Prevalence of oral impacts on daily performances among adolescents living with HIV at a tertiary paediatric hospital in Johannesburg, South Africa

Y Malele-Kolisa[1], M Netshiombo[1], TT Mpfuni[1], TRMD Ralephenya[1]

ABSTRACT

Objectives
To determine the prevalence of oral impacts on daily performance among HIV positive adolescents attending a wellness program at a Tertiary Hospital Johannesburg.

Methods
A cross-sectional study design was conducted where a clinical examination was performed to determine the intra-oral mucosal lesions, decayed, missing, filled teeth (DMFT) and Significant Caries Index (SiC). The Child-Oral-Impact on Daily-Performance (Child-OIDP) questionnaire was interviewer-administered to the adolescents at the tertiary paediatric hospital.

Results
There were n=208 adolescents with mean age 15.3 years (SD: 2.19; range 9.6-19.9 years). Fifty-five percent of the adolescents were female and 32% of had unemployed parents. About 39% rated their oral health as poor. More than 70% reported not accessing dental services six months prior. The most reported oral conditions were toothache (28.4%), unwanted colour of teeth (24.5%) and bleeding gums (24.0%). The dental caries prevalence was 87%, the DMFT was 3.9 (SD: 3.2; range 0-16) and the SiC was 7.6 (range 4-16). The participants had very minimal restorations (11.7%). The most common mucosal condition identified was linear gingival erythema (27.4%). The prevalence of at least one oral impact was 82% whilst the three mostly impacted activities were difficulty cleaning teeth (53.4%) eating food (51.2%) and enjoying being with people (48.9%). The distribution of the overall impact scores was skewed .The scores ranged from 0-56 with a median

Authors information:
1. Y Malele-Kolisa, ORCID: 0000-0003-3368-9193
2. M Netshiombo, ORCID: 0000-0001-9163-1972
3. TT Mpfuni, ORCID: 0000-0003-0080-4319
4. TRMD Ralephenya, ORCID: 0000-0002-0117-2942

Corresponding author:
Name: Y Malele-Kolisa
Postal address: Department of Community Dentistry, Faculty of
                   Health Sciences, University of Witwatersrand,
                   Johannesburg
Email: yolanda.Kolisa@wits.ac.za

Authors' Contribution:
Y Malele-Kolisa   50%
M Netshiombo   16.6%
TT Mpfuni   16.6%
TRMD Ralephenya   16.6%

of 6 and a mean score of 9.3 (SD = 10.5). The individual mean score range was, 0 to 9, the highest being 'smiling or laughing' at 2.8. A poor self-rated oral (p = 0.00) and not being satisfied with appearance of teeth and mouth (p = 0.05) was related to the overall impact score.

Conclusion
There was a high prevalence of oral impacts, dental caries and the symptoms related to dental caries. The most impacted activity was cleaning teeth and eating. These activities are related to the symptoms reported. It is imperative that dental caries and the symptoms are managed well to reduce the impacts on the adolescents' daily oral activities.

Key words
Adolescents living with HIV (ALHIV), oral health-related quality of-life (OHRQoL), Child-Oral-Impact on Daily-Performance (COIDP)

Introduction and background
The FDI World Dental Federation vision 2020 explains that the definition of oral health is multi-faceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow and convey a range of emotions through facial expressions with confidence and without pain, discomfort and disease of the craniofacial complex.[1] The ability to have complete oral health functions is even more essential for people living with chronic conditions and infected by the Human Immunodeficiency Virus (HIV). General health is interrelated to oral health especially the self-rated oral health[2] and the goal is to realise that health for all is achieved by all members of the population.

