



## Oral Impacts on Daily Performances among People Living with Human Immunodeficiency Virus on HAART Era Attending Care and Treatment Clinics in Dar es Salaam, Tanzania

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Received 27 May 2022, Revised 5 Dec 2022, Accepted 12 Dec 2022, Published Dec 2022

DOI: <https://dx.doi.org/10.4314/tjs.v48i4.10>

### Abstract

Oral disease/conditions are reported to have negative effects on the quality of life of People Living with Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (PLWHIV/AIDS). This study aimed to assess the prevalence and causes of oral impacts on daily performances (OIDP) and its associated factors among PLWHIV/AIDS. A cross-sectional study was conducted among 218 PLWHIV/AIDS attending two HIV Care and Treatment Centres (CTCs) in Dar es Salaam. The study utilized a structured interview schedule containing questions on socio-demography and a single item of global oral health measure on the perception of current oral health status (OHS). A Swahili version of an OIDP inventory was used to assess the impacts of oral conditions on participants' daily performances. Frequency distribution, chi-square, and logistic regression analyses were conducted ( $p < 0.05$ ). Participants' age ranged from 20 to 70 years, mean of 41.15 SD 10.7. About 70% ( $n = 154$ ) of the participants perceived their oral health status (OHS) as good. The prevalence of OIDP ( $\geq 1$ ) was 26.1% ( $n = 57$ ). The most affected performances reported were *eating and chewing food* followed by *maintaining the usual emotional state without being irritable*. *Toothache* was the main cause of impacts on all daily performances except *'speaking and pronouncing clearly'* which was caused by *oral ulcer*. Age ( $p = 0.025$ ) and perceived oral health status ( $p = 0.000$ ) were significantly associated with OIDP. More studies on biological and behavioural factors are recommended to support inclusion of oral health in CTCs.

**Keywords:** Care and Treatment Centres; HAART; HIV; Oral health; Quality of life.

### Background

Acquired immune deficiency syndrome (AIDS) is considered an important public health problem worldwide. Approximately 38 million people are living with HIV/AIDS according to the United Nations program on HIV/AIDS

<https://www.unaids.org/en/resources/fact-sheet>.

In Tanzania, according to the National AIDS Control Program, it is estimated that about 1.7 million people are living with HIV

(PLWHIV). After more than a decade since Highly Active Antiretroviral Therapy (HAART) treatment was introduced in 2005, significant improvements have been observed in terms of reduced morbidity and mortality. These advances in care for HIV-infected individuals have moved the disease from a terminal illness to a chronic one (Buczynski et al. 2008).

HIV/AIDS is a condition that has been associated with several manifestations in the

body including the orofacial area due to its immunosuppressive effects. With the HAART treatment, a reduction of oral manifestations of HIV/AIDS has been observed (Hamza et al. 2006, Raymundo de Andrade et al. 2011). However, dry mouth has been frequently reported in the course of the disease, and its management, which may lead to an increased risk of dental diseases such as dental caries and periodontal disease (Nittayananta et al. 2010, Kahabuka and Fabian 2012). These diseases are the main causes of pain and discomfort and might lead to poor oral health-related quality of life (Svensson et al. 2018).

Oral health-related quality of life (OHRQoL) measures have been developed to capture the subjective aspect of oral health and disease (Adulyanon et al. 1996). Oral Impacts on Daily Performances (OIDP) is one of the most used OHRQoL instruments. It is based on the conceptual framework of the World Health Organization's International Classification of Impairments, Disabilities and Handicaps (ICIDH), which has been amended for use in dentistry by Locker (Badley 1987, Locker 1988). The OIDP concentrates only on measuring "ultimate" oral impacts, covering the fields of disability and handicap, and measuring oral impacts that seriously affect the person's daily life (Adulyanon and Sheiham 1997). It consists of 8 items that assess the impacts of oral conditions on basic activities and behaviors, covering the physical, psychological, and social dimensions of daily living (Table 1) (Adulyanon and Sheiham 1997).

