BMJ Public Health

# HIV prevalence and associated factors among adolescent boys and young men in South Africa: 2017 nationally representative household-based population survey

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**To cite:** Makusha T, Mabaso M, Zungu N, *et al*. HIV prevalence and associated factors among adolescent boys and young men in South Africa: 2017 nationally representative household-based population survey. *BMJ Public Health* 2024;**2**:e000674. doi:10.1136/bmjph-2023-000674

Received 17 October 2023
Accepted 6 August 2024



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## ABSTRACT

**Introduction** There is growing recognition that adolescent boys and young men (ABYM) have been left behind in the HIV response and are under-represented in HIV services, leading to poor outcomes across the HIV care cascade. Improved understanding of the HIV epidemic in this population is important for engaging ABYM in the HIV response. This study examined HIV prevalence and associated factors among ABYM aged 15–24 years using the 2017 South African National HIV Prevalence, Incidence, Behaviour and Communication Survey.

**Methods** The data were collected using a multi-stage stratified cluster randomised sampling design. Descriptive statistics were used to summarise the study sample and HIV prevalence. A multivariate backward stepwise logistic regression model was used to determine factors associated with HIV prevalence. Variables with a significance level of $p<0.2$ were retained in the final model. Adjusted ORs (AORs) with 95% CI and a p value ≤0.05 were used to determine the level of statistical significance.

**Results** Of 3544 ABYM interviewed and tested, 47.8% (n=1 932) were aged 15–19 years and 52.2% (1612) were aged 20–24 years. Overall, 4.8% (95% CI 3.9 to 5.9) were HIV positive, translating to 230 585 ABYM living with HIV in 2017. The odds of being HIV positive were significantly lower among ABYM with tertiary education level (AOR=0.06 (95% CI 0.01 to 0.50), p=0.009), those who were employed (AOR=0.34 (95% CI 0.14 to 0.81), p=0.015) and those who had previously tested for HIV and were aware of their status (AOR=0.29 (95% CI 0.10 to 0.83), p=0.015).

**Conclusion** These findings suggest the need to diversify the HIV response to include the implementation of social policies to reduce structural challenges such as low educational attainment and unemployment. They also underscore the importance of promoting the uptake of HIV testing and awareness as the entry point to the treatment and care cascade among ABYM.

### WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Evidence shows that adolescent boys and young men (ABYM) are left behind in the HIV response and are under-represented in HIV services. Engaging boys and young men in HIV prevention and treatment efforts is critical in order to change the course of the HIV epidemic.

### WHAT THIS STUDY ADDS

⇒ This is the first nationwide nationally representative population-based survey focusing on HIV among ABYM. The study provides an important insight into HIV in the under-studied group of adolescents and young men in South Africa.

### HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The findings underscore the need to diversify HIV prevention strategies and implement social policies that aim to improve education and employment outcomes among ABYM.

## INTRODUCTION

In many eastern and southern African countries, the region with the highest HIV burden globally, there is a growing recognition that after more than four decades into the fight against the HIV epidemic, adolescent boys and young men (ABYM) aged 15–24 years have been left behind in the HIV response, and are less likely to test for HIV, initiate antiretroviral therapy and remain engaged in care.[1–7] This leads to poor outcomes across the HIV care cascade.[8 9] In South Africa, although progress has been made towards reaching the UNAIDS 95-95-95 target, the 2017 estimates revealed that most ABYM were not aware of their HIV status, and some of those living with HIV were not on treatment and were not virally

suppressed.[10] Poor performance along the HIV cascade of care can lead to advanced HIV disease and contribute to high mortality and onward transmission.[11] Examining context-specific drivers of HIV in this population group should be integral to the national HIV response if the ambitious UNAIDS targets are to be achieved.

