

The burden of HIV/AIDS among slum-dwelling school-age children in Kampala, Uganda

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Abstract

Introduction: Adult and youthful slum dwellers have been documented to have a higher prevalence of human immunodeficiency virus (HIV) compared to the general population. However, there is paucity of information on the extent of this infection among slum-dwelling school-age (5-14 years) children in Uganda. This study explored the burden of HIV among slum-dwelling school-age children (SDSAC) of Namuwongo, Kampala, Uganda.

Material and methods: We analysed data derived from HIV counselling and testing records of school-age children that tested at Kisugu HCIII between 2011 and 2016. A total of 555 anonymised records were analysed for: residence, HIV, religious, and sex status. Using STATA version 13, bi-variate analysis was conducted to obtain joint distribution, and the two-sample test of proportions test was used to elicit associations and their significance.

Results: The overall study population burden of HIV was 2%, with girls (2.6%) more affected than boys (0.9%). SDSAC had a higher HIV burden (3.3%) compared to non-slum dwellers (1.2%). HIV was more prevalent among slum-dwelling girls (5.2%) compared to their non-slum dwelling counterparts (0.9%). A positive HIV result was associated with being a slum dwelling girl (95% CI: [0.3-8.3], $p = 0.013$) and belonging to the 10-14-year age group (95% CI: [0.002-0.065], $p = 0.015$).

Conclusions: There is a high burden of HIV among slum-dwelling school-age girls in Kampala. SDSAC should be included among the blind spot population, and we recommend expansion of school-age-friendly, preventive, promotive, and therapeutic HIV services to these areas.

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Key words: HIV/AIDS, Uganda, school-age children, slum-dwelling, Kampala.

Introduction

Human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) remains a major global health challenge [1] responsible for 2.1 million new infections and

1.2 million AIDS-related deaths in 2015 [2]. Sub-Saharan Africa carries more than 70% of this burden [3]. As of 2016, the prevalence of HIV among adults, youths, and children (5 to 14 years) in Uganda stood at 6.0%, 3.6%, and 0.5%, respectively [4, 5]. Uganda is regarded as a progressor in the fight against

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HIV/AIDS [6]; however, it still faces the challenge of limited information on the extent of infection prevalence among populations like slum dwelling school-age children (SDSAC). According to the 2016 Uganda Population-Based HIV Impact Assessment Survey, school-aged children (5-14 years) had a 0.5% prevalence of HIV, with girls slightly more affected [5]. However, the report did not assess this data by formal or informal residence.

Slum dwellings are unplanned, poorer, urban informal settlements characterised by substandard infrastructure and overpopulation [7, 8]. Just like other developing countries, Uganda continues to struggle with urban informal settlements cropping up as a result of rural-urban migration [9]. Kampala, the capital, is home to over 50 slums [10], housing low-income earners the majority of whom are youths [11] whose parents are refugees from Northern Uganda, Rwanda, South Sudan, the Democratic Republic of Congo (DRC), and Eretria or opportunity seekers [12, 13].

Slum-dwelling adults and youths in Sub-Saharan Africa have been documented to have a higher prevalence of HIV compared to the general population. In Nairobi, Kenya, 12% of adult slum dwellers were found to have HIV compared to 5% of non-slum dwellers [14], while in Uganda, 13% of slum dwelling youths (15-25 years) in Kampala reported their HIV status as positive [15]; a prevalence far higher than the 3.6% national youth prevalence [5]. This is attributed to drug abuse, sex work, sexual exploitation, domestic violence, and rape; factors known to be rampant in slums and to increase the risk of HIV acquisition [11, 16-22].

Since school-aged children stay within the same settings, they may have greater exposure to these risk factors. It is thus pertinent to understand the burden of HIV among them. To our knowledge, this study is the first published endeavour to document the extent of HIV among SDSAC of Namuwongo, Kampala, Uganda.

Material and methods

Study area

The study was conducted at Kisugu Health Centre Three (HCIII), the only public outpatient health facility serving Namuwongo residents. Namuwongo has both formal and informal settlements, with the latter being home to over 15,000 residents of the Namuwongo slums (also known as Kasanvu) (Figure 1) [23]. Namuwongo's informal settlers are, largely, refugees from conflict areas like Northern Uganda, Rwanda, Kenya, the DRC, and Eretria as well as job-seeking rural-urban migrants [12, 13]. This slum area traverses the swampy part of Bukasa; one of the 19 parishes of Makindye Division (one of Kampala Capital City's five divisions) [24].

