Original Article

Knowledge and Attitudes toward HIV, Hepatitis B Virus, and Hepatitis C Virus Infection among Health-care Workers in Malawi

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ABSTRACT

Objective: The highest prevalence of HIV infection occurs in Sub-Saharan Africa and hepatitis B virus (HBV), and hepatitis C virus (HCV) prevalence are the second highest in Sub-Saharan Africa including Malawi. Health-care workers (HCWs) play an important role in the prevention of, response to, and management of these infectious diseases. There is, however, no published research about the level of knowledge and attitudes toward HIV, HBV, and HCV infection among Malawian HCWs. The purpose of this study was to explore and determine the knowledge of and attitudes toward HIV, HBV, and HCV among a targeted population of Malawian HCWs. **Methods:** A cross-sectional community-based participatory research with 194 HCWs was completed employing health survey method. The project was a collaborative effort between nursing faculties in the USA and Malawian. A one-way analysis of variance (ANOVA) with the Bonferroni adjustment for multiple comparisons was used to assess the differences in knowledge and attitude among three subgroups of HCWs. **Results:** Of 194 of Malawian HCWs surveyed, 41% were support staff, 37% were nursing students, and 22% were health-care professionals. Both health-care professionals and support staff had high knowledge scores related to HIV/AIDS, and their attitudes were mainly positive. However, a series of one-way ANOVAs revealed significant differences in knowledge and attitude toward HIV/AIDs, HBV, and HCV among HCWs ($P < 0.01$). The majority had less knowledge about HBV and HCV and more

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negative attitudes toward hepatitis. **Conclusions:** This study highlights the ongoing need for reducing negative attitudes toward HIV, HBV, and HCV; and providing health education among HCWs, especially focusing on HBV and HCV prevention. The findings of the research project can be used to develop interventions addressing low HBV- and HCV-related knowledge and attitudes.

Key words: Health-care workers, hepatitis B virus, hepatitis C virus, HIV, knowledge attitudes

Introduction

Infections with hepatitis B virus (HBV), hepatitis C virus (HCV), and HIV cause substantial mortality and morbidity globally.[1-3] The HIV pandemic in Africa did not allow most of the population to reach the age where noncommunicable diseases (NCD) such as cancer and cardiovascular disease (CVD) occurred.[4] Great progress has been made in the past two decades through the provision of access to antiretroviral therapy and health education in Sub-Sahara Africa including Malawi. Consequently, the life expectancy for HIV-infected populations has improved significantly.[5] However, with people living longer, there is evidence of the emergence of NCDs, particularly cancer, in younger age groups[4] and they face a double burden of confronting CDs and NCDs in resource-limited environments.

Cancer is one of the leading causes of death in the developed countries with the most common forms of cancer among white (European and North Americans) being breast, prostate, lung, and colon/rectum.[4] Cancers such as cervical, liver, stomach, and Kaposi sarcoma are among the leading forms of cancer in the developing countries.[4,6] In Malawi, HIV infection contributes to the pathogenesis of cancers, particularly AIDS-defining malignancies, such as Kaposi's sarcoma, and non-Hodgkin's lymphoma. Liver, stomach, cervical cancers, and AIDS-defining malignancies are attributed to chronic infections and are preventable by vaccinations or treatment of infections.[7]

Epidemiology of HIV, hepatitis B virus, and hepatitis C virus in low-income countries

The highest prevalence of HIV infection occurs in Africa, and HBV and HCV are the second highest in Sub-Saharan Africa including Malawi. Although only 10% of the global population lives in Sub-Saharan Africa, two-third of HIV-infected people globally live in Sub-Saharan Africa.[1] It is estimated that 40 million people globally live with HIV infection and that 3 million were estimated to have died due to AIDS. The World Health Organization estimates that more than 2 billion people have been infected with HBV and of those, 400 million (5%–7% of global population) are chronically infected with HBV-related disease and hepatocellular carcinomas and 170 million with HCV infection.[3] In Sub-Saharan Africa, over 8% of the population has chronic HBV infections and HBV-related hepatocellular carcinoma is the most common cancer among men and third leading cause of mortality women.[4]