The concept of oral-health related quality of life (OHRQoL) is explained simply and loosely as the 'impact of oral conditions on daily functioning and wellbeing'.[3] The concept of OHRQoL is context reliant as culture and society shapes an individual's belief system and influences how health and illness is viewed.[4]

The relationship between HIV and oral health status has been investigated, showing that poor health practices such as medicine non-adherence can lead to manifestations of oral lesions and conversely certain HIV regimens may cause uncomfortable oral side-effects like xerostomia (dry mouth).[5] The current information on HIV in South Africa reports that 310 000 [200 000 - 540 000] children aged 0 to 14 are living with HIV while 12 000 [6900 - 31 000] were newly

infected.[6] Approximately 370 000 adolescents aged 10-19 years were amongst the HIV infected population in South Africa.[6] Among the adolescents, statistics show that those who are 15-19 years are 5.8% female and 4.7% male.[6] Amongst those living with HIV according to the UNAIDS epidemiological estimates in 2019, adolescent girls are more likely to be infected with HIV than adolescent boys in sub-Saharan Africa.[6]

The adolescents living with HIV (ALHIV), have generic lifestyle and congenital oral health challenges. They have a risk of developing oral conditions such as dental caries, periodontal disease, halitosis, xerostomia and some of these conditions are directly related to compliance and adherence to highly active anti-retroviral treatment (HAART). These oral pathologies or abnormalities can affect one's health-related quality of life (HRQoL) i.e. self-perceived mental, physical, and social perspective health status,[7] enjoying food; speaking and pronouncing clearly; cleaning teeth; sleeping and relaxing; smiling; laughing and showing teeth without embarrassment; maintaining usual emotional state without being irritable; carrying out major work or social roles; and enjoying contact with people."[8] Accordingly, the measure of oral health status has shifted from being pathology-focused to being more holistic and patient-centred i.e. the patient's overall oral *health* is taken into regard.

Research in socio-dental indictors has been burgeoning and several Oral Health-Related Quality of Life (OHRQoL) tools have been developed. One such tool, is the *Children Oral Impact on Daily Performance*, which assesses the impact of ill-oral health on performing daily functions. The instrument was modified and amended for dentistry from the World Health Organization's (WHO) International Classification of Impairments, Disabilities and Handicaps.[9] This measurement tool is unique in that it bridges the gap between objective (normative) and subjective measures of oral health.[3]

There is a strong association between dental visits, oral health status and OHRQoL.[10] Routine dental visits have a protective effect on OHRQoL[11] and those who those who delay seeking oral healthcare often present with emergency dental needs and report a poor OHRQoL.[12] While OIDP studies have been widely conducted for adults and children

(Child OIDP), adolescent focused OIDP studies, specifically for adolescents living with HIV (ALHIV), remain scant.[13] Although measurable strides have been made in the effort to prevent and manage HIV/AIDS, there is a shift in infection trends toward the adolescent group (10 – 19 years) whose estimated global prevalence is 1.1 and 2.4 million.[11]

The South African disease trajectory shows similar trends with an increase in the prevalence from 3.0% in 2008, to 3.2 in 2012 and 4.1% in 2017.[14] Relatedly, a systematic review of caries and periodontitis disease patterns revealed that although there is a noticeable decrease in dentine cavitated carious lesions, the prevalence is still high among middle and low-income countries[15] and adolescents are particularly at risk. This group generally has a low risk assessment of disease i.e. their perceived threat of disease is skewed toward aesthetics rather than tooth decay and its associated consequences – pain, invasive treatment and possible tooth loss.[12] As a result, this group may delay healthcare seeking, particularly in households where oral health is not prioritised. An understanding of adolescent behaviour, oral health status and OIDP can facilitate dental services planning that is aligned to patient and community needs. The study will generate important findings on the the adolescent's oral health related quality of life and provide empirical evidence needed to initiate support and enforce holistic integration of oral disease prevention and oral health promotion interventions and general national adolescent and youth policy.

This study is part of a series of OHRQoL studies conducted on the site using different OHRQoL indices. It is the first study to use the Child Oral Impact on Daily Performance tool among the ALHIV in South Africa.

