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Analysis of factors associated with comprehensive knowledge about HIV/AIDS transmission and prevention among people aged 15-49 years in Eswatini: evidence from the 2021-2022 multiple indicator cluster survey

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Patient consent for publication: not applicable.

Availability of data and materials: the Eswatini 2021-2022 Multiple Indicator Cluster Survey (MICS) provided the data used in this study. The dataset was available to the public (upon request) in an anonymized format via the official MICS website.

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Abstract
Eswatini faces one of the highest HIV infection rates globally, largely due to a lack of comprehensive understanding of transmission and prevention methods. This study, utilizing data from the Eswatini Multiple Indicator Cluster Survey 2020-2021, aimed to identify factors associated with knowledge of HIV/AIDS among individuals aged 15-49. A total of 3665 respondents were analyzed using a retrospective cross-sectional methodology and survey logistics regression. The findings indicated that age, education, media engagement, and Internet usage significantly correlated with comprehensive HIV knowledge. Notably, individuals aged 30-44 had higher odds of knowledge compared to those aged 45-49, while higher education increased knowledge odds over twofold. Additionally, regular reading of newspapers and Internet usage were linked to greater awareness. The study suggests that HIV prevention programs should target adolescents and marginalized groups in Eswatini.

Introduction

AIDS has recently emerged as a significant public health issue. There are over 40.8 million persons with HIV around the world, and 60% of them live in sub-Saharan Africa.[1] In 2024, about 1.3 million people around the world got HIV (40% fewer than in 2010).[2] The Kingdom of Eswatini (formerly Swaziland), a small nation with a population of around 1.3 million, exhibits the highest HIV/AIDS prevalence (31%) among individuals aged 15-49 years internationally.[3] In the past few years, a lot of work has been done to control HIV both in Eswatini and around the world. The Joint United Nations Program on HIV/AIDS (UNAIDS) has set some very high goals, one of which is the 95-95-95 target. This means that by 2025, 95% of people living with HIV know their status, 95% of people who know they are living with HIV are on life-saving antiretroviral treatment, and 95% of people who are on treatment are virally suppressed.[4] The third target was to stop AIDS from being a public health threat by 2030. This meant cutting the number of new HIV infections and AIDS-related deaths by 90% from the 2010 level.[4]

A thorough understanding of HIV transmission and prevention is a crucial element in managing HIV infection. Numerous factors, including educational attainment, age, socioeconomic status, and media exposure, influence comprehensive understanding of HIV transmission and prevention.[5-9]

The Kingdom of Eswatini and its international partners have implemented various interventions to reduce the incidence of new HIV infections and lower the viral load among those infected, including measures to decrease mother-to-child transmission, the introduction of innovative diagnostic and treatment solutions for the identification, monitoring, and care of infected infants, an increase in HIV testing, care, and monitoring, enhancements in service delivery in rural areas, and the administration of pre-exposure prophylaxis and post-exposure prophylaxis. Despite these efforts, significant gaps in HIV prevention persist.[10-12]

To our knowledge, there are no published studies examining the factors related to knowledge of HIV/AIDS transmission and prevention among individuals aged 15-49 years in Eswatini. This study seeks to identify the factors associated with comprehensive knowledge regarding HIV/AIDS transmission and prevention within this demographic, utilizing data from the Eswatini MICS 2020-2021 as reported by UNICEF.

Materials and Methods

Study design and data source

This cross-sectional retrospective study used secondary data from the Eswatini Multiple Indicator Cluster Survey (MICS) 2021-2022, which was undertaken by the Central Statistical Office of Eswatini. The survey employed a multistage stratified cluster sampling to provide nationally representative samples from the four regions of Eswatini (Hhohho, Manzini, Shiselweni and Lubombo) and urban and rural strata. Enumeration areas were chosen from each stratum and systematic sampling was conducted. The Multiple Indicators Cluster Survey (MICS) is a nationally representative household survey program that supplies internationally comparable population-based health statistics that are used to monitor health indicators.[13,14]

Data and variables

The survey comprised 3,665 respondents aged 15 to 49 years, with 2,007 (54.8%) identified as females and 1,658 (45.2%) as males. The outcome variable, HIV comprehensive prevention knowledge, is delineated by three criteria: 1) awareness that consistent condom usage during sexual intercourse and maintaining a single uninfected, faithful partner can mitigate the risk of HIV transmission, 2) recognition that an ostensibly healthy individual may be HIV-positive, and 3) repudiation of the two predominant local misconceptions regarding HIV transmission and prevention.[13] The final part talks about the two most widespread false beliefs in Eswatini: that HIV can be spread by mosquito bites and that eating meals with someone who has HIV can also spread the virus.

