

Disparities in Oral Health Behaviour among Young Adults in Mangalore, India: A Psychosocial Perspective

G RAJESH¹, SIMI SEEMANTHINI², DILIP NAIK³, KESHAVA PAI⁴, ASHWINI RAO⁵

ABSTRACT

Introduction: Oral health inequalities imply unequal distribution of health and disease across socioeconomic gradients. Oral health related behaviour and its psychosocial antecedents can have a major impact on oral disease pathways in communities.

Aim: To ascertain disparities in oral health behaviour and its psychosocial antecedents among young adults in Mangalore, Karnataka, India.

Materials and Methods: Present study was carried out among 341 degree students at three randomly chosen institutions belonging to government, aided and private colleges in Mangalore. Oral health behaviour was assessed by a structured, pre-tested, self-administered questionnaire. Information about oral hygiene habits, tobacco use, sugar consumption, dental attendance patterns were collected. Respondent's self-reported gingivitis, perceived general and oral health, perceived need for care and locus of control were assessed. Information about demographic details was collected. Correlation analysis employed Pearson's correlation coefficient and binary logistic regression analysis was employed with snacking as dependent variable.

Results: Twice daily brushing was significantly associated with gender ($r=0.142$, $p=0.009$), type of college ($r=-0.164$, $p=0.003$) and father's occupation ($r=0.107$, $p=0.049$), while tobacco use was significantly associated with gender ($r=0.284$, $p=0.000$), religion ($r=-0.234$, $p=0.000$), type of college ($r=0.312$, $p=0.000$), father's education ($r=0.130$, $p=0.017$) and occupation ($r=0.120$, $p=0.027$). Self-perceived oral health was significantly associated with snacking ($r=0.173$, $p=0.001$) and tobacco use ($r=-0.261$, $p=0.000$), while locus of control was associated with snacking ($r=0.140$, $p=0.009$). Regression analysis revealed that father's education (OR=0.399, $p=0.014$), self-perceived need for care (OR=0.354, $p=0.009$), and locus of control (OR=0.166, $p=0.003$) emerged as significant predictors of snacking behaviour.

Conclusion: Psychosocial antecedents were significantly associated with oral health behaviour among the respondents. Policy and decision makers should consider causes of causes while tackling oral health problems. Present study may contribute towards addressing oral health inequalities in developing nations, where oral health issues are compounded by a definite paucity of resources.

Keywords: Causes of causes, Oral health inequalities, Psychosocial factors

INTRODUCTION

The pivotal role of behaviour as one of the major determinant of oral health has been established by numerous researchers [1-3]. Good oral health behaviour such as proper oral hygiene can easily prevent major oral diseases such as dental caries, periodontal diseases and oral cancer. Adopting healthy lifestyles can thus effectively and efficiently lead to prevention of oral diseases [4]. In this light, oral diseases are increasingly being viewed as lifestyle disorders. Besides, there is increasing evidence that oral health related behaviour such as sugar and tobacco consumption can also contribute to other Non-Communicable Diseases (NCDs) like cardiovascular diseases and cancer [5-8].

The relationship between oral health and behaviour, although very important to our understanding of disease process, should not be over emphasized. One of the major tasks for researchers is to explore why people behave the way they behave. There is a definite need to explore various factors that influence oral health behaviour [4]. Hence, there is a necessity to shift our focus from the study of causes of diseases to the study of causes of causes.

The sequence of events that eventually lead to adverse health outcome can be viewed as proximal and distal. Proximal factors influence individuals directly or almost directly that lead to the occurrence of adverse health outcome. Distal factors, on the other hand, exert their influence further back in the causal mechanisms.

They may act through various intermediary variables. One can thus infer that the causes that precipitate disease in the present scenario are rooted in events/factors that influenced the causal mechanisms previously in the broader context of psycho-socio-economic determinants [9,10].

Researchers in the Western world have identified that individuals belonging to higher socioeconomic strata and female gender are more likely to indulge in behaviours which are more conducive to good oral health. However, detrimental oral health behaviour such as snacking has been reported to be high among urban residents and individuals belonging to higher socioeconomic status [11-14]. One can thus infer that various factors such as demographic, socioeconomical, personality, cognitive and emotional factors might influence the way individuals behave.

