

Factors associated with unsuppressed viral load among HIV-positive individuals in South Africa: implications for achieving the third 90 of the UNAIDS 90-90-90 targets

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- Background
- Rational and objective of the study
- Methods
- Results
- Conclusion

- The South African (SA) HIV epidemic remains one of the largest globally, with an overall HIV prevalence estimate of 14.0% reported in 2017
- This translate to about 7.9 million people living with HIV (PLHIV)
- SA has the highest proportion of people who have tested for HIV
- The country has the largest ART programme in the world

- The country has made significant progress but has not yet achieved the UNAIDS 90–90–90 targets
- The 2017 survey reports that among PLHIV aged 15-64
 - An estimated 85% knew their status (the first 90)
 - In this group 70.6% were on ART (the second 90)
 - Of these viral load (VL) suppression was 87.5% (the third 90)
- However not everyone who is living with HIV is on ART and virally suppressed
- In 2017 it was found that only 62.3% of all PLHIV irrespective of treatment were virally suppressed

Background

- There remains challenge to achieving durable viral load (VL) suppression among PLHIV in the general population
 - Defined as a viral load threshold of <1000 copies HIV RNA/ml
- HIV viral suppression is important to improve the health of HIV infected individuals and reduce HIV transmission
- The current policy is to test and treat everyone who is HIV positive as soon they are diagnosed to achieve viral load suppression in the general population
- Evidence shows that there are a number of factors associated with lack of viral suppression among HIV-positive individuals on ART

- However, no studies have examined determinants of viral load suppression (VLS) among HIV-positive individuals in the general population
- Identifying factors associated with lack of VLS at a population level is important for tracking implementation and providing useful information to optimize ART access and coverage
- This study examined factors associated with unsuppressed VL among HIV-positive individuals in the general population using the 2017 South African National HIV Prevalence, Incidence, Behaviour and Communication Survey

Survey data

- The study used nationally representative survey data was obtained from a cross-sectional, population-based household survey conducted in 2017 using a multi-stage stratified random cluster sampling design
- A total of 1000 small area layers (SALs) were sampled using the 2015 national population sampling frame of 103 000 SALs developed by Statistics South Africa
- The selection of SALs was stratified by province, locality type (urban, rural informal (tribal area) and rural formal (farms) and race group.
- A total of 15 visiting points (VPs) / household were randomly selected from each of 1 000 SALs, targeting 15 000 VPs
- Of these, 12 435 (82.9%) VPs were approached. Among these VPs, 11 776 (94.7%) were valid VPs. A response rate of 82.2% was achieved from the valid VPs.
- All consenting members of the selected VPs formed the ultimate sampling unit

Survey data collection tools

- Four questionnaires were also used in this survey:
 - Household Questionnaire
 - Questionnaire for parent/guardian of children aged 0 to 11 years
 - Questionnaire for children aged 12 to 14 years
 - Questionnaire for persons aged 15 years and older
- The questionnaires were used to collect information on socio-demographic, sexual history and behavior, HIV risk perception, knowledge and attitude including tuberculosis (TB) and exposure to various HIV communication campaigns
- The survey also included collecting blood specimen from consenting individuals using Dried blood spot (DBS) samples for estimating HIV prevalence, incidence, ARV exposure and HIV viral load
- This analysis focused on HIV positive individual 15 years and older whose blood was tested for HIV VL

Measures

Dependant variable

- Unsuppressed VL (≥ 1000 copies HIV RNA/mL) is the primary outcome
- The outcome variable was dichotomized into 0 = viral load copies < 1000 HIV RNA/mL and 1 = viral load ≥ 1000 copies HIV RNA/mL

Independent variables

- Socio-demographic characteristics such age categories in years, sex, race, marital status, educational level, employment status, and locality type
- Health related variables included Alcohol Use Disorder Identification Test (AUDIT) risk score, self-rated health, and presence of ARVs in blood specimens

Statistical analysis

- Descriptive statistics (frequencies and percentages) were used to summarize the study sample, and unsuppressed viral load by socio-demographic characteristics and health related variables
- Bivariate logistic regression models were used to assess the relationship between the primary outcome and explanatory variables
- Statistically significant variables were fitted into a multivariate logistic regression model to determine factors associated with unsuppressed VL
- Adjusted odds ratio (aOR), and 95% confidence interval (CI), with p-value less than 0.05 were used to test the strength, direction, and statistical significance of the association with selected socio-demographic and health related factors
- All analyses carried out in STATA 15.0 using svy commands to take into account for the complex multilevel survey design