MATERIALS AND METHODS
The site
The Greater Johannesburg Metropolitan Area and the areas in the periphery, get health services from the Charlotte Maxeke Academic Hospital. Within the hospital, is the HIV Wellness site at the Paediatric Virology Clinic. The Department of Community Dentistry at the Wits Oral Health Centre provides dental services in collaboration with the clinic within the Hospital. This gave rise to the Oral Health Paediatric Virology Project (OHPVP) where daily; during

Table 1: Socio-demographics and other characteristics of the study population

Characteristic		N[a] (%)	Mean ±SD
Sex			
	Male	94(45.2)	
	Female	114 (54.8)	
Age, years			15.3±2.19
Parent Employment status			
	Unemployed	60(31.8)	
	Employed	129(68.3)	
School Level			
	Primary School	55(30.9)	
	High School	123(69.1)	
Age category			
	10-14 years	77(37.0)	
	15-20 years	131(63.0)	

[a] The total is not 208 due to missing values

FIGURE 1: The tooth and mouth problems self-reported by the adolescents
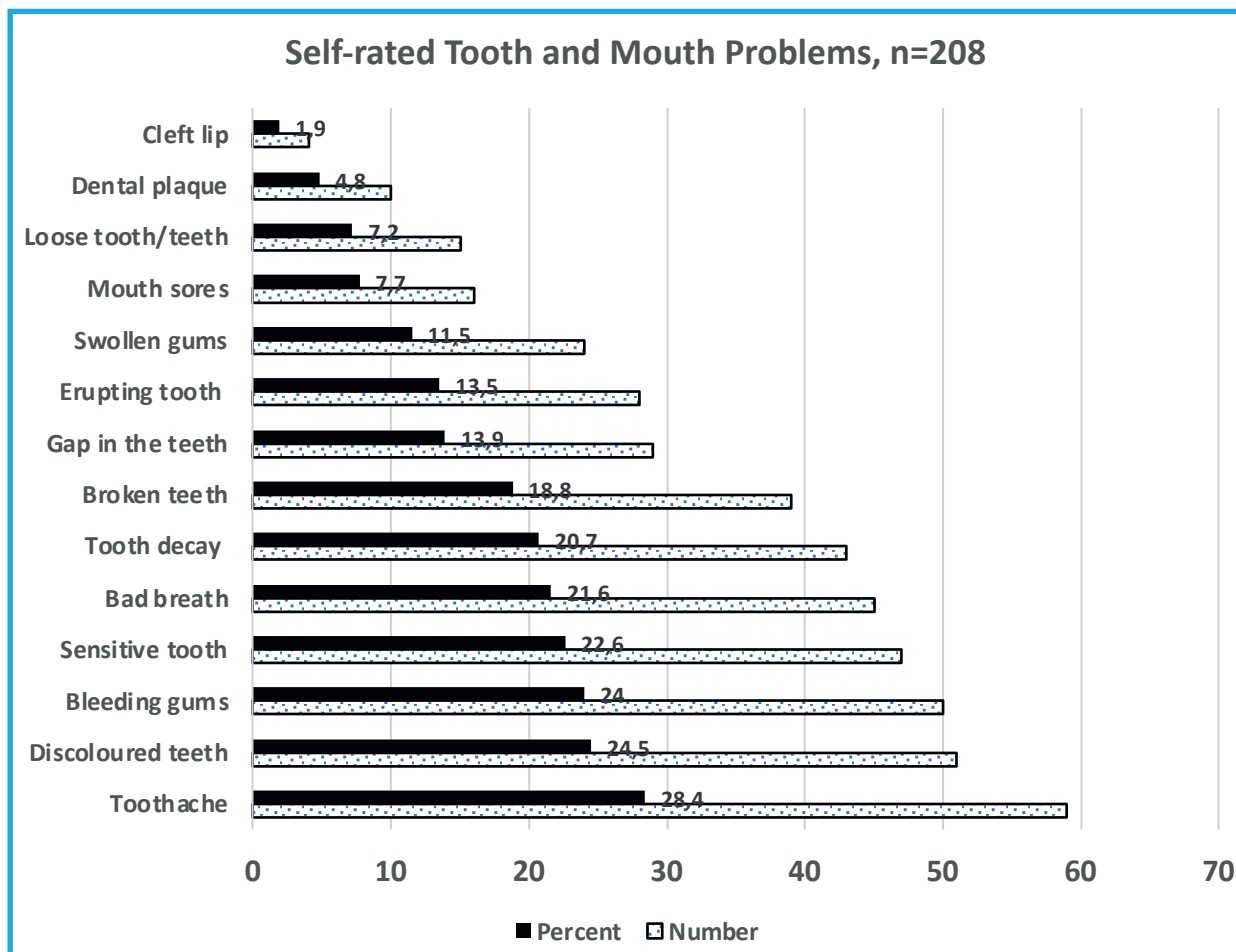
the week children are examined and provided with dental treatment within the paediatric clinic according to need.

