



USAID
FROM THE AMERICAN PEOPLE

DHS WORKING PAPERS

Knowledge about HIV and Discriminatory Attitudes toward People Living with HIV in Pakistan

Rukhsana Khan
Arshia Bilal
Shakira Huma Siddiqui

2017 No. 134

July 2017

This document was produced for review by the United States Agency for International Development.

DEMOGRAPHIC
AND
HEALTH
SURVEYS

Knowledge about HIV and Discriminatory Attitudes toward People Living with HIV in Pakistan

Dr. Rukhsana Khan¹

Dr. Arshia Bilal¹

Dr. Shakira Huma Siddiqui²

ICF

Rockville, Maryland, USA

July 2017

¹Fazaia Medical College, Air University

²Faculty of Social Sciences, Air University

Corresponding author: Dr. Rukhsana Khan, Fazaia Medical College, Air University, email: drukhsanakhan@hotmail.com

Acknowledgments

This research is supported by USAID through ICF. We would like to express our deepest appreciation to USAID and ICF for providing us the opportunity to complete this research. Special gratitude goes to our facilitators Wenjuan Wang and Shireen Assaf, whose stimulating suggestions and encouragement helped us to complete this research paper. We would also like to thank co-facilitators Bupe B. Bwalya and Mulenga C. Mulenga for their thoughtful support. We are grateful to the reviewers Joy Fishel and Bryant Robey for their guidance, reviews, and comments throughout the process.

Editor: Bryant Robey

Document Production: Joan Wardell

The DHS Working Papers series is a prepublication series of papers reporting on research in progress that is based on Demographic and Health Surveys (DHS) data. This research is carried out with support provided by the United States Agency for International Development (USAID) through The DHS Program (#AID-OAA-C-13-00095). The views expressed are those of the authors and do not necessarily reflect the views of USAID or the United States Government.

The DHS Program assists countries worldwide in the collection and use of data to monitor and evaluate population, health, and nutrition programs. For additional information about The DHS Program, contact DHS Program, ICF, 530 Gaither Road, Suite 500, Rockville, MD 20850, USA. Phone: +1 301-407-6500; Fax: +1 301-407-6501; Email: reports@dhsprogram.com; Internet: www.dhsprogram.com.

Recommended citation:

Khan, Rukhsana, Arshia Bilal, and, Shakira Huma Siddiqui. 2017. *Knowledge about HIV and Discriminatory Attitudes toward People Living with HIV in Pakistan*. DHS Working Paper No. 134. Rockville, Maryland, USA: ICF.

Abstract

Background: The current study explored the association between knowledge about HIV and discriminatory attitudes toward people living with HIV in Pakistan. The incidence of HIV among high-risk groups in Pakistan has reached 5% or higher, indicating a concentrated epidemic. However, little evidence is available about the attitudes of the general population toward people living with HIV. People living with HIV fear being stigmatized and anticipate discriminatory behavior from health care providers and the general community. Having incorrect knowledge about HIV leads to more discriminatory attitudes.

Methods: This study is based on secondary analysis of data from the Pakistan Demographic and Health Survey (PDHS) conducted in 2012-13. Ever-married women and men age 15-49 who had heard about AIDS were included in the study. Variables measuring composite knowledge about HIV and discriminatory attitudes were developed and categorized into three groups for the purpose of statistical analysis: no knowledge, some knowledge, and more knowledge. A chi-square test and multinomial regression analysis were performed to see the association between HIV/AIDS knowledge and discriminatory attitudes by background characteristics of the study group.

Results: The study found a statistically significant inverse relationship between knowledge about HIV and discriminatory attitudes toward people living with HIV. That is, having more knowledge about HIV was associated with a lower likelihood of exhibiting a more discriminatory attitude. The likelihood of having a more discriminatory attitude toward people living with HIV decreased as the level of knowledge about HIV increased. Regression analysis showed that the effects of wealth, education, and region were also statistically significant. Respondents with secondary and higher education and those in the middle, rich, and highest wealth quintiles were less likely to hold a discriminatory attitude. Men, despite having more knowledge than women about HIV, held a more discriminatory attitude toward people living with HIV.

Conclusions: The results suggest that there is a need for Pakistani society to become better informed about HIV and AIDS to reduce the stigma associated with HIV, which will in turn reduce discriminatory attitudes toward people living with HIV. Positive attitudes towards HIV will encourage them to seek medical care for their disease, which will control further spread of this epidemic.

Keywords: HIV and AIDS, people living with HIV (PLHIV), knowledge about HIV, discriminatory attitude, Pakistan

1. Introduction

There are 37 million people living with HIV (PLHIV) globally, with annual incidence of more than 2 million in 2015. AIDS remains a major global public health issues, resulting in more than 1 million deaths worldwide (WHO 2016). In Asia and the Pacific, the number of people living with HIV has increased by 10% since 2001 (UNICEF 2003). With the fastest growing HIV and AIDS epidemics, the Eastern Mediterranean region (EMRO 2017) is one of the top two regions of the world in the number of PLHIV. At the same time, HIV/AIDS-related mortalities are also on the rise in this region. Pakistan is among the five countries of EMRO, contributing about 80% of total cases (EMRO 2017).

The HIV epidemic in Pakistan is comparable to that in other Asian countries, having moved from low prevalence, high risk to concentrated epidemic in the early to mid-2000s (Pakistan Global 2015; WHO 2016). Concentrated epidemic means 5% or higher incidence of HIV among high-risk groups. The most vulnerable high-risk groups in Pakistan are injecting drug users and commercial sex workers (Bokhari et al. 2007; Farid-ul-Hasnain, Johansson, and Krantz 2009).

Some of the challenges for effective control and response to the HIV epidemic in Pakistan include lack of reliable data regarding the trend of the epidemic, low national commitment, the stigma attached to HIV (Alonzo and Reynolds 1995; Pitpitan et al. 2012), risk behaviors associated with HIV transmission, and discrimination toward PLHIV (EMRO 2017). Research suggests that individuals who express greater agreement with stigmatizing statements about PLHIV are those who have incorrect knowledge about HIV transmission (Ekstrand et al. 2012). Stigmatizing is not only restricted to discriminatory statements; it also extends to discriminatory behavior toward PLHIV. Studies have shown that HIV-related stigma and discrimination inhibit HIV prevention and mitigation (MacQuarrie, Eckhaus, and Nyblade 2009; Pitpitan et al. 2012) and ultimately lead to avoidance of HIV testing by people living with AIDS (Pitpitan et al. 2012) and unwillingness of the general community to provide social support to PLHIV (Steward et al. 2008).

People living with HIV fear being stigmatized (Heckman, Kochman, and Sikkema 2004; Venable et al. 2006), and they anticipate discriminatory behavior not only from the community (Major and O'Brien 2005) but also from medical care providers (Kelly et al. 1987). PLHIV experience rejection from others when they disclose their disease status (Rutledge 2007; Wong et al. 2009). Disclosing HIV status can have some positive effects; for example the risk of disease transmission can be reduced (Pinkerton and Galletly 2007), and PLHIV can start medication earlier, may regularly take medication, and receive its beneficial effects (Mellins et al. 2002; Serovich et al. 2001; Winstead et al. 2002). Nevertheless, to avoid social rejection, PLHIV do not usually disclose their disease status and instead keep it secret (Chandra, Deepthivarma, and Manjula 2003).

Though studies have been conducted on HIV- and AIDS-related knowledge and attitudes concerning high-risk groups (Khan et al. 2009, 2011; Zafar et al. 2014), little evidence is available

about the attitude of the general population toward PLHIV in Pakistan, and it cannot be generalized to the entire population. Currently, the data available in the 2012-13 Pakistan DHS survey are likely to fill the gap by providing information about the attitudes of individuals toward PLHIV in their communities. The DHS findings can be easily generalized due to their representativeness and adequate sample size.

From the existing data, we intend to measure the relationship between the knowledge men and women of reproductive age have regarding HIV and AIDS and their attitudes toward PLHIV. Our research also aims to investigate the association of demographic and socioeconomic indicators with knowledge of individuals about HIV and their attitudes toward PLHIV. The study's findings will possibly guide policymakers in addressing the causes of discriminatory attitudes toward PLHIV and focus resources on changing discriminatory community attitudes through promoting awareness and health education. This change in attitudes is likely to improve social responses of the communities toward PLHIV, and also to reduce the stigma attached to HIV testing/screening. In addition, it will motivate HIV patients to not hide their disease status and to regularly visit the health centers to seek care. We hope that present research will have greater social impact on the society by making the prevention and mitigation program a success.

