ORIGINAL ARTICLE

Impact of education and monthly income on caries index of community living in the rural area of Multan - a cross-sectional survey

Muhammad Ali[1], Muhammad Ahmed[2], Hasan Mujtaba[3*], Muhammad Farooq Umer[4], Muhammad Awais Khan[5], Javeria Afzal[6]

Biomedica - Official Journal of University of Health Sciences, Lahore, Pakistan
Volume 38(1):44-48
https://doi.org/10.51441/BioMedica/5-640

ABSTRACT

Background and Objective: Dental decays and periodontal diseases are among the most common ailments of the oral cavity. The decayed, missing, and filled teeth (DMFT) index defines the number of the decayed teeth, no of the treated teeth, and the number of teeth missing in oral cavity owing to decay. People's monthly income and level of education influence their behavior toward oral health. The objective of this survey was to assess the impact of education and monthly income on the caries index of the community of Jahangirabad Multan, Pakistan.

Methods: This 3 months survey-based study was conducted among 380 participants from the community of Jahangirabad Multan city. The oral health status of all participants was assessed by using the DMFT index. All individuals with permanent dentition were included in this study.

Results: There were 209 (55%) males and 171 (45) females. Age range of the participants was from 15 to 40 years. The mean and standard deviation of the DMFT index were 1.5 ± 0.156, the range of DMFT score was from 0 to 8. The significant association between the mean DMFT score and level of education was observed (*p*-value = 0.036).

Conclusion: The population of the rural area of Jahangirabad has an average of 1.5 teeth affected with dental caries. The level of dental caries is found to be inversely proportional to the level of education implying that improving education level of the communities may be one of the factors that can contribute to the reduction in the burden of caries in the rural communities of the country.

Keywords: Caries, DMFT, education, monthly income, oral health.

Received: 16 December 2021 **Revised date:** 19 February 2022 **Accepted:** 12 March 2022

Correspondence to: Hasan Mujtaba
*Associate Professor, Department of Oral Pathology, School of Dentistry, Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad, Pakistan.
Email: h_mujtaba@outlook.com
Full list of author information is available at the end of the article.

Introduction

Oral health is a condition of being free or without any chronic mouth, throat, and oral disease; infective, reactive, neoplastic, or inflammatory in nature or the absence of any birth defects (associated with mouth) and/or tooth loss owing to dental decay.[1,2] Good oral health is necessary for keeping the dentition healthy. Simpler methods of tooth brushing, as well as flossing, can assist in preserving oral health.[3,4] Oral structures include not only teeth but also the gums along with supporting structures, palate, lining of the throat and mouth, the lips, tongue, the salivary glands, chewing muscles, nerves, and also the bones of both lower and upper jaws.[5]

There exist possible associations' between chronic systemic infections and poor oral health as oral cavity ultimately reflects and supports the health of the body as a whole.[6,7] Dental decays and periodontal diseases are among the most commonly reported oral/dental diseases.[8] Inflammation of periodontium results in the loss of connective tissue and bone support with subsequent teeth loss in grown-ups. In addition to the pathogenic microbes in the biofilm, environmental and genetic factors, especially the use of tobacco, contribute to these diseases.[9]

Various indices are used to check the dental caries status in a population. A valuable index commonly used for monitoring and determining the dental health status of a community is "the decayed, missing and filled teeth (DMFT) index".[10] It has been in use for more than 70 years. This index

defines the number of the decayed teeth, no of the treated teeth, and the number of the teeth missing owing to decay.[11]

Dental care is a substantial financial problem for several nations, findings from one research suggest that the dental expenditures in "The Organization for Economic Co-operation and Development" nations could surge substantially over the next two decades and may differ considerably across nations.[12] Although not a common reason for demise, these disorders bear a serious impact on the general health of an individual.[13,14] Keeping in mind the imperative need, action is obligatory in the promotion of sound oral health, and prevention of gums ailments and tooth decay.