The burden of HIV among ABYM has been attributed to a combination of social-structural, interpersonal and individual-level risk factors largely shaped by culturally based social norms, especially those related to gender.[12 13] Social-structural risk factors include mainly educational attainment and employment status. Many studies show that low education attainment, not being married and being unemployed were associated with an increased risk of HIV infection.[13–16] Interpersonal risk factors include engagement in high-risk sexual behaviours, including condomless sex, sex under the influence of alcohol, high partner turnover, early sexual debut and multiple sexual partnerships.[13 17 18] Individual risk factors include alcohol use and mental health disorders (such as anxiety and depression) linked to risky sexual behaviours and increased risk of HIV acquisition.[19–21]

Additional factors that contribute to the burden of HIV among ABYM are harmful norms of masculinity that equate 'illness' to 'weakness', and that consider sexual and reproductive health a foremost female issue, leading to poor health-seeking behaviour and lower uptake of health services.[6 8] These factors shape ABYM access to HIV services during the critical transition to adulthood, a time when they are becoming sexually active and exposed to increased risk of HIV infection.[13] The vulnerability to HIV is exacerbated by their developmental, social and economic challenges,[12] together with the notable absence of interventions and research focusing on the HIV service needs of ABYM, except for voluntary medical male circumcision.[22] Few studies have explored PrEP uptake preferences in HIV prevention practices among ABYM.[23] Furthermore, opportunities to deliver facility-based HIV prevention messaging and counselling to infected and uninfected ABYM are often missed.[6] Consequently, there are insufficient data on HIV interventions and intersecting multi-level factors that contribute to HIV risk among ABYM, leading to limited evidence-based risk-reduction programmes.[24 25]

In South Africa, given the limited strategic information available to support HIV programming for ABYM from prevention to testing, treatment and care, there is a need for an improved understanding of the HIV epidemic to support the HIV response in this population group. This paper examines HIV prevalence and associated factors among ABYM aged 15–24 years using the 2017 South African National HIV Prevalence, Incidence, Behaviour and Communication Survey.

## METHODS

### Study data and sample

This secondary analysis used data from the 2017 South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, a nationally representative household survey described in detail elsewhere.[10 26] Briefly, participants were selected using multi-stage stratified cluster sampling. A systematic probability sample of 15 households was drawn from each of 1000 small area layers selected randomly, probability proportional to size, from a master sample stratified by province, locality type (urban, rural formal and rural informal/tribal areas) and predominant race groups in urban areas obtained from an updated database from Statistics South Africa.[27] A detailed head of the household questionnaire and three age-specific questionnaires were used to solicit information about sociodemographic factors and information about HIV knowledge, attitudes, practices and behaviours of consenting participants. All members of the selected households were invited to participate in the survey.

Dried blood spots specimens were collected from consenting participants and tested anonymously for HIV antibodies using a testing algorithm with three different enzyme immunoassays (EIAs). All samples that were HIV positive on the first two EIAs (Roche Elecys HIV Ag/Ab assay, Roche Diagnostics, Mannheim, Germany; and Gene Screen Ultra HIV Ag/Ab assay, Bio-Rad Laboratories, Hercules, CA, USA) were subjected to a nucleic acid amplification test (COBAS AmpliPrep/Cobas Taqman HIV-1 Qualitative Test, V.2.0, Roche Molecular Systems, Branchburg, NJ, USA) for the final determination of HIV status.

The data were benchmarked to the mid-year estimates for 2017 to generalise the findings to the South African population.[27] The current analysis is based on a subsample of ABYM aged 15–24 years who tested for HIV.

### Measures

#### Dependant variable

The primary outcome variable was HIV serostatus (HIV positive=1 and HIV negative=0) among ABYM aged 15–24 years.

#### Independent variables

Sociodemographic variables were age, race (Black African and other race groups which refers to white, coloured or mixed race and Asian/Indian), educational level (no education/primary, secondary and tertiary), employment status (unemployed and employed), locality type (urban areas, rural informal/tribal, rural formal/farm areas) and nine South African provinces. An asset-based socioeconomic status (SES) was constructed using multiple correspondence analyses[28] based on the availability of essential services and ownership of a range of household assets used to compute five quintiles using a composite indicator score representing a continuum of household SES from the poorest (lowest quintile) to the least poor (highest quintile), dichotomised into poorest SES (the lowest three quintiles) and less-poor SES (the highest two quintiles) (low and high).