Participant enrollment and data collection

The adolescents living with HIV (ALHIV) were enrolled from the HIV Wellness site during the clinic visits in 2016. The recruitment process was completed over a period of six months (February to August 2016) to enroll the participants into the study. During the recruitment process, the adolescents' parents and the adolescents were informed about the study by the administration staff at the center. Their permission was sought and those with parental consent and own assent became part of the study. The sample size was based on the HIV Wellness clinic attendance of approximately 400 patients in six months. Assuming an error of 5% and a 95% confidence interval, an estimated number of 196 participants was the calculated sample, to allow for non-respondents, 208 participants were enrolled. The participants enrolled as they came for their daily wellness visits.

Clinical oral examination

Detailed clinical oral assessment was conducted to detect dental decay and the oral mucosal lesions associated with HIV infection. The decayed missing and filled teeth (DMFT) index as outlined in the basic survey methods by World Health Organization (WHO, 1997) was applied to diagnose dental decay and later the Significance caries index (SiC) was calculated. Patients were examined sitting in the supine position on the portable dental chair using artificial light. The intra-examiner reliability was done by re-examining one

tenth of the sample the examiner and the calculated kappa statistics was 0.83. Simultaneously, the Oral HIV/AIDS Research Alliance (OHARA) case definitions by Shiboscki et al 2009; were used to record the oral mucosal conditions. The intra-oral examination was performed by a calibrated clinician (YMK). The clinician received training using the training material slides by Shiboscki et al 2009; the score for correctly diagnosed conditions had to be 80% and above in other to proceed with data collection; the intra-examiner score was 0.87.

Ethical Clearance was obtained from the Human Research Ethics Committee of the University of the Witwatersrand M141150. Written permission for the site was obtained from the managers, written signed consent and assent was obtained from the participants.

Child-OIDP tool administration.

Following a clinical examination, the Child-Oral-Impact on Daily-Performance (COIDP)[16] questionnaire was interviewer-administered to the adolescents at the wellness site. Socio-demographic information collected included gender, school information such as grade in school, the parent employment status, dental treatment need, satisfaction with teeth or mouth, oral hygiene practice, access to oral health education and source/s thereof.

The COIDP tool[16] sought information based on the eight daily activities/performances namely: *eating food, speaking, cleaning teeth, relaxing or sleeping, feeling different, being able to smile and /or laugh without embarrassment, doing*

Table 2: Dental caries prevalence and the oral health behavioural traits of the participants

Characteristic		Na (%)	Mean ±SD
Dental treatment need			
	Disagree	40(19.8)	
	Unsure	60(29.7)	
	Agree	102(50.5)	
Dental attendance in 6 months prior to study			
	Yes	55(27.1)	
	No	148(72.9)	
Frequency of Tooth brushing			
	Once a month	13(6.44)	
	Once a day	110(54.5)	
	Twice a day	79(39.1)	
Ever received advice about Oral health care			
	Yes	151(72.9)	
	No	56(27.1)	
Source of oral health care advice			
	School	77(37.0)	
	Family/friends	68(32.7)	
	Dental clinic	59(28.4)	
	Television/radio	37(17.8)	
	Magazine/newspapers	17(8.2)	
Satisfaction with current oral health status			
	Not so satisfied	90(45.7)	
	Satisfied	67(34.0)	
	A lot satisfied	40 (20.3)	
Global Oral Health Rating			
	Poor	77(38.7)	
	Fair	74(37.2)	
	Good	48(24.2)	
Dental caries	D>0	133(87.5)	3.2±2.9
Missing Teeth	M>0	30(22.9)	0.5±1.1
Filled teeth	F>0	15(11.7)	0.3±1.0
Significant Caries Index	SiC		5.5±2.6

a   The total is not 208 due to missing values

schoolwork and lastly, *enjoying being with people.* All questions were prefixed by – "in the past three months have you had the oral problems when you were…" The participants were expected to report on the frequency (once/twice a month = 1, once/twice a week = 2, three or more times a week = 3); the severity (A little = 1, moderate = 2, a lot = 3); and choose the oral condition from a list of 17 conditions (e.g. toothache, mouth ulcers etc.) and were allowed to mention any other conditions not on the list that caused the impact on daily activity.[13]

