

# Prosthetic treatment need and associated life course determinants in partially edentulous adults of age 18–35 years in Udupi taluk: A cross-sectional study

Kriti Sharma, Shashidhar Acharya, Deepak Kumar Singhal, Nishu Singla

Department of Public Health Dentistry, Manipal College of Dental Sciences, Manipal Academy of Higher Education, Manipal, Karnataka, India

## Abstract

**Aim:** The aims of this study were to assess the prevalence of use and need for dental prostheses and to associate need with the life course determinants in young adults of age 18–35 years in Udupi taluk, Karnataka, India.

**Materials and Methods:** It was a cross-sectional survey conducted on a total of 580 individuals those attended dental screening camps organized at random locations. A self-administered questionnaire was administered to participants to assess their life course determinants such as socioeconomic, behavioral, and psychological circumstances followed by an oral examination to assess their prosthetic status (WHO, 1997). Bivariate analysis followed by multivariate logistic regression analysis was carried out to determine the adjusted odds ratios (ORs) with 95% confidence interval (CI) for independent variables and the outcome.

**Results:** The need and use of dental prostheses was observed in 38% and 2.2% of young adults, respectively. Adjusted multivariable analysis revealed that life course determinants such as parental rearing style (OR = 7.66 [95% CI: 3.88–15.14]) and interaction between expenditure at 10 years of age and economic hardships at 10 years of age (OR = 9.63 [95% CI: 3.12–29.72] and OR = 6.43 [95% CI: 1.89–21.88]) were significantly associated with the need for prostheses.

**Conclusion:** The need for dental prostheses in the young adults can be related to socioeconomic and psychosocial circumstances during childhood, and thus the concept of life course approach has been highlighted.

**Keywords:** Dental prostheses, life course approach, need, young adults

**Address for correspondence:** Dr. Nishu Singla, Department of Public Health Dentistry, Manipal College of Dental Sciences, MAHE, Madhav Nagar, Manipal - 576 104, Karnataka, India.

E-mail: [nishu-gupta@hotmail.com](mailto:nishu-gupta@hotmail.com)

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## INTRODUCTION

Tooth loss can be a disabling and handicapping condition because it decreases masticatory function, limits nutrition,

affects phonation, and causes an esthetic disadvantage that may culminate in psychological disturbance. Tooth loss has a pronounced impact on the lives of some

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people.<sup>[1]</sup> Treatment of tooth loss is very important for those afflicted. In the National Oral Health survey, India, the percentages recorded for individuals of age 15 years in need for prostheses in the upper and lower arches were 2.8 and 3.8, respectively.<sup>[2]</sup> However, there is a scarcity of data on the dental prosthesis need and use in young adults lying in between the age group of 18 and 35 years in India.<sup>[3,4]</sup> The primary causative factors which consequently result in tooth loss are dental caries and periodontal diseases, but the lower socioeconomic condition, cultural misbeliefs, unfavorable environmental and demographic situation, poor attitude toward oral health care, irregular dental attendance, and inaccessibility and unaffordability for expensive treatment may further aggravate the causative factors of mortality of tooth/teeth.<sup>[4-7]</sup> Thus, it is logical to conclude that edentulism may be due to various combinations of factors in the past.<sup>[8]</sup>

A life course approach in epidemiology analyzes the long-term influences of physical and social exposures on health in the various stages of life of an individual.<sup>[9]</sup> Health status of an individual at any age is not only reflected by current circumstances, but also by prior living conditions during the life course.<sup>[10]</sup> Life course approach studies biological, behavioral, and psychosocial pathways that operate across an individual's whole lifespan, as well as across generations, to influence the health status. Hence, this approach provides us opportunity to study how the exposures in childhood affect health in adulthood.<sup>[11]</sup> Early life circumstances can play a major role in influencing adult oral health status.<sup>[9]</sup> Therefore, oral health life course studies can be useful in providing insights to explain oral health inequalities.<sup>[12]</sup>

Researchers in recent years have begun to investigate the associations between environments in early life and adult health, but little research has been carried out on oral health risk to exposures acting across generations. There is a dearth of studies about the use and need of dental prostheses in young adults and their possible determining factors in India. It is also important to acknowledge that it will allow determinants to be identified at an early stage, giving an opportunity for early intervention, rather than in later life when health is already lost. Thus, there is a need for studies in this field, preferably within the context of finding association of the need of the dental prostheses to the various life course factors. Therefore, this research was carried out with an aim of estimating the need and use of dental prostheses in young adults of age 18–35 years and association of need for dental prostheses with the life course determinants in Udupi taluk, Karnataka, India.

