

Understanding HIV and Associated Risk Factors Among Religious Groups in Zimbabwe

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Abstract

Background

The influence of religion and belief systems is widely recognized as an important factor in understanding of health risk perception and myths in the general fight against the HIV pandemic. This study compares the understanding of HIV risk factors and utilization of some HIV services among religious groups in Zimbabwe. **Methods:** We conducted statistical analysis to investigate the understanding of HIV and associated risk factors among religious groups in Zimbabwe using Zimbabwe Demographic and Health Survey (ZDHS) data.

Methods

We conducted statistical analysis to investigate the understanding of HIV and associated risk factors among religious groups in Zimbabwe using 2015-2016 Zimbabwe Demographic and Health Survey (ZDHS) data. We began by investigating on associations explaining of HIV risk factors among religious groups. A ranking procedure was conducted to compare the understanding of HIV risk for different religions. A multivariate stepwise backward elimination method was carried out to explore on factors determining understanding of HIV risk after controlling for confounding factors using the most recent ZDHS data (2015-2016). Analysis of the 2010-11, 2005-6 rounds of ZDHS data was also conducted

Results

The results from the three surveys showed that, in general apostolic sector had low understanding of HIV risk factors compared to other religious groups. Analysis of the 2015-2016 ZDHS data showed that women belonging to the apostolic sector were less likely to know where to get an HIV test odds ratio (OR) and 95% confidence interval, 0.665 (0.503-0.880) and to know that male circumcision reduces HIV transmission OR 0.863 (0.781-0.955). Women from this group did not know that circumcised men can be infected if they do not use condoms OR 0.633 (0.579-0.693), nor that it is possible for a healthy-looking person to have HIV, OR 0.814 (0.719-0.921). They would not buy vegetables from a vendor with HIV OR 0.817 (0.729-0.915) and were less likely to support that HIV positive children should be allowed to attend school with HIV negative children OR 0.804 (0.680-0.950). Similar results were obtained for men in the apostolic sector. These men also did not agree that women were justified to use condoms if the husband has an STI OR 0.851 (0.748-0.967).

Conclusions: Our results suggest that apostolic sector lack adequate knowledge of HIV and associated risk factors than other religious groups. Targeting HIV prevention programmes by religious groups could be an efficient approach for controlling HIV in Zimbabwe.

Introduction

Religion has a permeating influence on all aspects of life [1, 2]. Its role in explaining health access and health outcomes has received considerable scholarly debate in Africa [3–5]. The church, as a community, provides a unique platform for informal social interaction as well as formal teaching and regulation, thus shaping individual attitudes towards health-seeking behavior [6]. The influence of religious organizations is widely recognized as an important factor in the fight against the HIV epidemic, particularly in sub-Saharan Africa [7–9]. However, the causal mechanisms that explain the associations between religion and health have largely been inconclusive [10]. On the one hand, there are arguments that support the view that church doctrine; religious beliefs and values have a direct influence on health outcomes [10], while on the other hand, others maintain that the observed differences on health outcomes are not a result of religion itself but rather due to differential access to social and human capital [11, 12]. The effects of religious affiliation on health and their implications for prevention and care programmes therefore require further studying in order to guide the design of effective HIV prevention and mitigation programmes.

Zimbabwe is predominantly a Christian nation. Approximately, 87% of the population practice Christianity [13] under different church denominations [14]. According to the 2015 Zimbabwe Demographic and Health Survey (ZDHS), Apostolics were identified as the largest religious denomination in the country constituting 38% of the population ages 15–49 years [13], and is the most common religion denomination in most of the provinces in Zimbabwe (Fig. 1). Other religious affiliations in the country were distributed as follows: Pentecostal 22%, Protestant 16%, Roman Catholic 7%, Other Christian 5%, no religion 11%, traditional 2% and Moslem 1% [13]. In spite of the popularity of Christianity in the country there is great variability amongst the different churches and denominations in terms of beliefs, teachings and practices on sexual and health seeking behaviors. For example, while polygamy is not approved in the mainline churches, in particular those with Missionary foundations, it is acceptable in most African “Independent, Initiated, Indigenous, Instituted” Churches (AICs) [15]. The provision and promotion of western health beliefs and medicine, while abhorrent to most AICs, is widely accepted by the mainline churches [14, 15].

Although the last decade has seen the rapid emergence and expansion of Charismatic Evangelical denominations, primarily dominated by the Pentecostal churches, the apostolic churches still have a substantial following [15]. Christians who practice the apostolic ‘brand’ of faith religion are commonly referred to as Vapositori, a Shona adaptation of the word “apostolics” [4, 16, 17]. A trend analysis suggests that there has been a steady increase on group membership among the apostolics from 20% of the Zimbabwean population in the 1990s [18] to 27% in 2009 [19] and currently at 38% [13]. Forty two percent of the women respondents reported that they belonged to the apostolic sect [13]. Of the several apostolic churches in Zimbabwe, the Johanne Marange and Johanne Masowe apostolic groups command a huge following with members spread across the African continent and beyond [20].