One of the major public health challenges that the world is currently facing is health inequalities. Diseases are concentrated in areas where resources are very scarce, especially in developing and underdeveloped nations. Various risk factors for diseases tend to cluster around individuals who belong to lower socioeconomic strata [1,15-23]. Various contributing factors include limited access to care, hazardous occupations and environmental exposure.

One has to consider why there is consistently strong relationship between poor socioeconomic status and poor oral health. Oral health related behaviour might be one of the key factors contributing

to this relationship. Poor parental education, occupation and income might act as crucial risk factors which lead to poor oral health. Parental factors such as social class, ethnicity, employment, family size have been identified as major contributing factors [24]. These factors operate through poor oral health behaviour to adversely impact oral health outcomes [2,25].

Research pertaining to oral health behaviour is critical in a developing nation like India, owing to its large population offering socioeconomic and cultural diversities. Besides the existing paucity of resources, the morbidity, mortality and economic burden associated with oral diseases is very high. The best possible way to deal with this scenario is to identify factors that influence the oral health behaviour of the population and to positively modulate them to prevent these diseases at the grass root level. As a result, there is definite need to undertake investigations focusing on the oral health behaviour among Indian population.

The present study attempts to explore various oral health related behaviours in the context of social inequalities among young adults in India. Such investigations are pivotal as they shed light into distal determinants of oral health. They provide valuable baseline information for planning, implementing and evaluating oral health intervention programs. They will pave the way for oral health promotion initiatives and might have important contributions to make towards prevention of oral diseases.

MATERIALS AND METHODS

The present study employed a cross-sectional study design and was carried out among degree students in Mangalore University. A total of three institutions belonging to government, aided and private colleges were randomly chosen from the list of all educational institutions in Mangalore University. The institutions included in the present study were Government First Grade College, Mangalore Car street (Government category); Canara College, Mangalore (Private-aided category); and St. Aloysius College (Autonomous), Mangalore (Private category). A total of 341 students were included in the present study. Data was collected from January 2016 to February 2016.

Inclusion criteria were co-education institutions, degree students, and availability during the study period. Exclusion criteria was institutions not willing to consent, students undergoing orthodontic treatment, students who suffered from health/mental health problems in the last year, students with known systemic illnesses, students who were currently under treatment for known health/mental health problems.

Ethical clearance was obtained from the Institution Ethics Committee, Manipal College of Dental Sciences (MCOADS), Mangalore [Protocol Ref No: 11046]. Permission to carry out the present study was obtained from Dean, MCOADS, Mangalore and also from the Principals of educational institutions included in the present study. Informed consent was obtained from the study subjects.

A structured, pre-tested, self-administered questionnaire was used to assess oral health behaviour of the respondents. Questionnaire was derived by theory, research, observation and expert opinion [26]. Assessment of oral health behaviour also included brushing frequency, dental attendance, sugar intake and tobacco use status [27]. Respondent's self-reported gingivitis [28], perceived general and oral health [29,30], perceived need for dental care [31,32] and importance of oral health [33] were also assessed. Locus of control of respondents was also assessed by a questionnaire method. Demographic information regarding age, gender and place of residence, parent's education and occupation, number of family members were also obtained from the study subjects.

Prior to the start of the main study, a pilot study was conducted to assess the reliability and validity of the questionnaire. The questionnaire was administered to 53 study subjects and

Cronbach's alpha and split half reliability was found to be 0.82 and 0.79 respectively. For the estimation of sample size, the level of significance was fixed at 5% and the power of the study was fixed at 80%. The final sample size was estimated to be 300 for the present study.

Statistical analysis was performed by employing Statistical Package for Social Sciences, (SPSS), Version 14.0. Correlation analysis among different variables was performed by employing Pearson's correlation coefficient. Binary logistic regression analysis was performed with snacking as dependent variable and other demographic, psycho-social variables as independent variables. Level of significance was fixed at 5% for the present study.