## MATERIALS AND METHODS

It was a cross-sectional study conducted among young adults, aged 18–35 years, during January–April, 2014. Ethical clearance to do the study was obtained from the Ethics Committee, Manipal University (IEC no. 51/2013). The list of 61 gram panchayats in Udupi taluk was obtained from the official website of Udupi district ([udupi.nic.in](http://udupi.nic.in)). Ten gram panchayats were randomly selected. The sample was collected by organizing dental screening camps at these selected locations and the people were invited to join the study. They were briefed about the purpose and process of the study and informed consent was sought for questionnaire completion and clinical examination of the oral cavity. The inclusion criteria were willingness to participate, age group between 18 and 35 years, and ability to read the questionnaire. Individuals, those were undergoing orthodontic therapy, or those suffered with medical conditions, were excluded from the study. They were given instructions prior to administration of the questionnaire and queries were solved by the investigators. Care was taken to ensure that all the questions were answered and participants were requested to complete unanswered questions, if any.

The self-administered questionnaire consisted questions assessing the sociodemographic details of the participants in terms of age, gender, location, level of education, occupation, and income. Socioeconomic status (SES) was calculated into lower, middle, and upper SES groups by using modified Kuppuswamy scale.<sup>[13]</sup> The behavioral attitudes of the participants toward dental treatment in their childhood were assessed by asking “Did you go to a dentist in your childhood?” and “Have you ever received oral hygiene instructions by the dentist?” The responses were categorized as yes or no. The early life socioeconomic indicators were assessed by asking about their fathers' and mothers' education and occupation, the housing status, and the family structure at the age of 10 years. The parental rearing style, dissensions in the family, and economic hardships during the childhood of participants were assessed with the help of psychometric questionnaire. In addition, information on the dental prosthetic need and use by the participants was obtained by an oral examination.

A pilot study was performed on thirty individuals, aged 18–35 years, to assess the face validity of the questionnaire. Test–retest reliability of the questionnaire was assessed by administering the same questionnaires again after 1 week among the same twenty participants using Spearman's rank correlation, which was found to be 0.69 which reflected

a strong correlation. Kannada is the regional language of Karnataka; hence, the questions were translated into Kannada language. The face validity of the questions was checked by a back-translation method into English by experts in both languages. The oral examination of the participants was done for assessing their prosthetic need and status by using WHO assessment form (1997).<sup>[14]</sup> One trained and calibrated dentist conducted all clinical oral examinations with a trained recorder noting the observations. Intra-examiner reliability was assessed by duplicating the examination on twenty participants using kappa statistic, which was in the range of 0.89–0.93 for the indices which reflected a high degree of conformity in the observations.

As there was no previous data existed on the need of dental prostheses in this population, the maximum sample size of 384 participants was considered after assuming the prevalence at 50%, confidence level at 95% ( $Z$ , standard value of 1.96), and margin of error at 5% ( $d$ , standard value of 0.05). Considering high chances of refusal (>10%) or incomplete responses (>15%), the sample size was fixed at 580. A schedule was made for data collection considering an average time of 5–10 min for oral examination per individual. Forty to fifty individuals were examined per day. The oral examination was performed by the examiner following “Universal Precautions.” Statistical analysis of the data was performed using Statistical Package for the Social Sciences version 20.0 (SPSS Inc., Chicago, IL, USA). Descriptive analyses were performed to calculate the frequencies of various sociodemographic characteristics of young adults. Bivariate logistic regression analysis was carried out for assessing the association of life course variables such as behavioral attitudes of the participants during childhood, psychosocial characteristics, and economic hardships during childhood with the need for prostheses in young adults. Adjusted odds ratio (OR) with 95% confidence interval (CI) was calculated using the multivariate logistic regression analysis and only those variables exhibiting  $P < 0.2$  in the bivariate analysis were included in the multivariate analysis. The cutoff level for statistical significance was considered at 0.05. For statistical purposes, the outcome regarding prosthetic status was dichotomized into dental prosthesis needed/not needed; used/did not use categories.

## RESULTS

Out of 580 people to whom questionnaires were distributed, 524 participants returned the completed questionnaires with the acceptable response rate of 90.34%. Participants who had marked “don’t know options” were

excluded from the study. The final sample consisted of 500 participants who were young adults ranging from age 18 to 35 years; 52.6% were males ( $n = 263$ ) and 47.4% were females ( $n = 237$ ). Majority of the participants ( $n = 341$ ) were from rural areas with most of them belonging to middle socioeconomic status (79.6% [ $n = 398$ ]) [Table 1]. Among all the study participants, 38% had the need for dental prostheses and only 2.2% of the participants used dental prostheses [Table 2].

