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Economic growth and HIV knowledge, prevention and access to media in Burundi and Rwanda

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ABSTRACT

INTRODUCTION: HIV/AIDS remains a public health concern in both Rwanda and Burundi. These countries share many characteristics but in the last 15 years economic growth has been stronger in Rwanda. This has influenced HIV epidemiology and risky behaviour.

METHODS: We extracted data from tables in the available DHS reports from 2010-2019/20. The tables were selected to capture information on vulnerable populations, knowledge levels, at risk behaviour and media access. We compared this information with economic data from the two countries.

RESULTS: Rwanda has higher HIV prevalence than Burundi. However, higher prevalence in women, against lower at-risk sexual behaviour, was a common feature. Patterns of HIV prevalence differed in age groups, education level, wealth quintile and residence in the two countries over the past 15 years. Economic growth in Rwanda was markedly higher than Burundi over the same time period. Access to media in general increased and shifted from newspapers to social media, more markedly in Rwanda.

CONCLUSION: Epidemiological and behavioural differences suggest that higher economic prosperity in Rwanda compared with Burundi in the past 15 years increased the risk of acquiring HIV in some population groups, in spite of increased access to information. This implies HIV prevention strategies in low- and middle-income countries with marked economic growth may need to be adapted for potential changes in behaviour in certain populations. Enhanced access to social media, as economic growth rises, provides an opportunity to target those with increased risk of acquiring HIV with tailored information.

Keywords: Comparison, prevention, Demographic Health Surveys, HIV, economic growth, Rwanda, Burundi

INTRODUCTION

The incidence of Human Immunodeficiency Virus (HIV) has dramatically decreased globally since the peak of 2.8 million newly infected cases, in 1998. However, HIV is still considered a Global Health burden [1]. In 2019, 1.7 million new cases were recorded and there were an estimated 38 million people living with HIV globally [2]. There has also been a notable shift in policy away from preventative measures towards the policy of "treatment for all", in an effort to reduce transmission, such as

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the 90-90-90 approach [3]. This strategy aims for 90% of all people living with HIV to be diagnosed, 90% of all people who tested HIV positive to be on treatment, and 90% of all people on therapy to demonstrate viral suppression. Nevertheless, it is still recognized that those uninfected, but at risk of acquiring HIV, will benefit from increased knowledge of how to avoid becoming infected [4, 5].

HIV is endemic in both Rwanda and Burundi. However, while there are many historical, demographic and environmental similarities, political events and economic growth have differed in recent years. Rwanda, in contrast to Burundi, has experienced a period of stability over the past 15 years. This has led to higher economic growth with Gross Domestic Product (GDP) at $US 834 compared with $US 237 in Burundi in 2021 (www.worldbank.data.org).

We used Demographic Health Survey (DHS) reports in the two countries to identify current patterns and trends in those most vulnerable to HIV infection i.e. high-risk populations and those with low knowledge levels on how to protect themselves against HIV. Thereafter, we compared access and trends in access to various media. We aligned the patterns and trends with economic data, as reported by World Bank, over the same time-period. The results can inform HIV/AIDS programme managers in countries undergoing economic transition to target messages directly at those populations newly at risk of acquiring HIV/AIDS.

In Sub-Saharan Africa, HIV infection is mainly driven by key populations, including sex workers, men who have sex with men, and discordant couples [6]. There are, however, discrepancies between people living in urban and rural areas, education levels [7], socio-economic status [8] and sex, with higher incidence in young women compared with men [2].

Rwanda and Burundi are densely populated countries located in Central-East Africa with low levels of urbanization [9]. Despite there being similarities in many social aspects and historical backgrounds, the evolution of the two countries in the last few decades has differed. Since 1994 Rwanda has experienced a period of stability and economic growth. Burundi, on the contrary, continues to experience political instability, particularly since 2014.

Both Rwanda and Burundi have lower HIV prevalence than other Eastern and Central African countries [6]. The prevalence in Burundi is 1.2% women and 0.6% men aged 15-49 years [10] while in Rwanda the prevalence is higher at 4% women and 2% men [11]. Both countries have recently adopted Comprehensive Sexuality Education in schools [12].