RESULTS

A total of 406 students studying in private, aided and government colleges in Mangalore were contacted for the study. Overall, 341 students participated in the study, representing a response rate of 83.99%. Mean age of the participants was 18.31 ± 0.61 years. Study population comprised of a majority of females ($n=180$, 52.79%), aged ≤ 18 years ($n=242$, 70.97%), and belonging to Hindu religion ($n=246$, 72.14%) [Table/Fig-1].

Results of the present study indicate that participants aged ≥ 19 years and females had higher mean behaviour scores than those aged ≤ 18 years ($t=-2.454$, $p=0.015$) and males ($t=-2.171$, $p=0.031$). There was a statistically significant difference in the mean behaviour score among the three different types of colleges included in the present study ($F=11.486$, $p=0.000$).

A majority of the respondents did not brush their teeth twice daily ($n=182$, 53.4%) and were not visiting the dentist regularly ($n=305$, 89.4%). It can also be observed that 88 (25.8%) respondents reported snacking and 23 (6.7%) respondents reported tobacco use [Table/Fig-2].

Correlation analysis indicated that twice daily brushing was significantly associated with gender ($r=0.142$, $p=0.009$), type of college ($r=-0.164$, $p=0.003$) and father's occupation ($r=0.107$, $p=0.049$). It can also be observed that snacking was significantly associated with type of college ($r=0.276$, $p=0.000$) and father's occupation ($r=-0.196$, $p=0.000$). Tobacco use was significantly associated with gender ($r=0.284$, $p=0.000$), religion ($r=-0.234$, $p=0.000$), type of college ($r=-0.312$, $p=0.000$), father's education ($r=0.130$, $p=0.017$) and occupation ($r=0.120$, $p=0.027$); while dental attendance was significantly associated with type of college ($r=-0.151$, $p=0.005$), father's education ($r=0.118$, $p=0.029$) and occupation ($r=0.199$, $p=0.000$) and mother's education ($r=0.116$, $p=0.032$). Mean behaviour score was significantly associated with age ($r=0.113$, $p=0.038$), gender ($r=0.116$, $p=0.032$) and religion ($r=-0.117$, $p=0.031$) [Table/Fig-3].

Self-reported gingivitis was significantly associated with gender ($r=-0.148$, $p=0.006$), type of college ($r=0.203$, $p=0.000$) and father's occupation ($r=-0.130$, $p=0.016$). It can also be observed that self-perceived general health was significantly associated with father's occupation ($r=-0.105$, $p=0.052$); whereas self-perceived oral health was significantly associated with type of college ($r=0.128$, $p=0.019$) and father's education ($r=-0.122$, $p=0.025$). Perceived need for dental care was significantly associated with type of college ($r=0.218$, $p=0.000$) and father's occupation ($r=-0.110$, $p=0.043$), while locus of control was associated with religion ($r=-0.107$, $p=0.047$) [Table/Fig-4].

It can also be observed from the results that self-reported gingivitis, self-perceived general health and perceived need for dental care were significantly associated with snacking ($r=0.233$, $p=0.000$; $r=0.122$, $p=0.024$; $r=0.279$, $p=0.000$), tobacco use ($r=-0.229$, $p=0.000$; $r=-0.188$, $p=0.000$; $r=-0.248$, $p=0.000$) and dental attendance ($r=-0.131$, $p=0.015$; $r=-0.140$, $p=0.010$; $r=-0.311$, $p=0.000$); and self-perceived oral health was associated with

snacking ($r=0.173$, $p=0.001$) and tobacco use ($-r=0.261$, $p=0.000$). Results also indicate that locus of control was associated with snacking ($r=0.140$, $p=0.009$) [Table/Fig-5].

Results of regression analysis revealed that type of college ($OR=0.844$, $p=0.000$), gender ($OR=0.485$, $p=0.040$) and age ($OR=2.489$, $p=0.017$) were significant predictors of snacking behaviour of respondents. It can also be observed that father's education ($OR=0.399$, $p=0.014$), self-perceived need for care ($OR=0.354$, $p=0.009$), and locus of control ($OR=0.166$, $p=0.003$) also emerged as significant predictors of snacking behaviour [Table/Fig-6].