It must be highlighted, however, that the collective term vapositori masks the diversity among Christians commonly identified by this name. For example, they differ on theological foundations, are quite varied in terms of their beliefs, values, teachings, regulations and practices. An attempt to profile these churches is

documented elsewhere [4] and is beyond the scope of this paper. However, for comparative purposes, we adopt a taxonomy reported by Maguranyanga (2011), which categorizes apostolics on a continuum that ranges from the “ultra conservative” or “fundamentalists” to the “semi-conservative” and “liberal” apostolic groups based on their beliefs on uptake of modern medical services. The ultra-conservative apostolics teach against any access and utilization of modern healthcare services and place great emphasis on faith healing through prayers, the use of holy water and stones while the semi-conservative groups neither object nor openly promote use of modern medicine and actively seek healthcare [4]. All these attributes and characteristics are mirrored in the followers’ health seeking practices and attitudes towards conventional medicine.

Most of the available literature on the role of religion in Zimbabwe, in general and the apostolics in particular, on access to health services specifically has focused on small cross-sectional studies within specific geographic areas [21, 22, 25]. Consequently, these studies may not have been representative of the group nationally and the other southern African countries where this group exists. For example, a study conducted in Manicaland demonstrated the negative impact of affiliation to an apostolic church to child mortality [21]. Another study showed that mothers belonging to the Apostolic faith were less likely to have used postnatal care services in an urban suburb in Harare [22]. There are few studies that have used population based national data to understand the relationship between religion and access to health in general and among the apostolics in particular, however, they have their fair share of limitations. For example, an analysis of data from the Zimbabwe's Demographic and Health Survey 2005 [26] showed that apostolic women were at higher risk of HIV infection because they married early. The study however, only controlled for age and did not account for other potential confounding effects. Another, nationally representative study showed that affiliation with the Apostolic faith was a significant risk factor in reducing utilization of maternal and child health services despite reduced costs, accessibility and availability of these services [10]. However, since the primary focus of the study was maternal and child health, the relationship between HIV and its associated risks was not explored and the study did not control for other confounding factors.

Given this background, using data from a large nationally representative survey (ZDHS) this study investigates on the understanding of the HIV epidemic and associated risk factors for HIV infection among religious groups in Zimbabwe.

Methods

Study area and data sources

The study area was Zimbabwe, a landlocked country in southern Africa. Zimbabwe has the sixth highest HIV prevalence in sub-Saharan Africa, with approximately 1.2 million persons aged 15–64 years old living with HIV in 2016 [27]. The main source of data for this study was the most recent ZDHS conducted in 2015-16 [28]. Subjects were enrolled in the ZDHS via a two-stage sampling procedure to select households. A total of 400 ZDHS sample locations (Enumeration Areas) were selected (Fig. 2). The study

population was limited to adults aged 15 to 49 years for females and 15–54 years for males, resulting in a total of 9,955 women and 8,396 men included in the study. Anonymous HIV testing was performed with the informed consent of all sampled individuals. HIV serostatus was determined by testing with the enzyme-linked immunosorbent assay (ELISA) Vironostika Uniform 2 Ag/AB. All samples that tested positive and a random sample of 10% of samples that tested negative were retested with a second ELISA, the Enzygnost® HIV Integral II assay (Siemens). Positive samples on both tests were classified as HIV positive. If the first and second tests were discordant, the two ELISAs were repeated; if the results remained discordant, a confirmatory test, the HIV 2.2 western blot (DiaSorin), was administered.

Statistical analysis

STATA Version 15.1, Texas USA was used to conduct statistical analysis. Firstly, we explored on associations between variables using simple chi-square test for categorical variables. Thereafter, multivariate stepwise backward elimination method was used to explore factors significantly associated with being an Apostolic after controlling for confounding among these factors. Two models were analysed separately i.e. one for males and the other for females. Briefly, stepwise regression is a method of fitting regression models in which the choice of predictive variables is carried out by an automatic procedure in STATA or other statistical packages. We specifically conducted the backward elimination procedure which involves starting with all candidate variables, testing the deletion of each variable using a chosen model fit criterion, deleting the variable (if any) whose loss gives the most statistically insignificant deterioration of the model fit, and repeating this process until no further variables can be deleted without a statistically significant loss of fit. The initial backward elimination p-value was set at 0.25 as is standard. The final model was run on factors that had a p-value of less than 0.25 in the initial stepwise regression model result. Statistical significance cut-off for purposes of describing the significant factors associated with being an apostolic was set at $p < 0.05$.

We used the current ZDHS 2015-16 and two previous rounds done in 2010-11 and 2005-6 to conduct some chi-square tests on the knowledge and HIV risk factor variables. We conducted additional analysis on the latest round of DHS as recent data would more useful in shaping the current HIV programming techniques in Zimbabwe,

Results

Demographic characteristics for 2015 DHS survey.