Sociobehavioural variables were risky sexual behaviours, including age at early sexual debut (less than 15 years of

age or more than 15 years of age), age-disparate sexual partnerships (partner within 5 years, partner 5 years younger and partner 5 years older), number of sexual partners in the last 12 months (one partner, and two or more sexual partners), condom use at last sex (no and yes) and consistent condom use (no and yes). Alcohol use risk score (abstainers, low-risk drinkers, high-risk drinkers and hazardous-risk drinkers) was based on the Alcohol Use Disorder Identification Test scale.[26 27]

HIV-related factors included correct HIV knowledge and myth rejection based on the questions adapted from UNAIDS[29] of whether 'AIDS can be cured; a person can reduce the risk of HIV by having fewer sexual partners; a healthy-looking person can have HIV; a person gets HIV by sharing food with someone who is infected; a person can reduce the risk of getting HIV by using a condom every time he/she has sex?' (no and yes). Self-perceived risk of acquiring HIV was based on the following question: 'On a scale of 1 to 4 (1 being low and 4 being high), how would you rate yourself in terms of risk of becoming infected with HIV?' ('You are definitely going to get infected'; 'You are probably going to get infected'; 'You probably won't get infected'; 'You definitely will not get infected'), and the 'rating is coded into a dichotomised response' (low and high). Testing and awareness of HIV status (no and yes) were also included.

### Statistical analysis

All statistical analyses were performed using Stata software V.15.0 (Stata Corp, College Station, Texas, USA) using weights to adjust for the complex survey design. Descriptive statistics were used to summarise sociodemographic, sociobehavioural and HIV-related factors, including HIV prevalence. Differences between categorical variables were assessed using the $\chi^2$ test. A multivariate stepwise backward logistic regression selection method was used to determine factors associated with HIV prevalence. With stepwise backward elimination, factors with a significance level of p<0.2 were retained. Stata model selection stopped when the removal of variables produced a significant drop in $R^2$. Adjusted ORs (AORs) with 95% CIs and a p value ≤0.05 were used to ascertain the level of statistical significance.

### Patient and public involvement

We used the South African National HIV Prevalence, Incidence, Behaviour and Communication Survey data. No patients or the public were involved in setting the research question or the outcome measures, nor were they involved in developing plans for the study's design or implementation. No patients or the public were asked to advise on interpretation or writing up of results.

## RESULTS

### Sample characteristics

The study sample consisted of n=3544 ABYM aged 15–24 years. About half were aged 20–24 years. Most were Black African, unmarried, had secondary-level education and were unemployed. About half of the sample was from low and high-SES households, and most were from urban areas, as indicated in table 1.

**Table 1** Sociodemographic characteristics of the study sample (n=3544), adolescent boys and young men aged 15–24 years, South Africa, 2017

| Variables | N | % |
|---|---|---|
| Age groups in years | | |
| 15–19 | 1932 | 47.8 |
| 20–24 | 1612 | 52.2 |
| Race groups | | |
| Black African | 2986 | 83.7 |
| Other | 558 | 16.3 |
| Marital status | | |
| Married | 18 | 0.5 |
| Never married | 3328 | 99.5 |
| Educational level | | |
| No education/primary | 134 | 8.5 |
| Secondary | 1139 | 81.9 |
| Tertiary | 102 | 9.6 |
| Employment status | | |
| Unemployed | 2899 | 87.5 |
| Employed | 423 | 12.5 |
| Asset-based SES | | |
| Low SES | 1592 | 47 |
| High SES | 1544 | 53 |
| Locality type | | |
| Urban areas | 1723 | 61.4 |
| Rural informal/tribal areas | 1429 | 33.2 |
| Rural formal/farm areas | 392 | 5.4 |

Subtotals do not all add to the sample total due to non-response and/or missing data. Other race groups refer to white, coloured or mixed race and Asian/Indian combined.
SES, socioeconomic status.