1.1 Research questions

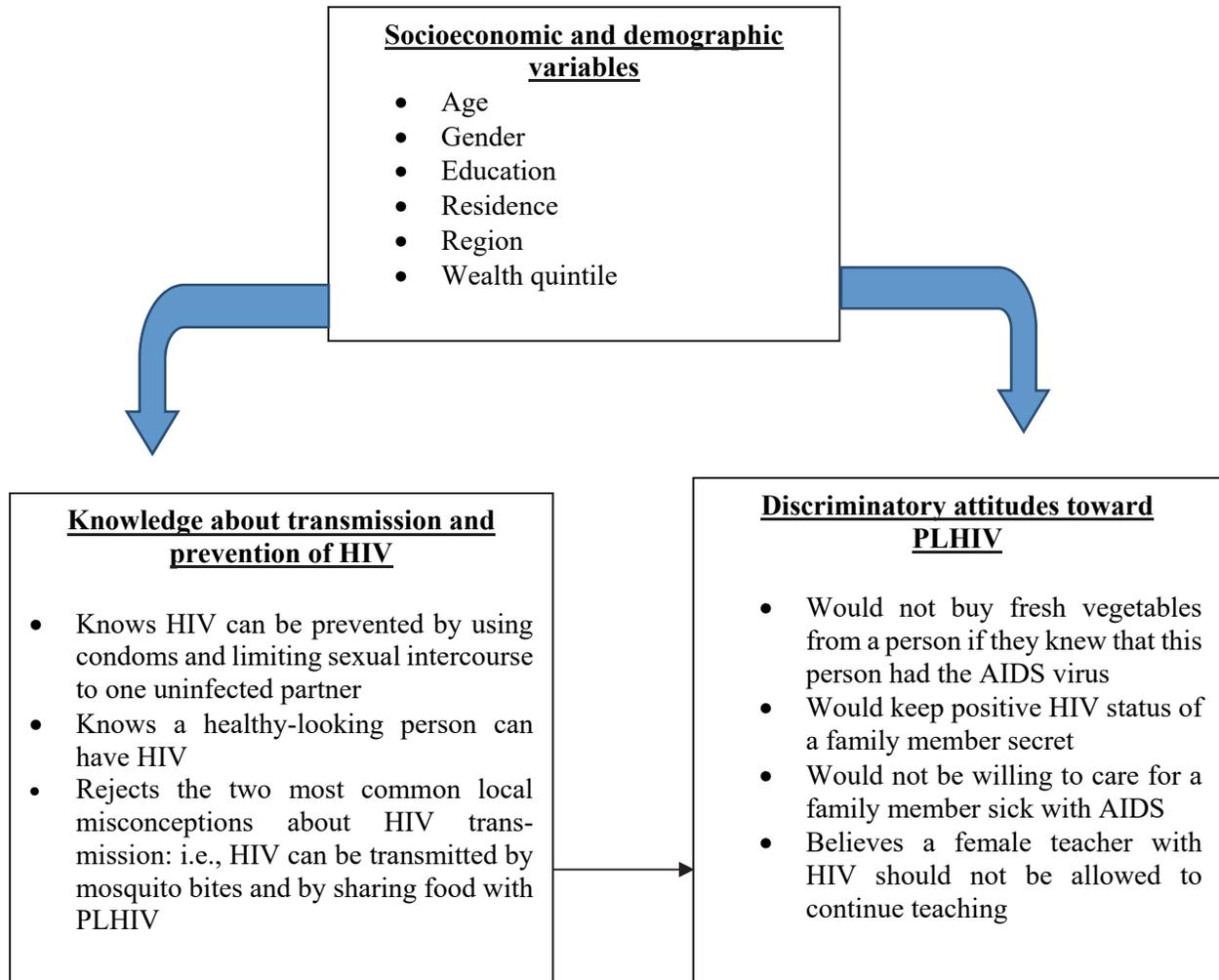
Our research questions were the following:

1. Does knowledge about HIV predict discriminatory attitude toward PLHIV?
2. Is there any association of socioeconomic and demographic variables with knowledge about HIV and discriminatory attitudes toward PLHIV?

1.2 Conceptual framework

Figure 1 shows the conceptual framework of the study. We investigated the relationship of knowledge about transmission and prevention of HIV and discriminatory attitudes of individuals toward PLHIV. We also assessed the effect of socioeconomic and demographic factors on this relationship.

Figure 1. Conceptual framework



2. Data and Methods

2.1 Data

This study is based on secondary analysis of data provided by the 2012-13 Pakistan Demographic and Health Survey (*Pakistan Demographic & Health Survey 2012-13*). The sampling frame for urban areas included 26,543 enumeration blocks updated through the economic census conducted in 2003 and identified by the Pakistan Bureau of Statistics (PBS), whereas the sampling frame for rural areas included a list of 46,307 villages/Mouzas/Dehs, which was developed through the 1998 population census. The PDHS used a two-stage stratified cluster sampling method. Enumeration blocks from urban areas and villages/Mouzas/Dehs from rural areas were included as the primary sampling units (PSUs). In the first stage, 500 PSUs comprising 248 urban areas and 252 rural areas were selected using a probability proportional to size. The PBS staff compiled a list of households in the selected PSUs. In the second stage, a total of 14,000 households, 28 from each PSU, were selected using a systematic sampling technique with a random start.

The data for this study were taken from interviews with ever-married women and men age 15–49 who have ever heard about AIDS. Our sample size after correction for sampling weight was 7,821, including 5,675 women and 2,146 men.

2.2 Variables

2.2.1 Dependent variables

In the PDHS, an affirmative response to some survey questions indicated an accepting attitude towards PLHIV, e.g., “Would you buy fresh vegetables from a shopkeeper or vender if you knew that this person had the AIDS virus?” In other questions, an affirmative response indicated a discriminatory attitude; e.g., “If a member of your family got infected with the AIDS virus, would you want it to remain a secret?” In our study, each variable was re-coded so that the same value indicated a discriminatory attitude for all questions, and a composite variable of discriminatory attitude was constructed. These modified indicators included:

1. Not willing to buy fresh vegetables from an HIV-infected person,
2. Want to keep the positive HIV status of a family member secret,
3. Not willing to care for family member sick with AIDS, and
4. Not willing to let an HIV-infected female teacher continue teaching in the school.

The Cronbach alpha for these four variables was 0.7. On the basis of responses to the four variables, discriminatory attitude was categorized into “no discriminatory attitude” (if no on all variables), “some discriminatory attitude” (if yes on one or two variables), and “more discriminatory attitude” (if yes on three or four variables).

2.2.2 Independent variables

Knowledge about HIV

For the present study, a composite variable regarding knowledge about HIV and AIDS was developed on the basis of five questions, including knowing that:

1. A healthy-looking person can have HIV.
2. HIV can be prevented by using a condom every time a person has sex.
3. HIV can be prevented by limiting sex to one uninfected partner who has no other partners.
4. HIV cannot be transmitted by mosquito bites.
5. HIV cannot be transmitted by sharing food with someone who has HIV.

The Cronbach alpha for these five variables was 0.86. The composite knowledge variable constructed from the five variables was categorized into “no knowledge” if the respondent gave no correct response, “some knowledge” if one or two responses were correct, and “more knowledge” if three to five responses were correct.

Socioeconomic and demographic variables

Variables related to background characteristics of study participants included age, sex, education, region, residence, and wealth. As mentioned, the study included ever-married persons age 15-49 who had heard about AIDS. While the PDHS dataset variables for age are in 5-year groups, this made it difficult for us to use because it included seven age categories, some with a very small sample size for men. Instead, for our analysis this variable was divided into three categories: age 15-26, 27-37, and 38-49. The education variable has four categories: none, primary, secondary, and higher education. Residence was divided into urban or rural. As in the PDHS, region is subcategorized into six broad areas: the five provinces of Pakistan, namely, Punjab, Sindh, Khyber Pakhtonkhwa (KPK), Balochistan, Gilgit and Baltistan (GB), and the capital, Islamabad Capital Territory (ICT). Household wealth status is an index divided into quintiles: lowest, second, middle, fourth, and highest.