Education makes a significant impact on oral health status of individuals. Caries index goes down in well-educated patients as compared to the lesser educated patients.[10] People's monthly income and level of education are also reported to influence their behavior towards oral health.[15] Therefore, the objective of this study was to evaluate the impact of education and monthly income on the caries index of a community living in the rural area of Southern Punjab, Pakistan.

Methods

This cross-sectional survey-based study was conducted among 380 participants from the rural community of Jahangirabad Multan, Pakistan. The duration of the study was 3 months (July 2021 to September 2021). The sample size of 380 was calculated through open Epi by keeping confidence level at 95%, margin error of 5%, and the population size of 18,000. Simple random sampling type was employed as it best suits the study.

Written informed consent was taken from all the participants and the study was approved by the institutional Ethics Committee of Multan Medical and Dental College, Multan, Pakistan. The questionnaire was designed having two parts; first part consisted of demographic data and second part contained DMFT score of the participants. Two qualified dentists were engaged to check all the participants for dental caries status by using DMFT index. Aseptic condition was maintained and the intra-oral examination was carried out with the aid of explorer and mouth mirror under good light of the dental unit at Multan Dental College, Multan. All individuals with permanent dentition were included in the study while those having deciduous teeth at the time of the study were excluded. The patient who did not feel comfortable disclosing their education status and/or monthly income levels were also excluded from the final sample. Patients who had extractions or missing teeth due to any medical illness or any esthetic procedures were also excluded.

DMFT scores of individual participants were counted. The mean DMFT of the population was determined by dividing the total number of DMFT of the study population by the sample size.

Statistical analysis

The study variables were age, gender, education, monthly income, and DMFT scores of the participants. Collected data were coded, entered, and analyzed by using SPSS version 23. Age, income, and education categories are presented as frequencies and percentages. A chi-square test was applied to observe the association between education and monthly income with DMFT keeping a level of significance at 95%.

Results

Out of the total 380 individuals participating in the study, 209 (55%) were males and 171 (45%) were females. Participants of this study were categorized on the basis of age group, level of education, and monthly income (Table 1).

When considering education level, approximately one-third of the participants had no formal education, while almost 32% of the participants had attended secondary school education. Educational attainment of high school and university combined was achieved by 20% of the participants. As highlighted in Table 1, most of the study participants had a monthly income in the range of 10,000-20,000 Pakistani rupees (PKR), while only 12.8% earned more than 50,000 per month.

The minimum value of DMFT obtained was 0, while the maximum value came out to be 8.0. The highest mean was in the category of decayed teeth with a mean DMFT of 1.5 and standard deviation of 0.156, as shown in Table 2. The score implies that on average the adult population belonging to the rural area of Jahangirabad has an average of 1.5 teeth affected by decay, are filled, or are missing due to dental caries-related complications.

For computing association, the participants were characterized into two groups, one with a mean DMFT of 0, while the other with a mean DMFT of 1 or more. Monthly income was also categorized into two groups with one group having an income of less than 20,000 and other earning 20,000 or more per month while the level of education was grouped into three categories as shown in Table 3. Applying chi-squared test, there was no significant association found between average monthly income and mean DMFT; however, a significant inverse association (p = 0.036) was observed between the mean DMFT and level of education meaning that the lower the educational level higher the caries prevalence.

Discussion

As stated by Baldani et al.[16], the prevalence of the dental caries is a phenomenon associated with the economic deprivation.

Table 1. *Socio-demographic characteristics of the participants (N = 380).*

Variables		Frequency	Percentage
Age (years)	15-20	40	10.5
	21-25	70	18.4
	26-30	90	23.7
	31-35	80	21.0
	36-40	100	26.4
Level of education	No formal education	105	27
	Primary school	80	21.0
	Secondary school	120	31.9
	High school	40	10.7
	College/ University	35	9.4
Monthly income (PKR)	<10,000	85	22.3
	10,000-20,000	178	46.7
	20,000-50,000	69	18.2
	>50,000	48	12.8

Table 2. *The DMFT score & mean DMFT of n = 380 participants.*

Criteria	Mean score
Decayed (D) teeth	1.02
Missing (M) teeth	0.13
Filling (F) teeth	0.34
Mean DMFT	1.5

Socio-economic aspects have also been recognized as the risk indicators to the development of this disorder.

