

Prevalence of Acrylic Removable Partial Dentures among Adult Patients Attending Public Dental Clinics in Dar-es-Salaam, Tanzania

Lorna C Carneiro¹, Alex E Kimambo²

ABSTRACT

Background: Acrylic removable partial dentures (ARPDs) are used for management of tooth loss in most developing countries.

Aim: This article aims to determine prevalence of ARPDS among adult patients attending public dental clinics in Dar-es-Salaam, Tanzania.

Methods: This study involved adults aged 18 years and above attending dental clinics in Dar-es-Salaam, Tanzania. Patient's hospital registration provided particulars on age and sex. Additional information sought from subjects with ARPDS included education level and denture wearing experience. Clinical assessment of ARPDS determined jaw involved and number of teeth replaced. Data were analyzed using SPSS at a p -value of less than 0.05.

Results: Of the 3,225 subjects aged 18–87 years, majority were 36–87 years ($n = 1,687$; 52.3%) and females ($n = 1,688$; 52.3%). The 10.5% prevalence of patients with ARPDS showed no difference by age, sex, or location ($p > 0.05$). Denture wearing experience of less than 2 years was statistically significantly higher among younger age-group and those with higher level of education. ARPDS in the upper jaw was statistically significantly related to young adults ($n = 102$; 63.8%), males ($n = 86$; 55.1%), and having secondary or higher level of education ($n = 110$; 54.5%). ARPDS replacing 1–5 teeth were statistically significantly higher among patients aged 18–35 years and those having secondary or higher level of education ($p < 0.05$).

Conclusion: The prevalence of ARPDS among attending dental patients was low (10.5%) with a denture wearing experience of less than 2 years being higher among younger adults and those with secondary or higher level of education. ARPDS in the upper jaw were related to being young, male, and having secondary or higher level of education, while replacement of 1–5 teeth was related to being young and having secondary or higher level of education. Community awareness on use of ARPDS in management of tooth loss should be emphasized.

Clinical significance: Determining factors associated with wearing of dentures will assist practitioners in patient management.

Keywords: Acrylic removable partial dentures, Adult, Dental, Patients, Prevalence, Tanzania.

Journal of Oral Health and Community Dentistry (2022): 10.5005/jp-journals-10062-0134

INTRODUCTION

Tooth loss has not only been associated with the sequelae of oral diseases¹ but has also been linked to sociodemographic, behavioral, or medical factors.^{2–4} Following tooth loss, restoration of a partial edentulous mouth may be done using a variety of treatment options,⁵ one such option is a removable partial denture. Removable prosthesis serves to restore the missing teeth and alveolar bone after tooth loss and plays a role in restoring functions of aesthetics, mastication, and speech.⁶ The denture base of the removable partial denture can be fabricated using metal alloy or acrylic resin.⁷ Metal-based removable partial denture is more expensive and technically more demanding and impacts a higher success rate.⁸ On the other hand, acrylic-based removable partial dentures (ARPDS) are not technically demanding and cost-effective making them feasible as a predictable treatment choice in clinical dentistry.⁹ Furthermore, as an interim treatment option, ARPDS are indispensable for aesthetic relief and basic functionality before fixation of permanent dentures.⁹ Other factors that promote its use are the resemblance to gingiva color, not being toxic,¹⁰ and being easy to fabricate and alter if further tooth loss occurs.¹¹ However, the prevalence of ARPDS use is determined not only by sociodemographic factors^{12–14} but by jaw affected^{15,16} and number of teeth replaced.¹⁶

ARPDS are considered a low-cost treatment option for tooth loss in several other countries,^{17,18} as in Tanzania.¹⁹ Tooth loss

¹Department of Restorative Dentistry, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

²Dental and Oral Health Department, The Benjamin Mkapa Hospital, Dodoma, Tanzania

Corresponding Author: Lorna C Carneiro, Department of Restorative Dentistry, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania, Phone: +255 713835140, e-mail: carneiro2@hotmail.com

How to cite this article: Carneiro LC, Kimambo AE. Prevalence of Acrylic Removable Partial Dentures among Adult Patients Attending Public Dental Clinics in Dar-es-Salaam, Tanzania. *J Oral Health Comm Dent* 2022;16(1):61–66.