Demographic Health Surveys (DHS) are nationally represented, household surveys conducted approximately every 4-5 years in 90 Low and Middle-Income Countries (LMICs) [13]. The surveys use standardized data collection and analysis methods, adapted to meet each country's needs and are led by the national statistical agencies. Rwanda conducted surveys in 2010, 2014/15 and, more recently, in 2019/20. Burundi also conducted a survey in 2010 but delayed the next survey until 2016/17 due to political instability, the most recent survey. Neither country collects data separately on men who have sex with men (MSM) nor female sex workers (FSW) in these surveys.

METHODS

This is a descriptive study using data from selected tables from DHS reports in Burundi and Rwanda from 2010-2019/20 (Table 1). Since access to social media was not explored in these DHS until 2019/20 the DataReportal website on mass media access complemented other sources of access to media found in the DHS reports. Data from the selected tables was transferred into excel spreadsheets. Graphs were generated from the excel tables to visualize differences between variables and trends over time. A comparison was made of the epidemiological patterns and trends. Key themes were identified.

Economic data was obtained from World Bank website. The information from the DHS reports was compared with the economic growth in the two countries and compared with existing literature on the link between economic status and risky sexual behaviour and HIV infection.

RESULTS

In this section we present the epidemiological and behavioural differences in the two countries. Thereafter, we describe access to media in Rwanda and Burundi over time. Finally, we provide a

chronology of the key economic indicators in the two countries using World Bank data.

Demographic Health Surveys were conducted in Burundi in 2010 and 2016/17 and in Rwanda in 2010, 2014/15 and more recently in 2019/20 as described above. In Table 1, the availability of key data is summarized.

The HIV prevalence data for Burundi in 2016/17 and Rwanda in 2014/15 are compared since the HIV test results for 2019/20 in Rwanda were not available at the time of submission of the article. HIV is more common in women in both countries (Burundi: women 2.5%, men 0.8% in 2016/17, Rwanda: women 5.8% men 3.5% in 2014/15). The HIV prevalence in Burundi was higher in women than men for all ages except the 40–44 age group (see Figure 1a). The HIV prevalence in Rwanda was higher in women versus men for all ages except the 45–49 age group. In Burundi, this pattern was particularly notable in women living in urban areas (3.5%) than rural areas (0.8%). Women in the lowest wealth quintile have similar HIV prevalence rates as men but otherwise, women have a higher prevalence in all other wealth quintiles levels than men, particularly the highest wealth quintile. Differences are noted in Rwanda, where a higher prevalence was found in women with lower education levels and a higher prevalence for both men and women in the highest wealth quintile (Figure 1b).

In Burundi, people living in urban areas have a higher prevalence of HIV than those in rural areas. The pattern for education levels is, however, more complex. In men, HIV infection is negatively correlated with education levels. In women, HIV infection is positively correlated with education levels. The socio-economic status of those infected with HIV in Burundi shows a marked increase in HIV infection in men in the highest wealth quintile over time (Figures 1a and 1b).

Sexual activity is the main driver of HIV infection in Rwanda and Burundi. In both Rwanda (2019/20) and Burundi (2016/17), men are more likely to have multiple sexual partners than women (2.7%: 3% and 5.5%: 1.3%, respectively). In Burundi, this pattern increased with age, except for the 40-49 age group (Figure 2a). This finding contrasts with Rwanda, where those in the 25-29 age group more frequently reported having multiple sexual partners (Figure 2b).

Sexual relations with multiple partners were more commonly reported in rural than urban populations in Burundi, while the opposite was found in Rwanda. In Rwanda, men in the highest wealth quintiles report having multiple partners when compared to men in the lower wealth quintiles. This pattern is different in Burundi, where men in the highest wealth quintile report having multiple partners less often than the lower wealth quintiles (Figure 2a).

In Rwanda in 2019/20, more men in the 20-39 age group in urban areas, with the highest education

Table 1: Summary of available data in the Demographic Health Surveys by indicator and year

Indicator	Burundi 2010	Rwanda 2010	Rwanda 2014/15	Burundi 2016/17	Rwanda 2019/20
Sex in previous 12 months	Unavailable	Unavailable	Unavailable	All data	All data
Sex with Multiple partners	All data	All data	All data	All data	All data
Alere HIV CmHIV prevalence	All data	All data	All data	All data	Unavailable
Use of condom	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
Comprehensive and complete HIV knowledge (CCHK)	All data	All data	All data	Insufficient data	Unavailable
Knowledge on Prevention	All data	All data	All data	All data	Unavailable