Study design and population

We conducted a cross-sectional comparative study, in which quantitative data were abstracted from the National HIV Counselling and Testing Registers stored at Kisugu HC III.



Figure 1. Google Earth map showing Namuwongo slums (yellow curve-out) and nearby industries and residencies [Imagery © 2017 Digital Globe, CNES Airbus, Map data © 2017 Google. png]

The study population comprised school-aged children (5-14 years) who were tested for HIV at Kisugu HCIII between 1 January 2011 and 31 December 2016. The period under consideration coincided the inception of HIV- testing at Kisugu HCIII (1 January 2011) and the last date (31 December 2016) for which reviewed data was available.

Data collection procedure

Two trained research assistants manually abstracted data from the National HIV Counselling and Testing (HCT) Registers using hard-copy templates designed by the researchers. Information of interest was extracted from columns; "4" for age, "5" for sex, "7" for residence, and "16" for HIV test result. Overall, 555 (80%) of all available (691) records at Kisugu HCIII were analysed (Figure 2).

To allocate slum or non-slum residence status, names of residences for all collected records were compared against the Makindye Local Government Division list of villages. This list highlights villages under slums in Namuwongo. With this list, researchers were able to classify 214 records as belonging to slum dwellers and 341 records as belonging to non-slum dwellers. Retesting was controlled for by excluding duplicate names at the point of data collection.

Variables of interest

The dependent variable was HIV status, defined as negative or positive, and the independent variables were socio-demographic characteristics: age (being 5-14 years), sex (male or female), religion (Christian, Muslim, or other), and residence. During analysis, age was stratified into age groups 5-9 years and 10-14 years.

Data management and statistical analysis

The accessible data were collated and incomplete records removed prior to analysis using STATA 13 (Stata Corp LP, College Station, Texas) software. Counts along with respective percentages were generated to describe the sample characteristics, and bivariate analysis was conducted using Fisher's exact test to obtain any associations. The two-sample test for binomial proportions was run to elicit differences in percentages along with their respective 95% compatible intervals [25] and *p*-values to elicit associations.

Ethical considerations

The Uganda AIDS Support Organisation (TASO) Research and Ethical Committee (Ref: TASOREC/09/17-UG-REC-009) and the Uganda National Council for Science and Technology (UNCST) (Ref: SS 4230) approved the study. Written approval for use of data at Kisugu HCIII was also provided by Kampala Capital City Authority (KCCA) Directorate of Public Health and Environment. Data collected did not have any identifier information and was kept by the principal investigator in a lockable cabinet. Electronic data were password protected.

Results

Of the 555 records analysed, 63.2% (*n* = 351) were female, 78% (*n* = 433) were Christians, and almost two-thirds (68.3%, *n* = 379) were within the 10-14-year age group. The mean age was 10.8 years; 10.3 and 11.1 for slum and non-slum dwelling school-age children, respectively. A slight majority of the children (61.4% [*n* = 341]) were non-slum dwellers (Table 1).

The burden of HIV among school-age children

Table 2 shows that the overall burden of HIV was 2%; threefold higher in school-age girls (2.6%) as compared to boys (0.9%). The SDSAC were approximately three times more affected by HIV (3.3%) as compared to their non-slum counterparts (1.2%), and Christians had a lower prevalence of HIV (1.9%) relative to Muslims (2.5%). Children within the 5-9-year age group were more affected by HIV (3.0%) relative to those in the 10-14-year age group (1.6%).

HIV among slum-dwelling school-age children

Table 3 shows the burden of HIV by residence status among 555 school-age children for whom complete HIV status data was available. The burden of HIV among female slum dwellers was 5.2%, six-fold that of their non-slum dwelling counterparts (0.9%). The difference in the HIV burden between female slum dwellers and female non-slum