Source of support: The Tanzania Ministry of Health, Community Development, Gender, Elderly and Children is acknowledged for the provided financial support towards data collection.

Conflict of interest: None

in Tanzania has been previously reported^{20,21} with a higher percentage of subjects being partially dentate.²² A very low number of subjects with dentures²³ have been reported; however, information on denture wearing experience, jaw affected, and number of teeth replaced was lacking. The purpose of the study was thus to determine the prevalence of ARPDS among patients

attending public dental clinics in Dar-es-Salaam, Tanzania. Data obtained from this study can be relevant, in particular to those involved in planning and organizing healthcare especially oral health rehabilitative services and oral health education on management of tooth loss. This study also provides baseline data for comparative studies locally and internationally on prevalence of ARPDs, denture wearing experience, jaw affected, and number of teeth replaced.

MATERIALS AND METHODS

This hospital-based cross-sectional study was conducted in Dar-es-Salaam, one of the highly populated cities of Tanzania with a population of 4,364,541 million people originating from all over the country.²⁴ At the time of the study, the city of Dar-es-Salaam had three municipals, namely, Ilala, Kinondoni, and Temeke. Facilities providing dental services in these municipalities were Amana, Mnazi Moja, Sinza, Magomeni, Temeke, and Muhimbili National Hospital (MNH). MNH is within the Ilala Municipality, and being a national hospital, it receives patients referred from within the city and all over the country (Fig. 1).

The estimated sample size of 384 attending patients wearing acrylic removable partial was determined using sample size determination formula for proportions [$n = z^2 p(1 - p)/e^2$], where, n = sample size; z = standardized deviation ($z = 1.96$) for 95% confidence interval; p = being a baseline study, proportion of attending patients wearing acrylic removable partial was estimated at 50% (0.50); e = marginal error = 0.05.

This was a two-stage sampling procedure. The first stage was visiting respective municipal councils and with their assistance dental clinics to be included in this study were selected.

The second stage included selection of attending participants aged 18 years and above attending each dental facility during the study period. Registered patients who consented were included in the study. Excluded from the study were the very ill and mentally challenged patients.

Following consent and prior to a clinical assessment, patient's information on registration number, age, and sex was obtained using their hospital registration form. Additional information on level of education and denture wearing experience was obtained from patients and clinical assessment determined affected jaw number of teeth replaced. Obtained findings were recorded in a modified version of the WHO oral health assessment form for adults.²⁵

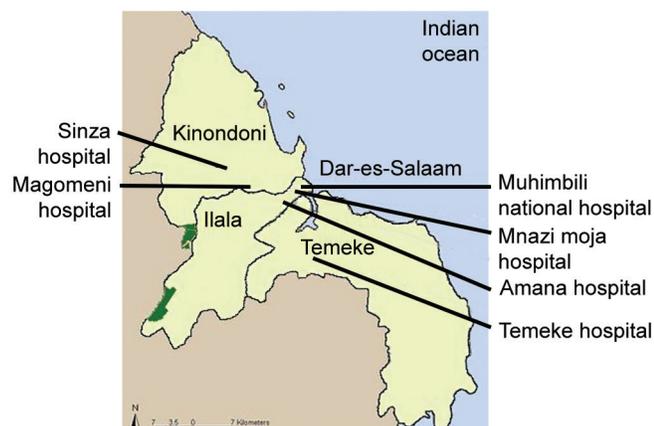


Fig. 1: Map showing location of the selected hospitals in the different municipalities of Dar-es-Salaam