The prevalence of HIV among adults in Malawi is estimated at 10.8% (ages 15–49).[8] The HIV epidemic in Malawi has placed a heavy strain on health-care systems contributing to a health-care professional resource crisis. People with HIV who are coinfected with either HBV or HCV are at increased risk for serious, life-threatening complications. Reports of the prevalence of HIV, HBV, and HCV in Malawi vary with the highest HIV prevalence occurring for medical inpatients (76.1%)[9] to the lowest prevalence in blood donors (10.7%). This data of the lower prevalence rates in blood donors are more closely aligned with the UNAIDS 2013 report of a 10.8% prevalence estimate for Malawi in the 15–49 age range.[10] The highest HBV prevalence rate in Malawi was also reported in the medical inpatient's study at 17.5%.[9] The highest HCV prevalence was 16.5% among pregnant women.[11]

Knowledge and attitudes toward HIV, hepatitis B virus, and hepatitis C virus

HIV, HBV, and HCV are both blood-borne and sexually transmitted, although it is rare to contract HCV sexually.[3,12,13] The occurrence of HBV and HCV transmission routes varies in individuals living in Western countries as compared to individuals in Sub-Saharan Africa.[1,3,12,13] Studies have found that people in Sub-Saharan Africa are infected with HBV and HCV in their childhood while people in Western countries are more likely to be infected in adulthood.[3,14,15] Therefore, individuals in Sub-Saharan African are most likely exposed to hepatitis infection before being at risk of HIV. The knowledge of these diseases transmission routes and their prevention was developed from experiences in Western countries; therefore, their relevance in the context of Malawian population needs further exploration. The most effective prevention of HIV, HBV, and HCV infection is through health education of both infected and uninfected high-risk groups to prevent further transmission of the viruses.[16,17]

Health-care workers

Health-care workers (HCWs) are defined as individuals (1) who are directly involved in patient care including doctors, clinicians, midwives, nurses, ambulance drivers, and laboratory technicians as well as students and trainees; (2) who are indirectly involved with patient care including administrative, environmental hygiene, cafeteria, and laboratory staff. HCWs play an important role in the prevention of, response to, and management of these infectious diseases. The HCW shave many opportunities to provide information to patients and members of the public and can help foster the behavior changes needed to prevent the spread of infectious diseases. Studies from other countries suggest that a lack of knowledge and negative attitudes among HCWs may serve as barriers to provide effective health education and disease management of these infectious diseases.[18,19] Although there is a high incidence of these three infections in Malawi, no literature was found regarding knowledge and attitudes toward HIV, HBV, and HCV infection among Malawian HCWs. The aim of this study was to examine and determine the knowledge and attitudes toward HIV, HBV, and HCV among a targeted population of Malawian HCWs.

Methods

A cross-sectional community-based participatory research (CBPR) study was conducted with 199 HCWs at one Health Science Center in Lilongwe, Malawi. HCWs included physicians, registered nurses, nurse aids, clinical officers, health technicians, administrative staff, as well as nursing students at the site. According to the registrar's report, there were 312 staff (112 nursing students and 200 employees) at the site.

Community-based participatory research approach

The study was developed and implemented based on a global collaboration between Faculty of Nursing School at the Public University in Massachusetts and faculty and students of nursing school which is located outside of Lilongwe, the Capital of Malawi. HIV, HBV, and HCV, and HPV were identified as key priority research areas by all of the faculty, students, and health-care professionals at the studied institution. The Malawian faculty, however, are masters prepared and did not have the research experience, training, and capacity to conduct the study. Case studies from their local settings were introduced by the US faculty and discussed as first steps to develop their capacity to conduct research. The problems identified at the study site were (1) many HCWs were not being vaccinated with HBV due to the cost and the institution was not able to afford to providing free vaccination and (2) low knowledge and misunderstanding about how the transmission of diseases such as HCWs occurred was debated both among health-care professionals and nonhealthcare professionals (such as employees in the cafeteria working as food handlers), for example, as to whether they would be able to continue to work in the cafeteria if they were diagnosed with hepatitis.