Previous studies reveal that oral disease and conditions affect the quality of life of individuals living with HIV/AIDS (Raymundo de Andrade et al. 2011, da Costa Vieira et al. 2018, Muralidharan et al. 2020). These studies reveal the *physical domain* mainly being affected as well as the *psychological domain*, while most reported causes of impacts being dental caries, gum problems and oral lesions. Research has been conducted on oral health issues among PLWHIV/AIDS in Tanzania. Most of these studies assessed knowledge, attitudes,

behaviours and patterns of oral manifestations of HIV/AIDS (Hamza et al. 2006, Fabian et al. 2009, Mwangosi and Majenge 2011, Mwangosi and Tillya 2012, Ngasala et al. 2016). Identifying the effects of oral conditions beyond the biological/physiological clinical parameter is important, that is to include perceptions of functioning and well-being in terms of OHRQoL measures among PLWHIV/AIDS. The latter may guide a holistic approach to providing health care that includes oral health at the CTCs. Currently, there are no retrievable studies with information on the oral health-related quality of life of people living with HIV/AIDS and associated factors in Tanzania. Therefore, the current study aimed to assess the prevalence and causes of OIDP and the associated factors, among PLWHIV/AIDS attending two selected HIV care and treatment clinics (CTCs) in Dar es Salaam.

## Methods

This was a health facility-based cross-sectional study conducted among patients attending two HIV CTCs in Dar es Salaam. The two clinics were conveniently selected from two districts in Dar es Salaam. One clinic was located at a tertiary hospital, Muhimbili national hospital (MNH) in Ilala District, and another at the Magomeni Health centre in Kinondoni District. The sample size of 218 was estimated assuming the prevalence of OIDP among PLWHIV/AIDS to be 50% since there were no retrievable similar studies in Tanzania, a marginal error of 7%, a 95% (1.96) standard normal deviation, and a 10%, adjusted for non-response rate. The study involved all confirmed HIV seropositive patients attending HIV CTCs during the study period, from September to November 2018. Recruitment was done with the assistance of identified staff at the centres, who ensured that there was no re-selection of participants. Participants were invited to the study, after signing a written consent. One author (LE) conducted the interviews in a private consultation room at the CTCs. Data was collected using a structured questionnaire

administered in an interview manner to the individuals. The study did not include participants with problems such as pain or mental instability that would interfere with the interview. The questionnaire consisted of two parts: Part one inquired on socio-demographic details (age, sex, level of education, employment status, and marital status), whereby *Age* was dichotomized into 0 = 20–39 years and 1 = 40 years and above; *Sex*, 0 = Males and 1 = Females; *Level of education* included options (no formal education, primary education, secondary education, more than secondary education), the options were dichotomized into 0 = ≤ Primary education (including options no formal education and primary education) and 1 = ≥ Secondary education (with options Secondary education and more than secondary education); *Employment status* had the following options: not employed, employed and self-employed, these options were dichotomized into 0 = unemployed/self-employed (not regular income) and 1 = Employed (regular income). *Marital status* included the options: single, married, cohabiting and widow/er, divorced, and these were dichotomized into: 0 = Single/divorced/widow/er and 1 = Married/cohabiting (Birungi et al. 2020); and a single-item global oral health measure on the perception of current *oral health status* (OHS), i.e., ‘*how do you consider the present condition of your mouth and teeth?*’ in which a participant responded to a five-point Likert scale (very good, good, average, poor, very poor). The scale was dichotomized into 0 = Good OHS (including options “very good” and “good”) and 1 = Poor OHS (including options “average”, “poor” and “very poor”) to obtain the prevalence of perceived oral health status (OHS). The second part of the questionnaire consisted of a previously tested *Swahili version of 8 item OIDP inventory* (Table 1), to assess the impacts of *oral conditions* on the *daily performances* of PLWHIV/AIDS (Kida et al. 2006). On each of the OIDP items, participants had to respond to options describing the frequency of perceived impacts with the following options: Never, Less than once a month,

Once or twice a month, Once or twice a week, 3-4 times a week, and Every or nearly every day. During analysis, for each of the OIDP items, options were dichotomized to 0 = Never and 1 = experienced an impact (including options Less than once a month, Once or twice a month, Once or twice a week, 3–4 times a week, Every or nearly every day). A total score of OIDP items (Table 1) ranging from 0 to 8 was used to calculate the *prevalence of OIDP*, which was dichotomized into 0 = never experience an impact and 1 = experienced one or more impacts. OIDP index has been utilized previously among adults in Tanzania and found to be reliable and valid (Masalu and Astrom 2003, Kida et al. 2006).