2.3 Statistical analysis

Descriptive analysis was performed for each of the component variables and composite variables of knowledge and discriminatory attitudes as well as socioeconomic and demographic variables. A chi-square test was applied to see the association of knowledge about HIV and AIDS and anticipated discriminatory attitudes toward PLHIV. Two models were developed to determine the association by using multinomial regression between knowledge of HIV and discriminatory attitudes. The first model was unadjusted, and the second model was adjusted for socioeconomic and demographic variables. Relative risk ratios with 95% confidence interval were calculated. The effect of the complex multistage sampling design was taken into consideration and sample weights were applied for all the analysis performed using STATA version 14.0 software.

3. Results

3.1 Background characteristics of study sample

A total of 7,821 individuals were included in the study, of whom about three-fourths were female. Table 1 shows the background characteristics of the sample population included in the study. The highest proportion of respondents (46%) were age 27-37. Thirty-seven percent of respondents had a secondary education, while 22% had no education. Nearly two-thirds (62%) were residents of Punjab province, and just over half (52%) of respondents were rural.

Table 1. Ever-married women and men age 15-49 who heard about AIDS by background characteristics

Variables	Women		Men		Total	
	Frequency	%	Frequency	%	Frequency	%
Age						
Young	1,437	25.3	272	12.7	1,709	21.9
Middle age	2,641	46.6	950	44.3	3,592	45.9
Old age	1,596	28.1	924	43.0	2,520	32.2
Education						
No education	1,424	25.1	324	15.1	1,748	22.4
Primary	1,083	19.1	443	20.7	1,526	19.5
Secondary	1,958	34.5	902	42.0	2,860	36.6
Higher	1,210	21.3	477	22.2	1,687	21.5
Region						
ICT	53	0.9	16	0.7	69	0.9
Punjab	3,562	62.8	1,318	61.4	4,879	62.4
Sindh	1,365	24.1	471	22.0	1,836	23.5
KPK	560	9.8	246	11.5	806	10.3
Balochistan	124	2.2	87	4.1	212	2.7
Gilgit Baltistan	11	0.2	8	0.3	19	0.2
Residence						
Urban	2,540	44.8	1,217	56.7	3,757	48.0
Rural	3,135	55.2	929	43.3	4,064	52.0
Wealth						
Lowest	167	3.0	197	9.2	365	4.7
Second	482	8.5	335	15.6	817	10.5
Middle	1,017	17.9	401	18.7	1,418	18.1
Fourth	1,646	29.0	592	27.6	2,239	28.6
Highest	2,361	41.6	621	28.9	2,982	38.1
Total	5,675	100	2,146	100	7,821	100

3.2 Distribution of knowledge about HIV

Knowledge about HIV is almost equally distributed among men and women, as Figure 2 shows. Among both women and men, 67% were aware that a healthy-looking person can have HIV. Regarding transmission of HIV, 50% had correct knowledge that HIV cannot be transmitted by sharing food with someone who has HIV. When asked about the transmission of HIV by mosquito bites, 49% of women and 59% of men gave a correct answer. When asked about prevention, overall 78% of individuals (76% of women and 84% of men) knew that limiting sex to one uninfected

partner can reduce the risk of getting HIV, and 54% of respondents (52% of women and 57% of men) said that condom use can reduce the risk of HIV.

Figure 2. Distribution of knowledge about HIV prevention and transmission among men and women

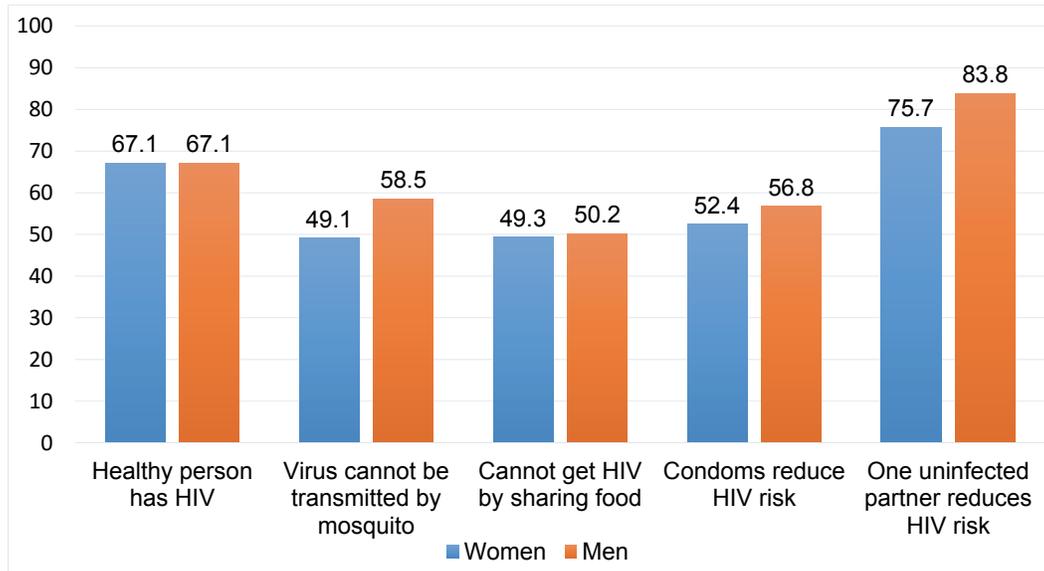
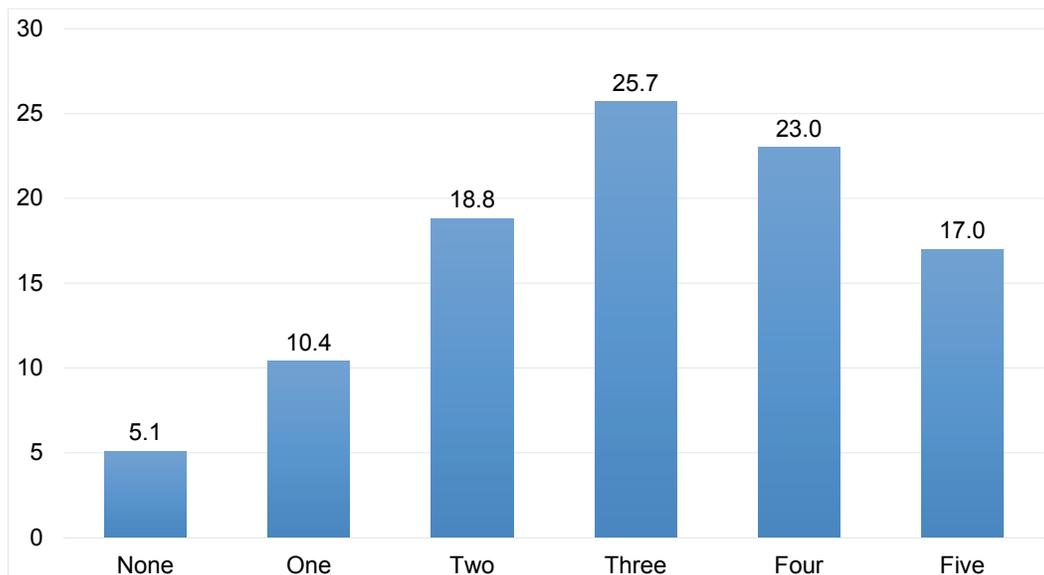


Figure 3 shows that 17% of respondents correctly answered all five questions regarding transmission and prevention of HIV, while 23% gave four correct answers, and 26% gave three correct answers. Overall, by the composite three-category knowledge variable, two-thirds (66%) had more knowledge (three to five correct responses), 29% had some knowledge (one or two correct responses), and only 5% had no knowledge (no correct responses) about HIV.