In response to this situation, we developed HBV case studies as a tool for CBPR-focused discussion. We learned that discussing their own case studies/stories was an effective way to get Malawian faculty involved in the issues of conducting research. These case studies also served as vehicles to discuss the relationships, causality, intention, and meaning of conducting research in Malawi. Priority areas were decided collaboratively with the goal of improving community participation, engaging the community as an active partner in the research process (in this case, the community was nursing faculty and health-care leaders at the hospital) and the prevention of HIV, HBV, and HCV infection through health education and evidence-based training by conducting a health survey with the HCWs. The problem remained, however, that only increasing knowledge might not increase HBV vaccination behavior because of affordability of high-cost vaccines. Hence, we secured the funds to provide free blood screening and HBV vaccination as an action of the project. Malawian collaborators actively participated in the full spectrum of this CBPR from identifying the problem to be studied and suggested including free blood screening and vaccination is the most important element.

The study was approved by the Institutional Review Board of the each institution as well as the College of Medicine Research Ethnic Committee which is recognized by the Malawi Government and was conducted in 2015.

Setting and sample

The study was conducted in one health-care facility located in a suburb of Lilongwe, the Capital city of Malawi. This health-care facility was founded by Korean missionaries and operates under the Christian Health Association of Malawi. It offers health-care services in its 200-bed capacity hospital and trains nurses and midwives. The inclusion criteria for the study were HCWs or nursing students in one health-care facility who were able to read or speak English or the local language Chichewa. The sampling frame included men and women between 18 and 50 years of age. The investigators advertised to recruit subjects through notices posted at DLH strategic sites and through announcements at the morning devotions for college and hospital staff.

Data collection

We invited both nursing students and HCWs who felt comfortable with answering the health survey questions to participate. All the documents, including the informed consent and health survey, were available in both English and Chichewa. The English versions of informed consent form and health survey were translated into Chichewa and then the translated versions were back-translated into English. The translators were bilingual experts who were familiar with the study content and everyday language, culture and health of Malawians. To ensure the survey was administered in a standardized manner, the data collectors were trained for 16 h in the process of conducting the research. After we obtained the participants' consent, bilingual nursing faculty or registered nurses administered the self-administered survey in local Chichewa language or English based on participant preference. The survey was administered during work hours and took approximately 15–20 min to complete.

Measures of knowledge and attitudes toward HIV, hepatitis B virus, and hepatitis C virus infections

The HIV/AIDs, HBV, and HCV-related knowledge scales were developed by modifying several existing survey tools.[20,21] Knowledge about HIV/AIDs consisted of 15 questions, HBV 9 items, and HCV 9 items. The items involved questions about transmission, risk factors, and prevention of diseases. All items could be answered with responses of "Yes," "No," or "Don't know (DNK)" with the correct and incorrect response score as 1 and 0, respectively and were summed on 15, 9, and 9 scores for HIV/AIDS, HBV, and HCV. Sample questions are listed in Tables 1 and 2. Attitude scales were developed to assess emphatic, acceptance, and avoidance behavior.[22,23] Items measuring attitudes toward HIV, HBV, and HCV consisted of the same eleven questions that could be answered with "Agree," "Not agree," or "DNK."

