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RESEARCH ARTICLE

ANALYSIS OF SOCIO DEMOGRAPHIC AND ECONOMIC DETERMINANTS OF HIV INFECTION IN ZAMBIA 2014

***Aseel M. Almansour**

Department of Statistics, School of Science, King Abdul Aziz University, Jeddah, KSA

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ABSTRACT

Objective: The objective of the study was to contribute to the literature by investigating how HIV spread differ with the demographics, and socio-economic factors among the population in Zambia.
Introduction: Sothern Africa is considered worst affected by Human Immunodeficiency Virus (HIV) and still home to an estimated 6.3 million people living with HIV in 2013. In an attempt to determine the factors that associated with HIV we investigated the demographic and socio economic elements.
Methods: In order to estimate the infection of HIV and its associated risk factors using Zambia ZDHS 2014 survey data, the univariate and multivariate logistic regression analysis were applied.
Results: The models showed that marital status, residence type, education level, wealth index were statistically significant. Where having electricity, television, radio, and using internet were not positively associated with HIV prevalence. With 83058 respondents from the Zambia Demographics and Health Survey (ZDHS) the HIV test showed higher percentage of HIV infection of 6.4% for female than male (3.6%).
Conclusions: In order to prevent the infection from increasing continuous investigation of the transmission determinants is needed. The outcome of this study will help the policy maker to update their current knowledge of HIV infection for an effective prevention program.

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INTRODUCTION

Sothern Africa is considered worst affected by Human Immunodeficiency Virus (HIV) and still home to an estimated 6.3 million people living with HIV in 2013 (UNAIDS: The Gap Report. 2014). In the same year, there were 330,000 new infections while 200,000 people died from Acquired Immune Deficiency Syndrome AIDS-related illnesses (UNAIDS: The Gap Report. 2014). The infection of HIV among the South African population was still high at 19.1%, however; the spread of HIV differed significantly between various regions of Africa[1]. Among these regions, Zambia had one of the highest HIV spread with a percentage equal to 12.5. The data about HIV infection from the National Statistics Agency (ZIMSTAT) and ICF international showed 15% of HIV infection varies between adults aged 15 and 49 years (Takarinda *et al.,* 2016). The United Nations Program on HIV/AIDS (UNAIDS) 2013 reported that over 54,000 people were dead in Zambia from AIDS related illnesses, and 12,000 children were orphaned due to AIDS.

Corresponding author:* **Aseel M. Almansour,
Department of Statistics, School of Science, King Abdul Aziz University, Jeddah, KSA.

Despite the awareness programs to promote for HIV prevention between young and adolescent adults, HIV risks remain associated with by socio demographics and economics factors. Studies showed that the increased commercial sex activities resulting, for example; from unemployment rates in rural areas contributed significantly to the spread of HIV (Chinomona and Mwambi, 2015). The study done by Sophie et al showed the association of sexual risk behaviors as a leading cause to HIV infection with lower socio economic position, lower education, and earlier marriage. Also, the study done by Amos et al presented the statistical significance of HIV infection with a person's residence type, age, gender, marital status, and level of education Kudakwashe et al study (Takarinda *et al.,* 2016) showed the correlation between HIV spread and educational level, wealth status, and currently being in union among men and women. The percentage of HIV spread from Kudakwashe study was higher among women 61% than men 39%. In order to reduce HIV and explain the infection in Zambia region, we need to under stands the determinants of the infection spread. Thus, the current objective of the study was to contribute to the literature by using Zambia ZDHS 2014 survey data to investigate how HIV spread differ with the demographics, and socio-economic factors among the population in Zambia.