The bivariate logistic regression analysis was performed to determine the unadjusted ORs with 95% CI for independent variables and the dependent outcome i.e., dental prosthesis need. The results of bivariate analysis revealed that need for prostheses was not significantly associated with participants’ gender ( $P < 0.71$ ), SES ( $P < 0.73$ ), location ( $P < 0.76$ ), visit to dentist during their childhood ( $P < 0.42$ ), and the housing status of the participants when they were 10 years old ( $P < 0.83$ ). However, the need for prostheses was significantly less in participants those who had received instructions about oral hygiene practices from the dentist in their childhood ( $P < 0.006$ ). The need for prostheses significantly decreased in the participants as the level of father’s or mother’s education and occupation level increased as per the Kuppusswamy socioeconomic scale when they were 10 years old. It was also found that participants those who lived with both the parents or with only mothers had comparatively less need for prostheses than participants those who lived with only fathers, relatives, or grandparents when they were 10 years old ( $P < 0.11$ ). The need for prostheses was more in participants those who had reported dissension in the family during their childhood ( $P < 0.001$ ). Further, participants those who had reported that their parents were generally negative and

**Table 1: Distribution of the study participants according to sociodemographic characteristics**

Variables	Participants ( $n=500$ ), $n$ (%)
Gender	
Males	263 (52.6)
Females	237 (47.4)
Socioeconomic status	
Upper	76 (15.2)
Middle	398 (79.6)
Lower	26 (5.2)
Location	
Urban	159 (31.8)
Rural	341 (68.2)

**Table 2: Prevalence of use and need for dental prostheses among young adults**

Variables	$n$ (%)
Need for dental prostheses	190 (38)
Use of dental prostheses	11 (2.2)

unsupportive (parental rearing style) showed more need for prostheses as compared to those whose parents were generally positive and supportive ( $P < 0.001$ ). Furthermore, the need for prostheses was also significantly associated with expenditure by the participant's family ( $P < 0.01$ ) and economic hardships at 10 years of age ( $P < 0.001$ ). The participants hailing from families those who "could save a lot of money" had less need for prostheses as compared to those who "could save a bit" or "had just enough money to get through the next day" [Table 3].

However, multivariate logistic regression analysis was performed to compute adjusted OR with 95% CIs for selected variables with  $P < 0.2$ , and only those variables which showed a significant relationship with need for prostheses in the bivariate analysis were taken for multivariate analysis to reduce the confounders. Adjusted multivariable analysis revealed that only parental rearing style, expenditure at age of 10 years, and economic hardships at age of 10 years remained significantly associated with the need for prostheses. It was found that those who had economic hardships and "had just enough money to get through the next day" were 9.63 times more likely to have need for prostheses as compared to those who did not report any economic hardships and "spent a lot than what they got" ( $P < 0.001$ ). Furthermore, those who had economic hardships in their childhood and "could just save a bit now or then" were 6.43 times more likely to have need for prostheses as compared to the reference category ( $P < 0.003$ ). Participants who believed that the rearing style of the parents during childhood was negative and unsupportive were 7.66 times more likely in need for prostheses as compared to those whose parents were positive and supportive ( $P < 0.001$ ) [Table 4].

## DISCUSSION

The present study was conducted among young adults of age 18–35 years to find the life course determinants associated with the need of dental prostheses. The use and need of dental prostheses existed in 2.2% and 38% of young adults, respectively. It was noticed that the need was much higher than the use of the prostheses in the young adults of the present study. Familial circumstances were inquired in the middle childhood of the participants when they were around 10 years of age because children at this age are believed to be sufficiently aware of the familial conditions to be recalled later in life.<sup>[15]</sup> The same age group was used to measure familial circumstances retrospectively in other studies as well.<sup>[16,17]</sup> The results supported the hypothesis that life course determinants such as parental rearing, expenditure, and economic hardships at the age of 10 years were significantly associated with the need for prostheses.