Obtained information of patients age was grouped into 18–35 years (young adults = 0) and ≥ 36 years (middle aged and older adults = 1), while sex of the patients was recorded as male = 0 or female = 1. Location of dental facility was further grouped by municipality, Ilala Municipal (Amana and Mnazi Moja = 1); Kinondoni Municipality (Sinza and Magomeni = 2); Temeke Municipality (Temeke = 3), and being a referral hospital, MNH was grouped independently (MNH = 0). Level of education was categorized into primary and lower level of education = 0 and secondary and higher level of education = 1; wearing of ARPDs (without ARPDs = 0 and with ARPDs = 1), denture wearing experience (less than 2 years = 0, 2–5 years = 1 and more than 5 years = 2), affected jaw (upper = 0, lower = 1 or both = 2), and total number of teeth replaced (1–5 replaced teeth = 0 and 6 or more replaced teeth = 1).

Prior to the study, calibration of the examiner (AEK) was done by an experienced examiner (LCC) using 10 patients wearing dentures attending the Muhimbili University dental clinic. Intra examiners' consistency was assessed during the study by recalling five randomly selected subjects at each of the six dental facilities wearing ARPDs. Kappa values showed perfect agreement of 1.00 for scoring of level of education, total number of teeth replaced, affected jaw and denture wearing experience.

All the gathered data were entered in a computer using Statistical Package for Social Sciences (SPSS, version 20.0, Chicago, Illinois). Collected data were analyzed, and using frequency tables, the distribution of subjects by demographic variables was determined. The prevalence of ARPDs among attending patients at public dental clinics in Dar-es-Salaam by age, sex, and location of dental facility was also determined. Chi-square test at a statistically significant p -value of 0.05 was used to further determine prevalence of ARPDs by demographic variables and with denture wearing experience, affected jaw, and total number of teeth replaced. Ethical clearance for this study was obtained from the Ethical Clearance Committee of the Muhimbili University of Health and Allied Sciences.

RESULTS

A total of 3,225 attending dental patients aged 18–87 years formed the study population with a mean age of 38.39 ± 13.83 . Age-group 36–87 years (middle aged and older adults) had the highest number of participants ($n = 1,687$; 52.3%), and there were many more females ($n = 1,688$; 52.3%) than males ($n = 1,537$; 47.7%). Kinondoni Municipality had the highest number of attending patients ($n = 1,121$; 34.8%) (Table 1).

Table 1: Distribution of study subjects by sociodemographic characteristics ($N = 3,225$)

Variables	<i>n</i>	%
Age-group (years)		
18–35 (young adults)	1,538	47.7
36–87 (middle aged and older adults)	1,687	52.3
Sex		
Male	1,537	47.7
Female	1,688	52.3
Location of dental facility		
Muhimbili National Hospital	578	17.9
Ilala Municipality	986	30.6
Kinondoni Municipality	1,121	34.8
Temeke Municipality	540	16.7

Table 2 shows the distribution of attending patients with and without ARPDs by age, sex, and location of dental facility. Of the 3,225 subjects, only 339 (10.5%) had ARPDs. There was no statistically significant difference between attending patients with or without ARPDs by age, sex, or location of dental facility.

Shown in Table 3 is the distribution of denture wearing experience of patients with ARPDs by age, sex, and hospital. Denture wearing experience of less than 2 years was statistically significantly higher among younger patients (age-group 18–35) and among those with secondary or higher level of education ($p < 0.05$). Although not statistically significant, denture wearing experience of less than 2 years was higher among males and patients in Kinondoni Municipality ($p > 0.05$).

The distribution of ARPDs in different jaws among patients by age, sex, and location of dental facility is shown in Table 4. ARPDs in the upper jaw were statistically significantly higher among younger adults ($n = 102$; 63.8%), while ARPDs in both jaws were higher among middle aged and older adults ($\chi^2 = 58.270$; $p = 0.001$). ARPDs in the upper jaw were statistically significantly more among males

($\chi^2 = 7.097$; $p = 0.029$) and those with secondary or higher level of education ($\chi^2 = 11.864$; $p = 0.003$). ARPDs in upper, lower, or both jaws showed no statistically significant difference with location of dental facility ($p > 0.05$).