Data Analysis

Data was analysed using Stata version 14 (Stata Corp, College Station, TX, USA) and SPSS (version 23). Socio-demographics were assessed through sex, age, school grade, parent employment status and township/area of location. Additional information before answering the COIDP[16] tool were based on the following: Dental treatment need "yes/no", Satisfaction with current oral health status" 5-point Likert scale", Dental attendance in 6 months prior to

study "yes/no", 5 options ranging from never, once a month, once a week, once a day to twice a day", self-rating of oral health. All demographic information was dichotomised and presented in frequencies and percentages.

The mean DMFT was calculated, dental caries prevalence (dichotomized as D=0 and D >0 and DMFT=0 and DMFT>0) were also reported. The HIV clinical markers retrieved from records were: WHO staging, duration on antiretroviral treatment and the CD4 count and viral loads (VL). The CD4 counts and VL are reported in means and median due to the skewness. Additionally, the Centre for Disease Control (CDC) guideline categories were used stratify the CD4 counts and the VL into three categories. The participants with CD4+ T cell count >500CD4 cells/mm³ (category 1), 200-500CD4 cells/mm³ (category 2) and <200CD4 cells mm³ (category 3). Similarly, the VL was categorized using the CDC cut off of <40VL copies/ml (asymptomatic); 40-1000VL copies/ml (symptomatic);   and >1000VL copies/ml(AIDS stage) .

Thereafter The COIDP score; the impact for every performance, was calculated by the product of frequency and severity scores of 0, 1, 2, 3 each with regards that performance. The possible range of scores was 0 to 9 for performances. The overall impacts score was then calculated by the sum of all eight performances with range of 0 to 72 divided by 72 and multiplied by 100.[14] The internal consistency reliability of the scales derived were assessed using Cronbach's Alpha test once.

RESULTS

There was a total of 208 adolescents who agreed to participate in the study. The table below (Table 1) depicts their demographic data. The mean age was 15.3 years (range = 9.6-19.9 years; SD: 2.199) and approximately 55% participants were female. Regarding their socio-demographic status, 31.8% of participants indicated that their parents were unemployed.

Almost 40% of the participants rated their oral health as poor and more than 70% reported not accessing dental services six months prior to the date of the interview.

DENTAL CARIES

The dental caries experience for the whole group expressed in mean DMFT was 3.9 (SD: 3.2) . The significant caries index (SiC) measures the DMFT in the highest third of the study population, the SiC index was 7.6 (SD: 2.72) (Table 2). The Decayed component contributed more to the DMFT score with a high value of D=3.2; SD: 2.9. The group's overall dental caries prevalence was 87% with at least one

participant having three decayed teeth, about one (0.5 SD: 1.1) missing tooth and close to none had filled teeth (0.3 SD: 1). 11.7% of the participants had restorative treatment done on them. Approximately 76% of the adolescence rated themselves to have poor to fair oral health while nearly half (46%) were not satisfied with how their teeth or mouth looked. A good majority (72.9%) of them have received oral health education from sources such as school settings (37%), family or friends (32.7%) and even the dental clinic visits (28.4%).

Most adolescents displayed good HIV clinical markers where most were at WHO clinical staging of 1-2 (77%), undetectable viral loads (59%) and higher CD 4 counts (65%). They have been on anti-retroviral treatment for up to 16 years with a mean of 7.6 years as illustrated in Table 3.