The demographic characteristics for the DHS 2015 are present in Table 1. Approximately two-thirds (62% for females and 59% for males) of the population lived in rural areas. Two thirds, (66% for both sexes) of respondents had secondary education and approximately one percent for both sexes had no education. The Apostolic Sect was the largest religious group, constituting 40% of women and 30% of adult males.

Table 1

Baseline frequencies for participant characteristics using ZDHS 2015-16 data

Variable	Female Frequency n (%)	Male frequency n (%)
Age group in years	2156 (22)	2065 (25)
15–19	1782 (17)	1376 (16)
20–24	1656 (17)	1166 (14)
25–29	1591 (16)	1104 (13)
30–34	1209 (12)	932 (11)
35–39	966 (10)	797 (9)
40–44	595 (6)	578 (7)
45–49		378 (5)
50–54 (Men only)		
Type of residence	4521 (38)	3,456 (41)
Urban	5434 (62)	4,940 (59)
Rural		
Highest education level	106 (1)	57 (1)
None	2385 (26)	1,855 (22)
Primary	6637 (66)	5,524 (66)
Secondary	827 (7)	960 (11)
Higher		
Marital status	2666 (25)	3,619 (43)
Never in union	5700 (59)	4,267 (51)
Married	315 (3)	70 (1)
Living with partner	430 (4)	66 (1)
Widowed	488 (5)	163 (2)
Divorced	356 (4)	211 (3)
Separated		

Variable	Female Frequency n (%)	Male frequency n (%)
Religion	60 (1)	220 (3)
Traditional	670 (7)	698 (8)
Roman catholic	1618 (16)	1,272 (15)
Protestant	2679 (25)	1,551 (18)
Pentecostal	3829 (42)	2,507 (30)
Apostolic sect	589 (5)	606 (7)
Other Christian	30 (0)	53 (1)
Muslim	471 (5)	1,479 (18)
None	9 (0)	10 (0)
Other		

Factors associated with the apostolic sect The results in Table 2 shows that the apostolic males and females were less likely to have ever heard about HIV when respectively compared to males and females of other religions ($p < 0.05$). Ever tested for HIV percentages and knowledge of where to get tested and ever having tested were also lower in the apostolic groups. When compared to males and females of other religions the apostolic sect showed lower percentage of knowledge on the following questionnaire items: Knowing that HIV transmission can be reduced by having sex with one partner who is HIV negative, knowing that sexual HIV transmission can be reduced by consistent condom use, knowing that, men can reduce HIV transmission by being circumcised and that circumcised men who have sex without condom can get HIV/AIDS. Apostolic females would think that HIV can be obtained from sharing food with an HIV infected person and that one can get HIV by witchcraft or supernatural means. They did not know that, a healthy person can still be HIV infected. Comprehensive knowledge of HIV is a composite measure and indicates that an individual knows that consistent condom use and limiting sexual intercourse to one uninfected partner can reduce the risk HIV transmission, that a healthy-looking person can have HIV, and rejects the two most common local misconceptions about the transmission of HIV. In Zimbabwe, the two most common misconceptions are that HIV can be transmitted through mosquitoes and that a person can become infected with HIV by sharing food with a person who has HIV. Nationally, only 55% of women and 56% of men have comprehensive knowledge of HIV prevention and transmission [13]. Comprehensive knowledge on HIV was only 47% among females Apostolics compared to 60% among non Apostolics females. Similarly, comprehensive knowledge on HIV was only 51% among males Apostolics compared to 58% among non Apostolics males. Additionally, a larger percentage of the apostolic would be ashamed if a family member gets infected with HIV and would not buy vegetables from a vender with HIV infection. A slightly higher parentage of female Apostolics attest that children with HIV should not be allowed to attend school with children without HIV. Both apostolic males and

females felt that a wife is not justified to ask her husband to use a condom if he has an STI. From the data, circumcision prevalence was low for the apostolic males.

Table 2

Factors associated with the apostolic sector analyzed separately for males and females from ZDHS 2015-16 data.

Variable	Females n (%)			Males n (%)		
	Apostolics	Other religion	P value	Apostolics	Other religion	P value
Ever heard about HIV	55 (1.4)	34(0.6)	0.011	27 (1.2)	28 (0.5)	0.002
No	3774 (98.6)	6092 (99.4)		2480 (98.8)	5861 (99.5)	
Yes						
Ever tested for HIV	805 (21.9)	1085 (17.5)	0.006	1016 (42.0)	1873 (32.2)	0.001
No	3024 (78.1)	5041 (82.5)		1491 (58.0)	4016 (67.8)	
Yes						
Know where to get tested	126 (3.6)	124 (2.3)	0.001	150 (6.2)	170 (3.0)	0.001
No	496 (96.4)	5947 (97.7)		2330 (93.8)	5691 (97.0)	
Yes						
HIV transmission can be reduced by having 1 sexual partner	7282 (7.6)	330 (5.4)	0.023	145 (5.8)	251 (4.7)	0.062
No	3434 (90.8)	5705 (93.5)		2312 (93.3)	5576 (94.7)	
Yes	58 (1.6)	57 (1.1)		23 (1.0)	34 (0.7)	
Don't know						
Condom use reduces HIV	519 (13.9)	705 (11.8)	0.006	300(11.8)	517 (9.1)	0.001
No	3125 (82.1)	5282 (86.0)		2146 (86.6)	5298 (90.1)	
Yes	130 (4.0)	105 (2.2)		34 (1.6)	46 (0.8)	
Don't know						
Men can reduce HIV transmission by being circumcised	672 (18.2)	829 (13.7)	0.001	446 (18.3)	925 (15.5)	0.016
No	2733 (71.1)	4794 (77.6)		1907 (76.5)	4694 (79.7)	
Yes	369 (10.7)	469 (8.6)		127 (5.3)	242 (4.8)	
Don't know						