Shown in Table 5 is the distribution of number of replaced teeth in ARPDs among patients by age, sex, and location of dental facility. ARPDs replacing between 1 and 5 teeth were statistically significantly higher among subjects of young adults ($n = 150$; 93.8%) and those with secondary or higher level of education ($n = 160$; 79.2%). Although ARPDs replacing between 1 and 5 teeth were higher among female subjects and among attendees of most facilities, the difference was not statistically significant ($p > 0.05$).

DISCUSSION

This hospital-based cross-sectional study determined the prevalence of ARPDs among patients attending public dental clinics in Dar-es-Salaam, Tanzania. The two-stage convenient sampling method employed in this study was considered in terms of its limitations,

Table 2: Distribution of subjects with or without ARPDs by age, sex, and dental facility ($N = 3,225$)

Variables	Acrylic removable partial dentures				Total	Chi-square and p value
	Without		With			
	n	%	n	%		
Age-group (years)						
18–35	1,378	89.6%	160	10.4%	1,538	$\chi^2 = 0.037$; $p = 0.848$
36–87	1,508	89.4%	179	10.6%	1,687	
Sex						
Male	1,381	89.9%	156	10.1%	1,537	$\chi^2 = 0.409$; $p = 0.522$
Female	1,505	89.2%	183	10.8%	1,688	
Location of dental facility						
Muhimbili National Hospital	514	88.9%	64	11.1%	578	$\chi^2 = 3.445$; $p = 0.328$
Ilala Municipality	885	89.8%	101	10.2%	986	
Kinondoni Municipality	1,014	90.5%	107	9.5%	1,121	
Temeke Municipality	473	87.6%	67	12.4%	540	

Table 3: Distribution of denture wearing experience of patients with ARPDs by age, sex, and location of dental facility ($N = 339$)

Variables	Acrylic removable partial dentures						Total	Chi-square and p value
	Less than 2 years		Between 2 and 5 years		More than 5 years			
	n	%	n	%	n	%		
Age-group (years)								
18–35	69	43.1	89	55.6	2	1.2	160	$\chi^2 = 39.934$; $p = 0.001$
36–87	40	22.3	101	56.4	38	21.2	179	
Sex								
Male	59	37.8	82	52.6	15	9.6	156	$\chi^2 = 4.680$; $p = 0.096$
Female	50	27.3	108	59.0	25	13.7	183	
Location of dental facility								
Muhimbili National Hospital	17	26.6	38	59.4	9	14.1	64	$\chi^2 = 4.494$; $p = 0.610$
Ilala Municipality	31	30.7	55	54.5	15	14.9	101	
Kinondoni Municipality	37	34.6	58	54.2	12	11.2	107	
Temeke Municipality	24	35.8	39	58.2	4	6.0	67	
Level of education								
Primary and lower level of education	30	21.9	82	59.9	25	18.2	137	$\chi^2 = 16.219$; $p = 0.001$
Secondary and higher level of education	79	39.1	108	53.5	15	7.4	202	

Table 4: Distribution of ARPDs in different jaws among patients by age, sex and location of dental facility (N = 339).

Variables	Acrylic removable partial dentures						Total	Chi-square and p value
	Upper jaw		Lower jaw		Both jaws			
	n	%	n	%	n	%		
Age-group (years)								
18-35	102	63.8	47	29.4	11	6.9	160	$\chi^2 = 58.270; p = 0.001$
36-87	64	35.8	38	21.2	77	43.0	179	
Sex								
Male	86	55.1	29	18.6	41	26.3	156	$\chi^2 = 7.097; p = 0.029$
Female	80	43.7	56	30.6	47	25.7	183	
Location of Dental facility								
Muhimbili National Hospital	30	46.9	18	28.1	16	25.0	64	$\chi^2 = 2.345; p = 0.885$
Ilala Municipality	47	46.5	26	25.7	28	27.7	101	
Kinondoni Municipality	58	54.2	25	23.4	24	22.4	107	
Tememe Municipality	31	46.3	16	23.9	20	29.9	67	
Level of education								
Primary and lower level of education	56	40.9	32	23.4	49	35.8	137	$\chi^2 = 11.864; p = 0.003$
Secondary and higher level of education	110	54.5	53	26.2	39	19.3	202	