Table 2. Selected economic and related indicators Burundi and Rwanda 2014-2021

	2010		2015		2020	
	Rwanda	Burundi	Rwanda	Burundi	Rwanda	Burundi
GDP per capita (USD)	609.8	234.2	751.1	305.5	786.3	233.8
% population under the poverty line (USD1.90/day)	64.4 (2010)	78.6 (2006)	56.5 (2016)	72.8 (2013)		
Life expectancy at birth (years)	63	57	67	60	69	62
Unemployment (% total labour force)	1.1	1.6	1.1	1.6	1.5	1.7
Access to electricity (% population)	9.7	5.3	22.8	8.4	46.6	11.7
Individual users of internet (% population)	8	1	18	2	27	9

Source: www.data.worldbank.org

level and in the highest wealth quintile report being sexually active in the past 12 months than women and their counterparts in other categories (Figure 3a). However, men and women in the 15-19 and 40-49 age groups reported sexual activity equally in the past 12 months, a pattern not seen in the Burundi survey (Figure 3b). Otherwise, participants in Burundi show the same pattern of reporting sexual activity in the past 12 months as in Rwanda.

In addition to being in the high-risk groups for HIV and being sexually active, particularly with more than one partner, and having low knowledge of HIV transmission and prevention, we considered being a risk factor for HIV infection. Comprehensive and Complete HIV Knowledge (CCHK) consists of knowledge 1. that a healthy-looking person can transmit HIV and 2. of three common misconceptions of HIV transmission (can be transmitted by mosquitoes, supernatural means and sharing food). While the prevalence and sexual activity are higher in Rwanda than Burundi, knowledge levels of HIV transmission and prevention are higher in Rwanda. In Rwanda in 2019/20, 63.6% of men and 64.2% of women had CCHK, while in Burundi, in 2016/17, 60.1% of men and 57.3% of women had CCHK. Thus, women have higher CCHK in Rwanda, while the opposite is true of Burundi. Furthermore, although comprehensive sexual education is provided in both countries, those in the 15-19 age group have lower knowledge levels than any other age group (Figures 4a and 4b). Knowledge of preventative measures for HIV infection captured in the DHS includes using condoms and limiting sexual intercourse to one uninfected person. The pattern of increase by age group is the same in both countries but less marked in Rwanda than in Burundi. There is an interesting difference between men's and women's knowledge of preventative measures for HIV infection in Rwanda and Burundi. A higher proportion of women in rural areas of Rwanda have knowledge on preventative measures than urban women, while the reverse is seen in Burundi. In Rwanda more female participants with no education than those with secondary education or higher had knowledge of preventative measures while the opposite trend was found in men.

Trends in HIV prevalence, sexual activity and knowledge levels in Rwanda and Burundi 2010-2020

The prevalence of HIV infection in Rwanda and Burundi has decreased between the most recently available prevalence data in the DHSs. In Rwanda the decrease was from 5.8% and 3.5% (2010) in women and men respectively to 3.7% and 2.2% in 2014/15. In Burundi a smaller decrease was observed, 1.7% and 1% in women and men respectively in 2010 to 1.2% and 0.6% in 2017.

In Rwanda, an increase in the proportion of women and men reporting having more than one sexual partner in the past 12 months was reported between 2010 and 2019/20. In 2019/20, 1.3%

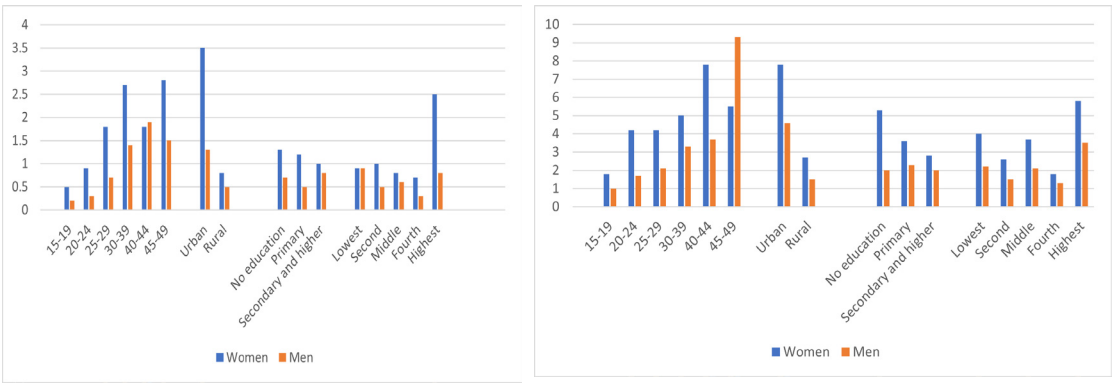


Figure 1a (Left): *HIV Prevalence by age, sex, residence, educational status and wealth quintiles in Burundi 2016/17 (Source: BDHS 2016/17).* **Figure 1b (Right):** *HIV Prevalence by age, sex, residence, educational status and wealth quintiles in Rwanda 2014/15 (Source: RDHS 2014/15)*

