7	2.8%
I'm not aware of HBV vaccination	5	2.0%
Not important	2	0.8%
Other reason	7	2.8%
HBV testing policy at the university		
	N= 244	
	Frequency	Percentage
Yes	2	0.8%

Hepatitis B vaccination status		
	Frequency	Percentage
No	242	99.2%
HBV testing policy in the workplace		
N = 75		
	Frequency	Percentage
Yes	8	10.7%
No	67	89.3%
Availability of HBV vaccine at the workplace		
N = 73		
	Frequency	Percentage
Yes	12	16.4%
No	61	83.6%

The above table indicates that a vast majority of the students (94.7%) were in zero doses and only 2.8% were fully vaccinated (three doses), whereas 1.6% and 0.8% stated to have received one and two doses, respectively. 54% of those vaccinated had to pay their vaccine costs out of pocket, while 46% got it free of charge. The main reasons for not receiving the vaccine were its unavailability (32.8%), high vaccine cost (26.7%), fear of vaccine side effects (12.6%), lack of trust in vaccine quality (8.5%), don't know where to go and receive the vaccine (5.7%), and lack of time (2.8%). Almost all of the respondents (99.2%) reported that their universities do not have an HBV testing policy. Also, 89.3% of the working students revealed that the HBV testing policy is not practiced in their workplaces, while 83.6% of them indicated that the HBV vaccine was not available at their workplaces.

Table 6
Factors associated with Hep B vaccination coverage among respondents

		Hep B Vaccine status		R-value	p-value
		Yes	No		
Age	21–25	12	213	-0.1	0.12
	26–30	3	13		
	31 and above	0	2		
Occupational status	working in the medical field	9	40	0.3	< 0.01
	working in a non-medical field	2	24		
	unemployed	4	165		
Monthly income	Less than 100 \$	1	85	0.2	0.01
	\$100–150	7	73		
	\$ 150–250	2	35		
	> 250 \$	5	28		
Marital status	married	4	23	0.13	0.05
	single	11	203		
	widowed	0	1		
	divorced	0	1		
Availability of HBV testing policy in the workplace	Yes	3	5	0.20	0.05
	No	8	59		
Availability of HBV vaccine in the workplace	Yes	3	9	0.15	0.22
	No	7	54		

The above table shows that the occupation, monthly income, and marital status of the respondents as well as the availability of testing policy in the workplace are associated with Hep B vaccine coverage with a correlation coefficient of 0.3, 0.2, 0.13, and 0.2, respectively. The association was statistically significant (P-value < 0.05). Furthermore, the age of the respondents and the availability of vaccines in the workplace are associated with Hep B vaccine status with a correlation coefficient of -0.1, and 0.1, respectively. This was not statistically significant.

Discussion

Hepatitis B virus infection is considered a serious health problem in developing countries since it causes chronic liver cirrhosis, hepatocellular carcinoma, and hepatic failure (16). Studies indicated that the risk of acquiring HBV is four times higher in HCWs compared to non-HCW (17). Medical students, especially those at the clinical level, are also a high-risk group for HBV infection (getting infected or transmitting the infection) as their fellow HCWs (34, 37). This is because they are occupationally exposed to blood and body fluids during medical training in health facilities as other healthcare workers (HCWs) (35, 36). The situation could be exacerbated by the low Hep B vaccination coverage among medical students and the high rate of accidental exposure to blood and body fluids (11).

Reports in Africa indicate HBV infection rate among medical students reaches up to 31.5% (18). The Hepatitis B vaccine has been found to effectively reduce the prevalence of HBV infection, and WHO recommends the hepatitis B vaccine for those at the highest risk of acquiring HBV infection, such as Healthcare Workers including medical students (19). However, the results of this study have shown that only 2.8% of respondents were fully vaccinated (Table 5). In contrast, our finding is lower than those reported in Ethiopia (5.8%), Nigeria (34.8%), Cameroon (18%), Kenya (20.2%), Uganda (44.3%), the kingdom of Saudi Arabia (43.2%) and India (4, 20–25). The main reason for the low Hep B vaccination coverage among respondents could be partially attributed to the fact that Hep B vaccination has been introduced in Somalia in April 2013 as a component of the pentavalent vaccine (five-in-one-vaccine) against several potentially fatal childhood diseases including HBV prevention for the first time and this has been integrated into the national Expanded Program of Immunization (EPI) (26). Another factor could be the low HBV testing policy in health facilities and universities reported in this study. Unfortunately, Somalia has neither a national policy of Hep B vaccination for HCWs including medical students nor an HBV screening policy for high-risk groups (40). The spectrum of reasons for not receiving the vaccine, reported in this study from highest to lowest frequency, included but was not limited to; its unavailability, high vaccine cost, fear of vaccine side effects, and lack of trust in vaccine quality (Table 5). Multiple studies have reported low HBV immunization coverage among medical university students (39). Conducted in different countries, these studies recorded common main reasons for low coverage including unavailability, high cost, and lack of training on infection prevention (21, 22, 25, and 27). In this study, the unavailability of the Hep B vaccine was the most frequent reason for not getting vaccinated among medical students. In contrast lack of knowledge about the Hep B vaccine, whereabouts was the most frequent reason for non-immunization in a study conducted in another country (38). Likewise, Low attitude toward the prevention of the infection; Poor knowledge level, Low quality of service delivery, lack of in-depth education, and low level of awareness have been shown in other studies (4, 28). Assuming adequate availability of the Hep B vaccines and improved accessibility mechanisms in place, the Introduction of opt-in and/or mandatory HBV vaccination in medical education institutions and workplaces can bring in higher immunization coverage (29).