Variable	Females n (%)			Males n (%)		
	Apostolics	Other religion	P value	Apostolics	Other religion	P value
Circumcised men who have sex without condom can get HIV/AIDS	981 (26.5)	1029 (17.4)	0.001	329 (13.2)	626 (10.5)	0.001
No	2210 (56.1)	4357 (68.7)		2016 (81.2)	5011 (85.1)	
Yes	583 (17.4)	706 (12.9)		135 (5.6)	224 (4.4)	
Don't know						
Can get HIV from sharing food	3371 (89.1)	5672 (93.2)	0.001	2197 (88.8)	5268 (90.0)	0.134
No	312 (8.2)	343 (5.3)		220 (8.6)	490 (8.1)	
Yes	91 (2.7)	77 (1.5)		63 (2.6)	103 (1.9)	
Don't know						
Can get HIV by witchcraft or supernatural means	3456 (91.8)	5696 (93.8)	0.001	2279 (92.2)	5403 (92.5)	0.442
No	239 (6.0)	306 (4.6)		146 (5.5)	353 (5.6)	
Yes	79 (2.2)	90 (1.6)		55 (2.4)	105 (1.9)	
Don't know						
A healthy person can be HIV infected	604 (15.7)	680 (11.3)	0.001	311 (13.1)	580 (10.3)	0.005
No	3131 (83.1)	365 (87.8)		2150 (85.9)	5242 (88.9)	
Yes	39 (1.2)	47 (0.9)		19 (1.0)	39 (0.8)	
Don't know						
Would be ashamed if a family member gets infected with HIV	3253 (85.4)	5469 (89.0)	0.001	1946 (81.5)	4942 (77.4)	0.001
Disagree	511 (14.4)	607 (10.7)		523 (22.2)	895 (16.0)	
Agree	10 (0.2)	16 (0.3)		11 (0.4)	24 (0.56)	
Don't know						

Variable	Females n (%)			Males n (%)		
	Apostolics	Other religion	P value	Apostolics	Other religion	P value
Would buy vegetables from a vendor with HIV	61 (23.4)	968 (16.4)	0.001	464 (18.3)	923 (15.3)	0.001
No	2888 (76.0)	5093 (82.9)		2002 (81.2)	4879 (83.7)	
Yes	25 (0.6)	31 (0.7)		14 (0.5)	59 (1.0)	
Don't know						
Children with HIV should be allowed to attend school with children without	324 (8.7)	312 (4.6)	0.001	245 (9.2)	486 (8.1)	0.201
No	3409 (90.1)	5741 (94.6)		2211 (89.9)	5341 (91.2)	
Yes	41 (1.2)	39 (0.8)		24 (0.9)	34 (0.7)	
Don't know						
Wife justified to ask husband to use a condom if he has an STI	509 (12.9)	662 (10.2)	0.040	397 (16.0)	670 (12.3)	0.001
No	3240 (84.8)	5372 (88.2)		2076 (82.6)	5164 (86.7)	
Yes	80 (2.3)	92 (1.6)		34 (1.4)	55 (1.0)	
Don't know						
Responded circumcised				2196 (88.7)	4861 (84.2)	0.001
No				306 (11.2)	1021 (15.7)	
Yes				5 (0.2)	7 (0.1)	
Don't know						

Table 3

Multivariate stepwise backward elimination model results for females: final model using ZDHS 2015 data.