In the present study, 27% participants had no formal education which is a better proportion than the study of Francis from India where 57% subjects had no formal education.[17] The mean DMFT was 1.5 which is greater than the mean DMFT of a similar study from India (0.99)[18] and lesser than that reported in a study from Iran where the mean value of the total DMFT index was 7.33 ± 3.0.[10] In the current research, mean value of decayed teeth was 1.02, that of missing teeth was 0.13, and that of filled teeth was 0.34. These results are different from Iranian study where mean values of DT, MT, and FT indices were 2.85 ± 1.7, 1.15 ± 1.84, and 3.33 ± 1.7, respectively.[10] In the present study, the average of missing teeth was 0.13, which is nearer to the results of another research where 0.1% of subjects had missing teeth due to cause other than caries.[19]

The present study did not find a significant association between average monthly income and dental caries status; however, a significant association between the DMFT score and level of education (high school and college/university) was recorded. This is in accordance with the results of Moradi et al. [10] where DMFT index was associated with individual's education (p = 0.001).

Oral health is an integral part of general health. Poor dental health may have detrimental outcome on the general health. Oral cavity is also a gateway for various toxins and pathogens, which can deteriorate the dental health and if not cleaned by several defense mechanisms which have developed to shield the mouth, may spread and transfer to rest of one's body. The consequences of diseased mouth and poor dental hygiene can be catastrophic to the general health.[19,20] Lower socio-economic rank and illiteracy increase the chances of poor dental hygiene which might influence oral and general health.[10]

By virtue of their high prevalence, the most consequential oral diseases affecting global health are dental caries and periodontal diseases.[21] Promotion of dental health is a planned and strategic effort to build the public policies, produce supportive atmosphere, strengthen community action, improve personal hygiene, or re-orient health services.[22]

Owing to the noteworthy effect of dental health on the everyday lives of the people, World Health Organization (WHO) has recognized dental health as one of the main public health priorities around the globe. Despite great stress by the WHO on the oral wellbeing, it is still an under-addressed issue, even in the developed nations and the situation is even more graver in the developing nations.[10,23] Experiencing good oral health, confidently and comfortably, permits an individual to accomplish their full capacity as well as participation in the society [24] as the teeth possess great influence on the personality and are also imperative for emotional as well as psychological wellness of the people.[25] Baseline data about the magnitude of dental problems and different epidemiological factors are essential for planning

Table 3. *Association between DMFT and level of education and income of the participants.*

	DMFT score		
	Score 0	Score of 1 or above	Level of significance
Education	Percentage		
Less than primary or primary	35.3	64.7	$p = 0.036$
Secondary	39.4	60.6	
More than secondary	64	36	
Income (PKR)/month			
Less than 20,000	43.4	56.6	1.466
20,000 or above	35	65	

the regional or national health promotion programs aiming to prevent as well as to treat the oral disorders.[26]

Conclusion

Prevalence of dental caries is low in rural areas of Jahangirabad, Multan and is inversely proportional to the level of education implying that education makes a significant impact on the occurrence of dental caries. These results highlight the importance of improving the education level of the rural population as a dental public health measure to reduce the incidence of caries in the local communities.

Limitations of the study

The data analysis has certain limitations as the age, education, and income were collected as categories; therefore, correlations could not be computed.

Acknowledgement

The authors would like to acknowledge the staff of Dental Section of Multan Medical and Dental College Multan, Pakistan for their logistic and technical support in the acquisition of data related to this study. The authors would also like to acknowledge all those subjects whose data has helped us to add this scientific context in the literature.

List of Abbreviations

DMFT Decayed, Filled, Missing Tooth
PKR Pakistani rupees
WHO World Health Organization

Conflict of interest

None to declare.

Grant support and financial disclosure

None to disclose.

Ethical approval

The Institutional Ethical Review Board of Multan Medical and Dental College, Multan, Pakistan vide Letter No. 0474-21.