**Table 1:** An oral impact on daily performances (OIDP) inventory reporting on how often problems with mouth and teeth have affected performances

OIDP items reporting on how often problems with mouth and teeth have affected the following performances in the past six months:	
1	Eating and chewing food
2	Speaking and pronouncing clearly
3	Cleaning teeth
4	Sleeping and relaxing
5	Smiling, laughing and showing teeth without embarrassment
6	Maintaining usual emotional state without being irritable
7	Carrying out major work or social role
8	Enjoying contact with people

Data was analysed using IBM SPSS Statistics for Windows, version 24.0 Armonk, NY: IBM Corp. Frequency distribution was used to describe the prevalence of OIDP, OHS and socio-demographic variables, as well as the most affected impacts and causes of impacts. Bivariate analyses were conducted using chi-square statistics to assess the relationship between independent variables and the prevalence of OIDP; while adjusted logistic regression analysis was done to assess the strength of the association. The level of significance was set at  $p < 0.05$ .

Ethical clearance to carry out the study was obtained from the Research Ethics Committee of the Muhimbili University of Health and Allied Science (REC-MUHAS). Permission to collect data from the clinics providing Antiretrovirals was sought from the Muhimbili National Hospital and Magomeni Health Centre administration. Participants were invited to participate in the study, following a careful explanation of the purpose of the study. No names were included in the questionnaire, and participants were assured that the information provided would be treated as confidential. Thereafter, those who provided signed written consent were included in the study. All participants were provided with oral health education after data collection and those reporting oral problems were motivated to attend a dental clinic for treatment.

## Results

### Characteristics of participants

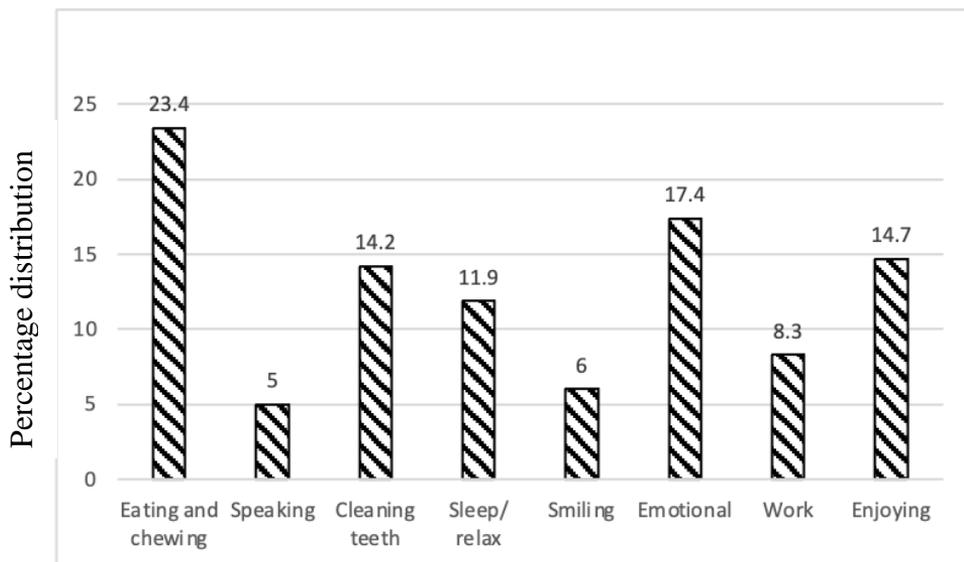
The study population comprised 218 adult PLWHIV/AIDS, who participated in an interview. Their age ranged from 20 to 70 years, with a mean of 41.15 SD 10.7 years. Table 2 shows that the majority of the participants were female (75.7%, n = 165),

