

Exploring public knowledge and attitudes towards HIV/AIDS in Saudi Arabia

A survey of primary health care users

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ABSTRACT

Objectives: To assess the knowledge and attitudes towards HIV/AIDS among the general public in Riyadh city, Saudi Arabia.

Methods: The study employed self-administered questionnaires to collect data from individuals aged 15 years or older who attended Primary Health Centers (PHC) in Riyadh City. In addition to demographic characteristics, the questionnaire was designed to collect data on a number of statements including basic knowledge about HIV/AIDS, its mode of transmission and people's attitudes and source of information about the disease. The questionnaires were distributed randomly to 500 persons (250 males and 250 females) during November and December 2004. Data were analyzed in a descriptive fashion.

Results: Although the majority of respondents correctly identified the main modes of HIV/AIDS transmission, there is a relative deficiency in their

knowledge about the disease. Moreover, their attitudes towards HIV/AIDS and infected persons were defective. The results indicate that this deficiency in knowledge and attitudes was associated with some of their demographic characteristics such as their gender, level of education, ages and nationality. Furthermore, the results show that the contribution of health staff and educational institutions was limited in providing the public with information about this health problem.

Conclusion: Although the prevalence of HIV/AIDS in Saudi Arabia is low, health care providers in general, and PHC centers in particular, should be involved in intensive educational programs as a part of their professional mission to help the general public acquire appropriate knowledge and attitudes towards HIV/AIDS. This will help in preventing the spread of this health problem.

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Today, HIV and the AIDS are among the most complex health problems. Since HIV/AIDS was discovered in the early 1980s, enormous efforts to control its spread were made. Despite progress made toward prevention and treatment, HIV/AIDS is still one of the major problems that threaten human life.¹ The HIV/AIDS prevalence is widely discussed and debated in scientific, medical and

public health forums.² In 2003, AIDS killed more than 3 million people, and an estimated 5 million more became infected, bringing to some 40 million the number currently living with the virus.³ Recent reports by the United Nations Program on AIDS (UNAIDS) indicate that more than 20 million have already died since the first clinical evidence of the disease was reported in 1981.^{3,4}

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Virtually no country in the world remains unaffected, and the Kingdom of Saudi Arabia is no exception. Generally, the status of the HIV/AIDS epidemic in the Kingdom, as well as in other Islamic countries, is not yet clearly defined. This is probably due to the lack of reliable data and the absence of published surveillance data on such a sensitive issue. Islam forbids risky behaviors such as homosexuality, intravenous drug use and sexual intercourse outside marriage, which are considered the main routes to the disease. Therefore, the prevalence and incidence of HIV/AIDS are expected to be low in Islamic communities.³

Data on HIV epidemiology in Saudi Arabia were found in a study carried out by Madani et al.,⁵ which indicates that from 1984 through 2001 a total of 6,046 HIV infections were diagnosed, of which 1,285 (21.3%) cases were among Saudi citizens and the remaining cases were among expatriates. The authors report that 157 (12.2%) of Saudi patients and 600 (12.6%) of non-Saudi patients had AIDS at the time of HIV diagnosis. Studies identify that heterosexual contact, blood transfusion, perinatal transmission, organ transplantation and intravenous drug use were the most common modes of transmission of the disease in the Kingdom.^{3,6} Data on HIV/AIDS from neighboring countries are scarce which makes comparison difficult. However, there is a belief that the prevalence of HIV/AIDS in Islamic countries is low.⁷⁻¹¹

Until recently there was no worry about public awareness on HIV/AIDS in Saudi Arabia. But since the rising epidemic of the disease, the issue became an important public health concern. Nowadays, Saudi Arabia shares with the world community a serious concern and a consequent determination to prevent the spread of the disease. Moreover, it is required by the Saudi authorities that expatriates must undergo blood tests to determine HIV status in their home countries prior to their employment and these tests are repeated upon arrival in the Kingdom. Furthermore, routine screening of blood, blood products, organ donors, intravenous drug users and patients with other sexually transmitted infections for HIV has been a standard procedure in Saudi Arabia since 1986.⁵ It is anticipated that these policies and procedures, beside others, will limit the prevalence of HIV/AIDS infection in the community.