Variables		N	Behavior score	
			Mean	SD
Age (years)	≤18 yrs	242	9.26	1.836
	≥19 yrs	99	9.77	1.689
Gender	Male	161	9.19	1.629
	Female	180	9.61	1.936
Religion	Hindu	246	9.53	1.849
	Others	95	9.08	1.661
Type of college	Government	109	9.08	1.852
	Private-aided	112	10.06	1.656
	Private	120	9.09	1.749
Fathers' Education	High	115	9.48	1.912
	Low	226	9.37	1.755
Father's occupation	High	176	9.48	1.836
	Low	165	9.33	1.778
Mothers' education	High	53	9.62	2.203
	Low	288	9.37	1.726
Mother's occupation	High	30	9.73	1.893
	Low	311	9.38	1.799
Family members	≤4	112	9.85	1.645
	≥5	229	9.19	1.847
Total			9.41	1.807

[Table/Fig-1]: Mean behavior scores and demographic factors of study subjects.

Number of study subjects	Tooth brushing		Snacking		Tobacco use		Visiting a dentist	
	Twice	Others	Yes	No	Yes	No	Regular	Irregular & never
n	159	182	88	253	23	318	36	305
%	46.6	53.4	25.8	74.2	6.7	93.3	10.6	89.4

[Table/Fig-2]: Oral health related behavior among study subjects.

Variable	Tooth brushing		Snacking		Tobacco use		Visit to dentist		Mean Behaviour score	
	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value
Age	0.000	0.994	0.021	0.700	-0.094	0.082	0.033	0.548	0.113	0.038
Gender	0.142	0.009	0.021	0.702	0.284	0.000	-0.038	0.482	0.116	0.032
Religion	-0.092	0.092	0.050	0.359	-0.234	0.000	-0.106	0.050	-0.117	0.031
Type of college	-0.164	0.003	0.276	0.000	-0.312	0.000	-0.151	0.005	-0.004	0.940
Father's education	0.045	0.407	-0.019	0.730	0.130	0.017	0.118	0.029	-0.028	0.607
Father's occupation	0.107	0.049	-0.196	0.000	0.120	0.027	0.199	0.000	-0.043	0.427
Mother's education	-0.005	0.932	-0.024	0.653	0.014	0.801	0.116	0.032	-0.051	0.347
Mother's occupation	0.104	0.056	0.018	0.747	-0.001	0.986	0.129	0.017	-0.056	0.302
Family size	-0.047	0.384	-0.058	0.282	-0.014	0.800	-0.017	0.758	-0.171	0.002

[Table/Fig-3]: Correlation analysis between socioeconomic factors and oral health behavior parameters among study subjects.

Pearson's correlation coefficient employed for correlation analysis

DISCUSSION

The present study was conducted to assess the psycho-socio-economic gradients in oral health behaviours among young adults in Mangalore, India. There is ample evidence to indicate that oral health is strongly influenced by oral health related behaviour among the population. The reasons behind the differentials in behaviour will have to be explored to identify the causes of the causes. Psychosocial models are thus increasingly becoming relevant in current research scenario [25]. The present study is the first study to explore psycho-socio-economic disparities in oral health behaviour in the Indian context.

Results of the present study indicate that females and respondents aged ≥19 years had higher behaviours scores than their counterparts. In similar studies conducted by Levin KA and Currie C and Maes L female respondents reported favourable twice daily brushing behaviour than their male counterparts [3,24]. Masalu JR et al., and Maes L et al., also reported that there was significant association between gender and tooth brushing [4,24]. Females who are young adults might stick to a more meticulous hygiene and oral hygiene regimen than males. With the stabilization of the adult personality, individuals aged ≥19 years might follow more disciplined lifestyle than those aged ≤18 years. As individuals step into their early adulthood, their appearance might be more important to them.

Results also indicate that there were statistically significant differences in mean behaviour scores among the types of colleges included. This indicates that there is a definite socio-economic gradient in oral health behaviour among young adults in Mangalore, India. Similar studies reported by Levin KA and Currie C, Maes L and Park JB et al., have indicated that socioeconomic differences were observed in oral [3,24,34] health related behaviour. The present study also showed that a majority of the respondents did not brush twice daily and were not regular in their dental attendance patterns. There is a definite need for oral health education and awareness programs, which highlights the importance of brushing and regularly visiting the dentists.