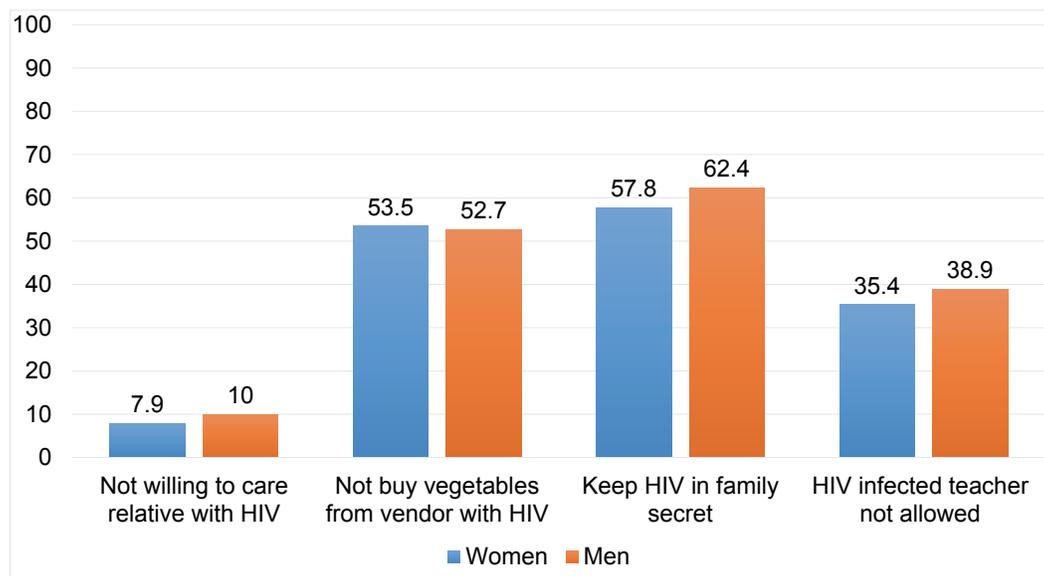
Figure 3. Percentages of correct responses regarding knowledge about HIV



3.2 Distribution of discriminatory attitudes among women and men

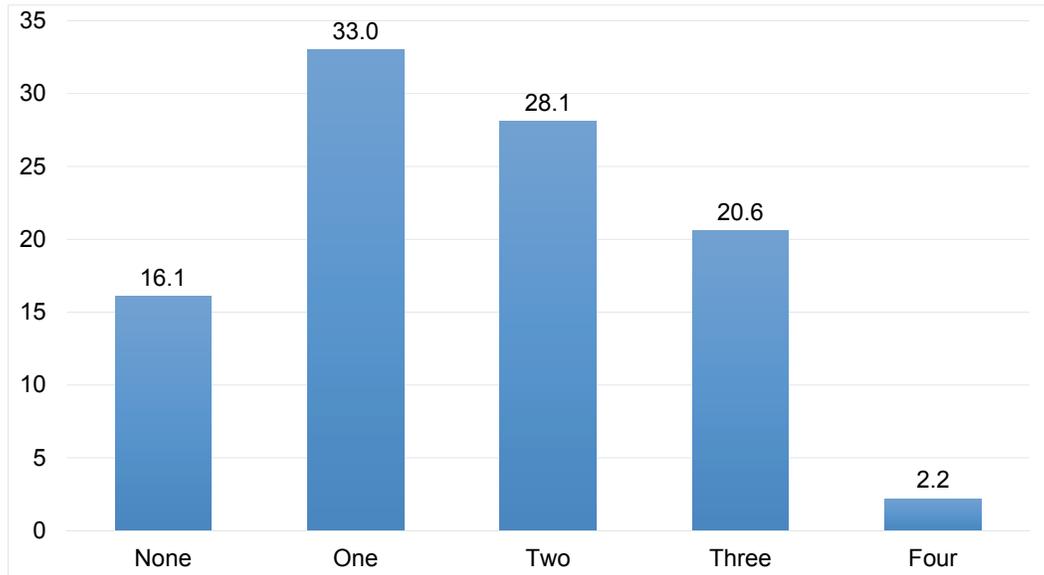
As Figure 4 shows, only a small percentage of respondents said they would be unwilling to care for HIV-infected family members (8% of women and 10% of men), while 58% of women and 62% of men said they would keep the positive HIV status of a family member secret. About half of the respondents (54% of women and 53% of men) said they would not buy vegetables from an HIV-infected vendor, and 35% of women and 48% of men would not be willing to allow an HIV-infected teacher to continue teaching in a school.

Figure 4. Distribution of discriminatory attitudes



The “discriminatory attitudes” variable in our study is measured by the four questions shown in Figure 4. Figure 5 shows the distribution of responses to these questions. One-third (33%) of respondents showed a discriminatory attitude on only one variable, while about a fifth (21%) showed a discriminatory attitude on three variables. Only 16% of the respondents showed no discriminatory attitude toward PLHIV.

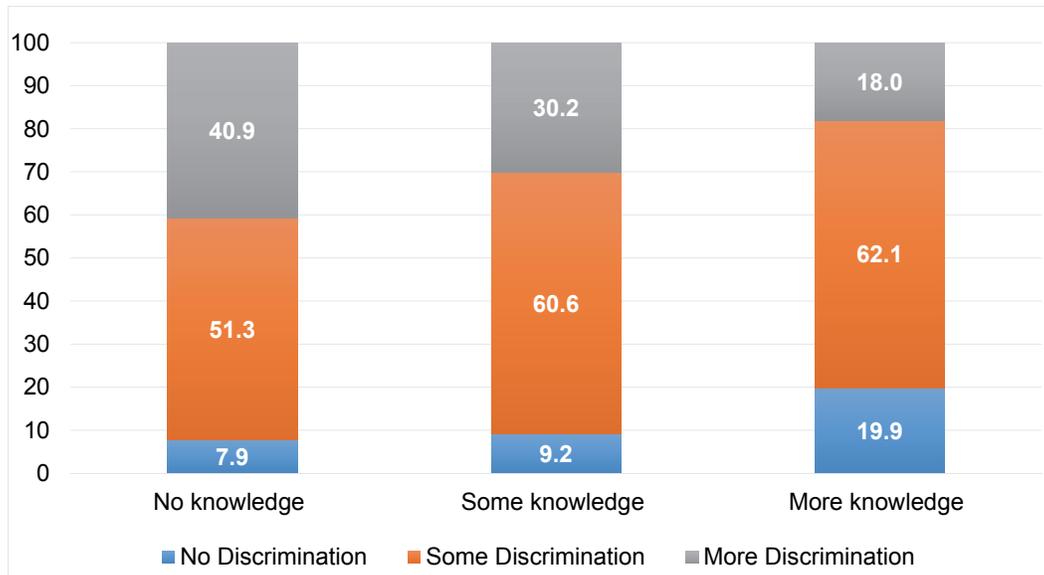
Figure 5. Percentages of response to the variables assessing discriminatory attitudes



3.4 Association of knowledge about HIV by discriminatory attitude

Figure 6 shows the results concerning knowledge about HIV by discriminatory attitude toward PLHIV. Respondents with no knowledge about HIV had the highest proportion of responses with a more discriminatory attitude (41%) compared with those with some or more knowledge (30% and 18% respectively). A chi-square test was used to see the association of knowledge with discriminatory attitude and was found highly significant, with p-value <0.001.

Figure 6. Discriminatory attitude toward PLHIV and knowledge about HIV



3.5 Association of knowledge about HIV with socioeconomic and demographic factors

This analysis explored the association of the composite variable of knowledge about HIV with selected socioeconomic and demographic factors, using a chi-square test. Table 2 shows that sex, education, region, residence, wealth (all $p < 0.001$), and age ($p < 0.001$) were significantly associated with HIV knowledge. Knowledge about HIV was greater in ICT, the capital city of Pakistan. A higher proportion of men than women had more knowledge about HIV, and individuals age 27-37 had higher proportions of more knowledge compared with other age groups. The level of the more knowledge variable was also high in the highest wealth quintile and in urban areas.