Variable	Adjusted Odds Ratio	95% CI	P Value
Ever tested for HIV	1.283	1.134–1.451	0.001
Know where to get tested	0.665	0.503–0.880	0.004
HIV transmission can be reduced by having 1 sexual partner	0.900	0.765–1.059	0.205
Men can reduce HIV transmission by being circumcised	0.863	0.781–0.955	0.004
Circumcised men who have sex without condom can get HIV/AIDS	0.633	0.579–0.693	0.001
Can get HIV from sharing food	1.203	1.012–1.429	0.036
Can get HIV by witchcraft or supernatural means	1.134	0.943–1.362	0.181
A healthy person can be HIV infected	0.814	0.719–0.921	0.001
Would be ashamed if a family member gets infected with HIV	1.110	0.970–1.270	0.129
Would buy vegetables from a vendor with HIV	0.817	0.729–0.915	0.001
Children with HIV should be allowed to attend school with children without HIV	0.804	0.680–0.950	0.011

Table 4

Multivariate stepwise backward elimination model results for males: final model using ZDHS 2015 data

Variable	Adjusted Odds Ratio	95% CI	P Value
Ever tested for HIV	0.825	0.743–0.916	< 0.001
Know where to get tested	0.637	0.502–0.809	< 0.001
Circumcised men who have sex without condom can get HIV/AIDS	0.771	0.665–0.895	0.001
Would be ashamed if a family member gets infected with HIV	0.709	0.616–0.816	0.001
Wife justified to ask husband to use a condom if he has an STI	0.851	0.748–0.967	0.014
Responded circumcised	0.773	0.675–0.885	0.001

Adjusted Regression Model Results For Females

In multivariate stepwise regressing models, compared to women of other religions, women belonging to the Apostolic sect continued to fair negatively in the following items. They are less likely to know where to get an HIV test odds ratio (OR) (95% confidence interval [CI]) = 0.665 (0.503–0.880), $p = 0.004$, they are less likely to know that men can reduce their chance of getting HIV by being circumcised, OR (95%CI) = 0.863 (0.781–0.955), $p = 0.004$. They were less likely to know that circumcised men who do not use condoms during sex can still get HIV, OR (95%CI) = 0.633 (0.579–0.693), $p = 0.001$. They are less likely to know that it is possible for a healthy-looking person to have, OR (95%CI) = 0.814 (0.719–0.921), $p = 0.001$. They would not buy vegetables from a vendor with HIV, OR (95%CI) = 0.817 (0.729–0.915), $p = 0.001$ and are unfortunately less likely to support the fact that children with HIV should be allowed to attend school with children without HIV, OR (95%CI) = 0.804 (0.680–0.950), $p = 0.011$.

Adjusted Regression Model Results For Males

In multivariate stepwise regressing models, compared to men of other religions, men belonging to the apostolic sect were less likely to have been tested for HIV, OR (5%CI) = 0.825 (0.743–0.916), $p = 0.001$, or know where to get an HIV test, OR (5%CI) = 0.637 (0.502–0.809), $p = 0.001$. The men were less likely to know that circumcised men who have sex without a condom can get HIV OR (5%CI) = 0.771 (0.665–0.895), $p = 0.001$. There men are less likely to concur with the fact that a wife is justified to as her husband to use a condom if he has an STI, OR (5%CI) = 0.851 (0.748–0.967), $p = 0.014$. Apostolic men were less likely to be circumcised OR (5%CI) = 0.773 (0.675–0.885), $p = 0.001$.

Trend Of Risk Perception

From data analysis results of the three rounds of DHS surveys, Apostolics male and females performed poorly in most questionnaire items related to their understanding of HIV and associated risk factors, see supplementary tables 1a, 1b, 2a, 2b, 3 and 4.

We also performed chi-square tests for various factors comparing the apostolic sect and people of other religions using the ZDHS 2005–2006 data (supplementary table 4). From this analysis, female Apostolics are significantly, in terms of the proportions, less likely to have ever heard of AIDS or to have been tested or know a place where one can get an HIV test. They are significantly less likely to know that HIV transmission can be reduced by having one sexual partner who is HIV negative, or to know that condom use reduces HIV transmission risk. They are likely to think that HIV can be transmitted by sharing food with an infected person and that one can get HIV from witchcraft or natural means. They are less likely to know that a healthy-looking person can be having HIV infection and are also less likely to buy vegetables from a vendor with HIV infection and do not think a person with HIV should be allowed to continue teaching. They are less likely to think that a wife is justified to ask her husband to use a condom if the husband has an STD. Similarly, apostolic males are less likely to have ever heard of AIDS or to have been tested or know a place where one can get an HIV test. Interestingly the male Apostolics are more likely to know that HIV transmission can be reduced by having one sexual partner who is HIV negative and this is something positive for this group. They do not think a person with HIV should be allowed to continue teaching. Although not statistically significant male Apostolics are less likely to know that condom use reduces HIV transmission risk and would think that HIV can be transmitted by sharing food with an infected person and are also less likely to buy vegetables from a vendor with HIV infection. Also, of statistical borderline significance is the fact that they are less likely to know that a healthy looking person can be having HIV infection and are less likely to say it is justified for a wife to ask her husband to use condoms if the husband has an STD infection