Correlation analysis indicated that gender, type of college and father's education was significantly associated with tooth brushing. This is in agreement with the findings reported by Levin KA and Currie C, Maes L and Park JB et al., [3,24,34]. Results also indicate that snacking was significantly associated with type of college and father's occupation. In a similar study conducted by Freire MCM et al., mother's education was significantly associated with snacking behaviour and soft drink consumption [25]. The present study highlights the presence of socioeconomic differentials in tooth brushing and snacking patterns of the respondents. The study also emphasizes the potential role of parental socioeconomic parameters in oral health behaviour.

Tobacco use among the respondents was significantly associated with gender, religion, type of college, father's education and father's occupation. Similar investigations by Sabbah W et al., and Safiri S

	Self-reported gingivitis		Self perceived general health		Self perceived oral health		Perceived need for dental care		Perceived importance of oral health		Locus of control	
	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value
Age	-0.030	0.583	-0.010	0.849	0.061	0.260	0.044	0.413	0.004	0.942	-0.059	0.281
Gender	-0.148	0.006	-0.006	0.911	-0.053	0.327	-0.065	0.234	-0.100	0.066	0.098	0.070
Religion	0.100	0.065	0.050	0.353	0.036	0.508	0.100	0.065	0.033	0.547	-0.107	0.047
Type of college	0.203	0.000	0.035	0.520	0.128	0.019	0.218	0.000	0.044	0.417	-0.057	0.297
Father's education	-0.090	0.097	-0.038	0.490	-0.122	0.025	-0.101	0.063	0.067	0.216	0.038	0.489
Father's occupation	-0.130	0.016	-0.105	0.052	-0.087	0.109	-0.110	0.043	-0.028	0.602	0.085	0.119
Mother's education	0.052	0.338	-0.104	0.056	-0.050	0.353	-0.002	0.976	0.040	0.457	0.128	0.018
Mother's occupation	0.004	0.937	0.034	0.533	-0.024	0.659	0.043	0.427	0.029	0.590	0.047	0.389
Family size	0.004	0.944	0.018	0.738	-0.041	0.454	-0.039	0.469	0.066	0.225	0.057	0.296

[Table/Fig-4]: Correlation analysis between socioeconomic variables and psychological parameters among study subjects. Pearson's correlation coefficient employed for correlation analysis

	Self perceived gingivitis		Self perceived general health		Self perceived oral health		Perceived need for dental care		Perceived importance of oral health		Locus of control	
	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value
Tooth brushing	0.037	0.494	-0.047	0.385	0.002	0.971	-0.095	0.079	0.038	0.486	-0.003	0.957
Snacking	0.233	0.000	0.122	0.024	0.173	0.001	0.279	0.000	0.016	0.766	0.140	0.009
Tobacco use	-0.229	0.000	-0.188	0.000	-0.261	0.000	-0.248	0.000	-0.100	0.065	0.015	0.783
Visit to dentist	-0.131	0.015	-0.140	0.010	-0.097	0.075	-0.311	0.000	0.032	0.551	0.074	0.172
Mean Behaviour score	-0.011	0.842	-0.055	0.313	0.015	0.776	0.088	0.107	-0.021	0.695	0.033	0.539

[Table/Fig-5]: Correlation analysis between oral health behavior parameters and psychological parameters among study subjects. Pearson's correlation coefficient employed for correlation analysis

Variables	OR	95% CI for OR		p-value
		Lower	Upper	
Type of college	0.844	0.363	1.963	0.000
Gender	0.485	0.243	0.967	0.040
Age	2.489	1.179	5.255	0.017
Father's education	0.399	0.191	0.833	0.014
Self-perceived need for care	0.354	0.163	0.770	0.009
Locus of control	0.166	0.051	0.537	0.003

[Table/Fig-6]: Regression analysis of various psychosocial variables on snacking behavior of respondents. Binary logistic regression analysis performed

et al., have indicated the association between socioeconomic status and smoking behaviour [35,36]. Masalu JR et al., have indicated significant associations between smoking and gender, which is in concurrence with the findings of the present study [4]. Freire MCM et al., have reported that mother's education was significantly associated with cigarette smoking, whereas, the present study indicates that father's education and occupation were associated with tobacco use [25].