Table 2 shows that most participants had a sexual debut at age 15 years and older, had sexual partners within a 5-year age gap of their age group, had one sexual partner in the last 12 months, used a condom in the last sex act, did not use condoms consistently, abstained from alcohol, did not have the correct HIV knowledge and myth rejection, had a low self-perceived risk of HIV and had tested for HIV and were aware of their status.

### HIV prevalence and sample characteristics

Overall HIV prevalence was 4.8% (95% CI 3.9 to 5.9) among ABYM aged 15–24 years, translating to a total of 230 585 ABYM living with HIV in the country in 2017. Table 3 shows that HIV prevalence among ABYM was significantly higher among Black Africans (5.5% (95% CI 4.4 to 6.8), p=0.007), those with no education/

**Table 2** HIV-related factors among adolescent boys and young men aged 15–24 years, South Africa, 2017

| Variables | n | % |
|---|---|---|
| Age of sexual debut | | |
| Younger than 15 years | 324 | 10.2 |
| 15 years and older | 3205 | 89.8 |
| Age disparate relationships | | |
| Within 5 years | 1210 | 90.4 |
| Younger than 5 years | 87 | 6.1 |
| Older than 5 years | 45 | 3.5 |
| Number of sexual partners in the last 12 months | | |
| One partner | 1009 | 72.4 |
| Two or more partners | 345 | 27.6 |
| Condom use at last sex act | | |
| No | 437 | 32.1 |
| Yes | 910 | 67.9 |
| Consistent condom use | | |
| No | 1286 | 95.2 |
| Yes | 54 | 4.8 |
| Alcohol AUDIT score | | |
| Abstainers | 2220 | 66.9 |
| Low drinkers (1–7) | 553 | 20.7 |
| High-risk drinkers (8–19) | 287 | 10.9 |
| Hazardous drinkers (20+) | 37 | 1.5 |
| Correct HIV knowledge and myth rejection | | |
| No | 2150 | 64.6 |
| Yes | 1193 | 35.4 |
| Self-perceived risk of acquiring HIV | | |
| Low | 2827 | 85.5 |
| High | 403 | 14.5 |
| Tested and awareness of HIV status | | |
| No | 2165 | 64.5 |
| Yes | 1125 | 35.5 |

Subtotals do not all add to the total due to non-response and/or missing data.
AUDIT score, Alcohol Use Disorder Identification Test; SES, socioeconomic status.

**Table 3** HIV prevalence among adolescent boys and young men aged 15–24 years by sociodemographic characteristics, South Africa, 2017

| Variables | n (%) | 95% CI | P value |
|---|---|---|---|
| Age group in years | | | 0.240 |
| 15–19 | 1932 (4.2) | 3.0 to 5.8 | |
| 20–24 | 1612 (5.4) | 4.1 to 7.1 | |
| Race group | | | 0.007 |
| Black African | 2986 (5.5) | 4.4 to 6.8 | |
| Other | 558 (1.5) | 0.5 to 4.0 | |
| Marital status | | | 0.587 |
| Married | 18 (0.0) | | |
| Never married | 3328 (4.9) | 3.9 to 6.1 | |
| Educational level | | | 0.040 |
| No education/primary school | 134 (8.5) | 4.1 to 16.6 | |
| Secondary school | 1139 (7.1) | 4.9 to 10.2 | |
| Tertiary | 102 (1.3) | 0.5 to 3.3 | |
| Employment status | | | 0.589 |
| Unemployed | 2899 (5.0) | 3.9 to 6.3 | |
| Employed | 423 (4.3) | 2.6 to 7.0 | |
| Asset-based SES | | | 0.182 |
| Low SES | 1592 (5.6) | 4.3 to 7.4 | |
| Hligh SES | 1544 (4.1) | 2.7 to 6.0 | |
| Locality type | | | 0.009 |
| Urban areas | 1723 (4.6) | 3.3 to 6.3 | |
| Rural informal/tribal areas | 1429 (4.3) | 3.1 to 5.7 | |
| Rural formal/farm areas | 392 (10.3) | 6.9 to 15.1 | |