Table 4 shows that the daily activity most impacted on was cleaning teeth (53.4%) followed by eating food (51.2%) and third was enjoying being with people (48.9%). The distribution of the overall impact scores was skewed with high kurtosis levels. The scores ranged from 0-56 with a median of 6 and a mean score of 9.3 (sd =10.5). The possible range of individual mean score was from 0 to 9, the mean score for 'cleaning teeth' was the third highest at 2.6, while the highest individual was that of 'smiling or laughing' at 2.8. The tool displayed good internal consistency with the Cronbach alpha of 0.68 with 24 items in the scale.

There was an association between COIDP impact scores and the oral problems reported by the adolescents using the Mann-Whitney U test. These oral conditions were

Table 3: The HIV clinical indicators for the adolescents

Characteristics	Attribute	N	%
Marginal Gingiva	Normal	114	61.96
	Mild Gingivitis	53	28.8
	Moderate Gingivitis	17	9.24
Periodontal Status	Normal	111	62.01
	LGE	49	27.37
	HIV-gingivitis	19	10.61
WHO Clinical staging	1-2 Staging	131	77.06
	3-4 Staging	39	22.94
DART# in years m(SD)	Min-max 0.2 -16.9 years	7.63	4.2
Weight (kg)	Min-max 34.9-130.45	68.5	15.23
CD4 count (n=188)	Min-max 0- 3904	643.3	402.14
	Median CD 4 counts	629	IQR: 401.5-796
	<200CD4	22	11.70
	200-500CD4	43	22.87
	>500CD4	123	65.43
Viral Load(n=193)	mean	6970.53	28193.43
	Median VL	39	IQR: 39-450
	<40	113	58.55
	40-1000	43	22.28
	>1000	37	19.17

#DART-duration on anti-retroviral treatment

Table 4: Prevalence of the daily activities impacted on by mouth/teeth problems and the Children –OIDP total and subscale scores

Child-Oral Impact on Daily Performance	Overall	Eating food	Speaking	Cleaning teeth	Sleeping/relax	Feeling different	Smiling/Laugh	School work	Enjoy being with people
COIDP Prevalence n (%)	105(51.2)	59(28.9)	111(53.4)	60(29.1)	72(34.6	82(40.2)	73(35.6)	99(48.29)
Impact intensity (%children with impacts)									
Never		50.1	75	51.4	68.3	68.8	65.9	69.7	58.7
Little		26.6	15.9	21.2	14.9	15.4	12.5	13.5	19.2
Moderate		11.1	3.9	16.4	7.7	10.6	9.6	6.3	8.7
Severe		14.4	5.3	11.1	9.1	5.3	12.0	10.6	13.5
Impact Score									
Range	0-56	0-9	0-9	0-9	0-9	0-9	0-9	0-9	0-9
Mean(sd)	9.3(10.5)	1.7(2.5)	0.8(1.9)	1.9(2.6)	0.34(1.4)	0.0(1.3)	1.6(2.8)	1.2(2.4)	1.6(2.6)
Percentiles (25,50,75)	1,6,13.5	0,0,2	0,0,0.5	0,0,3	0,0,0	0,0,0	0,0,2	0,0,1	0,0,2
Kurtosis	6	5	12	4	27	21	4	7	5

toothache, bleeding gums swollen gums and mouth sores (p-value<0.005). Similarly, a poor self-rated-oral-health (p-value<0.05) and not being satisfied with appearance of teeth and mouth (p-value=0.05) was related to the child-oral-impact on daily performance score.

DISCUSSION
Demographic characteristics of the participants
The demographic characteristic of the participants show that 55% participants were females and similar results were observed in other studies in Africa and Asia.[15,16] The South African parents seemed to be more educated as 30% had attained primary and 69% had secondary education in contrast to 15% and 22% respectively for the community in Tanzania. [15]

Studies have suggested that oral health outcomes are influenced by the parent's education level.[17] The effect of socioeconomic conditions on oral health related quality of life has also been reported. Low educational level may lead to reduced income, unemployment and poor occupational status; these conditions influence health behaviours and self-rated oral health.[18] The finding of this study reveal that

Table 5: Association of COIDP impact score and the mouth problems of he adolescents (p-values)