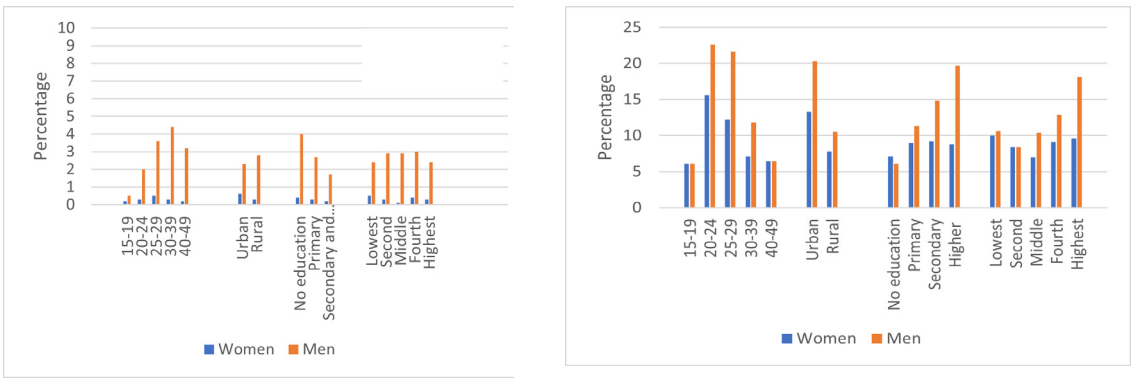


Figure 2a (Left): *Sexual activity with more than two partners in the past 12 months by age, residence, educational level and wealth quintile in Burundi 2016/17 (Source: BDHS 2016/17).* **Figure 2b (Right):** *Sexual activity with more than two partners in the past 12 months by age, residence, educational level and wealth quintiles in Rwanda 2014/15 (Source: RDHS 2014/15)*

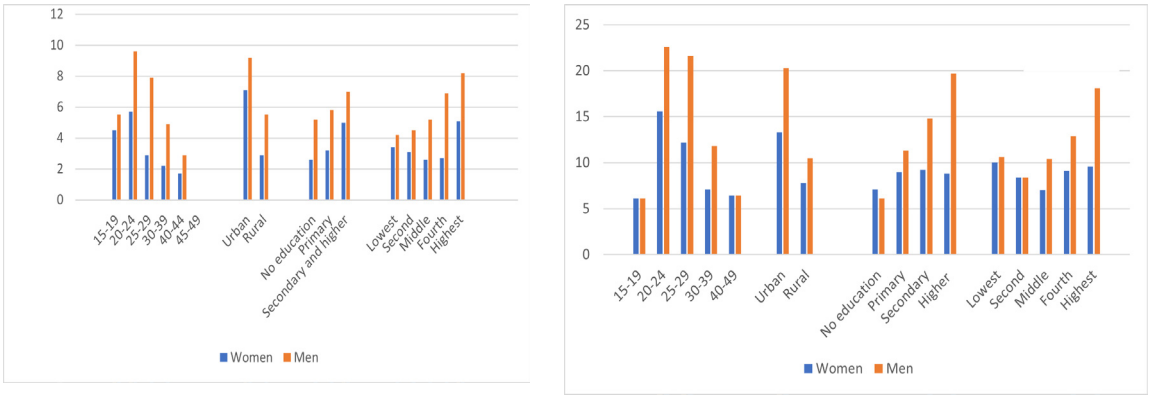


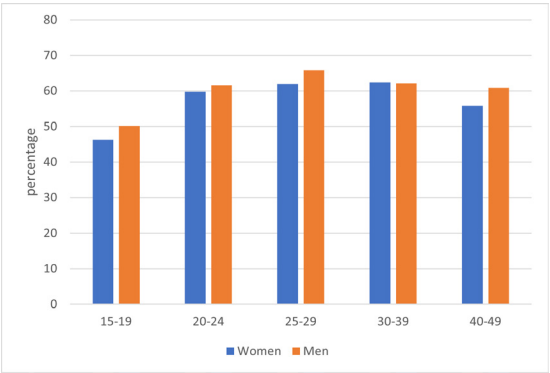
Figure 3a (Left): *Sexual activity in last 12 months by age, residence, educational status and wealth quintiles in Burundi 2016/17 (Source: BDHS 2016/17).* **Figure 3b (Right):** *Sexual activity in last 12 months by age, residence, educational status and wealth quintiles in Rwanda 2019/20 (Source: RDHS 2019/20)*