Authors' contribution

MA, MA, HM: Conception and design of the study, data collection and drafting of the manuscript.

MAK: Analysis and interpretation of data, important intellectual input.

MFU, JA: Acquisition of data, important intellectual input.

ALL AUTHORS: Approval of the final version of the manuscript to be published.

Authors' Details

Muhammad Ali[1], Muhammad Ahmed[2], Hasan Mujtaba[3], Muhammad Farooq Umer[4], Muhammad Awais Khan[5], Javeria Afzal[6]

1. Senior Registrar, Department of Community Dentistry, Dental College CMH Multan Institute of Medical Sciences, Multan, Pakistan
2. Assistant Professor, Department of Operative Dentistry, Multan Medical and Dental College, Multan, Pakistan
3. Associate Professor, Department of Oral Pathology, School of Dentistry, Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad, Pakistan
4. Assistant Professor, School of Public Health, Al Shifa Trust Eye Hospital, Islamabad, Pakistan
5. Assistant Professor, Department of Medical Education, Multan Medical and Dental College, Multan, Pakistan
6. Senior Lecturer, Department of Community Dentistry, Multan Medical and Dental College, Multan, Pakistan

References

1. Petersen PE. World Health Organization global policy for improvement of oral health-World Health Assembly 2007. Int Dent J. 2008;58(3):115–21. https://doi.org/10.1111/j.1875-595X.2008.tb00185.x
2. World Health Organization. Oral Health; 2011 [cited 22 Jan 10]. Available from: http://www.who.int/mediacentre/factsheets/fs 3l8/en/index.html
3. United States Public Health Service, Office of the Surgeon General, National Institute of Dental, Craniofacial Research (US). Oral health in America: a report of the Surgeon General. US Public Health Service, Department of Health and Human Services; 2000[cited 22 Jan 18]. Available from https://www.nidcr.nih.gov/research/data-statistics/surgeon-general
4. Tapsoba H, Deschamps JP. Promotion of orodental health in adolescents in Africa. Promot Educ. 19971;4(4):26–8. https://doi.org/10.1177/102538239700400413
5. Christopoulos A, Moubayed SP, Nader ME, Ayad T, Ghannoum JE, Meyers AD. Mouth anatomy. Drugs, diseases and procedures; 2015. Available from: http://emedicine.medscape. com/article/1899122-overview