Table 5: Distribution of number of replaced teeth in ARPDs among patients by age, sex and location of dental facility (N = 339)

Variables	Acrylic removable partial dentures				Total	Chi-square and p value
	1-5 teeth replaced		≥6 teeth replaced			
	n	%	n	%		
Age-group (years)						
18-35	150	93.8	10	6.2	160	$\chi^2 = 74.193; p = 0.001$
36-87	92	51.4	87	48.6	179	
Sex						
Male	106	67.9	50	32.1	156	$\chi^2 = 1.672; p = 0.196$
Female	136	74.3	47	25.7	183	
Location of dental facility						
Muhimbili National Hospital	44	68.8	20	31.2	64	$\chi^2 = 1.061; p = 0.786$
Ilala Municipality	72	71.3	29	28.7	101	
Kinondoni Municipality	80	74.8	27	25.2	107	
Tememe Municipality	46	68.7	21	31.3	67	
Level of education						
Primary and lower level of education	82	59.9	55	40.1	137	$\chi^2 = 14.970; p = 0.001$
Secondary and higher level of education	160	79.2	42	20.8	202	

and efforts were made to reduce the effect of bias on the expected outcome. Since Dar-es-Salaam has people originating from all over the country,²⁴ it can be assumed that these results are representative of Tanzania. Furthermore, being a hospital-based study, generalization of these results should be made with caution as ARPDs captured did not include all adults with ARPDs. Although information obtained is at one point in time, the data set provides baseline data that can be used for comparative studies locally and internationally.

In accordance with hospital-based studies previously conducted in Tanzania, this study also found that middle aged and older adults attended dental facilities more than the younger adults and many more were females compared to males.^{26,27} This study also reports that Kinondoni Municipality hospitals had the highest number of dental attendees, and this observation could be related to Kinondoni

Municipality having the highest population in comparison to other municipalities in Dar-es-Salaam.²⁴

The prevalence of 10.5% of subjects with ARPDs in this study was similar to a previous study done in Dar-es-Salaam²³ but lower than the 24.3% of patients who received ARPDs in Kosova.⁸ Contrastingly, an even higher prevalence of subjects with ARPDs was reported in Saudi Arabia⁷ and in Khartoum State.²⁸ Differences in the reported prevalence of subjects with ARPDs could be related to lack of insurance or financial limitations.²⁸

Contrasting to findings from this study that observed no statistically significant difference of wearing of ARPDs by age, studies done in Seuneubok District, West Aceh²⁹ and Saudi Arabia⁷ reported many more partial denture users of age 41 years and above. In addition, the statistically significantly higher proportion

of younger age-group wearing ARPDs replacing lesser number of teeth observed in this study was similar to findings reported in Hungary³⁰ and Kosova.⁸ Contrastingly, another study reported that ARPDs replacing higher number of teeth were observed to increase with age.³¹ The lesser number of teeth replaced among the younger age-group in this study could be related to shorter sequelae of diseases¹ in comparison to the older age-group who may have delayed seeking treatment.³²

Although other studies have reported on the influence of level of education on denture use,^{32,33} level of education in this study was observed not to have an influence on prevalence of ARPDs. In addition, the statistically significantly higher number of subjects in this study having secondary or higher level of education and ARPDs replacing between 1 and 5 teeth could be related to increased awareness on oral health.²⁸ While the negative influence of low educational level has been associated with edentulism,³⁴ a higher level of education provides employment opportunities and societal recognition which may be the explanation why many more participants restored their missing upper dentition.⁷