Dental attendance pattern was associated with type of college, father's education and occupation, and mother's education. These findings are in agreement with those reported by Freire MCM et al., Park JB et al., and Sabbah W et al., which indicated the strong influence that socioeconomic factors had on dental visits [25,34,35]. Since dental diseases are not life threatening, visit to dentist is usually pain oriented. This leads to accumulation of a huge burden of dental morbidities among the population over long periods of time. The present study highlights the need for oral health education programs which highlight the importance of oral health among the masses.

Self-reported gingivitis was significantly associated with snacking, tobacco use and dental visits. This indicates that individuals who snack and who do not visit dentist regularly are more likely to report gingivitis. Snacking and tobacco use were significantly associated with perceived oral and general health. Perceived general health was also significantly associated with visit to dentists. This implies

that individuals who reported smoking perceived that their general and oral health was poor.

Dental visits also showed significant correlations with snacking and tobacco use. One can infer that respondents who reported smoking and irregular visits to dentists perceived that they did not need any oral care. This implies that their attitude towards health and oral health may be poor and needs to be addressed. Locus of control showed significant correlation with snacking behaviour of respondents. External locus of control implies that individuals feel that the control of their health is not in their hands, but is in external factors. Such individuals may not resist consuming snacks as they think that control of their own health related behaviours is not in their hands. The present study highlights the importance of psychosocial parameters and its impact on oral health. This indicates that interventions targeting oral health behaviour should consider psychosocial determinants of the study subjects.

The present study has important public health policy implications, especially in the context of developing nations and underdeveloped nations. Psychosocial differentials are one of the major impediments for improving oral health of communities and nations. Background variables which act more distally exert strong influences on oral health behaviour of individuals. There should be definite policy to address important parameters such as education, income, occupation, family size which can influence oral health behaviour and oral health. Resources should be allocated in such a manner as to include all sections of the society and to ensure equal opportunities to health for all. Longitudinal studies which assess the role of socioeconomic factors and associated risks for oral diseases should shed more light into the oral health inequalities [16].

The present study can pave the way for effective planning, implementation and evaluation of interventions to improve oral health behaviour and oral health. One has to consider the psychosocial pathways that can affect oral health in various communities [37]. Targeting only oral health behaviour might not led to automatic improvements in oral health. However, the significant contributions that psychosocial pathways can have on oral health can no longer be ignored.

Numerous risk factors for oral diseases such as snacking and tobacco use also act as risk factors for systemic illnesses. There is a definite need to follow the common risk factor approach to effectively and efficiently tackle various health issues in the community. Distal psychosocial variables might have a crucial role to play in tackling various health problems by common risk factor approach. This is of special relevance to developing and underdeveloped nations as they face the dual burden of increasing disease load and scarcity of resources. This is also compounded by poor awareness and attitudes about oral health in the community. Psychosocial pathways might provide vital clues to improve the oral health and general health of the masses.

LIMITATION

Questionnaire based studies are prone to numerous biases such as yeah saying bias, social desirability/faking good bias and deviation/faking bad bias [26]. Cross-sectional nature of the present study indicates that causality and temporality cannot be established. Further studies are needed to shed more light on the findings of the present study.

CONCLUSION

The present study revealed that various psycho-socio-economic antecedent factors were significantly associated with oral health behaviour among young adults in Mangalore. The findings of the present study provide valuable baseline information to effectively target causes of the causes. Decision makers, policy makers and individuals planning for interventions should be acquainted with psychosocial pathways that can influence oral health behaviour of the individuals. The present study has important policy implications to address oral health inequalities, which is a growing cause of concern the world over.

Funding: The present study was funded by the Indian Council of Medical Research (ICMR), New Delhi, India.