Results: Sample characteristics and prevalence of unsuppressed VL

Out of 2,789 HIV-positive individuals 15 years and older tested for VL, 37.2 % were virally unsuppressed

The prevalence of unsuppressed VL was significantly higher among:

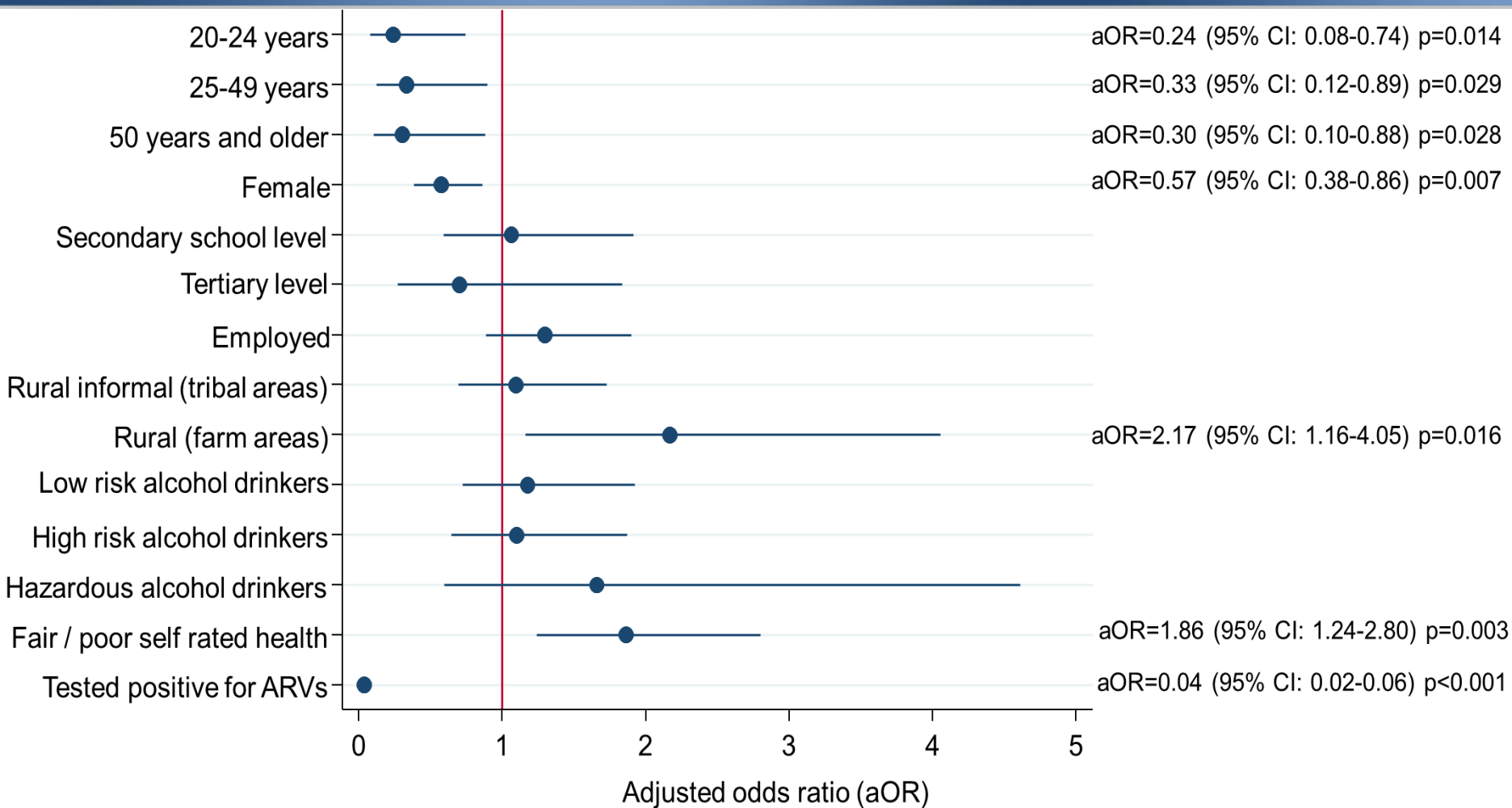
- 15-19 year olds (53.0%), and 20-24 year olds (52.0%)
- Males (45.0%) vs females (32.7%),
- Employed (41.6%) vs unemployed (35.0%)
- Those in urban(39.8%) and rural areas (39.4%) vs rural informal tribal areas (31.5)
- Hazardous drinkers (74.6%)
- Those negative for the presence of ARVs in their blood specimen (78.9%)