In disagreement with findings from this study that found ARPDs in the upper jaw statistically significantly higher in young adults, other studies report a higher prevalence of younger adults wearing ARPDs in the lower jaw.^{8,35} However, prevalence of ARPDs in the both jaws was observed more among the middle aged and older adults in this study as in accordance with a study done in Khartoum State.²⁸ Although a previous study reported that males are less concerned about their edentulism, less likely to opt for restorations and less likely to visit a dentist than females,³⁶ this study found a statistically significantly higher proportion of males having ARPD's in the upper jaw. A study done in Nigeria also reported that more males compared to females requested for upper dentures.³⁷ It is possible that males had more tooth extractions than females due to different other causes of tooth loss like interpersonal violence and motor accidents.³⁸

Previous studies done in Tanzania^{20,23} reported tooth loss among the middle-aged and older adults and a denture wearing experience of more than 2 years and replacing more than five teeth was also reported among middle aged and older adults in this study. In line with another study that reported education level to be associated with socioeconomic status and health outcomes,³⁹ many more subjects with primary and lower level of education in this study had a denture wearing experience of 2 or more years. The cumulative effect of tooth loss over long period of "wait-and-see"³² and the fact that faulty ARPDs can lead to rapid loss of remaining teeth^{40,41} could explain the observed findings.

CONCLUSION

The prevalence of ARPDs among attending dental patients was low (10.5%) with a denture wearing experience of less than 2 years being higher among younger age-group and those with secondary or higher level of education. ARPDs in the upper jaw were related to being young, male, and having secondary or higher level of education, while replacement of 1–5 teeth was related to being young and having secondary or higher level of education. Community awareness on use of ARPDs in management of tooth loss should be emphasized.

ACKNOWLEDGMENT

Authors would like to thank The Tanzania Ministry of Health, Community Development, Gender, Elderly and Children is

acknowledged for the provided financial support, Muhimbili University of Health and Allied Sciences, authorities of the dental facilities and participants for making this work possible.