Chi-square test was performed for various factors comparing the apostolic sect and people of other religions using ZDHS 2010-11 data (supplementary table 3). From this analysis, female Apostolics are significantly, in terms of the proportions, less likely to know where to get an HIV test, to know that HIV transmission can be reduced by having one sexual partner who is HIV negative, to know that condom use reduces HIV transmission risk, more likely to think HIV is transmitted by sharing food with someone who is HIV positive, are more likely to think that one can get HIV from witchcraft or through supernatural means, are less likely to know that a healthy looking person can be having HIV infection, would want HIV infection in the family to remain a secret, would not want to buy vegetables from a vendor with HIV, would not want a male teacher with HIV to continue teaching and finally although not statistically significant they are more likely to feel that a wife is not justified to ask her husband to use a condom if the husband has an STI. Similarly, male Apostolics are significantly less likely to have ever heard about HIV or to have ever been tested or to know where to get an HIV test, less likely to know that condom use reduces HIV transmission risk, are more likely to think that one can get HIV from sharing food with a person who is infected, are less likely to know that a healthy looking person can be having HIV infection, would want

HIV infection in the family to remain a secret, would not likely buy vegetables from a vendor with HIV, thinks a male teacher with HIV should not be allowed to teach, thinks a wife is not justified to ask her husband to use a condom if the husband has an STI and finally are less likely to be circumcised.

In supplementary table 1a chi-square test of proportions was used to compare various factors across the various religious groups among females. From table supplementary 1a, the proportions show religious groups with the poorest performance for each question item. We used religious groups with sufficient samples sizes, notably Roman Catholics, Protestant, Apostolic Sect, Other Christians and None, we to explore how religious groups are performing by ranking each factor for these religious groups using rating scores number 1 to 6 with 6 being the worst, see supplementary table 1b. In the analysis, we summed the-scores to assess the overall performance of the groups. This analysis showed that female Apostolics performed worst, followed by people of no religion then other Christians. The other three in that sequence are Protestant and Roman Catholic then the Pentecostal fared best with regards to risk factors and understanding of HIV issues. Statistical comparison of the scores using oneway analysis of variance showed some difference, $p < 0.001$. The Bonferroni posthoc tests shows that, the actual difference exists between the worst three and any member of the best three religions, $p < 0.001$. This similar approach described above was conducted for males (see supplementary tables 2a and 2b). The ranking results from males follows a similar trend from worst to best that is being Apostolics followed by No religion, Other Christians, Protestant, Roman Catholic and then Pentecostal, $p < 0.001$.

Discussion

We conducted a comparative analysis of understanding HIV risk factors among religions groups in Zimbabwe. Our findings support previous findings that Apostolics lag behind in terms of their behavior and understanding of HIV issues. Our findings are consistent with previous studies in Zimbabwe which shown that affiliation to an apostolic church has some impact on health seeking behavior, access to health and health outcomes [4, 10, 21, 22]. This association could be explained in one of several ways. First, the church provides social support mechanisms in times of need, which potentially results in improved mental and physical health for church members. Second, the strict church doctrine on sex and sexuality and moral codes of conduct have a strong influence on members sexual practices and on individual and collective HIV risk perceptions [21, 23]. Thirdly, health, disease and illness are perceived to have primarily a spiritual foundation and healing is believed to come from prophets through acts of the Holy Spirit [4]. Any reliance on traditional or western preventative and curative services is therefore viewed as a display of lack of faith [16] and may be condemned and despised by some apostolic groups [4]. It is no wonder that some apostolic sects openly object to the uptake of modern medical health services including immunization and the taking of medicines [4, 24].

Univariate analysis showed that while knowledge of existence of HIV is universal, the percentages of apostolics who has this knowledge is slightly lower. The proportions of ever receiving an HIV test or knowing where HIV testing is done are also low for both males and females. Because Apostolic forms an increasingly large proportion of the people in Zimbabwe [13, 18, 19], targeting these groups with HIV

testing messages and access to HIV testing, will certainly increase the first 90 of the UNAIDS's 90-90-90 targets. The construct variable for comprehensive knowledge of HIV also shows lack of knowledge among apostolic groups.

The results showed misconception with regards to HIV prevention and modes of transmission among apostolic males and females when compared to other religions. This poses serious challenges with regards to HIV prevention hence the need for targeted information around HIV transmission and prevention. Of note, is their failing to mention that HIV transmission can be reduced by having one HIV negative sexual partner who is faithful. This is also embodied in their religious teaching around having to be fruitful and multiply and of note is that apostolic groupings engage in polygamous marriages. The apostolic males and females are less likely to think that a healthy person may be having HIV infection and may therefore indulge in unsafe sex which would increase their chances of being positive. It is also disturbing to note that both male and female apostolic are less likely to think that a wife is justified to ask her husband to use a condom if he has an STI.

Our analysis also showed that male apostolic struggle with stigma issues and also on how they would relate to an HIV infected person. As previously reported [5] religion affects people's daily lives by solving social problems, although it creates others. Efforts to reduce stigma and discrimination around the apostolic is warranted.

It is worth noting that in multivariate regression models there are crucial HIV related factors that remained poor among these groups.

The main limitation of this study is that we did not disaggregate data on the apostolic sector as other studies have shown that it is not one homogenous group as captured by the ZDHS survey data but at least three groups: the ultraconservative, the semi-conservative and the liberal Apostolic groups which place varying emphasis on faith healing and the strict adherence to church beliefs against the use of modern medicine. However, our results may be interpreted as generalizing the situation among this group.