The survey instruments were content validated by reference to health literature on HIV, HBV, and HCV infection in African and Malawian populations. The items to measure knowledge of HIV, HBV and HCV were drawn from literature review of African American or African targeted studies and were then reviewed by key investigators who have expertise in hepatitis and HIV prevention and by Malawian researchers. This was done to ensure not only that the content of the instruments was psychometrically validated but also that they were culturally and linguistically sensitive to Malawians. In addition, the instruments were reviewed and modified by Malawian HCWs to improve their clarity, and address common misunderstandings about the sources of HIV, HBV, and HCV infection such as kissing

Table 1: Knowledge about HIV, HBV, and HCV in Malawi Health-care Workers ($n=194$)

Categories of HIV			
Questions/responses	**Yes (%)**	**No (%)**	**DNK (%)***
People can get HIV via unprotected sexual intercourse	98.4	1.0	0.5
People can get HIV via receiving a blood transmission from an infected	99.0	1.0	0
People can get HIV via sharing needles for injections	97.4	1	1.6
People can get HIV via tattoos or ear piercing	78.8	10.9	10.4
People can get HIV via living with a person with AIDs.	96.4	1	2.6
People can get HIV via sharing plates, cups, and utensils	95.3	1.6	3.1
People can get HIV via sitting in a hot tub or a swimming pool	94.3	1.6	4.1
People can get HIV via mosquitos and other insects	91.1	6.3	2.6
People can get HIV via Kissing	57.0	30.1	13
People who have been infected with HIV quickly show serious signs of being infected.	83.9	3.6	12.4
There is a vaccine that can stop getting HIV.	84.5	4.1	11.4
A woman cannot get HIV if she has sex during her period	79.8	5.2	15
People can get HIV through the air (coughing or staying in the same room as someone infected	97.9	0.0	2.1
Categories of HCV			
People can get HCV via hugging a person with HCV	52.8	9.8	37.3
People can get HCV via sharing plates, cups, and utensils	49.7	13.5	36.8
People can get HCV via receiving a blood transmission from an infected donor	65.8	4.7	29.5
People can get HCV via sexual intercourse	47.9	13.2	38.9
People can get HCV via sharing needles while injecting	56.5	14.5	29
People can get HCV via kissing	37.3	18.7	44
People can get HCV via tattoos or ear piercing	42	14	44
People can get HCV from being born to a mother with HCV infection	42	12.4	45.6
There is a vaccine that can stop getting HCV	63.7	7.8	28.5
Categories of HBV			
People can get HBV via their genes (heredity)	31.6	20.7	47.7
People can get HBV via the air (coughing or staying in the same room as someone infected)	46.6	15.0	38.3
People can get HBV via sharing spoons or bowls for food	50.3	13.5	36.3
People can get HBV via shaking hands	58.5	10.9	30.6
People can get HBV via sexual relationships	44.6	16.6	38.9
People can get HBV via the birth process from the HBV infected mother	48.7	8.8	42.5
People can get HBV via sharing toothbrushes	55.4	9.3	35.2
People can get HBV via sharing needles for injections or tattoos	60.6	5.7	33.7
HBV is infectious	63.2	5.2	31.6

*Yes means correct knowledge and no means incorrect knowledge. DNK: Don't know

Table 2: Attitude towards HIV, HBV, and HCV in Malawi Health-care Workers ($n = 194$)

Categories of Co-Infections	HIV (%)			HCV (%)			HBV (%)		
Questions/responses	Agree	Disagree	DNK*	Agree	Disagree	DNK*	Agree	Disagree	DNK*
I would feel uncomfortable to take care of patients with	90.2	7.8	2.1	70.5	14.5	15.0	67.4	15.5	17.1
I would feel uncomfortable sitting next to a person with	98.4	1.0	0.5	67.9	12.4	19.7	70.8	10.4	18.8
I would feel uncomfortable sharing a room with a person with	96.9	3.1	0.0	64.8	13.0	22.3	64.2	14.5	21.2
I would feel uncomfortable to being treated by a person with	89.6	8.3	2.1	63.7	15.5	20.7	60.6	22.3	17.1
I would feel uncomfortable eating the meals prepared by a person with	96.9	2.1	1.0	66.8	14.0	19.2	66.8	13.0	20.2
A person living with HIV/AIDs or HCV or HBV deserves what she or he gets	52.4	33.5	14.1	42.0	32.6	25.4	47.7	26.9	25.4
A person living with HIV/AIDs or HCV or HBV should be isolated	99.5	0.5	0.0	62.0	14.6	23.4	48.4	18.8	32.8
A person living with HIV/AIDs or HCV or HBV should feel ashamed of him/herself	98.4	0.5	1.0	80.8	1.0	18.0	83.0	1.0	15.0
Only promiscuous people get	76.7	15.0	8.3	66.7	5.2	28.1	67.4	4.1	28.5
I feel empathetic towards people with	71.4	24.5	4.2	61.7	19.2	19.2	58.6	20.9	20.4
I am willing to share a room with a person with	89.6	7.8	2.6	53.4	22.3	24.4	55.4	22.8	21.8