Variables	Study sample		Unsuppressed viral load		
	n	%	%	95% CI	p-value
Age categories in years					
15-19	108	3.2	53.0	41.0-64.6	<0.001
20-24	225	6.9	52.0	41.6-62.1	
25-49	1940	74.7	37.2	33.9-40.7	
50+	516	15.1	26.8	21.5-32.7	
Sex					
Male	797	36.4	45.0	40.0-50.2	<0.001
Female	1992	63.6	32.7	29.8-35.7	
Race					
Black African	2548	96.3	37.1	34.3-39.9	0.598
Other	241	3.7	40.0	29.7-51.3	
Marital status					
Married	572	23.8	32.8	26.9-39.3	0.073
Never married	1767	76.2	39.2	36.0-42.5	
Educational level					
No education / primary	556	21.5	34.7	28.4-41.4	0.017
Secondary	1487	72.3	37.8	34.2-41.4	
Tertiary	118	6.2	27.1	18.4-37.9	
Employment status					
No	1735	66.3	35.0	31.9-38.3	0.028
Yes	855	33.7	41.6	36.6-46.9	
Locality type					
Urban	1492	62.0	39.8	36.2-43.4	0.007
Rural informal (tribal areas)	889	30.9	31.5	27.2-36.1	
Rural (farms)	408	7.1	39.4	32.9-46.2	
AUDIT score					
Abstainers	1823	73.0	34.4	31.1-37.8	<0.001
Low risk drinkers (1-7)	397	16.9	42.1	35.7-48.8	
High risk drinkers (8-19)	196	9.0	46.3	37.8-55.2	
Hazardous drinkers (20+)	31	1.1	74.6	51.5-89.1	
Self rated health					
Excellent/good	1981	77.2	36.9	33.9-40.0	0.796
Fair/poor	634	22.8	37.7	32.4-43.4	
ART exposure					
Negative	889	37.1	78.9	74.4-82.8	<0.001
Positive	1587	62.9	12.6	10.4-15.1	

Results: Factors associated with unsuppressed VL in Bivariate models

- The less likelihood of being virally unsuppressed was significantly associated with
 - Older age groups
 - Females
 - Higher Educational levels
 - Residing in rural informal (tribal areas)
 - Those testing positive for ARVs
- The increased likelihood of being virally unsuppressed was significantly associated with
- Employment
- Reporting fair / poor self-rated health

Results: Factors associated with unsuppressed VL in a multivariate model



- The findings revealed that more than a third of HIV positive individuals 15 years and older were not virally suppressed
- This pattern was consistent among adolescents aged 15-19 years, males, those in farms (rural areas), those reporting fair / poor self rated health and those not on ARVs
 - Quality universal test and treat service including interventions such as simplified, decentralized and differentiated service delivery models across the HIV cascade are needed to improve VLS for these different populations subgroups
- HIV positive adolescent males not yet on ARVs should be prioritized for universal test and treat services
 - For perinatal HIV infected youth tailored treatment support for caregivers and families of such youth, including the use of social workers and peer support with more regular VL monitoring may be helpful in this group

- Unsuppressed VL associated with living in farms/ rural areas highlight the need to reduce disparities in access to treatment and care
 - Such population may benefit from the use of expanded outreach including mobile and community-based testing and treatment support services
- The reporting of bad/poor self-rated health among those with no indication of VLS e
 - Highlight the need for early diagnosis of HIV infection, prompt linkage to ART and sustained care which has been shown to reduce individual morbidity, mortality, and transmission of the virus
- Finally, this nationally representative survey helped identify national targets that may be important towards achieving the third 90% of the UNAIDS 90-90-90 targets and ultimately reduce HIV transmission in South Africa.

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