In the literature, there are several studies which assess the knowledge and attitudes of the population towards HIV/AIDS. These studies were conducted in countries with different cultures and values.^{8,12-16} Furthermore, studies on HIV/AIDS in Saudi Arabia are limited and were restricted to specific population groups such as physicians,¹⁷ students^{8,19} and drug users.²⁰ An important starting point for designing proper prevention strategy is to know how much the general public know about HIV/AIDS and what are

their attitudes towards this infectious disease. An understanding of the extent of knowledge, attitudes of the population about this issue assumes significance in evaluating the impact of HIV/AIDS awareness measures taken so far in Saudi Arabia and developing effective strategies for HIV/AIDS prevention in the future. Therefore, the main objectives of this study were: 1. To assess knowledge and attitudes of the general public about HIV/AIDS, 2. To determine sources of information on HIV/AIDS among the general public and, 3. To determine whether people's knowledge, attitudes and source of information on HIV/AIDS differ according to their demographic characteristics.

Methods. Given the fact that everyone in the community could be affected by HIV/AIDS regardless of their demographic characteristic (gender, age, education, nationality and marital status), the concern of this study has focused on adult persons attending the Primary Health Care (PHC) facilities. The PHC centers in Saudi Arabia are community health facilities where the general public are able to attend and where educational and prevention services are provided. Thus, by choosing the PHC centers as a site to carry out this study, it is assumed that a more representative sample would be obtained from these facilities. To serve the purpose of this study, Riyadh city was divided into 5 areas, East, West, North, South and Central. From each geographical area one PHC center was selected by simple random sampling. From each of the selected 5 PHC centers a systematic random sample of 100 users (50 males and 50 females) were asked to participate in the study. The sample consisted of 500 persons distributed equally among the 5 PHC centers.

The data were collected by self-administered questionnaire. The questionnaire was divided into 5 sections with a total of 28 items. Section I included questions on demographic characteristics (5 items). Section II consisted of questions on knowledge about HIV/AIDS mode of transmission (10 items). Section III consisted of statements regarding respondents' attitude towards HIV/AIDS (5 items). In section IV, respondents were asked about their source of information about the disease (5 items). Finally, section V included questions about the degree to which respondents had discussed HIV/AIDS with family, friends and health staff (3 items). The responses for items on knowledge were in "true" and "false" form and for items on attitudes a 5-point Likert scale ranging from "strongly disagree" to "strongly agree" were used. Items on respondents' source of information were scored on a 5-point Likert scale ranging from "none" to "very much." Similarly, items on discussions of HIV/AIDS were scored on a 5-point Likert scale ranging from "never" to "always". Several steps

were taken to increase the content validity of the questionnaire. Firstly, a review of the relevant literature was carried out in order to select some knowledge and attitudinal statements. Secondly, 2 specialists in infectious diseases and 2 academic staff reviewed the questionnaire and their suggestions were taken into consideration. Finally, a pilot survey of 40 adult persons (20 males and 20 females) was conducted. On the basis of the outcome of the pilot survey, a few questions were reformed and others were excluded. The pilot survey questionnaires were not included in the main survey. The covering letter of the questionnaire outlined the title and the purpose of the study and the identity of the researcher. Patients were informed about the importance of the study and were encouraged to participate. All participants were informed on the issue of anonymity, and no identifying information was included on the questionnaire. The data for this study were collected by a group of health services administration students and were analyzed in a descriptive fashion using the Statistical Package for Social Sciences.

Results. Respondents characteristics. Table 1 shows the general profile of the 500 respondents included in the study. Demographic variables indicate that the study sample was split between males and females and that most of the respondents were Saudis (68.8%), married (64%) and more than 60% had an educational level of secondary school or higher. The largest proportion of respondents was 45 years old or less (78.8%) with a mean age of 34.9 years (SD = 14.4) ranging from 15-69.