*DNK: Don't know

and mosquito bites. Internal consistency of the knowledge items on the HIV, HCV, and HBV is 0.70, 0.83, and 0.87, and "attitude" items are 0.46, 0.83, and 0.89.

Statistical analysis

All statistical analyses were performed using SPSS version 20 (SPSS Inc., Chicago, IL, USA). The alpha level was set at 0.01 to determine statistical significance. Descriptive statistics were computed for all variables for the full sample of subjects. Data analysis included means, standard deviation, and range to describe levels of knowledge and attitude. Chi-square was used to examine differences among occupational categories. One-way analysis of variance (ANOVA) was conducted to compare means in knowledge and attitudes across the three groups of HCWs. *Post hoc* Bonferroni-corrected $P < 0.017$ (0.05/3 groups for comparison) were considered to indicate statistical significance for multiple comparisons across the three groups.

Results

A total of 199 Malawian HCWs participated in the study. Five participants are not included in the final data analysis because of a high rate of missing data in multiple questions. The report of this study is based on a total of 194 participants. The demographic characteristics of the 194 Malawian HCWs are given in Table 3. HCWs were categorized into three groups: (1) health-care professional including a physician, nurses, and physician assistants; (2) nursing students; (3) support staff including laundry workers, building caretaker, security guard, cafeteria cook, and kitchen helper. The majorities (74%) used the English survey and were female (63%). The mean age of respondents was 29.5 years, and 50% were married. The employment status of the participants is as follows:

Table 3: Sociodemographic Characteristics of Health Care Workers ($n = 194$)

Socio-demographics	%
Type of questionnaire answered	
English	74.2
Chichewa	25.8
Gender	
Female	63.4
Male	36.6
Occupation	
Support Staff	41.1
Student Nurses	37.3
Healthcare Professionals	21.6
Marital Status	
Married	50.0
Single	47.9
Widow	2.1
Monthly Family Income	
< $60	9.5
$60-$100	21.6
$100-$200	38.5
$200-$400	18.2
>$400	12.2
Age	29.49±8.95

41% support staff, 37.3% nursing students, and 21.6% professional health-care providers (HCPs). Only 12.2% reported their monthly family income was higher $400 while 31.1% reported income of less than $100 per month.

Knowledge about HIV/AIDS, hepatitis B virus, and hepatitis C virus infections

HIV/AIDS knowledge score on a scale of 0–15 was high (13.4 ± 1.9; range 2–15); however, the HBV and HCV knowledge scores were moderately adequate HBV (4.5 ± 3.1; range 0–9) and HCV (4.7 ± 2.9; range 0–9). The means scores on the HIV, HCV, and HBV knowledge items were

different among HCW subgroups: HIV knowledge was 14.3 for HCPs; 13.5 for nursing students, and 12.7 for support staff; HBV knowledge was 6.9 for HCPs; 4.5 for nursing students; 3.3 for support staff; and HCV knowledge was 6.6 for HCPs; 5.0 for nursing students; and 3.3 for support staff [Table 4]. One interesting finding was that responses of "DNK" were significantly higher for HBV (range 31%–48%) and HCV (29%–46%) than for HIV/AIDS (0%–13%). The extent of knowledge about HBV, and HCV is limited among all groups, but especially among service staff.