Table 2. Relationship of knowledge with socioeconomic and demographic factors

Socioeconomic and demographic factors	No knowledge		Some knowledge		More knowledge		N	p-value
	%	CI	%	CI	%	CI		
Region								
ICT	1.8	[1.1, 2.8]	15.0	[12.5, 17.7]	83.3	[80.2, 85.9]	69	<0.001
Punjab	5.6	[4.6, 6.9]	30.3	[27.8, 32.9]	64.1	[61.3, 66.8]	4,879	
Sindh	4.5	[3.5, 5.7]	24.9	[22.3, 27.8]	70.6	[67.3, 73.6]	1,836	
KPK	7.4	[5.8, 9.3]	33.1	[29.5, 36.8]	59.6	[55.5, 63.5]	806	
Balochistan	6.2	[4.0, 9.6]	31.9	[26.5, 37.8]	61.9	[55.5, 67.9]	211	
Gilgit Baltistan	4.1	[2.3, 7.2]	23.5	[18.2, 29.8]	72.4	[65.3, 78.4]	19	
Sex								
Women	5.7	[4.9, 6.7]	31.4	[29.4, 33.4]	62.9	[60.6, 65.1]	5,675	<0.001
Men	4.9	[3.6, 6.7]	23.4	[20.9, 26.2]	71.6	[68.6, 74.5]	2,146	
Age								
Young	7.3	[5.7, 9.2]	32.0	[29.4, 34.7]	60.7	[57.9, 63.5]	1,709	<0.001
Middle age	4.9	[4.0, 6.0]	27.4	[25.1, 29.9]	67.7	[65.0, 70.2]	3,592	
Old age	5.2	[4.0, 6.7]	29.8	[27.1, 32.6]	65.0	[62.1, 67.8]	2,521	
Education								
No education	10.2	[8.1, 12.6]	42.4	[38.9, 46.0]	47.4	[43.7, 51.2]	1,748	<0.001
Primary	8.0	[6.3, 10.0]	34.4	[30.7, 38.2]	57.7	[53.4, 61.9]	1,526	
Secondary	3.8	[2.9, 4.8]	27.8	[25.3, 30.4]	68.5	[65.9, 70.9]	2,860	
Higher	1.4	[0.9, 2.3]	13.2	[11.3, 15.4]	85.3	[83.1, 87.3]	1,687	
Residence								
Rural	7.0	[5.9, 8.4]	34.2	[31.9, 36.7]	58.7	[56.1, 61.3]	3,757	<0.001
Urban	4.1	[3.3, 5.2]	24.5	[22.1, 27.1]	71.4	[68.5, 74.0]	4,064	
Wealth								
Lowest	12.0	[8.6, 16.5]	32.6	[26.9, 38.9]	55.4	[48.7, 62.0]	365	<0.001
Second	9.1	[6.7, 12.3]	36.4	[31.6, 41.6]	54.4	[49.0, 59.7]	817	
Middle	7.8	[5.8, 10.4]	37.0	[33.7, 40.4]	55.2	[51.6, 58.8]	1,418	
Fourth	5.4	[4.3, 6.6]	32.6	[29.7, 35.7]	62.0	[58.8, 65.2]	2,239	
Highest	2.8	[2.0, 3.8]	20.5	[18.2, 23.1]	76.7	[74.0, 79.2]	2,982	
Total	5.5	[4.8, 6.4]	29.2	[27.5, 31.0]	65.3	[63.3, 67.2]	7,822	

3.6 Association of discriminatory attitude with socioeconomic and demographic factors

The study also assessed the association of discriminatory attitudes with socioeconomic and demographic factors. Table 3 shows that discriminatory attitude was significantly associated with sex, education, wealth, and region ($p < 0.001$). Discriminatory attitude was also significantly associated with age ($p < 0.05$), while the association with residence was of borderline significance ($p = 0.05$). A higher proportion of men than women had a more discriminatory attitude toward PLHIV, and as respondents' level of education increased, the proportion with a more discriminatory attitude decreased.

Table 3. Relationship of socioeconomic and demographic factors with discriminatory attitude

Socioeconomic and demographic (SED) Indicators	No discriminatory attitude		Some discriminatory attitude		More discriminatory attitude		N	p-value
	%	CI	%	CI	%	CI		
Region								
ICT	19.9	[16.3, 24.1]	64.2	[60.5, 67.8]	15.9	[13.4, 18.7]	69	<0.001
Punjab	17.3	[15.4, 19.4]	60.4	[57.4, 63.3]	22.3	[20.0, 24.8]	4,879	
Sindh	13.4	[11.5, 15.4]	63.3	[60.4, 66.1]	23.3	[20.7, 26.2]	1,836	
KPK	16.9	[13.4, 21.0]	63.1	[59.3, 66.8]	20.0	[17.3, 23.1]	806	
Balochistan	9.3	[6.1, 13.9]	48.7	[41.9, 55.5]	42.0	[36.0, 48.4]	211	
Gilgit Baltistan	11.2	[7.9, 15.8]	63.8	[53.5, 72.9]	25.0	[17.1, 34.9]	19	
Sex								
Women	16.5	[15.1, 18.1]	63.5	[61.5, 65.5]	20.0	[18.5, 21.5]	5,675	<0.001
Men	15.1	[12.5, 18.2]	54.5	[50.8, 58.2]	30.4	[26.8, 34.2]	2,146	
Age								
Young	16.3	[14.1, 18.7]	63.1	[59.7, 66.3]	20.7	[18.2, 23.4]	1,709	0.022
Middle age	16.4	[14.7, 18.3]	62.1	[59.3, 64.8]	21.5	[19.2, 24.0]	3,592	
Old age	15.6	[13.7, 17.7]	58.3	[55.1, 61.4]	26.1	[23.3, 29.2]	2,521	
Education								
No education	10.5	[8.7, 12.5]	59.9	[56.5, 63.3]	29.6	[26.6, 32.7]	1,748	<0.001
Primary	13.7	[11.0, 16.9]	60.9	[56.5, 65.2]	25.4	[21.9, 29.3]	1,526	
Secondary	17.6	[15.1, 20.4]	61.4	[58.1, 64.5]	21.0	[18.9, 23.4]	2,860	
Higher	21.8	[19.4, 24.4]	61.8	[58.6, 64.9]	16.4	[14.0, 19.2]	1,687	
Wealth								
Lowest	9.4	[6.5, 13.3]	46.4	[36.9, 56.1]	44.2	[36.0, 52.8]	365	<0.001
Second	11.2	[8.3, 15.0]	61.4	[56.3, 66.3]	27.4	[23.0, 32.3]	817	
Middle	16.8	[14.3, 19.7]	59.4	[55.7, 63.1]	23.7	[20.9, 26.8]	1,418	
Fourth	17.1	[14.7, 19.8]	59.5	[56.7, 62.4]	23.4	[20.8, 26.1]	2,239	
Highest	17.2	[15.3, 19.4]	64.7	[61.3, 67.9]	18.1	[15.8, 20.7]	2,982	
Residence								
Rural	15.1	[13.3, 17.2]	60.0	[57.4, 62.7]	24.8	[22.3, 27.5]	3,757	0.050
Urban	17.1	[15.2, 19.1]	62.0	[59.0, 64.9]	20.9	[18.9, 23.2]	4,064	
Total	16.1	[14.8, 17.6]	61.1	[59.0, 63.0]	22.8	[21.2, 24.5]	7,822	

3.7 Regression results for discriminatory attitude by knowledge about HIV

Table 4 shows the unadjusted results of the multinomial regression model using knowledge about HIV to predict discriminatory attitudes toward PLHIV, with “no knowledge” and “no discriminatory attitude” as reference. Respondents with more knowledge about HIV exhibited half the risk of expressing some discriminatory attitude (versus no discriminatory attitude) compared with those with no knowledge ($p < 0.05$). When comparing “more discriminatory attitude” with “no discriminatory attitude,” respondents with more knowledge about HIV exhibited about one-fifth the risk of discriminatory attitude as those with no knowledge ($p < 0.001$).

The likelihood of people in the “some knowledge” category exhibiting discriminatory attitude toward PLHIV was not significantly different compared with the “no knowledge” group.

Table 4. Multinomial regression of discriminatory attitude and knowledge

Variables	Some discriminatory attitude		More discriminatory attitude	
	RR	CI	RR	CI
No knowledge	1.0		1.0	
Some knowledge	1.0	[0.5, 1.9]	0.6	[0.3, 1.2]
More knowledge	0.5*	[0.3, 0.9]	0.2***	[0.1, 0.3]

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

3.8 Regression results for discriminatory attitude toward PLHIV by knowledge about HIV adjusted for socioeconomic and demographic factors

Table 5 shows that the risk of having “more discriminatory attitude” toward PLHIV (versus “no discriminatory attitude”) is lower among respondents in the “more knowledge” category compared with the “no knowledge” group, and this relationship was significant ($p < 0.001$) even after adjusting for socioeconomic and demographic factors. However, after including these factors in the model, the association between knowledge of HIV and “some discriminatory attitude” toward PLHIV found in the unadjusted model was no longer significant.