**Table 3: Bivariate logistic regression analysis for need for dental prostheses and sociodemographic, behavioral, and psychosocial variables**

Variables	Prosthetic need	
	Crude OR (95% CI)	P
Gender		
Female <sup>R</sup>	1	0.70
Male	1.07 (0.74-1.54)	
Socioeconomic condition		
Lower <sup>R</sup>	1	
Middle	0.62 (0.25-1.57)	0.32
Upper	0.87 (0.381-94)	0.73
Location		
Urban <sup>R</sup>	1	0.76
Rural	1.02 (0.70-1.44)	
Visit to dentist		
Yes <sup>R</sup>	1	0.42
No	1.15 (0.80-1.66)	
Instructions from the dentist		
Yes <sup>R</sup>	1	0.006**
No	1.69 (1.16-2.47)	
Father's educational level		
Professional <sup>R</sup>	1	
Primary school or less	2.64 (1.34-5.20)	0.005**
High school	1.37 (0.69-2.72)	0.36
Diploma or certificate	0.79 (0.34-1.83)	0.59
Mother's educational level		
Professional <sup>R</sup>	1	
Primary school or less	3.12 (1.43-6.80)	0.004**
High school	2.17 (0.98-4.81)	0.05**
Diploma or certificate	1.15 (0.42-3.13)	0.77
Father's occupation at the age of 10		
Professional <sup>R</sup>	1	
Semi-professional	1.72 (0.76-3.88)	0.19*
Clerical, shopkeeper, farmer	2.01 (1.13-3.60)	0.01**
Skilled worker	3.33 (1.62-6.86)	0.001**
Unskilled worker	5.94 (2.39-14.77)	0.001**
Unemployed	17.22 (1.88-157.02)	0.01**
Mother's occupation at the age of 10		
Professional <sup>R</sup>	1	
Semi-professional	2.08 (0.75-6.19)	0.18*
Clerical, shopkeeper, farmer	3.43 (1.59-7.41)	0.002**
Skilled worker	2.61 (0.21-31.94)	0.45
Unskilled worker	7.83 (1.83-33.47)	0.005**
Household duties	3.87 (1.80-8.31)	0.001**
Family structure at the age of 10		
Lived with both parents <sup>R</sup>	1	
Lived with the father	2.46 (1.03-5.90)	0.04**
Lived with the mother	0.45 (0.16-1.22)	0.11*
Lived with the relatives or grandparents	1.99 (0.90-4.41)	0.08*
Housing status at the age of 10		
Own house <sup>R</sup>	1	
Rented house	1.15 (0.59-2.24)	0.67
Provided by government	1.10 (0.44-2.75)	0.83
Expenditure at 10 years		
Spent more money than got <sup>R</sup>	1	
Had just enough to get through next pay	0.68 (0.43-1.06)	0.09*
Could save a bit every now or then	0.49 (0.30-0.81)	0.006**
Could save a lot	0.44 (0.22-0.87)	0.01**
Economic hardship at 10 years		
No <sup>R</sup>	1	
Yes	7.39 (4.88-11.19)	0.001**
Family dissension at 10 years		
No <sup>R</sup>	1	0.001**
Yes	4.90 (3.10-7.74)	
Parental rearing style at childhood		
Generally positive and supportive <sup>R</sup>	1	0.001**
Generally negative and unsupportive	7.67 (4.24-13.8)	

<sup>R</sup>Reference category, \* $P \leq 0.2$ , \*\* $P \leq 0.05$ . OR: Odds ratio, CI: Confidence interval

**Table 4: Multivariate logistic regression analysis for need for dental prostheses and independent variables**

Variables	Prosthetic need	
	Adjusted OR (95% CI)	P
Expenditure of income by the family during childhood and economic hardships at the age of 10 years		
Spent more than got and no economic hardships <sup>R</sup>	1	
Had just enough money to get through the next day and with economic hardships	9.63 (3.12-29.72)	0.001*
Could save a bit every now or then and with economic hardships	6.43 (1.89-21.88)	0.003*
Parental rearing style		
Generally positive and supportive <sup>R</sup>	1	0.001*
Generally negative and unsupportive	7.66 (3.88-15.14)	

<sup>R</sup>Reference category, \* $P \leq 0.05$ . OR: Odds ratio, CI: Confidence interval

Family structure had also been related with gingivitis and dental caries in previous studies.<sup>[18,19]</sup> Studies had revealed that family dissensions and conflicts were associated with unhealthy behaviors and poor health.<sup>[19-21]</sup> In the present study too, participants those lived with their mothers had positive and supportive parental rearing style and no family dissension during childhood and had less need for dental prostheses than their counterparts. The reason being that most of the loving parents responsibly take care of their children and provide them safe and secure environment to develop positive health attitudes later in life. It has been seen that families that have regular conflicts, arguments, fights, aggression, unfriendliness, and less supportive parent-child relationships predispose their children to poor psychosocial development, behavioral problems, and chronic health conditions in adulthood.<sup>[22,23]</sup> The attention from parents, positive parental rearing style, and the healthy local environment during childhood can result in better oral health outcome in adulthood.<sup>[24]</sup>