Attributes	P-value
Toothache	0.002*
Bleeding gums	0.01*
Sensitive teeth	0.49
Swollen gums	0.003*
Tooth decay	0.19
Loose tooth	0.58
Mouth sore	0.02*
Bad breath	0.12
Discoloured teeth	0.13
Dental Visit	0.8
Poor oral health self-rating	0.00*
Not satisfied with OH	0.05*
Older Adolescent	0.9

*P≤0.05

most parents are employed at 68,3 % and similar results were observed from a population in Brazil.[18]

It has been noted in the South African context that oral health is impacted when parents or guardians are employed as they are not home to monitor the oral health self-care to the children.[19] This could explain the findings observed in this study as 68% of parents were working and the participants presented with conditions including dental caries and periodontal disease. The distance from the workplace to home and long working hours could contribute to the oral health of the participants.[19,20]

The results of this current study concur with other studies that indicated that the impact of education of parents and guardians on the outlook of learners cannot be ignored as the socioeconomic status plays an important role in the utilization of health services.[21,22] In some studies the maternal education was associated with the use of dental services, indicating that lower oral health knowledge leads to unhealthy behaviors and less interest in preventive treatment.[23] The role of education in health could lead to more health-conscious and healthier lifestyle choices.[24]

The participants reported the need for dental treatment, had dental caries and experienced toothache. This is not surprising as statistics from the Global Burden of Disease Study in 2019 estimated that oral diseases affect close to 3.5 billion people worldwide, 2 billion with caries of permanent teeth being the most common condition; and 520 million children suffer from caries of primary teeth.[25]

Of concern was that 72% of the participants had not sought dental treatment in six months prior to the study. This is critical as lack of dental care has an impact on periodontal and dental health. Oral health conditions could be prevented, and the importance of regular checkups is crucial in ensuring that patients maintain meticulous oral hygiene. Over 31% of the adolescents' parents were unemployed. Adolescents whose parents are of a low socio-economic status are less like to practice good oral health behaviour such as frequent dental visits[27] as observed in the study. While some studies have pointed to adolescent self-esteem being a predictor of dental visits, the explanations sought to determine this relationship are rare and inconsistent. [28]

From a life course perspective, it can be hypothesized that children from families with early life low socio-economic conditions may have less access to (and use of) dental services ;variety of oral hygiene items and may be more likely to develop harmful oral health behaviours later in life.[26,27] These could predispose individuals to problems such as dental caries, gingival bleeding, dental pain, malocclusion as observed from the participants in the study which in turn may impact on adolescents' oral health related quality of life.[26,27]

The participants indicated that the source of oral health care advice was obtained from school. This is important as it shows the value of the integrated school health programme in the Gauteng district oral health setting where learners get the opportunity to be educated on oral health. The influence of family and friends is important in relaying health messages as 32% of participants relied on them to share information on oral health. The oral health/dental clinic setting still has a role as most learners found it a suitable space to gain oral health education (28%). Within this perspective and considering the challenges of the adolescent phase in life, it is necessary to develop educational measures on oral health in schools by means of programs capable of meeting the needs and characteristics of this portion of population. [28]

Dental Caries
The dental caries prevalence for this cohort was high at 87% and the decayed portion contributed most to the dental caries experience. These dental caries prevalence rates are higher than the findings observed from the South African National Children Oral Health Survey which showed that 36.1% 12 years old children had dental caries albeit, the survey was conducted more than two decade later.[29] Similar studies in Sudan Nigeria, Uganda and Tanzania on OHRQoL using the COIDP measure among child participants, showed different caries prevalence results. The prevalence was 45.8% in Sudan[30], 21.9 % in Nigeria[31], 48% in Uganda [36] and 43.5% in Tanzania.[32] The findings from the Ugandan study indicates that all the participants were HIV infected like the current study. The current cohort had a higher prevalence, and this was corroborated by the high levels of self-reported tooth decay and toothache. The higher prevalence of dental caries can even explain why the participants rated themselves poorly with regards their general oral health and were not satisfied with how their teeth or mouth looked. The results from this study indicated that the dental problems, mostly dental caries and self-reported toothache and decay impacted on the daily activities of the adolescents. The results are similar to the Tanzanian where the overall prevalence had a greater impact on scores and children OHRQoL.[32] In addition, a similar Thailand study revealed that among all kinds of oral diseases, dental caries related most to oral impacts on children's and adolescents' QoL.[33] These findings were also comparable to previous studies showing that sensitive tooth and toothache impacts on most of the eight daily performances.[13] Participants in the study struggled with eating food and this may have created problems on the nutritional balance and status of the participants. It is concerning that the treatment such as dental restorations were done very minimally however, the participants did receive oral education and thus have an idea of prevention.