Table 5 also shows the results of a model predicting discriminatory attitude toward PLHIV by knowledge about HIV adjusted for socioeconomic and demographic factors. “Some discriminatory attitude” (versus “no discriminatory attitude”) was significantly associated with the level of education. Risk of exhibiting some discriminatory attitude was lower among individuals with secondary and higher education compared with no education. The risk of having a more discriminatory attitude (versus no discriminatory attitude) was lower among those with secondary and higher levels of education compared with no education.

Risk of “some discriminatory attitude” was 1.4 and 1.9 times higher among respondents in the provinces of Sindh and Gilgit Baltistan, respectively, compared with ICT. Residents of Balochistan

province had three times the risk of exhibiting more discriminatory attitude (versus no discriminatory attitude) as residents of ICT.

Men were almost twice as likely as women to have a more discriminatory attitude (versus no discriminatory attitude), and the relative risk ratio was extremely significant ($p < 0.001$). Individuals in the top three wealth quintiles had lower risk for more discriminatory attitude (versus no discriminatory attitude) compared with the lowest quintile. However, there was no difference between some discriminatory attitude versus no discriminatory attitude when comparing the top four wealth quintiles with the lowest quintile.

Table 5. Multinomial regression of knowledge and discriminatory attitude adjusted for socioeconomic and demographic factors

Variables	Categories	Some discriminatory attitude		More discriminatory attitude	
		RR	CI	RR	CI
Knowledge	No knowledge	1.0		1.0	
	Some knowledge	1.1	[0.5, 2.1]	0.7	[0.3, 1.4]
	More knowledge	0.5	[0.3, 1.0]	0.2***	[0.1, 0.4]
Age	Young age	1.0		1.0	
	Middle age	1.0	[0.8, 1.2]	1.0	[0.8, 1.3]
	Old age	0.9	[0.7, 1.1]	1.1	[0.8, 1.5]
Education	No education	1.0		1.0	
	Primary	0.8	[0.6, 1.1]	0.8	[0.5, 1.1]
	Secondary	0.6**	[0.5, 0.9]	0.5***	[0.4, 0.8]
	Higher	0.5***	[0.4, 0.7]	0.4***	[0.3, 0.6]
Region	ICT	1.0		1.0	
	Punjab	0.9	[0.7, 1.2]	1.0	[0.7, 1.5]
	Sindh	1.4*	[1.0, 1.8]	1.6*	[1.1, 2.3]
	KPK	0.9	[0.6, 1.4]	0.8	[0.5, 1.3]
	Balochistan	1.4	[0.8, 2.4]	3.0***	[1.7, 5.2]
	Gilgit Baltistan	1.9*	[1.1, 3.1]	2.1*	[1.1, 4.1]
Sex	Female	1.0		1.0	
	Men	1.1	[0.8, 1.4]	1.9***	[1.4, 2.6]
Residence	Rural	1.0		1.0	
	Urban	0.9	[0.7, 1.1]	1.0	[0.7, 1.3]
Wealth	Lowest	1.0		1.0	
	Second	1.2	[0.7, 2.2]	0.6	[0.4, 1.1]
	Middle	0.9	[0.5, 1.4]	0.4***	[0.3, 0.7]
	Fourth	1.0	[0.6, 1.6]	0.5**	[0.3, 0.8]
	Highest	1.3	[0.8, 2.2]	0.5*	[0.3, 0.9]

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

4. Discussion

The present study had two objectives: (1) to explore the association between knowledge about HIV and discriminatory attitudes toward people living with HIV and (2) to describe the association of socioeconomic and demographic factors with knowledge about HIV and discriminatory attitudes toward PLHIV.

4.1 Knowledge about HIV/AIDS

In our study, two-thirds (66%) of respondents had more knowledge about HIV compared with less knowledge (29%) and no knowledge (6%). Our finding is consistent with a study in South India, which found that most of the population had good knowledge about HIV and AIDS (Bhagavathula et al. 2015). A study in Lao Republic also found that the highest proportion of individuals had a high level of knowledge about HIV (46%) compared with a medium level (31%) and low level of knowledge (22%) (Thanavanh et al. 2013). The differences in proportion between this and our study can be explained on the basis of differences in classifying the levels of knowledge.

A study in Karachi by Farid-ul-Hasnain and colleagues (Farid-ul-Hasnain, Johansson, and Krantz 2009) found that most participants (59%) had good knowledge about HIV, which is consistent with our study, while the proportions with no knowledge (22%) and less knowledge (19%) were different from our study. This difference could be because the Karachi study included only the population age 17-21 while our study population was age 15-49. In contrast with our finding, a study in Nijeria found that 27% of participants had good knowledge about HIV, 38% had fair knowledge, and 34% had poor knowledge. This difference among studies is possibly due to differences in education among the study populations, as three-fourths of our participants had primary, secondary, or higher education, while two-thirds of participants in the Nigerian study had no formal schooling (Iliyasu et al. 2006).

When we assessed knowledge about whether a healthy-looking person can have AIDS, we found that 67% of respondents gave the correct answer, which is consistent with the findings of studies from India (Hazarika 2010) and Bangladesh (Yaya et al. 2016), but a much lower proportion than found in a study among adolescents in Korea (Sohn and Park 2012). Our result was quite high compared with a recent study conducted among fishermen in Karachi (Leili, Elham, and Farkhondeh 2008; Zafar et al. 2014). The low level of knowledge about HIV among fishermen could be explained on the basis of their low literacy rate.

Our study revealed that around half of the participants rejected the common misconception of transmission of HIV and AIDS through mosquito bites, a finding similar to studies in Bangladesh (Yaya et al. 2016) and Iran (Leili, Elham, and Farkhondeh 2008), while studies in Japan (Maswanya et al. 2000) and South India (Bhagavathula et al. 2015) observed higher levels. The Japanese study, however, only included college students (Maswanya et al. 2000), and in the Indian study more of the participants were male and all were relatives of people living with HIV

(Bhagavathula et al. 2015). In Korea, only about a third of adolescents had correct knowledge about transmission of HIV through mosquito bites, but the study only interviewed high school students (Sohn and Park 2012).

Our finding that half of respondents had correct knowledge, rejecting the misconception that sharing of food can transmit HIV is consistent with another study in Pakistan (Rehan et al. 2016) but much lower than the study of South India, which only covered adult family members of people living with HIV (Bhagavathula et al. 2015), who can be presumed to have more knowledge about HIV than the general population.

In our study, knowledge regarding preventive measures against HIV and AIDS was 54% concerning condom use and 78% concerning limiting sex to one uninfected partner. Results from a study in Bangladesh (Yaya et al. 2016) and a national survey (NFHS-3) in India showed almost similar results (Hazarika 2010).

Our study found the level of knowledge about HIV higher among men than women, individuals with more education, and residents of urban area. These findings agree with studies in Bangladesh and India (Bhagavathula et al. 2015; Hazarika 2010; Yaya et al. 2016). Hazarika found that level of knowledge about HIV was lower among women in rural India (Hazarika 2010), while Yaya showed a significant association of knowledge about HIV with education, sex, residence, and wealth status (Yaya et al. 2016).

In our study participants age 27-37 and those in the highest wealth quintile had significantly more knowledge about HIV. A study in Karachi also revealed the same significant association with knowledge (Farid-ul-Hasnain, Johansson, and Krantz 2009). The Karachi study also found that poor knowledge of HIV was prevalent among younger people (age 17-18), which agrees with our finding that the youngest participants (age 15-26) had less knowledge about HIV compared with the other age groups.