and 5.5% women and men respectively reported having more than one sexual partner compared with 0.7% and 4.6%, respectively in 2014/15 and 0.6% and 3.9% respectively in 2010. The reverse was found in Burundi where the proportion of women who reported having more than one sexual partner in the past 12 months remained constant at 0.3% while the same indicator for men decreased from 3.1% to 2.7% (Figure 5). Trends were not calculated for reported sexual activity in the past 12 months because this indicator was not collected prior to 2016-17.

Comprehensive and Complete HIV Knowledge (CCHK) in women and men remained relatively stable over time but decreased between the last two surveys in Rwanda. In Rwanda, CCHK in women between 2010, 2014/15 and 2019/20 was 55.5%, 68.8% and 64.3%, respectively.

For men, the corresponding percentages were 51.6%, 66.9% and 63.6%, respectively. In, Burundi, while overall CCHK levels were lower than in Rwanda, there was an increase in knowledge from 45% to 57.3% in women and 46.7% to 60.1% in men. Increases in CCHK were found in all age categories (Figures 6a & 6b).

In Rwanda, an increase in knowledge on the prevention of HIV between 2010, 2014/15 and 2019/20 is also reported for all age groups in both men and women, reaching 80% in all age categories for both sexes. In Burundi, however, a fall in knowledge on prevention was found in the respondents aged 15-24 in women. In men the decrease was in the 15-19 age group only.
The DHS report collects information on three communications channels: newspaper, television, and radio.



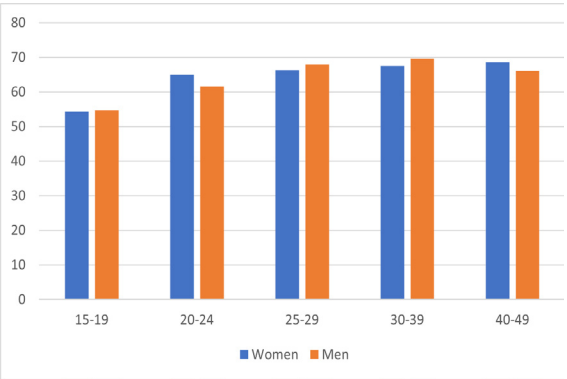


Figure 4a (Left): *Comprehensive and complete knowledge of HIV prevention by age in Burundi 2016-17 (Source: BDHS 2016/17).* **Figure 4b (Right):** *Comprehensive and complete knowledge of HIV prevention by age in Rwanda 2019/20 (Source: RDHS 2019/20).*

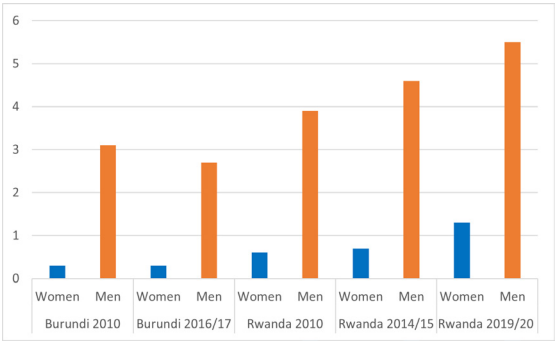


Figure 5: *Percentage people reporting sex with two or more partners in past 12 months, by sex, in Rwanda and Burundi (2010-2020) (Source: Demographic Health Surveys).*

Radio access is the most widespread in both countries, followed by television and newspaper. Women have less access to any media source than men in both countries (see Figures 7a & 7b). However, the trends in access are very different between the two countries, with participants in Rwanda increasing access to newspapers and television and reducing access to radio. Access to all three media channels for women increased in Rwanda from 0.6% (2010) to 0.7% (2014/15) to 1.3% (2019/20) and for men from 3.9% (2010) to 4.6% (2014/15) and 5.5% (2019/20) in the same time periods. In Burundi, those accessing all three media sources declined between 2010 and 2016/17: women 0.3% (2010 & 2016/17) and men 3.1% (2010) to 2.7% (2016/17). Another contrast