ORCID

Lorna C Carneiro  <https://orcid.org/0000-0001-9015-3155>

REFERENCES

- Holt R. ABC of oral health: Dental damage, sequelae, and prevention. *British Medical Association* 2000;320(7251):1717–1719. DOI: 10.1136/bmj.320.7251.1717.
- Allen P, McMillan A. A longitudinal study of quality of life outcomes in older adults requesting implant prostheses and complete removable dentures. *Clin Oral Implants Res* 2003;14(2):173–179. DOI: 10.1034/j.1600-0501.2003.140206.x.
- Kolciuk L, Godlewski T. Oral health-related quality of life of patients using removable dentures—review of literature. *Dent Med Probl* 2015;55(2):222–226.
- Al Habashneh R, Khader Y, Salameh S. Use of the Arabic version of Oral Health Impact Profile-14 to evaluate the impact of periodontal disease on oral health-related quality of life among Jordanian adults. *J Oral Sci* 2012;54(1):113–120. DOI: 10.2334/josnusd.54.113.
- Akinyamaju C, Ogunrinde T, Taiwo J, et al. Comparison of patient satisfaction with acrylic and flexible partial dentures. *Niger Postgrad Med J* 2017;24(3):143–149. DOI: 10.4103/npmj.npmj_54_17.
- Patel I, Madan G, Patel B, et al. Behaviours and hygiene habits of a sample population of complete denture wearers in Ahmedabad. *J Int Oral Heal* 2012;4(2):29–38.
- Gad M, Abualsaud R, Al-Thobity A, et al. Prevalence of partial edentulism and RPD design in patients treated at College of Dentistry, Imam Abdulrahman Bin Faisal University, Saudi Arabia. *Saudi Dent J* 2020;32(2):74–79. DOI: 10.1016/j.sdentj.2019.07.002.
- Bukleta M, Bukleta D, Selmani M, et al. Frequency of complete and removable partial denture treatment in the primary health centres in three different regions of Kosovo from 2002 to 2013. *Slov J Public Heal* 2019;58(3):104–111. DOI: 10.2478/sjph-2019-0014.
- Xie Q, Ding T, Yang G. Rehabilitation of oral function with removable dentures—still an option? *J Oral Rehabil* 2015;42(3):234–242. DOI: 10.1111/joor.12246.
- Taiwo J, Arigbede A. Denture hygiene of the elderly denture wearers in South East Local Government Area in Ibadan, Nigeria. *J Biol Agric Healthc* 2012;2(6):22–27.
- Graham R, Mihaylov S, Jepson N, et al. Determining "need" for a removable partial denture: a qualitative study of factors that influence dentist provision and patient use. *Br Dent J* 2006;200(3):155–158. DOI: 10.1038/sj.bdj.4813193.
- Muneeb A, Khan B, Jamil B. Causes and pattern of partial edentulism/exodontia and its association with age and gender: semi rural population, Baqai dental college, Karachi, Pakistan. *Int Dent J Students Res* 2013;1(3):13–18.
- Abdel-Rahman H, Tahir C, Saleh M. Incidence of partial edentulism and its relation with age and gender. *Zanco J Med Sci* 2013;17(2):463–470. DOI: 10.15218/zjms.2013.0033.
- Mack F, Mundt T, Budtz-Jørgensen E, et al. Prosthodontic status among old adults in Pomerania, related to income, education level, and general health (results of the Study of Health in Pomerania, SHIP). *Int J Prosthodont* 2003;16(3):313–318. PMID: 12854798.
- Sadig W, Idowu A. Removable partial denture design: a study of a selected population in Saudi Arabia. *J Contemp Dent Pract* 2002;3(4):1–11. PMID: 12444401.
- Batista MJ, Lawrence HP, de Sousa M da LR. Impact of tooth loss related to number and position on oral health quality of life among adults. *Health Qual Life Outcomes* 2014;12(1):1–10. DOI: 10.1186/s12955-014-0165-5.
- Radhi A, Lynch C, Hannigan A. Quality of written communication and master impressions for fabrication of removable partial prostheses