6. Nazir MA. Prevalence of periodontal disease, its association with systemic diseases and prevention. Int J Health Sci. 2017;11(2):72–80.
7. Bramantoro T, Hariyani N, Setyowati D, Purwanto B, Zulfiana AA, Irmalia WR. The impact of oral health on physical fitness: a systematic review. Heliyon. 2020;6(4):e03774. https://doi.org/10.1016/j.heliyon.2020.e03774
8. Doifode VV, Ambadekar NN, Lanewar AG. Assessment of oral health status and its association with some epidemiological factors in population of Nagpur, India. Indian J Med Sci. 2000;54(7):261–9.
9. Könönen E, Gursoy M, Gursoy UK. Periodontitis: a multifaceted disease of tooth-supporting tissues. J Clin Med. 2019;8(8):1135. https://doi.org/10.3390/jcm8081135
10. Moradi G, Bolbanabad AM, Moinafshar A, Adabi H, Sharafi M, Zareie B. Evaluation of oral health status based on the decayed, missing and filled teeth (DMFT) index. Iran J Public Health. 2019;48(11):2050. https://doi.org/10.18502/ijph.v48i11.3524
11. Roland E, Gueguen G, Longis MJ, Boiselle J. Validation of the reproducibility of the DMF index used in bucco-dental epidemiology and evaluation of its 2 clinical forms. World Health Stat Q. 1994;47(2):44–61.
12. Jevdjevic M, Listl S, Beeson M, Rovers M, Matsuyama Y. Forecasting future dental health expenditures: development of a framework using data from 32 OECD countries. Community Dent Oral Epidemiol. 2021;49(3):256–66. https://doi.org/10.1111/cdoe.12597
13. Kim JK, Baker LA, Davarian S, Crimmins E. Oral health problems and mortality. J Dent Sci. 2013;8(2):115–20. https://doi.org/10.1016/j.jds.2012.12.011
14. Shao R, Hu T, Zhong YS, Li X, Gao YB, Wang YF, et al. Socio-demographic factors, dental status and health-related behaviors associated with geriatric oral health-related quality of life in Southwestern China. Health Qual life Outcomes. 2018;6(1):1–9. https://doi.org/10.1186/s12955-018-0925-8
15. Baniasadi K, Armoon B, Higgs P, Bayat AH, Mohammadi Gharehghani MA, Hemmat M, et al. The Association of Oral Health Status and socio-economic determinants with oral health-related quality of life among the elderly: a systematic review and meta-analysis. Int J of Dent Hyg. 2021;19(2):153–65. https://doi.org/10.1111/idh.12489
16. Baldani MH, Vasconcelos AGG, Antunes JLF. Association of the DMFT index with socioeconomic and dental services indicators in the state of Paraná, Brazil. Cad Saude Publica. 2004;20:143–52. https://doi.org/10.1590/S0102-311X2004000100030
17. Francis DL. PUB011 an assessment of oral health status, tobacco use and cancer awareness among tea plantation workers (Irula Tribes), Nilgiri Hills, India. J Thorac Oncol. 2017;12(11):S2368. https://doi.org/10.1016/j.jtho.2017.09.1874
18. Mandal S, Ghosh C, Sarkar S, Pal J, Kar S, Bazmi BA. Assessment of oral health status of Santal (tribal) children of West Bengal. J Indian Soc Pedodont Prevent Dent. 2015;33(1):44–7. https://doi.org/10.4103/0970-4388.148976
19. Mohan R, Venkatanarasu B, Rao BV, Eswara K, Martha S, Hemasundar H. Assessment of oral health status and dental treatment needs among 12-and 15-year-old school-going children of fisherman community residing at east coast road, Chennai: a cross-sectional study. J Pharm Bioallied Sci. 2019;11:S385–92. https://doi.org/10.4103/JPBS.JPBS_42_19
20. Nazir A, Asghar F, Akram S, Haider E, Rana SA, Khan MA, et al. Factors associated with frequency of the first permanent molar caries in young children of Multan District, Pakistan. J Dent Indones. 2019;26(2):70–4. https://doi.org/10.14693/jdi.v26i2.1292
21. Blinkhom AS. Dental health education: what lessons have we ignored. Br Dent J. 1998;184:58–9. https://doi.org/10.1038/sj.bdj.4809544
22. Peres MA, Macpherson LM, Weyant RJ, Daly B, Venturelli R, Mathur MR, et al. Oral diseases: a global public health challenge. Lancet. 2019;394(10194):249–60. https://doi.org/10.1016/S0140-6736(19)31146-8
23. Niranjan VR, Kathuria V, Venkatraman J, Salve A. Oral health promotion: evidences and strategies. Insights into various aspects of oral Health. London: IntechOpen; 2017. pp 195–217. [cited 2022 May 13]. Available from: https://www.intechopen.com/chapters/55701 doi: 10.5772/intechopen.69330
24. Jin LJ, Lamster IB, Greenspan JS, Pitts NB, Scully C, Warnakulasuriya S. Global burden of oral diseases: emerging concepts, management and interplay with systemic health. Oral Dis. 2016;22(7):609–19. https://doi.org/10.1111/odi.12428
25. Crocombe L, Siddiqi M, Kamae G, Bettiol S, Knight G, Sari E, et al. Feedback to the World Health Organization on the draft global strategy on tackling oral diseases; 2021 [cited 22 Feb 18].Available from http://ecite.utas.edu.au/146604
26. Sajid M, Noreen R, Jamil M, Javed M, Haider E, Ahmad M. Prevalence of dental traumatic injuries in young children in public school of Layyah. Pak Oral Dent J. 2019;39(4):337–40.