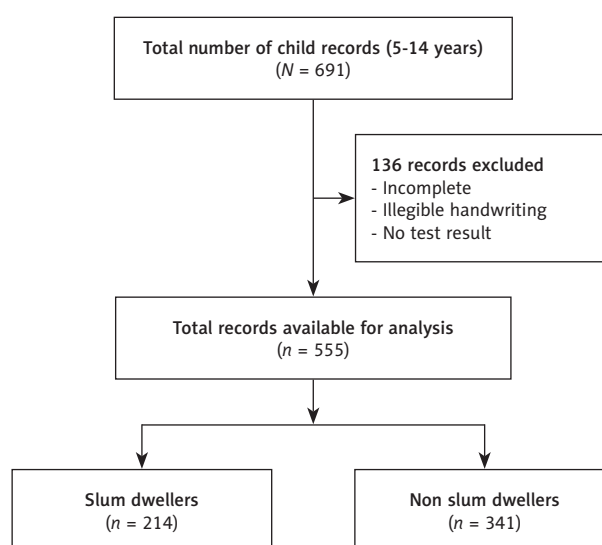


Figure 2. Selection criteria of records reviewed at Kisugu HCIII

dwellers was 4.3% (95% CI: [0.003-0.083], *p* = 0.013) and statistically significant. Similarly, children aged 10-14 years were more likely to be infected with HIV (3.2%) in comparison to those aged 5-9 years (0.4%) (95% CI: [0.002-0.065], *p* = 0.015). Slum-dwelling Christians and Muslims carried a higher burden of HIV (3.1% and 3.9%, respectively) relative to their non-slum dwelling counterparts (1.1% and 1.5%, respectively) although the differences (0.024 [95% CI: (-0.083 to 0.036), *p* = 0.415], 0.198 [95% CI: (-0.049 to 0.009), *p* = 0.139] respectively) were not statistically significant.

Table 1. Social demographic characteristics of school-age children tested for HIV at Kisugu HCIII

Characteristic	Stays within slum area <i>n</i> (%)			χ^2
	Yes (<i>n</i> = 214)	No (<i>n</i> = 341)	Total	
Mean age (SD)	10.3 (2.9)	11.1 (3.0)	10.8 (3.0)	
Age group				
5-9 years	77 (36.0)	99 (29.0)	176 (31.7)	0.087
10-14 years	137 (64.0)	242 (71.0)	379 (68.3)	
Sex				
Female	134 (62.6)	217 (63.6)	351 (63.2)	0.808
Male	80 (37.4)	124 (36.4)	204 (36.8)	
Religion				
Christian ^a	162 (75.7)	271 (79.5)	433 (78.0)	0.178
Muslim	52 (24.3)	67 (19.6)	119 (21.4)	
Others ^b	0 (0)	3 (0.9)	3 (0.5)	

^aChristian includes Catholics, Protestant, Pentecostals, and Adventists.

^bOthers includes Traditionists, atheists, and those who reported no religion.

Discussion

The overall burden of HIV among SDSAC (3%) was far higher than Uganda and Kenya's national HIV burdens for school-age children in the general population (0.5% and 0.9%, respectively) [5, 26]. This highlights the respective vulnerability of SDSAC to HIV infection. That said, our study findings concur with other studies that have found HIV to be more prevalent among slum dwellers than in the general population. A study by Swahn *et al.* in 2016 reported that 13.9% of slum-dwelling youths (15-24 years of age) in Kampala had HIV as compared to the 7.3% national preva-

lence [15], while Madise *et al.* in 2012 found the prevalence of HIV among slum dwellers in Kenya to be 12% compared to the 5% national burden [14]. Due to this, SDSAC should be given more attention, especially in Uganda where HIV programs are more focused on children under the age of five years, youths (15-25 years), and adults [27].

Generally, HIV was three times more prevalent among school-age girls (2.6%) as compared to their male counterparts (0.9%). This is in line with the epidemiology of HIV in Uganda and Africa, where females are more affected than males [28, 29]. In Uganda's general population; women have a 4-6-fold higher risk of acquiring HIV compared to men [27, 30]. This is attributable to early onset of puberty among girls (nine years old) compared to boys (12 years old) [31], earlier engagement in sexual activities [32], vulnerability to sexual exploitation [30], and the female sexual anatomy, which makes the acquisition of HIV easier compared to men [33].

The statistically significant difference in the HIV burden between female slum dwellers and female non-slum dwellers (4.3% [95% CI: (0.3-8.3), $p = 0.013$]) highlights the challenges that slum-dwelling girls experience. Although slum dwellers are known to carry a higher burden of HIV [14, 15], the statistically significant discrepancy, highlighted here, calls for further studies to understand factors for this occurrence among school-age slum dwelling girls. That said, known high rates of rape and sexual violence in slums [34, 35], which have also been documented in Namuwongo [36], could be factors. Moreover, the risk for children 5 to 14 years of age is even higher due to their lack of physical strength to fight off likely offenders [37].