Subtotals do not all add to the total due to non-response and/or missing data.
SES, socioeconomic status.

primary-level education (8.5% (95% CI 4.1 to 16.6), p=0.040) and those residing in rural formal/farm areas (10.3% (95% CI 6.9 to 15.1), p=0.009).

Table 4 shows that HIV prevalence did not statistically differ by any sociobehavioural or HIV-related characteristics. However, HIV prevalence was higher among those who had a sexual debut at younger than 15 years, those who reported having a sexual partner 5 years younger than their age, those who reported having one sexual partner, those who reported no condom use at last sex act, hazardous drinkers and those who were tested and aware of their HIV status though not statistically significant.

### Factors associated with HIV prevalence

In the final multivariate model (figure 1), the odds of being HIV positive were significantly lower among ABYM with tertiary education level than those with no education/primary school level education (AOR=0.06 (95% CI 0.01 to 0.50), p=0.009). The odds were also significantly lower among ABYM who were employed (AOR=0.34 (95% CI 0.14 to 0.81), p=0.015) and among those who indicated that they had tested and were aware of their HIV status (AOR=0.29 (95% CI 0.10 to 0.83), p=0.022).

## DISCUSSION

This is the first nationally representative study focusing on the HIV prevalence and associated factors among ABYM aged 15–24 years in a generalised epidemic. The results revealed an HIV prevalence of 4.8%, which translates to just over a quarter of a million ABYM living with HIV in 2017 in the country. This denotes a significant increase

**Table 4** HIV prevalence among adolescent boys and young women aged 15–24 years by sociobehavioural characteristics and HIV-related factors, South Africa, 2017

| Variables | n (%) | 95% CI | P value |
|---|---|---|---|
| Age of sexual debut | | | 0.579 |
| Less than 15 years | 324 (6.1) | 2.4 to 14.4 | |
| 15 years and older | 3205 (4.7) | 3.8 to 5.8 | |
| Age disparate relationships | | | 0.667 |
| Within 5 years | 1210 (4.4) | 2.9 to 6.5 | |
| Younger than 5 years | 87 (6.5) | 2.6 to 15.2 | |
| Older than 5 years | 45 (6.3) | 1.4 to 24.1 | |
| Number of sexual partners in the last 12 months | | | 0.096 |
| One partner | 1009 (5.2) | 3.4 to 7.9 | |
| Two or more partners | 345 (2.5) | 1.1 to 5.6 | |
| Condom use at the last sex act | | | 0.150 |
| No | 437 (6.5) | 3.1 to 12.8 | |
| Yes | 910 (3.5) | 2.4 to 5.2 | |
| Consistent condom use | | | 0.919 |
| No | 1286 (4.4) | 2.9 to 6.6 | |
| Yes | 54 (4) | 0.8 to 18.2 | |
| Alcohol AUDIT score | | | 0.949 |
| Abstainers | 2220 (5) | 3.8 to 6.5 | |
| Low-risk drinkers (1–7) | 553 (4.5) | 2.7 to 7.4 | |
| High-risk drinkers (8–19) | 287 (5.1) | 2.4 to 10.5 | |
| Hazardous drinkers (20+) | 37 (7) | 1.0 to 36.3 | |
| Correct HIV knowledge and myth rejection | | | 0.106 |
| No | 2150 (5.5) | 4.2 to 7.2 | |
| Yes | 1193 (3.7) | 2.5 to 5.5 | |
| Self-perceived risk of HIV | | | 0.494 |
| Low | 2827 (4.2) | 3.2 to 5.6 | |
| High | 403 (3.4) | 1.9 to 5.9 | |
| Tested and awareness of HIV status | | | 0.080 |
| No | 2165 (5.4) | 4.0 to 7.2 | |
| Yes | 1125 (3.6) | 2.5 to 5.0 | |