Further, the findings of the present study suggested that the participants those who had received oral hygiene instructions had less need for dental prostheses as compared to those who did not receive any instructions from the dentists in their childhood. This was in accordance with the results reported in a cohort study and similar to the present study, where the utilization of dental services at age 15 was not associated with the need for prostheses.<sup>[25]</sup> Hence, this study reinforces that health education and oral health promotion in early life are more important to attain better oral health than just meeting the individual's treatment needs at one point of time.

Life course determinants such as level of education and occupation of both the parents had shown significant association with the need of prostheses in young adults. Father's/mother's level of education and occupation are important indicators of SES. Higher education level mostly is predictive of better occupations, higher incomes, and better living standards and socioeconomic position in a society.<sup>[26-28]</sup> From a life course perspective, children from lower socioeconomic circumstances in early life may

have less accessibility or affordability to dental treatments or oral hygiene amenities due to which they may get predisposed to develop unhealthy oral health behaviors or dental problems later in life.<sup>[29]</sup> Therefore, guarding children against the influences of socioeconomic adversity could reduce the burden of disease experienced by them in adulthood.

### Limitations

The temporal association between the variables could not be established due to the cross-sectional study design. Most of the information collected was self-reported and retrospective. This might have introduced some level of recall bias and the information collected may not be validated. In addition, the "use and need for dental prosthesis" was recorded with the WHO (1997) index which measures normative need for dental prosthesis from dentists' perspective. It was not based on the felt need of the people, and hence may have overestimated the dental prosthesis need. The study sample was not proportional to the general population in many aspects and no weights were used for the purpose. Hence, it is suggested that more research should be carried out to further explore how life course factors affect oral health in later life using a prospective study design and a larger sample size.

### Future scope and recommendations

These outcomes may serve as a beneficial guideline for the future assessment of prosthetic status and prosthetic need among the young adult population for oral health service providers and decision makers. It is recommended for researchers and policymakers to recognize the need for prosthetic care which is considerable among young adults. The use of a life course approach to dental prosthesis needs' assessment, with a focus of vulnerability, could provide a more integrated and focused approach of assessing populations' need for dental services. It further reinforces the importance of health education and oral health promotion in early life to attain better oral health in later life. There is a need to prioritize health-care services to prevent tooth loss determinants rather than delivering rehabilitative prosthodontic services later.

## CONCLUSION

The need of dental prostheses in the young adults can be related to various socioeconomic, behavioral, and psychosocial circumstances during childhood, and thus the concept of life course approach has been highlighted. This study concluded that early life circumstances were related to young adults' oral health status. It is important to recognize that interventions for promotion of oral health should start early in life, rather than in later life when most of the health is already lost. A targeted population approach can be used to develop strategies to identify such childhood with difficult circumstance and help policymakers and health-care professionals in establishing a strong and efficient dental care framework.