had primary education or less (62.4%, n = 136), and were not employed (80.3%, n = 175). The single/divorced/widow/er and married/cohabiting participants were, 58.3% (n = 127) and 41.7% (n = 91), respectively. Most of the participants perceived their oral health status (OHS) to be good (70.6%, n = 154) (Table 2). For those with poor OHS perceptions, the main reason stated was tooth decay (64%, n = 41) followed by gum abscess/disease (12.5%, n = 8). The participants also reported oral ulcers/fungus (7.8%, n = 5), bad breath (4.7%, n = 3), and other conditions (10.9%, n = 7) such as tooth sensitivity, mobile tooth, and bitter taste, as reasons for reporting poor oral health status.

The prevalence of oral impacts on daily performances (OIDP  $\geq 1$ ) among the PLWHIV/AIDS examined in this study was 26.1% (n = 57). The most affected performance reported was *eating and chewing food* followed by *maintaining usual emotional state without being irritable* (Figure 1). *Speaking and pronouncing clearly* and *smiling, laughing, and showing teeth without embarrassment* were the least affected performances reported by PLWHIV/AIDS.

**Table 2:** Frequency distribution of socio-demographic and perceived oral health status variables among PLWHIV/AIDS, N = 218

Variables	Category	% (n)
Age	20–39 years	44 (96)
	40–70	56 (122)
Sex	Male	53 (24.3)
	Female	165 (75.7)
Marital status	Single/divorced	58.3 (127)
	Married/cohabiting	41.7 (91)
Education level	$\leq$ Primary education	62.4 (136)
	$\geq$ Secondary education	37.6 (82)
Employment status	Self/Not employed	80.3 (175)
	Employed	19.7 (43)
Reported oral health status	Good	70.6 (154)
	Poor	29.4 (64)



Performances affected

Figure 1: Percentage distribution of the performances affected.

The participants were asked about the major causes of perceived impacts on their daily performances, and the responses are displayed in Figure 2. Toothache was a major cause of impacts on all daily performances, except 'speaking and pronouncing clearly' performance, whereby oral ulcer was its primary cause. The third most reported cause

of impacts was gum abscess mainly affecting the performance on 'maintaining usual emotional state without being irritable', and 'eating and chewing food'. Bad breath and mobile teeth were the least reported causes of impacts on participants' daily performances.

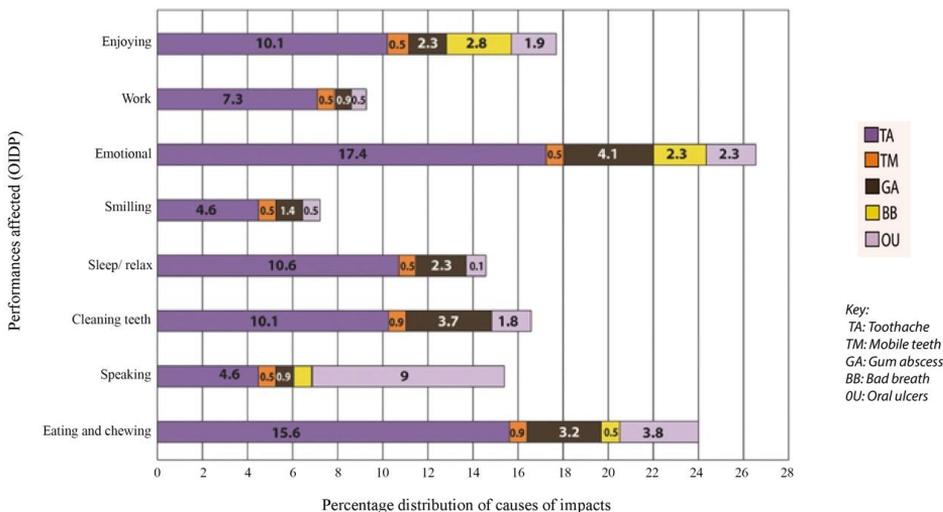


Figure 2: Percentage distribution of causes of impacts on the daily performances.