Respondents' general knowledge. Table 2 shows that the vast majority of respondents knew that HIV/AIDS could be transmitted through sexual contact, receiving blood transfusion and sharing needles or sharp tools. Three-quarters of respondents answered in the affirmative to the statement that a person can get HIV infection "through dentistry tools." A considerable percentage of respondents, however, mistakenly answered that HIV/AIDS can be transmitted "through sharing food utensils" and "sharing toilet seats with an infected person". Just below 10% of respondents mistakenly answered that HIV/AIDS can be transmitted by "touching or shaking hands of an infected person" and that "exposure to coughing or sneezing of an infected person can transmit the disease."

Gender of respondents differs significantly in knowledge about methods of contracting HIV infection. Males responded more correctly in this regard than females. For instance, males were more likely to respond correctly to such questions as HIV cannot be transmitted through the use of food utensils ($\chi^2 = 18.294, p < 0.001$), touching or shaking hands ($\chi^2 = 5.792, p < 0.05$) and sharing toilet seats

($\chi^2 = 16.941, p < 0.001$). Similarly, males were more likely to respond correctly to the statement that HIV can be transmitted through receiving blood transfusion from someone who has HIV/AIDS than females ($\chi^2 = 6.144, p < 0.05$).

Significant differences also emerged in relation to respondents' ages with younger respondents (15-45 years) performing better in all "correct" answers of mode of transmission of the disease than older respondents (>45 years). They were more likely to respond correctly to the statements that HIV can be transmitted through infected blood ($\chi^2 = 6.435, p < 0.05$), sharing needles or sharp tools ($\chi^2 = 20.981, p < 0.001$), sex relations with an infected person ($\chi^2 = 21.776, p < 0.001$), through infected mother to child during pregnancy ($\chi^2 = 19.724, p < 0.001$) and by contaminated dentistry tools ($\chi^2 = 14.181, p < 0.001$). Respondents older than 45 years of age showed significantly more knowledge about what cannot transmit HIV than younger respondents. They were more knowledgeable about statements that mosquito bites ($\chi^2 = 4.817, p < 0.05$) and sharing toilet seats ($\chi^2 = 5.596, p < 0.05$) cannot transmit the disease.

Significant differences were also revealed in relation to respondents' level of education, nationality and marital status. In all statements, respondents with lower level of education were more likely to answer the questions incorrectly. While Saudis were more likely to respond incorrectly to the statement that HIV can be transmitted through mosquito bites ($\chi^2 = 16.947, p < 0.001$), non-Saudis were less likely to respond correctly to the question that HIV can be transmitted

Table 1 - Demographic characteristics of respondents.

Characteristics	n (%)
Gender	
Males	250 (50)
Female	250 (50)
Age	
15-25	150 (30)
26-35	145 (29)
36-45	104 (20.8)
>45	101 (20.2)
Nationality	
Saudi	344 (68.8)
Non-Saudi	156 (31.2)
Marital status	
Married	320 (64)
Unmarried	180 (36)
Education	
Illiterate	74 (14.8)
Primary/intermediate	124 (24.8)
Secondary	228 (45.6)
University and higher	74 (14.8)

Table 2 - Respondents' general knowledge of HIV/AIDS.

Statements	Yes	No
	n (%)	n (%)
HIV/AIDS can be contracted through		
Mosquito's bites	85 (17)	415 (83)*
Sharing food utensils with an infected person	113 (22.6)	387 (77.4)*
Shaking hands with an infected person	49 (9.8)	451 (90.2)*
Exposure to coughing or sneezing of an infected person	46 (9.2)	454 (90.8)*
Sharing toilet seats with an infected person	109 (21.8)	391 (78.2)*
Receiving a blood transfusion from an infected person	432 (86.4)*	68 (13.6)
Sharing needles or sharp tools with an infected person	411 (82.2)*	89 (17.8)
Sexual relations with an infected person	481 (96.2)*	19 (3.8)
From infected mother to child during pregnancy	392 (78.4)*	108 (21.6)
Contaminated dentistry tools	375 (75)*	125 (25)
*indicates correct answers		

Table 3 - Respondents' attitudes towards HIV/AIDS.

Statements	Mean \pm SD	Agree* %
People with HIV/AIDS should be kept isolated from public places (schools, workplaces, and so forth)	2.52 \pm 1.21	28.4
People with HIV/AIDS should inform others about their disease	4.20 \pm 1.06	82.8
Testing for HIV/AIDS should be made as a law before marriage	4.20 \pm 0.89	78.8
I would end my friendship with infected persons	3.52 \pm 1.41	52
AIDS-related topics should be added to schooling curricula	4.48 \pm 0.72	86.4

Table 4 - Respondents' source of information about HIV/AIDS.