Attitudes toward HIV/AIDS, hepatitis B virus, and hepatitis C virus

Attitude scores, as measured on a scale of 0–10, were mainly positive. The mean scores on attitude toward HIV, HCV, and HBV were; 10.0, 8.3, and 8.2 for HCPs; 9.9; 8.0; and 7.9 for student nurses; and were 9.1; 5.7; and 5.5; and for support staff. The positive attitude scores indicated a high degree of empathy toward patients with HIV/AIDs. Answering the questions with a response of "DNK," remained a concern, as indicated by this response to HIV (0%–14%), to HBV (16%–33%), and to HCV (15%–28%).

Differences in Knowledge and Attitude among Health-care workers

Across all subgroups of HCWs, there is less knowledge about HBV and HCV than HIV. A series of one-way ANOVAs revealed significant differences in knowledge about HIV among HCWs ($F = 10.09$, $P = 0.002$), HCV ($F = 21.36$, $P = 0.002$), and HBV ($F = 21.87$, $P < 0.001$). A significant difference was also observed in attitudes toward HIV ($F = 10.36$, $P = 0.031$), HCV ($F = 12.20$, $P < 0.001$), and HBV ($F = 12.33$, $P < 0.001$). When further examining differences between each pair of groups using Bonferroni multiple comparisons, the *post hoc* analysis revealed that HCPs had significantly higher knowledge and more positive attitudes related to HIV, HBV, and HCV than support staff ($P < 0.001$). HCPs also had significantly higher HBV and HCV knowledge than students ($P < 0.001$ and $P = 0.006$, respectively). Support staff had significantly more negative attitudes toward the three infectious diseases than HCPs and students. Support staff also had less HCV knowledge than students.

Discussion

HCWs in Malawi face an enormous challenge in dealing the impact of HIV, HBV, and HCV epidemic, largely because of the high workload, chronic staff shortages, and the suboptimal protection of HCWs against these diseases in the workplace. This was the first study; we were aware of that directly compare knowledge and attitudes toward the three infectious diseases of HIV, HBV, and HCV by occupations of HCPs, nursing students, and service staff. In this study, as we expected, we did not find a significant difference in knowledge of infectious diseases between HCPs and nursing students but did find a significant difference between service staff either HCPs or students. However, we were surprised to find that while there was a more positive attitude toward HIV than toward HCV and HBV across the three groups; support staffs' attitudes were more negative than either the students or HCPs. It is plausible that the lower level of knowledge of the service staff about these diseases resulted in their negative attitude toward the three infectious diseases and highlights the need for health education intervention for this group.

The study also found out that knowledge of HIV/AIDS was high among HCWs. This finding is similar to the Malawi Demographic Health Survey findings where it was reported that awareness of AIDS among women and men in Malawi was 99%.[8] The knowledge of HIV is expected to be high in a country that has HIV an epidemic, and that conducts community sensitization and mobilizations for HIV prevention through various educational methods and approaches to change health behaviors. Various national media and community radio stations are also involved in disseminating information on HIV/AIDS in many languages. Although HIV knowledge in our study is very

Table 4: Knowledge and Attitude about HIV, HBV and HCV ($n = 194$)