Subtotals do not all add to the total due to non-response and/or missing data.
AUDIT score, Alcohol Use Disorder Identification Test; SES, socioeconomic status.

in HIV prevalence from 2012, when an estimated 2.9% of ABYM were living with HIV.[30] Modelling estimates also suggest that HIV incidence in this population group increased between 2012 and 2017.[31] The current national estimate for HIV prevalence for ABYM shows a decline to 3.5%.[32] Although South Africa has made strides in controlling the HIV epidemic among ABYM, increased and sustained investment in advocacy and behaviour change interventions are still needed to reduce the risk of HIV infection among this population group.

Furthermore, HIV prevalence varied by selected sociodemographic factors and was higher among Black Africans, those residing in rural formal/farm areas and those with no education or with primary-level education. Overall, these results reflect the state of the South African HIV epidemic, with high HIV prevalence in rural provinces and the concentration of infections mainly among Black Africans residing in areas of widespread poverty, unemployment, and lack of quality education.[33 34] These observations reinforce the need for social policies aimed at mitigating structural conditions that contribute to increased vulnerability and risk of HIV acquisition in the study population.

The final multivariate model suggests that having no education or low educational attainment, unemployment, not testing and not knowing HIV status increased the odds of being HIV positive among ABYM. Evidence shows that educated people are more likely to be exposed

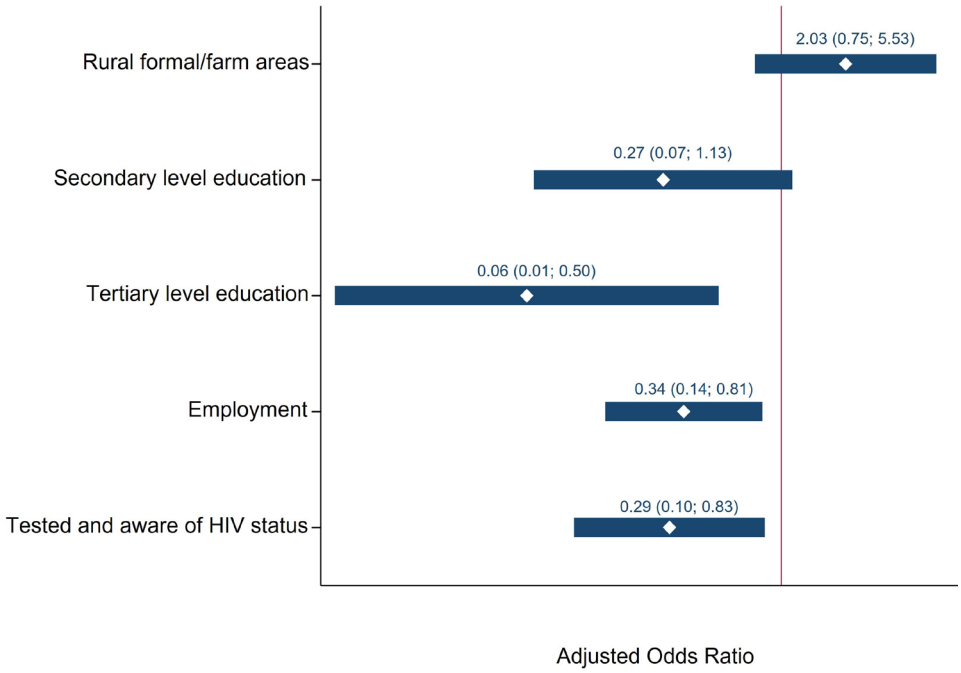


**Figure 1** Coefficient plot showing the model of factors associated with HIV prevalence among adolescent boys and young women aged 15–24 years, South Africa, 2017.