A number of explanatory variables were considered to determine their association with complete HIV knowledge, including place of residence (urban and rural), region, age, education, marital status, disability and household wealth index.

Statistical analysis

The descriptive statistics was used to describe the characteristics of all the explanatory variables. Chi square test assessed the bivariate associations with outcome variables (HIV prevention, knowledge) with statistical significance set at $p<0.05$. Survey logistic regression was used to determine the unadjusted and adjusted prevalence odds ratios (PORs) and 95% confidence intervals, first for uni-variable analysis, and then for a multi-variable model to identify independent predictors.

The survey design (stratification, cluster and weights) was taken into consideration and data from the Eswatini Multiple Indicator Cluster Survey was used. We were able to perform a complete case analysis due to low levels of missing data. We used IBM SPSS version 28 for analyses.

Results

The study involved 3,665 participants between the ages of 15-49 years. A majority lived in rural areas (69.5%) with 30.5% living in urban areas. The sample was spread across the four regions, with the largest representation from Manzini (34.2%) followed by Hhohho (30.4%). Women made up 54.8% of the study population. The distribution of ages favored the younger age groups, with 21.5% in the 15-to-19-year age group. The majority had secondary-level education (65.1%) - very few had no education or pre-primary education. Most were never married or in a union (63.1%). The sample was fairly well distributed across quintiles, although there were slightly greater proportions in the richest and fourth quintiles (Table 1).

There was considerable diversity in media use. Most never read newspapers and magazines (54.0%), but television was the most common media, with 54.0% viewing almost every day. Radio was also widely consumed (36.7% almost daily). While the use of computers or tablets was low, almost half of the sample had access to the internet. Mobile phone use was very popular (90.5%) (Table 2).

There were relatively minor variations in comprehensive HIV knowledge between regions. Manzini had the highest proportion of comprehensive HIV knowledge (60.3%) and Lubombo the lowest (53.0%) (Figure 1).

Most sociodemographic factors and media-related factors were significantly associated with comprehensive HIV knowledge (*Supplementary Table 1*). Participants living in urban areas had higher HIV knowledge than those living in rural areas (64.0% *vs*. 52.9%, $p<0.001$). There was a general trend of increasing HIV knowledge with age, reaching a maximum among those aged 30-34 years (65.8%). Education was also strongly correlated, with higher levels of education associated with higher levels of HIV knowledge, and participants with higher education having much higher HIV knowledge compared to participants with primary and no education.

In general, participants from better-off households had higher HIV knowledge than those from poor households. Likewise, participants with no functional difficulties had higher HIV knowledge than those who reported functional difficulties. Media exposure (newspaper or magazine, television viewing, internet use, and mobile phone ownership) was consistently positively associated with comprehensive HIV knowledge. Only gender was not significantly associated with HIV knowledge (*Supplementary Table 1*).

In the multivariable analysis, age, higher education, newspaper and magazine reading, television viewing and internet use were significantly associated with comprehensive HIV knowledge (*Supplementary Table 2*). Those aged 30-44 years were more likely to have comprehensive HIV knowledge than those aged 45-49 years. Those with higher education had more than two times greater odds of comprehensive HIV knowledge than those with lower education. Internet users also had higher odds of having comprehensive HIV knowledge. Residence, marital status, functional difficulties, wealth index, radio listening, computer or tablet use, and mobile phone ownership were

not significantly associated with HIV knowledge, even after controlling for other factors (*Supplementary Table 2*).

Discussion

The Kingdom of Eswatini, a small country with a surface area of 17,363 square kilometers and a population of 1.3 million, has the highest global prevalence of HIV/AIDS, impacting 31% of people aged 15 to 49.[3,15]

Our study discovered that persons in urban were considerably more likely to know how to prevent HIV/AIDS than those in rural areas. This is consistent with the Eswatini MICS 2020-21 and with findings from other studies in Sub-Saharan Africa, including Ethiopia, Kenya, Malawi, Nigeria, and Tanzania, as well as Asian countries such as India and Bangladesh.[16-23] However, this was not observed in a study conducted in Rwanda.[24] The Manzini region possessed the most knowledge about how to prevent the spread of HIV/AIDS throughout the country. This could be because it is the primary hub for business, farming, and transportation in Eswatini. However, after controlling for education, affluence, and media exposure, the spatial differences were not statistically significant. This suggests that observed urban-rural and regional discrepancies are primarily due to basic socioeconomic and informational disadvantages, rather than just residential issues. These findings indicate that people in rural areas of Eswatini require greater knowledge on how to avoid HIV/AIDS.