Conclusions

The study results give a more comprehensive understanding of HIV and its risk factors amongst the largest key religious groups in Zimbabwe. Programmatic decisions based on aggregated data may fail to identify specific HIV prevention care needs among population sub-groups. These results show that HIV knowledge and understanding is lower in the Apostolic sector compared to other religious groups and the odds of HIV high risk behavior is higher in this sector than other religious groups. This association remained even after adequately controlling for other mediating factors. This conclusion is supported by a number of other studies on health seeking behavior generally amongst the apostolic sect but not specifically referring to HIV prevention and care services [5]. Some studies [4;5] suggest that "religious teaching and church regulations, of the Apostolic sect groups for example faith healing, negatively shape healthcare-seeking behavior".

In order to overcome theological rigidity on health related issues among the apostolic sector, the Ministry of Health and Child Care (MoHCC) and its implementing partners should work more closely with apostolic sector representative organizations to develop enhanced, targeted information, education and communication materials and promotional events to address misinformation, myths and lack of understanding on HIV prevention and care.

Declarations

Authors' contributions

GM, MM, IC, FM & ZM conceived the study and carried out the statistical analysis. GM wrote the first draft of the paper. All authors (MM, ZM, IC, DC, FM, OM & GM) contributed to the writing of the manuscript. All authors ((MM, ZM, IC, DC, FM, OM & GM)) read and approved the final manuscript.

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Competing interests

The authors declared that they have no competing interests.

Availability of data and materials

Data will be available upon request from the corresponding author.

Consent to publish

Not applicable.