REFERENCES

- Locker D. Deprivation and oral health: a review. *Community Dent Oral Epidemiol.* 2000;28:161-69.
- Vanobbergen J, Martens L, Lesaffre E, Bogaerts K, Declercq D. Assessing risk indicators for dental caries in primary dentition. *Community Dent Oral Epidemiol.* 2001;29:424-34.
- Levin KA, Currie C. Inequalities in toothbrushing among adolescents in Scotland 1998-2006. *Health Education Research.* 2009;24 (1):87-97.
- Masalu JR. Oral health related behaviours among adult Tanzanians: a national pathfinder survey. *BMC Oral Health.* 2009;9:22.
- Albandar JM, Streckfus CF, Adesanya MR, Winn DM. Cigar, pipe, and cigarette smoking as risk factors for periodontal disease and tooth loss. *J Periodontol.* 2000;71(12):1874-81.
- Sheiham A, Watt RG. The common risk factor approach: a rational basis for promoting oral health. *Community Dent Oral Epidemiol.* 2000;28(6):399-406.
- Moynihn PJ, Kelly SAM. Effect on caries of restricting sugars intake: systematic review to inform WHO guidelines. *J Dent Res.* 2014;93(1):08-18.
- Freire MCM, Jordao LMR, Malta DC, de Araújo Andrade SSC, Peres MA. Socioeconomic inequalities and changes in oral health behaviours among Brazilian adolescents from 2009 to 2012. *Rev Saúde Pública.* 2015;49:50.
- Petersen PE. Sociobehavioural risk factors in dental caries - international perspectives. *Community Dent Oral Epidemiol.* 2005;33:274-79.
- World Health Organization. *The World Health Report 2002. Reducing risks, promoting health life.* Geneva: WHO; 2002.
- Kuusela S, Kannas L, Tynjala J, Honkala E, Tudor-Smith C. Frequent use of sugar products by school children in 20 European countries, Israel and Canada in 1993/94. *International Dental Journal.* 1999;49:105-14.
- Blay D, Astrom AN, Haugejorden O. Oral hygiene and sugar consumption among urban and rural adolescents in Ghana. *Community Dent and Oral Epidemiol.* 2000;28:443-50.
- Astrom AN, Masalu JR. Oral health behaviour patterns among Tanzanian university students: a repeat cross-sectional survey. *BMC Oral Health.* 2001;1:2.
- Lien N, Jacobs DR Jr, Klepp KI. Exploring predictors of eating behaviour among adolescents by gender and socio-economic status. *Public Health Nutr.* 2002;5:671-81.
- Gillcrist JA, Brumley DE, Blackford JU. Community socioeconomic status and children's dental health. *J Am Dent Assoc.* 2001;132:216-22.
- Reisine ST, Psoter W. Socioeconomic status and selected behavioural determinants as risk factors for dental caries. *J Dent Educ.* 2001;65:1009-16.
- Källestål C, Wall S. Socioeconomic effect on caries. Incidence data among Swedish 12- to 14-year-olds. *Community Dent Oral Epidemiol.* 2002;30:108-14.
- Poulton R, Caspi A, Milne BJ, Thomson WM, Taylor A, Sears MR, et al. Association between children's experience of socioeconomic disadvantage and adult health: a life-course study. *Lancet.* 2002;360:1640-45.
- Marthaler TM. Changes in dental caries 1953-2003. *Caries Res.* 2004;38:173-81.
- Vereecken CA, Maes L, De Bacquer D. The influence of parental occupation and the pupils' educational level on lifestyle behaviours among adolescents in Belgium. *J Adolesc Health.* 2004;34:330-38.
- Hamasha AA, Warren JJ, Levy SM, Broffitt B, Kanellis MJ. Oral health behaviours of children in low and high socioeconomic status families. *Pediatr Dent.* 2006;28:310-15.
- Cheng NF, Han PZ, Gansky SA. Methods and software for estimating health disparities: the case of children's oral health. *Am J Epidemiol.* 2008;168(8):906-14.
- Thomson WM. Social inequality in oral health. *Community Dent Oral Epidemiol.* 2012;40 (Suppl 2): S28-S32.
- Maes L. Tooth brushing and social characteristics of families in 32 countries. *Lea Maes. International Dental Journal.* 2006;56:159-67.
