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Research Article

Marginalization and Its Association with Dental Caries among 5-12 Years Old Slum Children in Central India

Singh A[1]*, Raushan SK[2] and Purohit BM[3]

[1]Department of Dentistry, All India Institute of Medical Sciences (AIIMS), India

[2]Medical Student, All India Institute of Medical Sciences (AIIMS), India

[3]Department of Public Health Dentistry, People's College of Dental Sciences, India

***Corresponding author:** Singh A, Department of Dentistry, All India Institute of Medical Sciences (AIIMS), Bhopal, India

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Abstract

Objective: The aim of the study was to assess dental caries and associated risk factors among 5-12 year old slum dwelling children in Bhopal City, Central India.

Methods: A total of 311 children were there in the 5-12 year old age group and all were examined. Information on demographic characteristics of participants along with parent's literacy status, annual family income, oral health behaviors and visits to health personnel for dental needs were collected. Data was collected on dental caries of primary dentition (dmft) and permanent dentition (DMFT) using modified WHO criteria (1997). Linear and logistic regression analysis was performed to determine the factors associated with dmft/DMFT status. Odds ratio was calculated for all variables with 95% confidence intervals.

Results: Ninety three (26.7%) and sixty (19.3%) children were having one or more decayed teeth (dt/DT) in primary and permanent dentition respectively. Mean dmft/DMFT scores were 0.69 ± 1.42 and 0.35 ± 0.90 in the primary and permanent dentition respectively. Variables in the dmft/DMFT model explained only 18.3% and 8% of the variance in the primary and permanent dentition.

Conclusion: The study reveals exceptionally low dental care utilization and dental caries levels among slum dwelling children. Addressing marginalization will require a responsive and a caring workforce on the part of health authorities and government.

Keywords: Caries risk; Childhood caries; Disadvantaged children; Urban slum

Introduction

Marginalization is the social process of becoming or being made marginal. Marginalized refers to being separated from the rest of the society, forced to occupy the edges and not to be at the centre of things [1]. Marginalized people experience a complex economic situations, social disadvantages, health problems as well as stigma [2]. Social exclusion narrates a process by which certain groups are thoroughly disadvantaged because they are discriminated against on the basis of their ethnicity, race, religion, caste or where they live.

Society and culture are linked to behavioral patterns or lifestyles [3]. Therefore, there is a need to explore the influence of social factors on health. One of the measures of social differentiation is socioeconomic status. Another important way of distinguishing people is by their area of residence. Slum inhabitants are one such marginalized and socially excluded community based on the type of residence.

United Nations Human Settlement Program (UN-HABITAT) defines slum as residential areas that are physically and socially deteriorated and in which satisfactory family life is impossible. They lack durable housing of permanent nature, sufficient living space, access to safe water, inadequate sanitation in form of toilets and insecure tenure. According to UN the rise in urban populations and the number of slum dwellers is rising. One billion people worldwide live in slums and the figure will likely grow to 2 billion by 2030 [4]. Populations report estimated urban slum population in India as approximately 70 million by mid 2011 [5]. Even more disturbing is a truth that urban poverty is underestimated as many of the urban poor live in undocumented squatter colonies and pavements.

In India children comprise 40% of a rapidly growing population. Approximately, 26.3% of the urban population resides in urban slums.5 Squalor, lack of clean drinking water, unhygienic sanitary environment, crowding and garbage disposal pose series of threats to the health of slum dwellers children in particular, as they spend most of their time around the unhygienic environment. Infant mortality rates are twice as high in slums as the national rural average. Nutritional problems like Protein Energy Malnutrition (PEM), anemia and vitamin A deficiency continue to plague a large proportion of Indian children. The nutritional status of slum children is worst amongst all urban groups and is even poorer than the rural average. On average, slum children are more nutritionally wasted than other children. Lack of education and information further aggravates the situation as residents depend on unreliable sources for prevention and cure [6].