Ethics approval and consent to participate

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Figures

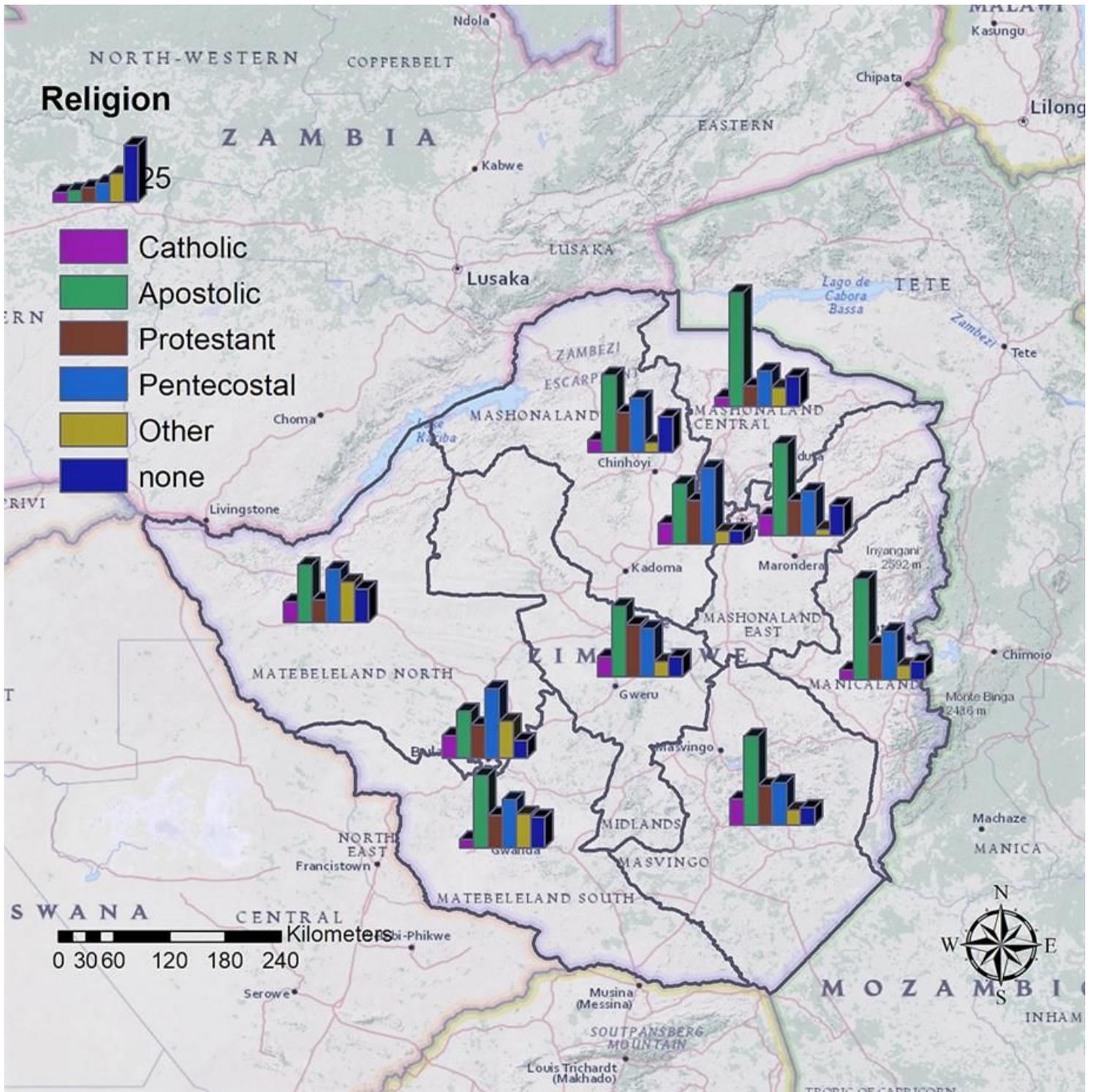


Figure 1

Distribution of main religions by provinces in Zimbabwe. Maps were created using ArcGIS® software by Esri version 10.3 (<http://www.esri.com/>).

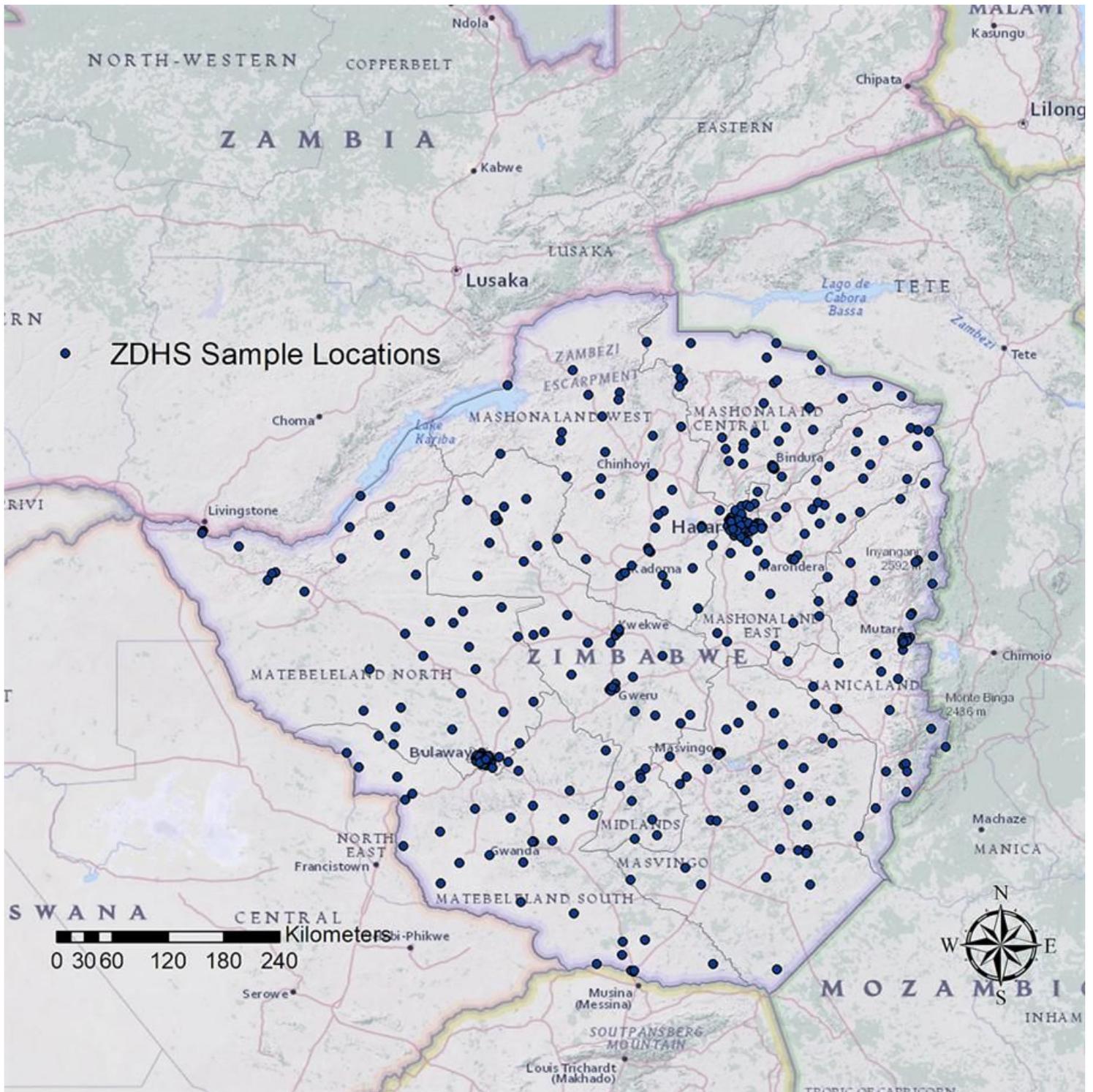


Figure 2

Zimbabwe Demographic and Health Survey (ZDHS) sample locations (blue dots). Maps were created using ArcGIS® software by Esri version 10.3 (<http://www.esri.com/>).

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