Cross tabulations analyses to determine the factors associated with the prevalence of OIDP in terms of socio-demographic details and perceived OHS are depicted in Table 3. Age ( $p = 0.011$ ), sex ( $p = 0.024$ ) and perceived OHS ( $p = 0.000$ ) were statistically

significantly associated with the prevalence of OIDP. On the contrary, marital status ( $p = 0.237$ ), education level ( $p = 0.057$ ) and employment status ( $p = 0.394$ ) did not show a statistically significant association with the prevalence of OIDP.

**Table 3:** Cross-tabulation of the prevalence of OIDP against socio-demographic details and perceived oral health status-OHS (Chi-square) N = 218

Variables		% (n)	OIDP $\geq$ 1, % (n)	P - value
Age:	20–39 years	44 (96)	34.4 (33)	0.011*
	40–70 years	56 (122)	19.7 (24)	
Sex:	Male	24.3 (53)	15.1 (8)	0.024*
	Female	75.7 (165)	29.7 (49)	
Marital status:	Single/divorced	58.3 (127)	28.3 (36)	0.237
	Married/cohabiting	41.7 (91)	23.1 (21)	
Education level:	$\leq$ Primary education	62.4 (136)	30.1 (41)	0.057
	$\geq$ Secondary education	37.6 (82)	19.5 (16)	
Employment status:	Self/Not employed	80.3 (175)	26.9 (47)	0.394
	Employed	19.7 (43)	23.3 (10)	
Perceived oral health status (OHS):	Good	70.6 (154)	9.7 (15)	0.000**
	Poor	29.4 (64)	65.6 (42)	

Key: \*  $p < 0.05$ ; \*\*  $p < 0.01$ .

Variables that showed statistically significant association at bivariate analysis were further assessed for the strength of their association with OIDP. As seen in Table 4, the adjusted regression analysis, age and oral health status remained statistically significant predictors, while sex lost its significance ( $p = 0.300$ ). In this model, older adults (40–70

years) were less likely to report oral impacts on daily performances (OR = 0.4; CI: 0.19–0.89),  $p = 0.025$ . Additionally, adults who perceived to have poor OHS were more likely to report oral impacts on daily performances (OR = 18.1; CI: 8.3–39.1),  $p = 0.000$  (Table 4).

**Table 4:** Logistic regression to describe the association between socio-demographic and perceived OHS variables with the prevalence of OIDP (adjusted odds ratio, 95% confidence interval) (N = 218)

Variables		OIDP $\geq$ 1 % (n)	Adjusted OR (95% CI)	p-value
Age:	20–39 years	34.4 (33)	1	0.025*
	40–70 years	19.7 (24)	0.412 (0.19–0.89)	
Sex:	Male	15.1 (8)	1	0.300
	Female	29.7 (49)	1.68 (0.63–4.45)	
Reported oral health status:	Good	9.7 (15)	1	0.000**
	Poor	65.6 (42)	18.1 (8.3–39.1)	

Key: \*  $p < 0.05$ , \*\*  $p < 0.01$ .

**Validity and reliability of the OIDP inventory**

None of the items in the questionnaire were left unanswered, showing that the tool had good face validity. Furthermore, criterion validity was demonstrated by the OIDP score associated with perceived OHS in the expected direction. For ethical reasons, oral health education and referrals were provided

after an interview, hence test-retest reliability could not be assessed. However, reliability in terms of internal consistency showed homogeneity of OIDP items, whereby, the corrected item-total correlation coefficient ranged from *Spearman's rho* 0.60 to 0.86 and *Cronbach's alpha* was 0.93, based on standardized items (Table 5).

**Table 5:** Internal consistency of OIDP inventory (Swahili version) among adults PLWHIV/AIDS

OIDP performance item	Corrected item total correlation	Alpha if item is deleted
Problem-eating	0.74	0.92
Problem-speaking	0.60	0.92
Problem-cleaning teeth	0.79	0.91
Problem-sleeping/relaxing	0.86	0.90
Problem-state of emotion	0.83	0.91
Problem-smiling	0.71	0.92
Problem-working	0.67	0.92
Problem-social contact	0.81	0.91
Standardized Cronbach's alpha		0.93