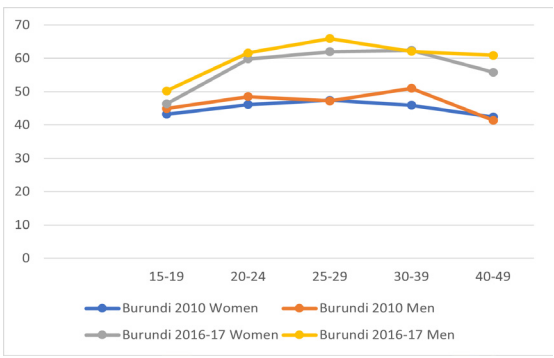
is the trend in access between age groups in the two countries. In Burundi, the age group 15-19 (those with the lowest knowledge levels) have the least access to all three forms of media. In Rwanda, the age group 15-19 (also with the lowest levels of knowledge on HIV) has the greatest access to all three forms of media. Media access increases with both countries' education level and wealth quintiles (Figures 7a & 7b).

Following a period of political stability in Rwanda, GDP per Capita rose from US$ 609.8 in 2010 to US$ 786.3 in 2020. Life expectancy increased from 63 years to 69 years. The proportion of the population with access to electricity and individual users of the internet increased from 9.7% and 8 % to an impressive 46.6% and 27%, respectively (Table 2).

In Burundi, economic growth was both slower and GDP per Capita was lower at US$ 234 in 2010 to US$ 233.8 in 2020. Life expectancy is seven years less than Rwanda but increased by six compared to Rwanda's seven years in the past decade. In 2020 the proportion of the population with access to electricity and users of the internet were only 2% and 1% higher, respectively, than Rwanda one decade before.

DISCUSSION

Burundi and Rwanda's HIV prevalence and sexual behaviour indicators, while more favourable than other sub-Saharan African countries, show similar patterns. In general, women have higher prevalence rates than men but report less risky behaviour: reporting less sexual partners and less 'having had sex in the past 12 months' [6].
The pattern of higher HIV prevalence rates in women than men in Rwanda and Burundi corroborates this evidence. However, lower HIV



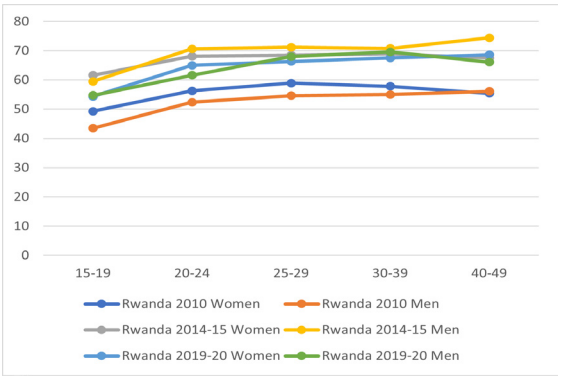
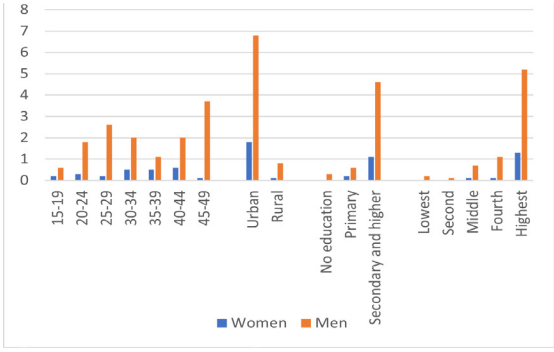


Figure 6a (Left): *Comprehensive and complete knowledge of HIV prevention in Burundi by sex and age groups (BDHS 2010 & 2016-17).* **Figure 6b (Right):** *Comprehensive and complete knowledge of HIV prevention in Rwanda by sex and age groups (RDHS 2010, 2014-15 2019/20).*