Source of information	None n (%)	Little n (%)	Much n (%)	Mean \pm SD
Television	2 (0.4)	32 (6.4)	466 (93.2)	4.61 \pm 0.66
Radio	34 (6.8)	372 (74.4)	94 (18.8)	2.74 \pm 8.84
Newspapers	174 (34.8)	312 (62.4)	14 (2.8)	1.88 \pm 0.79
Posters and signs	390 (78)	60 (12)	50 (10.0)	1.54 \pm 1.16
Schools/university	360 (72)	140 (28)	- (0.0)	1.28 \pm 0.46

Table 5 - Respondents' source of discussion about HIV/AIDS.

Source of discussion	Never/rarely n (%)	Sometimes n (%)	Often/Always n (%)	Mean \pm SD
Family	466 (93.2)	34 (6.8)	-	1.07 \pm 0.27
Friends	413 (82.6)	71 (14.2)	16 (3.2)	1.21 \pm 0.48
Health staff	452 (90.4)	48 (9.6)	-	1.12 \pm 0.39

through exposure to coughing or sneezing of an infected person ($\chi^2 = 4.216, p < 0.05$) and through sex relation with an infected person ($\chi^2 = 11.179, p < 0.05$). Unmarried respondents were more likely to respond correctly to the statements that HIV cannot be contracted through touching or shaking hands ($\chi^2 = 8.204, p < 0.05$) and through the dentistry tools ($\chi^2 = 7.234, p < 0.05$). On the contrary, married respondents were more likely to respond correctly to the statement that HIV cannot be transmitted through mosquito bites ($\chi^2 = 10.238, p < 0.05$).

Respondents' attitudes. Table 3 presents the results on attitudes to HIV/AIDS. Findings revealed that over 80% agreed that the infected HIV/AIDS persons should inform others about their disease and more than half of the respondents indicated that they would end their friendship with HIV/AIDS-infected persons. More than a quarter of the respondents agreed with the statement that people with HIV/AIDS should be kept out from public places such as schools and workplaces. Other attitudes regarding HIV/AIDS were expressed by the respondents. For example, more than three-quarters of the respondents agreed that testing for HIV/AIDS should be made as a law before marriage and more than 85% of the respondents agreed that HIV/AIDS-related topics should be added to schooling curricula.

There were no significant differences between respondents according to their gender, age (15-45 versus >45 years) and educational level (lower than secondary school versus secondary school or higher) in all statements about attitudes to HIV/AIDS disease. However, there was a significant difference between respondents according to their nationality and marital status regarding some attitudinal statements. For instance, non-Saudis had a significantly lower mean score (3.29) than Saudis (3.62) in the statement that they would end their friendship with HIV/AIDS-infected persons (t -test = 2.381, $p < 0.05$) and married respondents had a significantly higher mean score (4.29) than unmarried respondents (4.04) in the statement that testing for HIV/AIDS should be made as a law before marriage (t -test = -2.966, $p < 0.05$).

Respondents' source of information. Table 4 shows that more than 90% of the respondents indicated that television (TV) had contributed much to their knowledge about HIV/AIDS while approximately 75% and 60% of the respondents indicated that radio and newspapers had contributed a little to their knowledge about the disease. Approximately three-quarters of the respondents indicated that none of the posters or signs and schools or universities had contributed to their knowledge about the disease. Moreover, Table 5 shows that more than 90% of the respondents had rarely or never discussed HIV/AIDS with their families, a similar percentage of the respondents had

rarely or never discussed HIV/AIDS with health staff and more than 80% had rarely or never discussed HIV/AIDS with their friends.