- Freire MCM, Sheiham A, Hardy R. Adolescents' sense of coherence, oral health status, and oral health-related behaviours. *Community Dent Oral Epidemiol.* 2001;29: 204-12.
- Streiner DL, Norman GR, Cairney J. *Health measurement scales: a practical guide to their development and use.* Oxford University Press, USA; 2014 Oct 30.
- Bernabé E, Kivimäki M, Tsakos G, Suominen-Taipale AL, Nordblad A, Savolainen J, et al. The relationship among sense of coherence, socio-economic status, and oral health-related behaviours among Finnish dentate adults. *Eur J Oral Sci.* 2009;117:413-18.
- Ayo-Yusuf OA, Reddy PS, van den Borne BW. Adolescents' sense of coherence and smoking as longitudinal predictors of self-reported gingivitis. *J Clin Periodontol.* 2008;35:931-37.
- Bernabé E, Watt RG, Sheiham A, Suominen-Taipale AL, Uutela A, Vehkalahti MM, et al. Sense of coherence and oral health in dentate adults: findings from the Finnish Health 2000 survey. *J Clin Periodontol.* 2010;37:981-87.
- Savolainen J, Suominen-Taipale A, Uutela A, Aromaa A, Härkönen T, Knuutila M. Sense of coherence associates with oral and general health behaviours. *Community Dental Health.* 2009;26(4):197-203.
- Ekanayake L, Perera I. Perceived need for dental care among dentate older individuals in Sri Lanka. *Special Care in Dentistry.* 2005;25(4):199-205.
- Mashoto KO, Åström AN, David J, Masalu JR. Dental pain, oral impacts and perceived need for dental treatment in Tanzanian school students: a cross-sectional study. *Health and Quality of Life Outcomes.* 2009;7(1):1.
- Hinze ES, Casamassimo PS, Seale NS, McIlroy M, Kerins CA, McWhorter AG. Relative value of oral health in well-child care: A survey of pediatricians in Texas and Ohio. *Journal of Dentistry for Children.* 2014;81(2):84-90.
- Park JB, Han K, Park YG, Ko Y. Association between socioeconomic status and oral health behaviours: The 2008-2010 Korea national health and nutrition examination survey. *Experimental and Therapeutic Medicine.* 2016;12(4):2657-64.
- Sabbah W, Tsakos G, Sheiham A, Watt RG. The role of health-related behaviours in the socioeconomic disparities in oral health. *Social Science & Medicine.* 2009;68(2):298-303.
- Safiri S, Kelishadi R, Heshmat R, Rahimi A, Djalalinia S, Ghasemian A et al. Socioeconomic inequality in oral health behaviour in Iranian children and adolescents by the Oaxaca-Blinder decomposition method: the CASPIAN-IV study. *International Journal for Equity in Health.* 2016;15(1):143.
- Polk DE, Weyant RJ, Manz MC. Socioeconomic factors in adolescents' oral health: are they mediated by oral hygiene behaviours or preventive interventions? *Community Dent Oral Epidemiol.* 2010;38:01-09.

PARTICULARS OF CONTRIBUTORS:

- Professor and Head, Department of Public Health Dentistry, Manipal College of Dental Sciences, Manipal University, Mangalore, Karnataka, India.
- Ex-Associate Professor, Department of Psychiatry, Kasturba Medical College, Manipal University, Mangalore, Karnataka, India.
- Dean, Department of Periodontology, Manipal College of Dental Sciences, Manipal University, Mangalore, Karnataka, India.
- Professor and Head, Department of Psychiatry, Kasturba Medical College, Manipal University, Mangalore, Karnataka, India.
- Professor, Department of Public Health Dentistry, Manipal College of Dental Sciences, Manipal University, Mangalore, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. G Rajesh,
Professor and Head, Department of Public Health Dentistry, Manipal College of Dental Sciences,
Manipal University, Light House Hill Road, Mangalore - 575001, Karnataka, India.
E-mail: drrajeshgao@gmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Jan 15, 2017**
Date of Peer Review: **Feb 04, 2017**
Date of Acceptance: **Feb 09, 2017**
Date of Publishing: **Apr 01, 2017**