Studies have shown that slums are associated with high levels of poverty [16, 17] and sex work [36]. Engaging in sex work increases the risk of HIV transmission and acquisition [38]. The observed high prevalence of HIV among slum-dwelling girls, especially those in the 10-14-year age group, could be attributed to early engagement in sex work. This highlights further risks of acquiring HIV [39], attrib-

Table 2. HIV status by select socio-demographic characteristics of school-age children tested for HIV at Kisugu HCIII

Characteristics	HIV status n (%)		Fisher's exact test
	Negative	Positive	p-value
Overall	544 (98.0)	11 (2.0)	
Sex			
Male	202 (99.0)	2 (0.9)	0.343
Female	341 (97.4)	9 (2.6)	
Age categories			
5-9	171 (97.2)	5 (2.8)	0.337
10-14	373 (98.4)	6 (1.6)	
Religion			
Christian	425 (98.1)	8 (1.9)	0.727
Muslim	116 (97.5)	3 (2.5)	
Other	3 (100.0)	–	
Residence status			
Slum	207 (96.7)	7 (3.3)	0.116
Non-Slum	337 (98.8)	4 (1.2)	

Table 3. Associated factors with residence status among HIV-positive children at Kisugu HCIII

Characteristics	HIV burden by residence status n (%)		Two-sample test of proportions Difference (95% CI)	p-value
	Slum	Non-Slum		
Sex				
Male	0 (0.0)	2 (1.6)	-0.016 (-0.038, 0.006)	0.254
Female	7 (5.2)	2 (0.9)	0.043 (0.003, 0.083)	0.013*
Age categories				
5-9	2 (2.6)	3 (3.1)	-0.004 (-0.053, 0.045)	0.865
10-14	5 (3.7)	1 (0.4)	0.032 (0.002 [†] , 0.065)	0.015*
Religion				
Christian	5 (3.1)	3 (1.1)	-0.024 (-0.083, 0.036)	0.415
Muslim	2 (3.9)	1 (1.5)	-0.198 (-0.049, 0.009)	0.139

[†]Divide the lower limit of the difference for children aged 10-14 years by 100

*Statistically significant

unable to their immature sexual reproductive system that is prone to injuries during sexual intercourse [37].

Other factors for the high burden of HIV among slum-dwelling school-age girls could be the inability to negotiate condom use or other protective measures [40] and lack of access to other reproductive health services [41, 42], which is attributable to low levels of knowledge about HIV and reproductive health services, as has been reported in slums [41, 43]. HIV risk perception is lower among less educated slum dwellers [44, 45] compared to those with full knowledge of HIV prevention [29]. This increases HIV vulnerability among more disadvantaged settlers. The low coverage of education facilities [36, 46] and high (60%) dropout rates [47] observed in Namuwongo mean that many girls are more likely to engage in risky sexual behaviour at an earlier age, hence the need for programs that target these children.

Strengths and limitations of the study

The strengths of the study included utilising up to date data from standardised HIV counselling and testing registers in a public facility. This ensured consistency during data collection and the ability to effectively assess the outcome of interest. Completeness and clarity of reviewed data were at 80%, representing a generalisable majority of the study population. However, the study was limited to review of already available HIV testing records. For this, researchers could not prove beyond reasonable doubt the HIV status, address, religion, and sex of the recipients of reviewed records. The exclusion of about 20% of available records due to incompleteness could also have affected the findings. Lastly, the National HIV counselling and testing register had no provisions on factors for the high prevalence of HIV among SDSAC. We recommend further studies in this area.

Conclusions

Based on reviewed records, there is a high burden of HIV among SDSAC of Namuwongo, Kampala, especially girls within the 10-14-year age group, although the exclusion of 20% of the records could have affected this. Much as the Government of Uganda has stepped up efforts to deal with HIV/AIDS, our findings highlight a gap in Uganda's efforts towards targeting all key populations. We recommend expansion of school-age-friendly, preventive, promotive, and therapeutic HIV services to these areas and more rigorous population-based studies to understand these phenomena and their drivers.

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Ethics approval and consent to participate

The study was approved by the TASO Research Ethics Committee (TASOREC/09/17-UG-REC-009) and the Uganda National Council for Science and Technology (SS 4230).

Conflict of interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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