MATERIALS AND METHODS

Our study uses 2014 Zambia Demographics and Health Survey (ZDHS) which is a national sample survey carried out by the Central Statistical Office (CSO) in partnership with the Ministry of Health (MoH), the University of Zambia Teaching Hospital (UTH) Virology Laboratory, the Tropical Diseases Research Center (TDRC), and the Department of Population Studies at the University of Zambia (UNZA) under the guidance of the National Steering Committee. All DHS datasets are free to the public use to download. The survey designed to provide up to date information on background characteristics of the respondents. In this paper we are interested in the following variables: person's age, marital status, residence type, education level, wealth status, having electricity, using radio, using television, having internet service, and their association with infection of HIV/AIDS. The DHS program has conducted population based HIV testing since 2001, it is a testing protocol provided for anonymous, informed, and voluntary testing of women and men. All respondents received educational materials and referrals for free testing and counselling. The target groups in this study were men age 15-59 and women age 15-49 randomly selected across Zambia's households. Information about children age 0-5 was collected, including data on weight and height. The DHS survey collected blood samples for HIV testing in order to determine national and provincial infection and incidence rates. The CSO ensured that the data properly reflect the situations they intended to describe, and sample weights were considered. Sampling weights were adjustment factors applied to adjust for differences in probability of selection and interview between cases due to design or chance. Sampling weight was divided by 1,000,000 to make sample data representative of the entire population. Cross tabulation was used with SPSS Statistical package to determine the HIV infection in Zambia 2014, describing the behavior of demographics and socio economics risk factors by gender. The study provided estimates of HIV infection at gender level using the bivariate and multivariate logistic regression models (Chinomona and Mwambi, 2015). Then, we estimated the association between HIV infection and some risk factors by using bivariate (unadjusted) and (for the effects of the other covariates in the model) logistic regression models. For simplicity in interpretation the coefficients of the covariates were expressed on the odds ratios (ORs) of the logistic regression model with 95% confidence intervals (CIs).

RESULTS

Altogether, there were 83,058 participants in the 2014 ZDHS with (51.4%) female participants.Table1 shows demographic and socio economic characteristics of the participants in the 2014 ZDHS. The results from the HIV test showed higher percentage of HIV infection of 6.4% for female than male (3.6%). The majority of the female and male respondents in the survey were aged group from 20-29 representing (16.9%) female and (13.5%) male. For marital status, most of the respondents were married with a percentage equal to (56.8%), where the percentage of the widowed status were female (5.6%) female and (0.7%) male. Regarding the respondent's residence type, most of them lived in rural area (58.1%) and their level of education clustered around primary grade (44%) with fewer in the higher grade (3.4%). For the wealth index as one of the socio economic indicators, the majority of the respondents fell under the middle class (22.1%), and more than three quarter (76.5%) of the respondents reported not having electricity at their houses, (40.2%) did not have radio, (63.1%) did not have television, and (94.6%) did not have access to the internet. Results from the univariate logistic regression were presented by gender in Table 2. The results showed that the likelihood of being HIV positive was (23%) higher for male (OR 1.23; 95% CI [0.99, 1.52]) with age group 40-49 than in the female group. All age groups were significantly associated with HIV infection except the female and male age group 30-39.

All type of marital status for female were significant with HIV test except the single group with a P-value equal 0.7. On the other hand, all type of marital status for male were also significant with HIV test except for the divorced group with a P-value 0.6. The rest of the covariates in general as the residence type, wealth index, having electricity and television are all positively associated with HIV prevalence, except, having a radio or internet were not. Table 3 represents the odds ratios with 95% confidence intervals for the multivariate logistic regression between HIV infection and the effect of the other covariates for both gender.

Table 1. Demographics and Socio Economic Characteristics by Gender for Zambia Population, 2014

	Total	Males	Females
Background Characteristics	n (%)	n (%)	n (%)
Age (years)			
15 - 19	8242 (21.6)	4022 (10.5)	4220 (11.1)
20 - 29	11589 (30.4)	5139 (13.5)	6450 (16.9)
30 - 39	9104 (23.9)	4352 (11.4)	4752 (12.5)
40 - 49	5666 (14.9)	2914 (7.6)	2752 (7.2)
50 - 59	3541 (9.2)	1497 (3.9)	2044 (5.4)
Gender			
Male	40355 (48.6)	-	-
Female	42703 (51.4)	-	-
Marital Status			
Single	12805 (30.6)	7249 (17.3)	5556 (13.3)
Married	23757 (56.8)	11539 (27.6)	12218 (29.2)
Widowed	2608 (6.2)	284 (0.7)	2324 (5.6)
Divorced	1976 (4.7)	419 (1)	1557 (3.7)
Separated	664 (1.7)	230 (0.6)	434 (1)
Residence Type			
Urban	34809 (41.9)	16677 (20.1)	18132 (21.8)
Rural	48249 (58.1)	23678 (28.5)	24571 (29.6)
Education Level			
No Education	25804 (31.2)	12241 (14.8)	13563 (16.4)
Primary	36358 (44)	16818 (20.4)	19540 (23.7)
Secondary	17597 (21.4)	9401 (11.4)	8196 (9.9)
Higher	2837 (3.4)	1657 (2)	1180 (1.4)
Wealth Index			
Poorest	16334 (19.7)	7729 (9.3)	8605 (10.4)
Poorer	17188 (20.7)	8452 (10.2)	8736 (10.5)
Middle	18336 (22.1)	9060 (10.8)	9276 (11.2)
Richer	16314 (19.6)	8010 (9.6)	8304 (10)
Richest	14886 (17.9)	7104 (8.6)	7782 (9.4)
Has Electricity			
No	63403 (76.5)	30922 (37.3)	32481 (39.2)
Yes	19528 (23.5)	9368 (11.2)	10160 (12.3)
Has Radio			
No	33376 (40.2)	15809 (19)	17567 (21.2)
Yes	49662 (59.8)	24535 (29.5)	25127 (30.3)
Has television			
No	52370 (63.1)	25402 (30.6)	26968 (32.5)
Yes	30648 (36.9)	14934 (18)	15714 (18.9)
Has internet			
No	78554 (94.6)	38224 (46)	40330 (48.6)
Yes	4485 (5.4)	2123 (2.6)	2362 (2.8)
HIV Test Results			
Non-Reactive	24065 (89.7)	11620 (43.3)	12445 (46.4)
Reactive	2696 (10.3)	968 (3.9)	1728 (6.4)