4.2 Discriminatory attitudes toward people living with HIV

Overall, only 16% of individuals in our study expressed no discriminatory attitude toward PLHIV, while 61% had some discriminatory attitude and 23% had more discriminatory attitude. A study in Iran also found a high level of negative attitude toward PLHIV among the general public (Leili, Elham, and Farkhondeh 2008). In the Lao Republic study 44% of high school students showed a negative attitude toward PLHIV (Thanavanh et al. 2013), which is much lower than our finding but could be due to a difference in classification. A study in Bangladesh found a moderate level of discriminatory attitudes among health care workers (Hossain and Kippax 2010). A study in an anti-retroviral clinic in South India found that more than half of the respondents had an accepting attitude toward PLHIV (Bhagavathula et al. 2015), which may reflect the fact that the participants were family members of PLHIV.

In our study examining the individual components of discriminatory attitudes, 54% of respondents showed a discriminatory attitude toward buying vegetables from an HIV-infected vendor, 38% toward allowing an HIV-infected teacher to continue in a school, and 9% toward provision of care to their HIV-infected family members. These findings are similar to a study conducted in Botswana (Letamo 2003), where 11% of participants were unwilling to care for an HIV-infected family member, 42% would not allow an HIV-infected teacher to continue teaching, and 60% would not buy vegetables from an HIV-infected vendor. A study in India found less prevalence of discriminatory attitudes (Hazarika 2010), a difference that could be explained by the higher educational level of participants compared with our study. This highlights the importance of education in reducing the discriminatory attitudes of the general population toward PLHIV.

Our finding that 59% of respondents would keep secret the status of an HIV-positive family member is much higher than in the study in India, where only about a third of participants held this view, with little variation among rural and urban areas (Hazarika 2010). The difference may be because more than half of respondents in the Indian study had at least a secondary education.

The current study also found that men were more likely to have a more discriminatory attitude than women, and that individuals with no education were more likely to have a more discriminatory attitude than those with secondary or higher levels of education. These associations were statistically highly significant. Similarly, a study among youth in Botswana showed that male had more negative attitudes than females toward PLHIV (24% versus 18%), and less educated participants had more negative attitudes than more educated participants (Majelantle et al. 2014). The Indian clinic study also found a significant association between more education and lower discriminatory attitudes (Bhagavathula et al. 2015).

4.3 Association of knowledge about HIV and discriminatory attitudes toward people living with HIV

The study revealed a highly significant association ($p < 0.001$) between knowledge about HIV and discriminatory attitudes toward PLHIV. There is an inverse relationship between the level of knowledge and the odds of having a discriminatory attitude, such that having more knowledge about HIV is associated with a lower likelihood of exhibiting a more discriminatory attitude toward PLHIV. The finding is consistent with the studies in India, Bangladesh, and Iran (Bhagavathula et al. 2015; Ekstrand et al. 2012; Hossain and Kippax 2010; Tavoosi et al. 2004). Bhagavathula et al. found a statistically significant correlation between knowledge and negative attitudes (Bhagavathula et al. 2015). Ekstrand et al. (2012) found that a discriminatory attitude toward PLHIV was reduced with more correct knowledge about transmission of HIV (Ekstrand et al. 2012). In Iran, Tavoosi et al. found a significant correlation between more negative attitude toward PLHIV and less knowledge about HIV (Tavoosi et al. 2004). Another study in Iran also agrees with the finding of our study, as a significant negative correlation was found between awareness

about HIV and AIDS and discriminatory attitudes toward people with symptoms of HIV and AIDS (Masoudnia 2015).

A study in Kuwait showed a high level of negative attitude toward PLHIV despite a high level of knowledge about HIV (Ellepola et al. 2011), which actually supports our result, as men in our study showed twice the risk of discriminatory attitude in spite of having more knowledge about HIV. In Bangladesh, Hossain and Kippax also found that holding a negative attitude was more prevalent among men (Hossain and Kippax 2010).

We found that discriminatory attitudes toward PLHIV was more common among participants in the low wealth quintile and those with less education. Similarly, studies in India, Bangladesh, and Tanzania also found a significant association between level of education and attitudes toward PLHIV (Amuri et al. 2011; Bhagavathula et al. 2015; Hossain and Kippax 2010).

5. Conclusion

There is a significant association between knowledge about HIV and discriminatory attitudes toward PLHIV after adjusting for socioeconomic and demographic background characteristics of respondents. Some discrimination was found at all levels of knowledge about HIV. Having secondary and higher education, being in the middle, fourth, and highest wealth quintiles, and having more knowledge about HIV were associated with lower likelihood of a more discriminatory attitude toward PLHIV. Participants in Sindh, Balochistan, and Gilgit Baltistan provinces were associated with increased risk of more discrimination. Men, despite having more knowledge than women about HIV, had more discriminatory attitudes toward PLHIV.

6. Policy Implications

Since 1987, the government of Pakistan has maintained a sustained response to the HIV epidemic. Awareness about HIV among the general population is also a component of the National Aids Control Program (NACP). Despite having knowledge about HIV, our study population showed negative views reflected through their discriminatory attitudes toward people living with HIV. Results of this study will encourage policymakers to provide adequate resources and pay attention to all aspects of the HIV epidemic. Pakistani society must be better informed about HIV and AIDS. It is critical to reduce the stigma associated with HIV and the discriminatory attitudes that many people hold, which is one of the factors that may influence the further spread of HIV and AIDS in Pakistan.

References

- Alonzo, A. A., and N. R. Reynolds. 1995. "Stigma, HIV and AIDS: An Exploration and Elaboration of a Stigma Trajectory." *Social Science & Medicine* 41(3):303-315.
- Amuri, M., S. Mitchell, A. Cockcroft, and N. Andersson. 2011. "Socio-Economic Status and HIV/AIDS Stigma in Tanzania." *AIDS Care* 23(3):378-382.
- Bhagavathula, A. S., D. K. Bandari, A. A. Elnour, A. Ahmad, M. U. Khan, M. Baraka, F. Hamad, and A. Shehab. 2015. "A Cross Sectional Study: The Knowledge, Attitude, Perception, Misconception and Views (Kapmv) of Adult Family Members of People Living with Human Immune Virus-HIV Acquired Immune Deficiency Syndrome-AIDS (PLWHA)." *Springer Plus* 4(1): doi: 10.1186/s40064-015-1541-2.
- Bokhari, A., N.M. Nizamani, D.J. Jackson, N.E. Rehan, M. Rahman, R. Muzaffar, S. Mansoor, H. Raza, K. Qayum, and P. Girault. 2007. "HIV Risk in Karachi and Lahore, Pakistan: An Emerging Epidemic in Injecting and Commercial Sex Networks." *International journal of STD & AIDS* 18(7):486-492.
- Chandra, P.S., S. Deepthivarma, and V.Manjula. 2003. "Disclosure of HIV Infection in South India: Patterns, Reasons and Reactions." *AIDS Care* 15(2):207-215.
- Ekstrand, M.L., S. Bharat, J. Ramakrishna, and E. Heylen. 2012. "Blame, Symbolic Stigma and HIV Misconceptions Are Associated with Support for Coercive Measures in Urban India." *AIDS and Behavior* 16(3):700-710.
- Ellepola, A., B. Joseph, D. Sundaram, and P. Sharma. 2011. "Knowledge and Attitudes Towards HIV/AIDS Amongst Kuwait University Dental Students." *European Journal of Dental Education* 15(3):165-171.
- EMRO. 2017. *HIV in the Who Eastern Mediterranean Region*. <http://www.emro.who.int/pdf/asd/about/hiv-situation-region.pdf?ua=1>.
- Farid-ul-Hasnain, S., E. Johansson, and G. Krantz. 2009. "What Do Young Adults Know About the HIV/AIDS Epidemic? Findings from a Population Based Study in Karachi, Pakistan." *BMC Infectious Diseases* 9(1): doi:10.1186/1471-2334-9-38.
- Hazarika, I. 2010. "Knowledge, Attitude, Beliefs and Practices in HIV/AIDS in India: Identifying the Gender and Rural–Urban Differences." *Asian Pacific Journal of Tropical Medicine* 3(10):821-827.
- Heckman, T. G., A. Kochman, and K. J. Sikkema. 2004. "Depressive Symptoms in Older Adults Living with HIV Disease: Application of the Chronic Illness Quality of Life Model." *HIV and Older Adults: Challenges for Individuals, Families and Communities*. New York: Springer Publishing Company.
- Hossain, M. B., and S. Kippax. 2010. "HIV-Related Discriminatory Attitudes of Healthcare Workers in Bangladesh." *Journal of Health, Population and Nutrition* 28(2):199-207.
- Iliyasu, Z., I. S. Abubakar, M. Kabir, and M. H. Aliyu. 2006. "Knowledge of HIV/AIDS and Attitude Towards Voluntary Counseling and Testing among Adults." *Journal of the National Medical Association* 98(12):1917-1922.