Gender of respondents differs significantly according to the source of information about HIV/AIDS. Males had a significantly higher mean score (2.06) than females (1.7) in receiving information from newspapers (t -test = 5.202, $p < 0.001$). Moreover, males had a significantly higher mean score (1.34) than females (1.22) in receiving information from schools or universities (t -test = 2.938, $p < 0.05$). On the contrary, female respondents had a significantly higher mean score (4.74) than males (4.48) in receiving information from TV (t -test = -4.440, $p < 0.001$). Young respondents (15-45 years old) had a significantly higher mean score (4.65) than older respondents (>45 years) (4.48) in receiving information from TV (t -test = 2.212, $p < 0.05$). Comparing respondents according to their nationality it was found that Saudis had a significantly higher mean score (4.65) than non-Saudis (4.51) in receiving information from TV (t -test = 2.147, $p < 0.05$). Respondents with education less than secondary school had a significantly higher mean score (4.69) than respondents with secondary school or higher (4.55) in receiving information from TV (t -test = 2.425, $p < 0.05$). Moreover, respondents with education less than secondary school had a significantly higher mean score (2.84) than respondents with secondary school or higher (2.68) in receiving information from radio (t -test = 2.197, $p < 0.05$), but respondents with secondary school or higher had a significantly higher mean score (1.94) than their counterparts (1.77) in receiving information from newspapers (t -test = -2.367, $p < 0.05$). Findings about discussing HIV/AIDS with family, friends and health staff revealed that males had a significantly higher mean score (2.10) than females (1.82) in discussing the disease with friends (t -test = 4.319, $p < 0.001$). Non-Saudis had a significantly higher mean score (1.19) than Saudis (1.09) in discussing the disease with health staff (t -test = -2.210, $p < 0.05$) and married respondents had a significantly highest mean score (2.03) than unmarried (1.84) in discussing the disease with friends (t -test = -2.569, $p < 0.05$).

Discussion. This study provides descriptive information on knowledge about HIV/AIDS among the general public in Riyadh city, Saudi Arabia. The significance of this study is that it was carried out in primary health care centers where the general public, despite their demographic characteristics, normally attend for their health care. Health authority and policy makers in the Kingdom could benefit from its result by enhancing the general knowledge of the public about HIV/AIDS. However, the fact that this study was only

conducted in a single city makes its results unrepresentative of the general population.

The results of this study revealed a significant difference in knowledge, attitudes and source of information about HIV/AIDS according to the selected demographic characteristics of the respondents. It has been reported that there should be no difference between individuals in knowledge about a disease that is transmitted to all, not respecting race, color or gender.²¹ Therefore, efforts should be given to remove inequalities in knowledge about this infectious disease among the population. The results provide evidence that most of the respondents correctly identify the main routes of HIV/AIDS infection. This could be explained by the fact that the awareness of the HIV/AIDS in the Saudi society is relatively high, particularly with the presence of the media. However, respondents reported some misconceptions on how HIV/AIDS is transmitted, for example, by mosquito's bites, sharing food utensils, shaking hands, coughing or sneezing, sharing toilet seats, and so forth. These findings are in line with the findings reported from neighboring countries;²²⁻²⁴ as well as studies conducted in the West.^{13-15,21,22,25,26}

In this study, there was a substantial negative attitude to HIV/AIDS-positive patients. More than half of the respondents expressed that they would terminate their friendship with infected persons. This finding may be explained by the fact that some people in the Saudi society link HIV/AIDS infection with the stigma of adultery and intravenous drug use. Such negative attitudes were reported, although at lower percentages, in other studies.^{7,21,27} Merakou et al.²⁷ for example, identified that only 5% of the respondents expressed that they would terminate their friendship with infected persons. Similarly, the findings of the present study indicate that more than a quarter of the respondents reported that people with HIV/AIDS disease should be kept isolated from public places (for example, schools, workplace, and so forth). This finding suggests that more negative attitudes tended to be associated with greater fear of contagion. Such finding agrees with other studies. For example, a study conducted in Iran⁷ found that approximately half of the respondents expressed that an infected person should not be allowed to enter schools. These findings contradict the results reported by a study in Turkey²¹ which found that about half of the respondents believed that people with HIV/AIDS should be able to attend school and should not have to stop working.