**Discussion**

This study utilized an OIDP index to measure OHRQoL. The index is advantageous due to the following reasons: it is short and hence easier to administer; it measures behavioural impacts, which is better than measures of feeling states; and also, OIDP assesses ultimate impacts, therefore, reducing the possibility of over-scoring (Adulyanon and Sheiham 1997). The current study has utilized a Swahili version of the OIDP inventory, which has shown acceptable psychometry for use among PLWHIV/AIDS, similar to what has been reported before among older adults in Tanzania (Kida et al. 2006). Reliability of the OIDP in terms of internal consistency showed *Cronbach's alpha* of 0.93 (Table 5) which was above the recommended value of 0.70, and higher than what was reported before, among the urban and rural older adults and young adults in Tanzania (Masalu and Astrom 2003, Kida et al. 2006). Additionally, the corrected item-total correlation coefficients were satisfactory for inclusion into the OIDP scale (Table 5), i.e., *Spearman's rho* 0.60 to 0.86 (Streiner et al.

2015). An instrument's validity may change depending on the type of population investigated and the settings under which it was administered (Streiner et al. 2015). This study among PLWHIV/AIDS showed good face validity in that no items were left unanswered.

Regarding the socio-demographic characteristics, the higher percentage of females among the participants is similar to what was reported in previous studies among PLWHIV attending HAART clinics in South Africa (Bajomo 2007, Yengopal and Naidoo 2008). The higher number of female participants depicts typical regular healthcare attendance patterns as explained by previous scholars on gender differences (Cohen and Gift 1995). Unlike the South African studies, the current study portrayed the dominance of those with a lower level of education and those who were unemployed/self-employed (Bajomo 2007, Yengopal and Naidoo 2008).

The prevalence of oral impacts on daily performance (proportion of older adults reporting at least one impact on their daily performances) was substantial (26.1%). The fact that participants in this study were

recruited from clinics that provide HAARTs, might be a plausible reason for the reported lower prevalence of OIDP, as they might have exhibited low levels of oral manifestation of HIV. Previous studies among adult Tanzanians, reported PLWHIV/AIDS on HAARTs were less likely to exhibit oral manifestations of HIV/AIDS (Hamza et al. 2006). Besides, PLWHIV/AIDS who had oral lesions/problems were reported to have more oral impacts on their quality of life when compared to those without oral lesions (Yengopal and Naidoo 2008). The current prevalence level is similar to what was reported among HIV1 mothers (Birungi et al. 2021), but lower than among children and adolescents living with HIV utilizing a similar index to assess the quality of life (Raymundo de Andrade et al. 2011). The current figure is also lower when compared to studies utilizing other indices among PLWHIV adults, such as Oral Health Impact Profile (OHIP-14 and OHIP-49), which showed a prevalence range of 30% to 63% OHIP score indicating poor OHRQoL (Bajomo 2007, (Bajomo et al. 2013, Muralidharan et al. 2020). The implication is that people living with a chronic disease like HIV/AIDS could see the disease with a dimension that other problems such as oral conditions, may not negatively influence their quality of life.

The current study showed that the most affected performance was *eating and chewing food*, followed by *maintaining usual emotional state without being irritable* (Figure 1). As expected, the reduced ability to *eat and chew food* is responsible for significant functional and nutritional consequences to the oral and general health of individuals (Locker et al. 2002). Similarly, the findings on oral health effects on *maintaining usual emotional state without being irritable* emphasizes the stronger relationship between poor emotional well-being and HIV-infected individuals, when compared to those without HIV or other chronic diseases (Megari 2013). These findings corroborate with what was reported in a review study of OHRQoL among HIV-

positive adults, which reported the most affected domain being the physical (e.g. pain/discomfort in eating food) followed by the psychological domain, despite dissimilarity of OHRQoL instrument used i.e. the 14-item Oral Health Impact Profile (OHIP-14) (Muralidharan et al. 2020). Previous studies among adults in the general population showed that physical performances, i.e., *eating and chewing food*, followed by *cleaning teeth*, were the most affected, and low effects were reported on psychological performances (Kida et al. 2006). HIV/AIDS has been reported to cause emotional distress that affects the quality of life more often than other chronic diseases, hence; it might explain the significant effect that *maintaining usual emotional state without being irritable* performance has displayed among participants in this study (Megari 2013).