Regarding the knowledge of the students about HBV infection, the study revealed that 73.7% of the participants had a good level of knowledge regarding the transmission modes, preventive measures, and

complications of HBV disease. The finding was similar to those of other studies conducted in Southwest Ethiopia (73.6%), and Uganda (74.6%) (22, 25), but higher than in one conducted in India (43%) (22). This difference might be due to the variety in health policies of the countries; in some countries, orientation and direction on general safety measures were given to senior medical students before enrolling in clinical practice, which makes them find out more about HBV infection and its occupational risks. On the other hand, this study reported that the majority of the respondent (94.3%) believed that the vaccine is effective against HBV infection (Table 3), this finding is in line with another study conducted in Saudi Arabia (86.5%) (30). The high pro-vaccine perception rate could be attributed to the fact that the majority of the respondents have also reported a good knowledge level of HBV infection. Furthermore, most of the respondents (76.9%) believe that they are in danger of acquiring HBV infection because of the nature of their work, this result is higher than that reported in Ghana (54.6%) (31). Overall, the good level of knowledge of HBV infection (Table 2), positive perception towards Hep B vaccination, and the good risk perception rate reported in this study could partially reflect the awareness level of the respondents as clinical-level medical students.

According to the exposure status of the medical students, this study revealed that almost a third of the participants had unintentional needle injury during their training period (Table 4), a result which is higher than that reported in Nigeria, almost half, and Syria more than three quarters (32, 33). The findings of the study have shown that about a third of the respondents had at least one accidental exposure to blood during their medical training, this result is lower than that reported in Cameroon where more than half of the participants had accidental exposure to blood (20). This difference might be due to the good levels of HBV knowledge, and risk perception of the respondents.

Finally, the study results have presented that the vaccination status of the respondents was significantly associated with such variables as occupation, monthly income, marital status, and availability of testing policy in the workplace (Table 6). This is inconsistent with other studies around the world that have shown an association of Hep B vaccination status with marital status (41), income (42, 44), occupation (20, 43, 44), and HBV vaccination policy at the workplace as a job entry requirement (45).

After all, worth to mention is that the vaccination status of the medical students was self-reported and not verified by vaccination records. This could indicate the possibility of recall bias and subsequent over or underestimation of the immunization coverage.

Conclusions

The study revealed that the vaccination status of medical students in Bosaso was very low. Only 5.3% of the respondents stated the Hep B vaccination while 2.8% are fully vaccinated against HBV infection.

Occupation, monthly income, marital status of the respondents, and availability of testing policy in the workplace are associated with Hep B vaccination coverage with a correlation coefficient of 0.3, 0.2, 0.13, and 0.2, respectively.

The main reasons for not getting vaccinated included vaccine unavailability, high vaccine cost, fear of vaccine side effects, and lack of trust in vaccine quality.

Generally, 73.7% of the participants were knowledgeable about HBV.

This study shall contribute to increased awareness of the infection risks related to the very low Hep B immunization coverage among the future medical cadre and subsequently to their clients, and suggests the expansion of the sample size to include multiple cities, for increased generalizability, with Hepatitis B titer test of the respondents so that strong evidence is generated for high-level advocacy of immediate actions and policies including adequate HBV vaccine availability and accessible for healthcare workers including medical students and to other adult population groups that are at risk of HBV infection as well as the immediate development of a national HBV elimination plan and related policies.

Abbreviations

HBsAG	Hepatitis B surface antigen
HBV:	Hepatitis B virus
HCWs:	Health Care Workers
Hep B:	Hepatitis B
SPSS:	Statistical Package for the Social Sciences
WHO:	World Health Organization

Declarations

Ethical approval and consent to participate

All methods of this study were carried out in accordance with relevant guidelines and procedures in the Declaration of Helsinki. Ethical approval has been obtained from the East Africa University (EAU) Faculty of Health Sciences Review Board. A permission letter was obtained from the regional office of the Ministry of Health of Puntland state, Somalia. Written informed consent has been obtained from all participants of this study.

Consent for publication

Not applicable

Data Availability

The data is available through the corresponding author upon rational request

Conflict of Interest

The authors declare that they have no conflict of interest.

Funding statement

There is no funding in this study to be reported

Authors' contributions

Ali, Hussein, and Elmi conceptualized the study design and defined the problem, objectives, and variables. Hussein and Abdi have written the introduction and the literature review. Ismail and Elmi have written the methodology, collected the data, conducted the descriptive analysis, and computed the coefficient correlations. Ali has conducted a reliability test of the knowledge measurement tool, assured validity and reliability of the data collection tools in general, and has written the discussion, conclusion, and the abstract as well as processed submission and publication. All authors have reviewed and approved the final draft of the manuscript.

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