- in the Kingdom of Bahrain. *J Oral Rehabil* 2007;34(2):153–157. DOI: 10.1111/j.1365-2842.2006.01685.x.
18. Lynch C, Allen P. The teaching of removable partial dentures in Ireland and the United Kingdom. *Br Dent J* 2007;203(8):1–5. DOI: 10.1038/bdj.2007.581.
 19. Ministry of Health, Community Development, Gender EAC. The second guidelines for provision of oral health services in Tanzania. 2020. p. 30–31.
 20. Kida IA, Åström AN, Strand GV, et al. Clinical and socio-behavioral correlates of tooth loss: a study of older adults in Tanzania. *BMC Oral Health* 2006;6:1–10. DOI: 10.1186/1472-6831-6-5.
 21. Gerritsen A, Sarita P, Witter D, et al. Esthetic perception of missing teeth among a group of Tanzanian adults. *Int J Prosthodont* 2008;21(2):151–155.
 22. Mumghamba E, Fabian F. Tooth loss among habitual chewing-stick and plastic toothbrush users in the adult population of Mtwara, rural Tanzania. *Int J Dent Hyg* 2005;3(2):64–69. DOI: 10.1111/j.1601-5037.2005.00131.x.
 23. Quaker AS. Consequences of tooth loss on oral function and need for replacement of missing teeth among patients attending Muhimbili Dental Clinic. Muhimbili University of Health and Allied Sciences; 2011.
 24. United Republic of Tanzania. The United republic of Tanzania. National Bureau of Statistics: 2012 population and housing census population distribution by administrative areas. Natl Bur Stat Minist Financ 2013. p. 177, 180.
 25. World Health Organization. Oral health surveys: basic methods. World Health Organization. ISBN 978 92 4 154864 9 (NLM classification: WU 30) © World Health Organization; 2013. p. 1–137.
 26. Mseke M, Kikwilu E. Patient satisfaction with oral care among adult dental patients in Dar es Salaam. *Tanzania Dent J* 2017;19(special issue. abst#10):18.
 27. Carneiro L, Minja A. Prevalence of dentine hypersensitivity among adult dental patients in Dar-es-salaam, Tanzania. *Dent Res Oral Heal* 2020;3(2):74–82.
 28. Wahbi R, Elamin E. Impact of removable partial denture on quality-of-life of Sudanese adults in Khartoum State. *J Contemp Dent Pract* 2018;19(1):102–108. DOI: 10.5005/jp-journals-10024-2220.
 29. Rahmayani L, Sofya P, Andriany P, et al. Oral hygiene behavior of acrylic removable partial denture usage in Seuneubok District, West Aceh: a cross-sectional study. *J Int Oral Heal* 2020;12(2):163–167. DOI: 10.4103/jioh.jioh_177_18.
 30. Fejérdy P, Borbély J, Schmidt J, et al. Removable partial denture design and its effect on remaining teeth, based on Hungarian national survey. *Fogorv Sz* 2008;101(1):3–11. PMID: 18488739.
 31. Knezović-Zlatarić D, Čelebić A, Valentić-Peruzović M, et al. Patients' satisfaction with partial denture therapy. *Acta Stomatol* 2000;34(4):373–378.
 32. Kikwilu EN, Masalu JR, Kahabuka FK, et al. Prevalence of oral pain and barriers to use of emergency oral care facilities among adult Tanzanians. *BMC Oral Health* 2008;8(1):1–7. DOI: 10.1186/1472-6831-8-28.
 33. Krawczyk J, Bożyk A, Kiworkowa-Rączkowska E, et al. Hygiene, ways of storage and lifetime of removable dentures. *J Pre-Clinical Clin Res* 2015;9(1):54–56. DOI: 10.5604/18982395.1157577.
 34. Baran İ, Ergün G, Semiz M. Socio-demographic and economic factors affecting the acceptance of removable dentures. *Eur J Dent* 2007;1(2):104–110. PMID: 19212485.
 35. Rehmann P, Orbach K, Ferger P, et al. Treatment outcomes with removable partial dentures: a retrospective analysis. *Int J Prosthodont* 2013;26(2):147–150. DOI: 10.11607/ijp.2959.
 36. Steele J, Walls A, Ayatollahi S, et al. Dental attitudes and behaviour among a sample of dentate older adults from three English communities. *Br Dent J* 1996;180(4):131–136. DOI: 10.1038/sj.bdj.4809000.
 37. Arigbede A, Taiwo J. Pattern of demand for removable acrylic partial denture (RPD) in the city of Port Harcourt, Nigeria. *Niger Heal J* 2011;11(2):47–50.
 38. Mosha H. Dentistry for the underprivileged. *Tanzania Dent J* 2006;13(1):23–29.
 39. Ueno M, Ohara S, Inoue M, et al. Association between education level and dentition status in Japanese adults: Japan public health center-based oral health study. *Community Dent Oral Epidemiol* 2012;40(6):481–487. DOI: 10.1111/j.1600-0528.2012.00697.x.
 40. Yamazaki S, Arakawa H, Maekawa K, et al. A retrospective comparative ten-year study of cumulative survival rates of remaining teeth in large edentulism treated with implant-supported fixed partial dentures or removable partial dentures. *J Prosthodont Res* 2013;57(3):156–161. DOI: 10.1016/j.jprior.2013.03.003.
 41. Moldovan O, Rudolph H, Luthardt R. Biological complications of removable dental prostheses in the moderately reduced dentition: a systematic literature review. *Clin Oral Investig* 2018;22(7):2439–2461. DOI: 10.1007/s00784-018-2522-y.