Table 2. Estimates of the Factors Associated with HIV Infection Among Male in Zambia, 2014 from the Model

Background Characteristics	OR (95% CI)	AOR (95% CI)
Age (year)		
15 – 19	0.07 (0.05-0.1)	0.12 (0.07-0.19)
20 – 29	0.25 (0.2-0.32)	0.32 (0.24-0.43)
30 – 39	0.86 (0.69-1.06)	0.91 (0.73-1.14)
40 – 49	1.23 (0.99-1.52)	1.34 (1.07-1.67)
50 – 59	1	
Marital Status		
Single	0.1 (0.07-0.16)	0.31 (0.19-0.51)
Married	0.57 (0.37-0.86)	0.56 (0.36-0.86)
Widowed	3.38 (1.84-6.21)	2.82 (1.49-5.34)
Divorced	1.15 (0.69-1.92)	1.05 (0.62-1.79)
Separated	1	1
Residence Type		
Urban	1.95 (1.71-2.23)	1.72 (1.43-2.07)
Rural	1	1
Education Level		
No Education	0.68 (0.46-1.01)	1.1 (0.71-1.73)
Primary	0.62 (0.49-0.8)	1.12 (0.82-1.52)
Secondary	0.8 (0.63-1.02)	1.42 (1.07-1.88)
Higher	1	1
Wealth Index		
Poorest	0.44 (0.34-0.57)	0.54 (0.34-0.85)
Poorer	0.7 (0.56-0.86)	0.81 (0.54-1.22)
Middle	0.83 (0.68-1.02)	0.89 (0.61-1.27)
Richer	1.22 (1.01-1.47)	1.1 (0.84-1.44)
Richest	1	1
Has Electricity		
No	0.72 (0.63-0.83)	1 (0.77-1.29)
Yes	1	1
Has Radio		
No	0.81 (0.7-0.93)	1 (0.85-1.18)
Yes	1	1
Has television		
No	0.72 (0.63-0.82)	0.98 (0.79-1.21)
Yes	1	1
Has internet		
No	1.02 (0.77-1.35)	1.16 (0.84-1.61)
Yes	1	1

Table 3. Estimates of the Factors Associated with HIV Infection Among Female in Zambia, 2014 from the Model

Background Characteristics	OR (95% CI)	AOR (95% CI)
Age (years)		
15 – 19	0.12 (0.1-0.15)	0.16 (0.12-0.21)
20 – 29	0.47 (0.41-0.54)	0.54 (0.46-0.63)
30 – 39	0.97 (0.85-1.12)	1.11 (0.96-1.28)
40 – 49	1	1
Marital Status		
Single	0.97 (0.85-1.12)	0.54 (0.38-0.77)
Married	0.26 (0.19-0.36)	0.57 (0.42-0.77)
Widowed	0.57 (0.42-0.77)	3.09 (2.16-4.42)
Divorced	4.05 (2.87-5.71)	1.32 (0.94-1.85)
Separated	1	1
Residence Type		
Urban	2.30 (2.07-2.55)	1.82 (1.58-2.11)
Rural	1	1
Education Level		
No Education	0.70 (0.52-0.93)	1.07 (0.76-1.49)
Primary	0.72 (0.57-0.91)	1.13 (0.86-1.49)
Secondary	0.81 (0.64-1.02)	1.31 (1-1.7)
Higher	1	1
Wealth Index		
Poorest	0.47 (0.39-0.57)	0.53 (0.37-0.76)
Poorer	0.57 (0.48-0.68)	0.66 (0.48-0.91)
Middle	0.93 (0.80-1.08)	0.94 (0.71-1.24)
Richer	1.26 (1.09-1.45)	1.16 (0.94-1.43)
Richest	1	1
Has Electricity		
No	0.70 (0.63-0.78)	0.92 (0.75-1.13)
Yes	1	1
Has Radio		
No	1.08 (0.97-1.19)	1.18 (1.04-1.35)
Yes	1	1
Has television		
No	0.78 (0.7-0.86)	1.09 (0.91-1.29)
Yes	1	1
Has internet		
No	1.02 (0.83-1.25)	1.18 (0.92-1.5)
Yes	1	1