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## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Fiske J, Davis DM, Frances C, Gelbier S. The emotional effects of tooth loss in edentulous people. *Br Dent J* 1998;184:90-3.
2. National Oral Health Survey and Fluoride Mapping. An Epidemiological Study of Oral Health Problems and Estimation of Fluoride Levels in Drinking Water. New Delhi: Dental Council of India; 2004.
3. Bucx AJ. Linked Lives. Young Adults' Life Course and Relations with Parents, Phd thesis. The Netherlands: Dissertation Utrecht University; 2009. Available from: <http://www.dspace.library.uu.nl/bitstream/handle/1874/36223/Bucx>. [Last accessed on 2014 May 18].
4. Shah VR, Shah DN, Parmar CH. Prosthetic status and prosthetic need among the patients attending various dental institutes of Ahmedabad and Gandhinagar district, Gujarat. *J Indian Prosthodont Soc* 2012;12:161-7.
5. Shrirao ND, Deshmukh SP, Pande NA, Radke UM. An evaluation of patient's decisions regarding dental prosthetic treatment. *J Indian Prosthodont Soc* 2016;16:366-71.
6. Bharti R, Chandra A, Tikku AP, Arya D, Gupta R. Oral care needs, barriers and challenges among elderly in India. *J Indian Prosthodont Soc* 2015;15:17-22.
7. Singla N, Acharya S, Prabhakar RV, Chakravarthy K, Singhal D, Singla R, *et al.* The impact of lifestyles on the periodontal health of adults in Udupi district: A cross sectional study. *J Indian Soc Periodontol* 2016;20:330-5.
8. Zarb GA, Bolender CL. *Prosthodontic Treatment for the Edentulous Patients*. 12<sup>th</sup> ed. St. Louis: Mosby; 2004. p. 6-23.
9. Ben-Shlomo Y, Kuh D. A life course approach to chronic disease epidemiology: Conceptual models, empirical challenges and interdisciplinary perspectives. *Int J Epidemiol* 2002;31:285-93.
10. Kawachi I, Subramanian SV, Almeida-Filho N. A glossary for health inequalities. *J Epidemiol Community Health* 2002;56:647-52.
11. Graham H, Power C. *Childhood Disadvantage and Adult Health: A Lifecourse Framework*. London: Health Development Agency; 2004.
12. Watt RG. From victim blaming to upstream action: Tackling the social determinants of oral health inequalities. *Community Dent Oral Epidemiol* 2007;35:1.
13. Bairwa M, Rajput M, Sachdeva S. Modified Kuppaswamy's socioeconomic scale: Social researcher should include updated income criteria, 2012. *Indian J Community Med* 2013;38:185-6.
14. Joharji RM, Adenubi JO. Prevention of pit and fissure caries using an antimicrobial varnish: 9 month clinical evaluation. *J Dent* 2001;29:247-54.
15. Sanders AE, Spencer AJ. Childhood circumstances, psychosocial factors and the social impact of adult oral health. *Community Dent Oral Epidemiol* 2005;33:370-7.
16. Bosma H, van de Mheen HD, Mackenbach JP. Social class in childhood and general health in adulthood: Questionnaire study of contribution of psychological attributes. *BMJ* 1999;318:18-22.
17. Harper S, Lynch J, Hsu WL, Everson SA, Hillemeier MM, Raghunathan TE, *et al.* Life course socioeconomic conditions and adult psychosocial functioning. *Int J Epidemiol* 2002;31:395-403.
18. Nicolau B, Marcenes W, Bartley M, Sheiham A. A life course approach to assessing causes of dental caries experience: The relationship between biological, behavioural, socio-economic and psychological conditions and caries in adolescents. *Caries Res* 2003;37:319-26.
19. Nicolau B, Marcenes W, Hardy R, Sheiham A. A life-course approach to assess the relationship between social and psychological circumstances and gingival status in adolescents. *J Clin Periodontol* 2003;30:1038-45.
20. Lundberg O. The impact of childhood living conditions on illness and mortality in adulthood. *Soc Sci Med* 1993;36:1047-52.
21. Sweeting H, West P, Richard M. Teenage family size, lifestyles and life changes: Associations with family structure, conflict with parents and joint family activity. *Int J Law Policy and Family* 1998;12:15-46.
22. Bowlby J. *Attachment and Loss*. Vol. 1. London: Hogarth Press; 1969.
23. Repetti RL, Taylor SE, Seeman TE. Risky families: Family social environments and the mental and physical health of offspring. *Psychol Bull* 2002;128:330-66.
24. Holst D, Schuller AA. Oral health in a life-course: Birth-cohorts from 1929 to 2006 in Norway. *Community Dent Health* 2012;29:134-43.
25. Correa MB, Peres MA, Peres KG, Horta BL, Gigante DP, Demarco FF, *et al.* Life-course determinants of need for dental prostheses at age 24. *J Dent Res* 2010;89:733-8.
26. Peres KG, Peres MA, Araujo CL, Menezes AM, Hallal PC. Social and dental status along the life course and oral health impacts in adolescents: A population-based birth cohort. *Health Qual Life Outcomes* 2009;7:95.
27. Heraclides A, Brunner E. Social mobility and social accumulation across the life course in relation to adult overweight and obesity: The Whitehall II study. *J Epidemiol Community Health* 2010;64:714-9.
28. Singla R, Acharya S, Singla N. Comparative study of lifestyle-related risk factors of periodontal disease among urban and rural population of India. *World J Dent* 2016;7:129-34.
29. Bastos JL, Peres MA, Peres KG, Araujo CL, Menezes AM. Toothache prevalence and associated factors: A life course study from birth to age 12 yr. *Eur J Oral Sci* 2008;116:458-66.