Age was the most significant factor, with adolescents (15-19 years) having the lowest knowledge and adults 30-44 years having better odds of comprehensive knowledge (APOR=1.60). This pattern is consistent with the Eswatini MICS 2020-2021 and other sub-Saharan African studies, which show that younger people are more vulnerable and less likely to have adequate HIV prevention knowledge.[19] Participants aged 30 to 44 have a more comprehensive awareness of HIV/AIDS prevention than other age groups. This is similar to an Indian study that discovered that women aged 40 to 44 have a better awareness of how to prevent HIV/AIDS.[25] It also differs from a study conducted in Ghana,[26] possibly because Ghanaians are more motivated to learn and have greater access to HIV/AIDS preventive information through newspapers, periodicals, television, and the Internet.

Participants with education knew 4.5 times more about HIV/AIDS prevention (APOR=2.33) than those with little or only pre-primary schooling. This is consistent with the findings of other research conducted in African countries, emphasizing the importance of education in gaining comprehensive knowledge about HIV/AIDS prevention and confirming that investment in education serves as an indirect but effective approach of HIV prevention.[21,24,27-29] In our study, married people were 25% more likely to know about HIV prevention than unmarried (APOR=0.97); however, this difference was erased in the adjusted model. Other examinations have shown similar conclusions,[20,29-31] however a study conducted in Angola identified no association.[32] Married people frequently have higher HIV prevention awareness due to increased access to health services, older age, better socioeconomic stability, and a stronger sense of responsibility. The adjusted model emphasizes the role of age and education.

In this study, people without functional disabilities knew 58% more than people with disabilities. Evidence from 37 MICS surveys conducted in low- and middle-income nations supports this conclusion.[33] The observed gap underscores the need for inclusive HIV prevention methods that target individuals with disabilities, even though the link was not significant after correction.

According to the wealth index, HIV prevention knowledge was lower among the poorest, second, middle, and fourth groups than in the richest (UPOR=0.42), which is in line with research from Bangladesh, India, and sub-Saharan Africa.[18,19,25] Wealth, however, was not significant in the modified model, indicating that it functions through education and access to media and technology rather than directly predicting knowledge. This is consistent with the Eswatini MICS 2020–2021 report, which emphasises the importance of communication and education in raising HIV awareness.[25]

Our the study's main conclusions is that people who interact with media on a nearly daily basis are

more likely to have thorough knowledge of HIV, which is in line with earlier research emphasizing the significance of media and technology in raising awareness of the disease, also, a study from India and the Gambia reported that internet use was statistically significantly associated with increased HIV prevention knowledge (APOR 1.56; CI: 1.23-1.98), with users having almost 1.5 times greater awareness than non-users.[22,32,34] This association persisted as an independent predictor following adjustment. Ownership of a mobile phone, radio, and television, on the other hand, had less of an impact. This suggests that digital platforms are becoming more and more significant and should be incorporated into HIV education programs in addition to conventional media.

Implications for policy and practice

This study concludes that multiple initiatives are required to increase HIV prevention knowledge in Eswatini. We discovered that education, age, and access to information were the most important independent variables, with adolescents, the rural poor, and those with disabilities requiring special care. Furthermore, the independent influence of digital media emphasizes the need to scale up internet- and mobile-based HIV prevention activities, while traditional media (newspapers and television) remain crucial for reaching individuals without internet access.

Study's strengths and weaknesses

Our study has two major strengths, the data on Eswatini MICS 2021 that we used were very complete, well-organized, and representative of the entire country by including 5,256 households; and the survey logistic regression approach can take into account complex survey designs, such as stratification, clustering, and sample weights, to provide more accurate estimates. The cross-sectional nature of the approach prevented us from determining causality, and it is also susceptible to recollection bias, which may have influenced the results collected. Despite its limitations, this study is significant in analyzing the various characteristics related with comprehensive HIV prevention knowledge in Eswatini.

Conclusions

This study indicated that comprehensive HIV/AIDS knowledge among people aged 15 to 49 in Eswatini remained poor and is significantly impacted by educational achievement, age, and media exposure. Individuals with a higher level of education, internet access, and regular exposure to newspapers and television had greater HIV knowledge. In contrast, younger people and those with lesser educational levels showed less awareness. These findings underline the critical significance of education and digital/media-based interventions in increasing HIV prevention awareness. Improving targeted awareness campaigns, particularly for younger and socioeconomically disadvantaged people, may aid HIV prevention efforts in Eswatini.