Male with age group 40- 49 years had the highest odds ratio (AOR 1.34; 95% [1.07, 1.67]) compared to the other age groups. Where, in the female age group 20- 29 had the highest odds ratio (AOR 0.54; 95% [0.46 – 0.63]). Also, the results showed that the risk of HIV infection was high as being widowed than the other marital status with (AOR 2.82; 95% [1.49 – 5.34]) for male, and (AOR 3.09; 95% [2.16 – 4.42]) for female. The odds of HIV positive increased with higher education level in both genders relative to no education or primary level with (AOR 1.42; 95% [1.07 – 1.88]) for male and (AOR 1.31; 95% [1 – 1.7]) for female. Relative to the type of residence Table 3 showed that for both genders the HIV infection was high for urban residence (AOR 1.72; 95% [1.43 – 2.07]) and (AOR 1.82; 95% [1.58 – 2.11]) for male and female respectively. However, the odds ratio for having electricity, radio, television, and internet the odds ration were not significant with HIV being positive controlling for the other covariates.

DISCUSSION

The burden of HIV infection in Zambia led to the need to identify the most locally significant factors associated with this prevalence. In an attempt to determine the factors that associated with HIV we investigated the demographic and socio economic elements. The outcome of this study will help the policy maker to update their current knowledge of HIV infection for effective prevention program. A discussion of these factors follows. Age effects still positively associated with HIV prevalence, and tends to peak between the ages of 25 and 29 among female gender. The young females particularly were at higher risk of HIV than young males since they were vulnerable to rape, violence in sexual relationship, and had limited control or power with older partners (Johnson and Budlender, 2002, Chanda-Kapata *et al.,* 2016). However, the older age group between 40 and 49 for the male gender was at greatest likelihood of HIV infection since they have the longest duration of sexual activity that contracting the disease through sexual means (Malhotra and Yang, 2011).The outcome for the marital status from this study suggested less infection for the single/never married respondents for both genders possibly since they were not yet sexually active (Chinomona and Mwambi, 2015). Where, the risk of infection was higher for the married group because they were less likely to have multiple numbers of partners. However, the infection was three times higher for the widowed group in males and females, and might be an indication that the partner died due to AIDS (Mmbaga *et al.,* 2007; Johnson and Budlender, 2002). For the residence place HIV infection was higher in the urban than the rural respondents and this could be explained that the most of urban residents were middle aged and were involved in high sexual activities (Mmbaga *et al.,* 2007; Oster, 2010). Regarding education levels, higher education level was at low risk of HIV infection for female than individual with lower education. Similar study done by Johnson Leigh *et al* (Johnson and Budlender, 2002; Kapina *et al.,* 2009) explained that uneducated individuals who were living in rural areas were experiencing lower risk of HIV than the one more educated and living in urban communities, that was not considered traditional. Also, the respondents with lower wealth index had higher likelihood of being HIV positive than those from higher wealth index.

Conclusion

The burden of HIV infection was considered high in the general population of Zambia. In order to prevent the infection

from increasing continuous investigation of the transmission determinants is needed. The results from this study relate the HIV infection to the demographics and socio economics of Zambia ZDHS 2014 survey data. The study showed that HIV infection was dependent on age factor, marital status, residence type, education level, and wealth index. A logistic regression models were used to explain the variation between HIV infection and the risk factors. The studyreveal that HIV infection was higher for younger women who live in the urban area than men. Older men who were widowed with secondary level of education and poorest wealth index were more likely to be affected with HIV than other. HIV prevention programs in Zambia should make more efforts on targeting these transmission determinants with the porous of decreasing such behaviors.

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