Oral health related quality of life scores and impacts on daily activities.
All participants in the study reported at least one impact on daily performance. In addition, cleaning teeth and eating were the highest reported impacts on daily performance, with a COIDP prevalence of 53.4% and 50.5% respectively. This is slightly different to the Thailand study where impact on cleaning teeth was 48.5% but they experience a higher impact on eating at 72.9%.[13] Tanzania also reported eating as the highest impact on daily performance, although the prevalence was comparably low at 22.8%.[32]

The mean COIDP of our study was high (9.3 SD: 10.5), indicating self-perceived poor OHRQoL. Our results are in stark contrast with socioeconomic counterparts in other upper-middle income countries. For instance, Brazil, Thailand, and Peru reported mean COIDP scores of 7.1, 8.8 and 7.8 respectively.[13,34] The mean score also did not compare to high- and low-income country like France –7.8[35] and Tanzania - 1.2.[32]

There are several factors that may explain the reported poor OHRQoL. The study's cohort is specificically– adolescents living with HIV. While OHRQoL studies are scant for this group, a study of HIV positive Ugandan mothers using the OIDP tool, found HIV status was not significantly associated with oral impacts on daily performances.[36] On the other hand, socio-economic status may have contributed to the reporting of poor OHRQoL. Over 60% of the participants parents were unemployed; some OHRQoL studies have demonstrated that children who come from low-income households and large families report significantly high COIDP scores, compared to their counterparts with higher socio-economic characteristics.[35]

Enjoy being with people as well as smiling/laughing were the third and fourth highest reported impacts on daily performance. A study in 2015 which assessed adolescents' perceptions on oral health and health care seeking behaviour, found that aesthetics was the most cited reason for seeking healthcare services.[12] Adolescents valorise appearance, therefore it may contribute to the perceived poor OHRQoL [34]. The caries prevalence in our study was high and toothache was the most reported mouth-related problem. A COIDP study in Saudi Arabia found that toothache was reported as a perceived impairment for almost all oral impacts and was the strongest predictor of COIDP. [37] Considering that eating and cleaning teeth were the highest impacts on daily performance in our study, dental problems (toothache) and impact on daily performance.

Majority of participants reported low oral health care seeking in the past 6 months, which would explain perceived poor oral health behaviour. A study in Uganda found that those adolescents who frequented dental facilities were more likely to report poor OHRQoL.[38] Attendance patterns were related to the perceived treatment need among Ugandan school children and were considered as a proxy for oral health related quality of life.

Limitations
The adolescent self-rated tooth decay and toothache may be over-rated, self-reporting also poses the risk of bias. This is specifically true for young people who may be inclined to give socially desirable responses. However, the normative assessment of dental caries provided an objective assessment of dental caries.

Conclusion
The adolescent living with HIV infection in the study

setting had high prevalence of dental caries. However, they displayed good HIV clinical markers. Approximately each adolescent had at least three teeth with dental caries and few restorations done. They generally rated that their health was not good and had a poorer oral health related quality of life as they experienced toothache, bleeding gums and discolored teeth. Oral symptoms, infrequent dental access and aesthetic were associated with a poorer oral health related quality of life.

The findings from the study highlight the infrequent attention given to the impact that oral health has on quality of life. It is therefore recommended that an inclusive approach is required, where not only clinical conditions are valued, but the patient-based input are also considered. This holistic approach will enhance the focus for oral health services to be linked with general health so that the social and psychological impact are considered when planning for wellness centers. Future research is also recommended in this field to use longitudinal studies to see the changing patterns of disease impacts on the quality of life.

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