In this study, the principle respondents' source of information about HIV/AIDS was TV. This was followed by radio and newspapers. This finding is consistent with the findings reported earlier.^{21,28} It has been reported that in a country, where people are not in the habit of reading, visual methods may

be a more effective way to launch an effective educational program about HIV/AIDS.²¹ Generally, studies showed the importance of visual media in increasing the people's knowledge about HIV/AIDS.^{25,29} Our results show that a very high percentage of the respondents had rarely or never discussed the disease with their friends (82%) or families (93%). This may not be surprising since discussions on intravenous drug use or sexual matters in the Saudi society are taboo and diseases such HIV/AIDS are stigmatizing. What is probably surprising is the fact that more than 90% had rarely or never discussed the disease with health staff (for example, doctors, nurses, and so forth). This may question health education activities held in health care facilities such as PHC centers, where health education is considered one of their principles.

The relative deficiency in knowledge of the Saudi society about HIV/AIDS was not only apparent in the respondents' answers to mode of transmission of the disease, but also to statements assessing their attitudes towards HIV/AIDS-infected persons. The level of knowledge on HIV/AIDS and the attitudes of people to patients are important in eradicating the disease.³⁰ Even though the number of HIV cases in Saudi Arabia is still limited, there is a potential for a rapid spread of this virus.⁵ In the absence of an effective treatment or vaccine for HIV/AIDS at present, medical education remains the best way to prevent the infection. This suggests that health facilities, in general and PHC centers in particular, should be involved in intensive health educational programs as a part of their holy mission. In fact, the family, educational institutions and the media can play an important role in preventing the spread of the disease.

Although the findings reported here may be influenced by the inevitable limitations of the study design and the available data, it is believed that the results provide a valuable insight into the people's knowledge and attitudes to HIV/AIDS in Saudi Arabia. One major limitation with this study is that the researcher was restricted in asking questions concerning people's behaviors and beliefs on matters such as sex and drug use. Second, this study does not claim to be comprehensive because the study took place in Riyadh city only. Accordingly, the results may have limited applicability to other cities in the Kingdom. Third, the results reported here are based on information collected by questionnaires and are subject to the usual problems of bias in reporting health care events. However, the questionnaire was anonymous, which should have encouraged accurate and honest self-disclosure. Future research should attempt to address some of the concerns indicated in the limitations. Further investigation, in other cities in the Kingdom, or using a different methodology and data analysis may elicit a greater volume of information about the

general public knowledge and attitudes about this significant topic of Saudi public health.