Toothache has been responsible for causing impacts on daily performances both for PLWHIV and the general adult community, showing the need for oral health care among PLWHIV (Masalu and Astrom, 2003, Kida et al. 2006). Majority of the participants who perceived to have poor oral health status in this study reported the cause to be tooth decay (Figure 2). This finding may uphold what has been reported before on the high prevalence of dental caries among PLWHIV attending HAART, hence, recommending integration of oral health care to HIV programs to improve the oral health of PLWHIV (Kalanzi et al. 2019, Birungi et al. 2021).

Socio-demography regarding sex, age, education and employment status have been reported to play substantial roles in perceptions of quality of life (McGrath and Bedi 2002). In this study, older PLWHIV were less likely to report impacts on daily performances. This association was maintained even after adjusting for other socio-demographic and oral health perception variables. This finding might be attributable to adaptation and changes in expectation with older age (Locker and Gibson 2005, Åström et al. 2006). Furthermore, older adults with HIV/AIDS might have multiple

comorbidities that might downplay their perception of oral impacts on their quality of life (da Costa Vieira et al. 2018). However, comorbidities were not assessed in the current study, limiting the explanation of findings in this aspect. Female participants reported more impacts on their daily performances than male participants, which was statistically significant on bivariate analysis, but lost significance on adjusted multivariate analysis (Table 4). This finding differs from the earlier reports stating females living with HIV were more likely to perceive poor quality of life than males living with HIV (Bajomo et al. 2013). Assessment of education level as well as employment status has been regarded as a useful proxy of socio-economic status in population surveys (Ueno et al. 2012). Lower education level and unemployment have been reported to be associated with poor perceptions of OHRQoL among PLWHIV (Bajomo 2007). This finding is demonstrated in the current study showing a similar association in the expected direction, though not statistically significant. Therefore, this calls for more investigations utilizing a larger sample size to establish socio-demographic factors influencing the OHRQoL of PLWHIV. Regarding marital status, this study showed no statistically significant association with the OIDP as OHRQoL, similar to what was reported in a study among HIV1-positive mothers in the region (Birungi et al. 2020). However, these studies are different in terms of the study population, and the indices used, showing the need for future investigations (Birungi et al. 2020).

Participants who perceived to have poor oral health status (OHS) were at higher odds of reporting oral impacts on their daily performances. This finding shows the effects of oral disease/conditions' on individuals' quality of life (Kida et al. 2006). Furthermore, this finding demonstrates good construct validity in that perceived OIDP was significantly associated with perceptions of OHS in the expected direction. This association was maintained after adjusting for other variables (Table 4). As seen previously, self-reported measures of oral health status

have been validated and used frequently in dental literature and found to correlate well with clinical data (Pitiphat et al. 2002, Matsui et al. 2016). Also, self-reported oral health measures have been reported to be useful in many ways: they integrate patients' values and beliefs, they are convenient to use, as well as lower cost to implement in terms of facilities, equipment and time (Locker 1998, Matsui et al. 2016).

It is important to note that the current results were obtained from a cross-sectional study hence might be difficult to establish a causal relationship. However, the information reported may guide future research on oral health and quality of life among PLWHIV in Tanzania. Secondly, this study was conducted among individuals attending specialized clinics for HIV/AIDS which may not be representative of the general populations with HIV/AIDS patients.

### **Conclusion and recommendations**

The prevalence of oral impacts on daily performances among PLWHIV-AIDS in selected CTCs in Dar es Salaam was substantial. *Toothache* and *oral ulcers* were the main causes of impacts. Socio-demographic and oral health perceptions contributed significantly to their oral health-related quality of life. More studies are recommended to ascertain biological and behavioural factors to justify the inclusion of oral health care as part of comprehensive care for PLWHIV.

### **Acknowledgement**

The authors would like to acknowledge the study participants, staff and administration of the Care and Treatment Centres. This study was sponsored by the Tanzania Higher Education Students' Loans Board (HESLB).

### **Conflict of interest**

The authors declare no conflict of interest.

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