- Kelly, J. A., J. S. St Lawrence, S. Smith Jr, H. V. Hood, and D. J. Cook. 1987. "Stigmatization of AIDS Patients by Physicians." *American Journal of Public Health* 77(7):789-791.
- Khan, M. S., M. Unemo, S. Zaman, and C. S. Lundborg. 2009. "Knowledge, Attitudes and Practices Regarding Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome and Sexually Transmitted Infections among Health Care Providers in Lahore, Pakistan." *Journal of Ayub Medical College Abbottabad* 21(4):1-6.
- Khan, M. S., M. Unemo, S. Zaman, and C. S. Lundborg. 2011. "HIV, STI, Prevalence and Risk Behaviours among Women Selling Sex in Lahore, Pakistan." *BMC Infectious Diseases* 11(1):119.
- Leili, S., S. Elham, and S. Farkhondeh. 2008. "A Population-Based Survey of HIV/AIDS Knowledge and Attitudes in General Public, Bandar-Abbas, Iran." *Pakistan Journal of Medical Sciences* 24(6):838-844.
- Letamo, G. 2003. "Prevalence of, and Factors Associated with, HIV/AIDS Related Stigma and Discriminatory Attitudes in Botswana." *Journal of Health, Population and Nutrition* 21(4): 347-357.
- MacQuarrie, K., T. Eckhaus, and L. Nyblade. 2009. *HIV-Related Stigma and Discrimination: A Summary of Recent Literature*. Geneva: UNAIDS. http://data.unaids.org/pub/report/2009/20091130_stigmasummary_en.pdf.
- Majelantle, R., M. Keetile, K. Bainame, and P. Nkawana. 2014. "Knowledge, Opinions and Attitudes Towards HIV and AIDS among Youth in Botswana." *Journal of Global Economics* 2:108. doi:10.4172/2375-4389.1000108.
- Major, B., and L. T. O'Brien. 2005. "The Social Psychology of Stigma." *Annual Review of Psychology* 56:393-421.
- Masoudnia, E. 2015. "Public Perceptions About HIV/AIDS and Discriminatory Attitudes toward People Living with Acquired Immunodeficiency Syndrome in Iran." *SAHARA-J: Journal of Social Aspects of HIV/AIDS* 12(1):116-122.
- Maswanya, E., K. Moji, K. Aoyagi, Y. Yahata, Y. Kusano, K. Nagata, T. Izumi, and T. Takemoto. 2000. "Knowledge and Attitudes toward AIDS among Female College Students in Nagasaki, Japan." *Health Education Research* 15(1):5-11.
- Mellins, C. A., J. Havens, E. McCaskill, C. Leu, K. Brudney, and M. Chesney. 2002. "Mental Health, Substance Use and Disclosure Are Significantly Associated with the Medical Treatment Adherence of HIV-Infected Mothers." *Psychology, Health & Medicine* 7(4):451-460.
- National Institute of Population Studies and ICF International. 2013. *Pakistan Demographic and Health Survey 2012-13*. Islamabad, Pakistan, and Calverton, Maryland, USA: National Institute of Population Studies (NIPS) and ICF International.
- Pakistan Global, A. 2015. "Response Progress Report (Garpr) 2015." *Country Progress Report. Pakistan. Islamabad: National AIDS Control Program, Ministry of National Health Services, Regulation and Coordination, Government of Pakistan*.

- Pinkerton, S.D., and C.L. Galletly. 2007. "Reducing HIV Transmission Risk by Increasing Serostatus Disclosure: A Mathematical Modeling Analysis." *AIDS and Behavior* 11(5):698.
- Pitpitan, E.V., S.C. Kalichman, L.A. Eaton, D. Cain, K.J. Sikkema, D. Skinner, M.H. Watt, and D. Pieterse. 2012. "AIDS-Related Stigma, HIV Testing, and Transmission Risk among Patrons of Informal Drinking Places in Cape Town, South Africa." *Annals of Behavioral Medicine* 43(3):362-371.
- Rehan, M., U. Waheed, M. Sarwar, M. Arshad, H. S. Satti, and H. A. Zaheer. 2016. "Knowledge, Attitude, Practices and Awareness Regarding HIV/AIDS among University Students of Islamabad and Rawalpindi, Pakistan." *Annals of Pakistan Institute of Medical Sciences* 12(2):89-92.
- Rutledge, S. E. 2007. "Enacting Personal HIV Disclosure Policies for Sexual Situations: HIV-Positive Gay Men's Experiences." *Qualitative Health Research* 17(8):1040-1059.
- Serovich, J. M., J. Kimberly, K. Mosack, and T. Lewis. 2001. "The Role of Family and Friend Social Support in Reducing Emotional Distress among HIV-Positive Women." *AIDS Care* 13(3):335-341.
- Sohn, A., and S. Park. 2012. "HIV/AIDS Knowledge, Stigmatizing Attitudes, and Related Behaviors and Factors That Affect Stigmatizing Attitudes against HIV/AIDS among Korean Adolescents." *Osong Public Health and Research Perspectives* 3(1):24-30.
- Steward, W. T., G. M. Herek, J. Ramakrishna, S. Bharat, S. Chandy, J. Wrubel, and M. L. Ekstrand. 2008. "HIV-Related Stigma: Adapting a Theoretical Framework for Use in India." *Social Science & Medicine* 67(8):1225-1235.
- Tavoosi, A., A. Zaferani, A. Enzevaei, P. Tajik, and Z. Ahmadinez. 2004. "Knowledge and Attitude Towards HIV/AIDS among Iranian Students." *BMC Public Health* 4(1):17 doi: 10.1186/1471-2458-4-17.
- Thanavanh, B., M. Harun-Or-Rashid, H. Kasuya, and J. Sakamoto. 2013. "Knowledge, Attitudes and Practices Regarding HIV/AIDS among Male High School Students in Lao People's Democratic Republic." *Journal of the International AIDS society* 16(1): DOI: 10.7448/IAS.16.1.17387.
- UNICEF. 2003. "Accelerating the Momentum in the Fight against HIV/AIDS." Paper read at South Asia High-Level Conference, at Kathmandu, Nepal. Available at <https://www.unicef.org/rosa/IP2.pdf>
- Vanable, P.A., M.P. Carey, D.C. Blair, and R.A. Littlewood. 2006. "Impact of HIV-Related Stigma on Health Behaviors and Psychological Adjustment among HIV-Positive Men and Women." *AIDS and Behavior* 10(5):473-482.
- WHO. 2016. *Fact Sheet: HIV/AIDS*. Available at <http://www.who.int/mediacentre/factsheets/fs360/en/>.
- Winstead, B.A., V.J. Derlega, A.P. Barbee, M. Sachdev, B. Antle, and K. Greene. 2002. "Close Relationships as Sources of Strength or Obstacles for Mothers Coping with HIV." *Journal of Loss & Trauma* 7(3):157-184.

- Wong, L.H., H. Van Rooyen, P. Modiba, L. Richter, G. Gray, J.A. McIntyre, C.D. Schetter, and T. Coates. 2009. "Test and Tell: Correlates and Consequences of Testing and Disclosure of HIV Status in South Africa (Hptn 043 Project Accept)." *Journal of Acquired Immune Deficiency Syndromes* 50(2):215-222.
- Yaya, S., G. Bishwajit, G. Danhouno, V. Shah, and M. Ekholuenetale. 2016. "Trends and Determinants of HIV/AIDS Knowledge among Women in Bangladesh." *BMC Public Health* 16(1): doi: 10.1186/s12889-016-3512-0.
- Zafar, M., N. Nisar, M. Kadir, Z. Fatmi, Z. Ahmed, and K. Shafique. 2014. "Knowledge, Attitude and Practices Regarding HIV/AIDS among Adult Fishermen in Coastal Areas of Karachi." *BMC Public Health* 14(1): doi:10.1186/1471-2458-14-437.