References

1. Torabi M, Jeng I. Trends of public knowledge and attitudes related to HIV/AIDS in Indiana. *Am J Health Studies* 1999; 15: 203-216.
2. Bigger J. The AIDS problem in Africa. *Lancet* 1986; 1: 79-83.
3. UNAIDS. Joint United Nations Programme on HIV/AIDS (2004). The Media and HIV/AIDS: Making a difference. Available from URL: <http://www.unaids.org/en/resources/publications>.
4. UNAIDS. Joint United Nations Programme on HIV/AIDS (2004) Executive Summary - Report on the global AIDS epidemic. Available from URL: <http://www.unaids.org/bangkok2004/GAR2004.html>.
5. Madani T, Al-Mazrou Y, Al-Jeffri M, Al-Huzaim N. Epidemiology of the human immunodeficiency virus in Saudi Arabia; 18-year surveillance results and prevention from an Islamic perspective. *BMC Infect Dis* 2004; 4: 25-32.
6. Mustard C, Kozyrskiy A, Barer M, Sheps S. Emergency department use as a component of total ambulatory care: a population perspective. *Can Med Assoc J* 1998; 158: 49-55.
7. Taavoosi A, Zaferani A, Enzevaei A, Tajik P, Ahmadi-zhad Z. Knowledge and attitude towards HIV/AIDS among Iranian students. *BMC Public Health* 2004; 4: 17-22.
8. Tebouriski F, Ben Alaya D. Knowledge and Attitudes of high school students regarding HIV/AIDS in Tunisia: Does more knowledge lead to more positive attitudes? *J Adolesc Health* 2004; 34: 161-162.
9. Gray P. HIV and Islam: is HIV prevalence lower among Muslims? *Soc Sci Med* 2004; 58: 1751-1756.
10. Rahman M, Shimu T, Fukui T, Shimbo T, Yamamoto W. Knowledge, attitudes, beliefs and practices about HIV/AIDS among the overseas job seekers in Bangladesh. *Public Health* 1999; 113: 35-38.
11. Khan M. Knowledge on AIDS among female adolescents in Bangladesh: evidence from the Bangladesh demographic and health survey data. *J Health Popul Nutr* 2002; 20: 130-137.
12. Valimaki M. Attitudes of professionals, students and the general public to HIV/AIDS and people with HIV/AIDS: a review of the research. *J Adv Nurs* 1998; 27: 752-759.
13. Serlo K, Aavarinne H. Attitudes of university students towards HIV/AIDS. *J Adv Nurs* 1999; 29: 463-470.
14. Hodgson I. Attitudes towards people with HIV/AIDS: Entropy and health care ethics. *J Adv Nurs* 1997; 26: 283-288.
15. Nwokocha A, Nwakoby B. Knowledge, attitude and behavior of secondary (high) school students concerning HIV/AIDS in Enugu, Nigeria, in the year 2000. *J Pediatr Adolesc Gynecol* 2002; 15: 93-96.
16. Rondahl G, Innala S, Carlsson M. Nursing staff and nursing students' attitudes towards HIV-infected and homosexual HIV-infected patients in Sweden and the wish to refrain from nursing. *J Adv Nurs* 2003; 41: 454-461.
17. Mahfouz A. Knowledge and attitudes towards AIDS among primary health care physicians in Asir region, Saudi Arabia. *JR Soc Health* 1995; 115: 23-25.
18. Abdelmonem I, Khan M, Daffalla A, Al-Ghamdi S, Al-Gamal M. Knowledge and attitudes towards AIDS among Saudi and non-Saudi bus drivers. *East Mediterr Health J* 2002; 8: 716-724.
19. Saleh A, Al-Ghamdi S, Al-Yahia A, Shaqran M, Mosa R. Impact of health education program on knowledge about AIDS and HIV transmission in students of secondary schools in Buraidah city, Saudi Arabia: an exploratory study. *East Mediterr Health J* 1999; 5: 1068-1075.
20. Njoh J, Zimmo S. The prevalence of human immunodeficiency virus among drug-dependent patients in Jeddah, Saudi Arabia. *J Subst Abuse Treat* 1997; 14: 487-488.
21. Savaser S. Knowledge and attitudes of high school students about AIDS: a Turkish perspective. *Public Health Nurs* 2003; 20: 71-79.
22. Al-Jabri A, Al-Abri J. Knowledge and attitudes of undergraduate medical and non-medical students in Sultan Qaboos University toward acquired immune deficiency syndrome. *Saudi Med J* 2003; 24: 273-277.
23. Megeid A, El-Shekh S, El-Ginedy M, El-Araby M. Knowledge and attitudes about reproductive health and HIV/AIDS among family planning clients. *East Mediterr Health J* 1996; 2: 459-469.
24. Al-Ginedy M, El-Sayed N, Darwish A. Knowledge and attitudes of teenage students in relation to sexual issues. *East Mediterr Health J* 1998; 4: 76-80.
25. Borsum K, Gjerno P. Relationship between knowledge and attitudes regarding HIV/AIDS among dental school employees and students. *Eur J Dent Educ* 2004; 8: 105-110.
26. McCann T, Sharkey R. Educational intervention with international nurses and changes in knowledge, attitudes and willingness to provide care to patients with HIV/AIDS. *J Adv Nurs* 1998; 27: 267-273.
27. Merakou K, Costopouo J, Kourea-Kremastinou J. Knowledge, attitudes and behavior after 15 years of HIV/AIDS prevention in schools. *Eur J Public Health* 2002; 12: 90-93.
28. Urgan M, Yanan H. AIDS knowledge and educational needs of technical university students in Turkey. *Patient Educ Couns* 2003; 51: 163-167.
29. Davis C, Noel M, Chan SF, Wing L. Knowledge, attitudes and behaviours related to HIV and AIDS among Chinese adolescents in Hong Kong. *J Adolesc* 1998; 21: 657-665.
30. Binswanger H. Scaling up HIV/AIDS programs to national coverage. *Science* 2000; 23: 2173-2176.