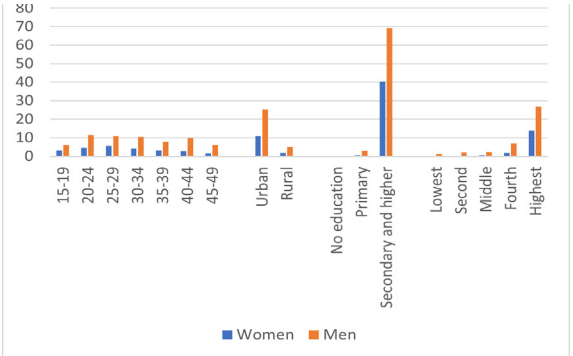


Figure 7a (Left): *Access to Mass Media by age, residence, educational status and wealth quintiles in Burundi 2016-17 (BDHS 2016-17).* **Figure 7b (Right):** *Access to Mass Media by age, residence, educational status and wealth quintiles in Rwanda 2019-20 (RDHS 2019-20).*

prevalence in Burundi in the 40–44-year age group is an anomaly that cannot be explained within the current literature. This is particularly interesting since the highest prevalence is in the 45-49 age group.

Women living in urban areas are more likely to be HIV positive than men living in urban areas and their counterparts living in rural areas. This is more marked in Burundi. However, the DHS does not collect data separately on female sex workers, who are more commonly working in urban settings. Female sex workers have a higher prevalence than women in the general population, with 50% of all HIV infections reported in Rwanda [14].
The correlation between sexual activity and socio-economic status in Sub-Saharan Africa has been recognized, with more wealthy individuals being more sexually active, including having more partners, than their counterparts of lower socio-economic status [15]. The pattern in Rwanda and Burundi also corroborates this evidence. In Burundi, sexual activity with more than two partners over the past 12 months does not reach 5% population in any population group. For sexual activity in the last 12 months, it does not reach 10%. In Rwanda, by contrast, more than 5% of all population groups reported sexual activity with more than two partners in the past 12 months in 2019/20. Of the male youth in Rwanda (20-24 years), 22.6% report sex with more than two partners in the past 12 months, compared with 2% of the male youth in Burundi. A trend is shown that contrasts the two countries. Sex with more than two partners in the past 12 months decreased in Burundi in men (and stagnated in women) from 2010-1016/17 during a period of slow economic growth. The DHS data showed increases in Rwandan women and men in this indicator from 0.6% to 1.3% and 3.9% to 5.5% between 2010 and 2019/20, respectively.

Knowledge levels of HIV prevention increased in all age groups in both sexes in the two countries. Shamu and colleagues, in a study of HIV knowledge in youths in South Africa, found a positive association between access to media and knowledge on HIV [16]. In 2015, many media sources (radio, television, and newspaper) were forced to close in Burundi in the aftermath of widespread protests [17]. Of particular importance is the fact that radio (the mass media to which most people have access) was affected by the closure of many radio stations in the midst of the protests of 2015 [17]. However, in spite of increased access to electricity and individual internet access in Rwanda, trends in knowledge levels mirrored those of Burundi. Furthermore, while access to the internet and media generally is lower in women than men, women have higher levels of knowledge than their male counterparts in all age groups.

Related to another source of messages, Bastien and colleagues found there to be a positive correlation between knowledge of HIV prevention and comprehensive sexuality education (CSE) [18]. Both Rwanda and Burundi introduced CSE in schools in recent years. However, the DHS reports showed younger people in Burundi with lower knowledge levels in 2016/17 than in the previous survey.

CONCLUSION

The comparison between Rwanda and Burundi, with similar demographic (including ethnicity), geographical, historical and cultural backgrounds but recent differences in political stability influencing economic growth, allows for an interesting insight into the impact of economic growth on HIV/AIDS.

Access to media provided a medium to reach more of the population, particularly those at risk of HIV infection. However, this was not translated into high knowledge levels. Furthermore, access to finances appears to increase risky sexual activity, despite the same or higher knowledge levels on transmission.

The findings of this study suggest that the prevention of new HIV infections will require a tailored approach. The focus on women should emphasize preventing infection from long-term partners who may have additional sexual partners. The focus on men should be aimed at reducing risky behaviour and protecting their long-term partners (condom use, etc.). Access to media and social media is typically higher in urban areas and in people with higher education attainment/ socio-economic status. Since these are the most at risk (higher prevalence and sexual activity), mass media messages may reach a higher proportion of the, thus far, uninfected.

Low and Middle-Income Countries experiencing high economic growth can learn from the experience of Rwanda to tailor HIV prevention programmes to reduce risky behaviour in at-risk populations and reduce the potential impact of economic growth in the country, particularly on women.

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