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Online supplementary material

Supplementary Table 1. HIV prevention comprehensive knowledge across explanatory variables.

Supplementary Table 2. Survey logistic regression analysis for the association between HIV prevention comprehensive knowledge and explanatory variables.

Table 1. Sociodemographic characteristics of participants (n=3665).

Variables		Count	Percent
Area	Urban	1117	30.5
	Rural	2548	69.5
Region	Hhohho	1113	30.4
	Manzini	1252	34.2
	Shiselweni	615	16.8
	Lubombo	685	18.7
Gender	Female	2007	54.8
	Male	1658	45.2
Age	15-19	789	21.5
	20-24	638	17.4
	25-29	661	18.0
	30-34	471	12.9
	35-39	486	13.3
	40-44	384	10.5
	45-49	236	6.4
Education	Pre-primary or none	94	2.6
	Primary	687	18.7
	Secondary	2386	65.1
	Higher	481	13.1
	Vocational	17	0.5
Marital/Union status	Currently married/in union	1151	31.4
	Formerly married/in union	200	5.4
	Never married/in union	2314	63.1
Functional difficulties (age 18-49 years)	Has functional difficulty	170	4.6
	Has no functional difficulty	2988	81.5
	Missing	507	13.8
Wealth index quintile	Poorest	679	18.5
	Second	645	17.6
	Middle	736	20.1
	Fourth	783	21.4
	Richest	822	22.4

Table 2. Media exposure characteristics of the study participants (n=3665).

		Frequency	Percent
Frequency of reading newspapers or magazine	Not at all	1977	54.0%
	Less than once a week	637	17.4%
	At least once a week	685	18.7%
	Almost every day	364	9.9%
	No response	2	0.1%
Frequency of listening to the radio	Not at all	1190	32.5%
	Less than once a week	503	13.7%
	At least once a week	626	17.1%
	Almost every day	1343	36.7%
	No response	3	0.1%
Frequency of watching TV	Not at all	1010	27.6%
	Less than once a week	255	7.0%
	At least once a week	419	11.4%
	Almost every day	1980	54.0%
Computer/ tablet usage	Yes	1399	38.18%
	No	2265	61.79%
	No response	1	0.03%
Internet Usage	Yes	1769	48.27%
	No	1450	39.55%
	No response	1	0.03%
	Missing	445	12.14%
Owning a mobile phone	Yes	3317	90.5%
	No	348	9.5%

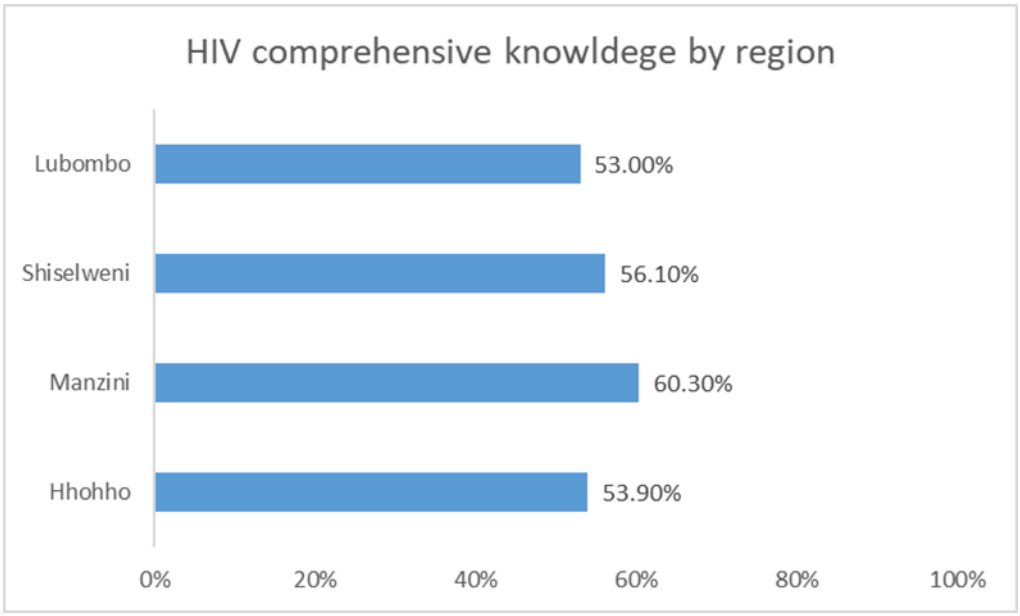

Figure 1. Comprehensive knowledge of HIV prevention by region.