	Mean±SD (Range)				ANOVA		*P*		
							Post Hoc Tests (Bonferroni)		
	Health care professionals	Student Nurses	Support staff	Overall	*P*	*F*	SS vs. Student	SS vs. HCP	Student vs.HCP
HIV Knowledge	14.28±0.93 (11-15)	13.54±1.61 (6-15)	12.71±2.31 (2-15)	13.36±1.92 (2-15)	0.002	10.09	0.021	<0.001	0.141
HIV Attitude	10.10±0.93 (7-11)	9.85±1.21 (6-11)	9.09±1.45 (3-11)	9.60±1.33 (3-11)	0.031	10.36	0.001	<0.001	0.975
HCV Knowledge	6.63±2.06 (0-9)	4.99±2.63 (0-9)	3.32±2.87 (0-9)	4.67±2.90 (0-9)	0.002	21.36	0.001	<0.001	0.006
HCV Attitude	8.35±2.80 (0-11)	8.03±2.86 (0-11)	5.72±3.85 (0-11)	7.16±3.48 (0-11)	<0.001	12.20	<0.001	<0.001	1
HBV Knowledge	6.88±1.79 (0-9)	4.48±2.73 (0-9)	3.32±3.17 (0-9)	4.52±3.05 (0-9)	<0.001	21.87	0.036	<0.001	<0.001
HBV Attitude	8.15±2.77 (0-11)	7.93±2.96 (0-11)	5.50±3.91 (0-11)	7.01±3.54 (0-11)	<0.001	12.33	<0.001	<0.001	1

SS=Support staff; HCP=Healthcare professionals

high, some gaps and misconceptions about it still exist. Answers to items such as "by tattoos or ear piercing (79%), sex during her period (80%), or by kissing (57%)" reveal areas where lack of education in HCWs in Malawi exists.

The literature reviewed indicated that stigmatization related to HIV is pervasive and negative attitudes toward carriers of HIV/AIDs are commonplace in Malawi.[24-31] Our study, however, interestingly found that stigmatization or discrimination toward HIV/AIDs carriers was low. HCPs' attitudes were characterized by empathy and compassion. These findings though are in line with the earlier studies from other Sub-Saharan countries where positive attitudes toward HIV/AIDs among HCPs exist.[28,32] This difference between our findings of very high positive attitudes toward HIV among HCPs and findings of high stigma in the general population may be a result of social desirability bias. It may be also, however, being the reluctance of HCPs to openly share their true feelings in caring HIV/AIDs patients. However, although attitudes of HCWs were mainly positive, there are areas of concerns related to answers to items such as "A person living with HIV/AIDs deserves what she or he gets (52%)" and "Only promiscuous people get HIV/AIDS (77%)." Results of this study show that although overall attitudes toward HIV/AIDs are positive, there are still misconceptions toward HIV/AIDs among HCPs that may have a negative impact in caring for HIV/AIDs patients. This finding also highlights that the variability produced by these two items might cause low-reliability estimates for HIV compared to HBV and HCV. We consider that this is an important finding because it may help in explaining the reluctance of HCPs to openly share their true feelings about HIV which could result in these apparently contradictory findings.

Limitations

The study has several limitations that are common to all studies that use nonprobability sampling and are limited to one site/health care setting. The first limitation is a lack of external validity because we used volunteers from limited geographic areas was used. The second limitation is a lack of variable control which includes the interview settings and the participants' mood which might have influenced their responses to the interview questions. Furthermore, the presence of data collectors during the administration of the survey may have made the participants feel compelled to provide socially acceptable responses.

Conclusion

The data revealed a fair level of knowledge among HCWs in Malawi with the highest level of knowledge among the HCPs and the lowest among the service staff. Interestingly, there were not positive attitudes toward HBV and HCV compared with HIV/AIDs across all HCWs and even more negative attitudes among the service staff. This study highlights the ongoing need to reduce negative attitudes toward HIV, HBV, and HCV and providing health education among HCWs, especially focusing on HBV and HCV prevention. Understanding knowledge about and attitudes toward these infectious diseases among HCPs is the first step in improving health education and health-care services to both the patients and HCVs. The findings of the study can be used to develop interventions addressing HIV, HBV, and HCV-related knowledge and attitudes for HCPs, which in turn will help to prevent or reduce HIV, HBV, and HCV infection. Finally, the fidelity of attitudes toward HIV infection data obtained by self-reporting is a concern because of social desirability and the under-reporting of negative attitude. Thus, more studies are needed to identify strategies to enhance the reliability of self-reported attitudes toward HIV infection.

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Conflicts of interest

There are no conflicts of interest.

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