to prevention information as part of formal education, which provides a framework for understanding the connection between behaviour (eg, unprotected sex) and outcome (HIV infection).[35 36] Consequently, it has been suggested that formal education can empower individuals to engage with prevention initiatives and adopt risk-reducing behaviours more effectively.[35 36]

Additionally, in line with the current model, several studies have previously reported that unemployment was associated with societal circumstances known to increase both the prevalence and risk of HIV.[37 38] Unemployment is associated with increased social stress, instability and disruption, which may result in engagement in sexual behaviours that increase vulnerability and risk of acquiring HIV.[37 38] Similarly, youth unemployment and living in poverty have been tied to similar high-risk behaviours and increased vulnerability to HIV.[39 40] Therefore, initiatives promoting sustained youth employment can help mitigate the impact of poverty and HIV on young people.

In agreement with current findings, evidence shows that ABYM are less likely to test for HIV, and therefore, most are unaware of their status.[41–43] Consequently, ABYM contribute disproportionately to the gap in achieving the global target of 95% of people living with HIV knowing their status.[41 42] When they eventually test for HIV, it is often too late, and they are most likely to die of AIDS-related complications.[22] Moreover, ABYM who engage in high-risk sex without knowing their HIV status pose a risk for HIV acquisition and onward transmission.[43] These observations highlight the importance of male-friendly HIV services to reach more men and enable them to test and know their HIV status.

## LIMITATIONS

This study used self-reports and, given the sensitive nature of questions related to sexual behaviours, may have induced recall and social desirability bias. The causal relationships between HIV prevalence and selected covariates could not be deduced due to the cross-sectional nature of the survey, which only allows for the assessment of associations. Another limitation is that the analysis is based on the survey that was conducted in 2017 and may not reflect the current HIV context in the country. Unmeasured or unobserved covariates may also limit the secondary analysis. Nevertheless, this analysis is based on nationally representative population data that can be generalised to ABYM aged 15–24 years in the country.

## CONCLUSION

This paper provides an important perspective on HIV in the under-studied group of ABYM in South Africa. The study found that HIV prevalence in this young population is associated with a lack of engagement in educational and employment opportunities. Educational achievement and early employment represent developmentally appropriate socioeconomic milestones for adolescents and young adults. The findings underscore the need for government to diversify the HIV response and implement social policies to reduce structural challenges coupled with current biomedical and behavioural interventions. Identifying men and boys living with HIV is the entry point to the treatment and care cascade and is critical to ending the epidemic. Therefore, there is a

need to promote the uptake of HIV testing and awareness in this study population.

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**Contributors** TM conceptualised, drafted and wrote the results, discussion and conclusions. MM analysed the data, edited the manuscript. NZ, SM, IN, KM, KZ and LS edited the manuscript. TM accepts full responsibility for the finished work and/or the conduct of the study, had access to the data, and controlled the decision to publish. TM is the guarantor. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

**Funding** This study was funded by the US President's Emergency Plan for AIDS Relief: Grant/Award Number: Cooperative Agreement #GH001629.

**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not applicable.

**Ethics approval** This study involves human participants and the survey protocol was approved by the Human Sciences Research Council's Research Ethics Committee (REC: 4/18/11/15) and the Associate Director for Science, Center for Global Health, Centers for Disease Control and Prevention (CDC), GA, USA. Informed consent was sought from all participants aged 18 years and older. However, informed consent was first sought from parents/guardians of participants aged 15–17 years, and then assent was obtained from the youth themselves. Participants gave informed consent to participate in the study before taking part.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data are available in a public, open access repository. [dataset] Human Sciences Research Council. Data from: South African National HIV Prevalence, HIV Incidence, Behaviour and Communication Survey (SABSSM) 2017: Visiting point–all provinces. Human Sciences Research Council, 2024. https://doi.org/10.14749/1634193363.



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