These children are imperative to the nation's present and its future. Yet populations vary considerably in their obligation to the collective health of children and in the resources that they make available to meet children's needs. This is reflected in the ways in which society address their shared commitment to children's health.

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It is suggested that marginalized populations have grave and pessimistic views of health in general including oral health [7]. According to World Oral Health Report 2003, National Oral Health Survey 2003 and a number of point prevalence studies a fact appears that dental caries is increasing both in prevalence and severity over the last few decades in developing countries [8-10]. Dental caries is a major public health problem owing to their high prevalence and incidence globally, specifically among children. Unfortunately, no published study has investigated the prevalence of dental caries globally among slum children making it difficult to understand the pattern of oral health status in this marginalized community. Also, there is no data on the oral health status of children residing in slums in India. Therefore, this study explores the association between this marginalized group and oral health. Specifically, the aim of the study was to assess dental caries status and associated risk factors among 5-12 year old slum dwelling children in Bhopal City, Central India.

Materials and Methods

Study design and subjects

The target population for the cross-sectional study was 5-12 year old children in an urban slum area in Bhopal City, Central India. All households were visited and the children aged 5-12 years were invited to participate in the study. If the house was locked or child not present at time of visit then a second visit was arranged to include the children in that particular house. A total of 311 children were there in 5-12 year old age group and all were examined.

Information on demographic characteristics of participants along with parents literacy status, annual family income, oral health behaviors such as frequency of brushing, material used for cleaning teeth, and visits to any health personnel for dental needs were collected by means of personal interviews administered by the examiner. Age was sub classified in 3 groups namely 5-6 years, 7 -10 years and 11-12 years. Paternal and maternal literacy levels were categorized for study subjects. The four categories recorded were illiterate (no formal education), completed middle school (6th Grade), completed high school (12th Grade) and those with a graduation or higher degree. Similarly, family income levels were recorded as ≤ 60,000, earning between Rs 60,000 – Rs 120,000 (~ 1000 to 2000 US $) and those earning ≥ 120,000 (~ 2000 US $). The dental team comprised of the examiner assisted by a recording clerk.

Clinical examination

All the subjects were examined under adequate illumination and clinical data were collected on dental caries of primary dentition (dmft) and permanent dentition (DMFT) using modified WHO criteria (1997) [11]. The examination was conducted with a plane mouth mirror. A systematic approach was adopted for assessment of dental caries. The examination proceeded in an orderly manner from one tooth or tooth space to the adjacent tooth or tooth space. A tooth was considered present in mouth when any part of it was visible.

Subjects were examined seated in a chair, with the examiner standing approximately in 10 o' clock position, under natural daylight. The subject well positioned so as to receive maximum illumination, while avoiding discomfort from direct sunlight. The recorder was made to sit close enough so that instructions could be easily heard and the examiner could see that the findings were being recorded correctly. Oral examination was conducted by a single examiner and was done in uniform manner beginning from the maxillary right quadrant in a clockwise direction in maxillary and mandibular region

Table 1: Distribution of subjects according to age, gender, parent's literacy and income status.

Age group (years)	Gender		P value
	Male (%)	**Female** (%)	
5-6 years	37 (24)	41 (26.1)	0.571
7-10 years	76 (49.4)	78 (49.7)	
11-12 years	41 (26.6)	38 (24.2)	
Total	154 (100)	157 (100)	311 (100)
Literacy status	**Father** (%)	**Mother** (%)	**P value**
Illiterate	70 (22.5)	117 (37.6)	0.001
Completed middle school (6th Grade)	37 (11.9)	66 (21.2)	
Completed high school (12th Grade)	188 (60.5)	116 (37.3)	
Graduation and higher	16 (5.1)	12 (3.9)	
Total	311 (100)	311 (100)	
Annual Family Income levels (Rs)*	**Male** (%)	**Female** (%)	**P value**
≤ 60,000	96 (62.4)	84 (53.5)	0.062
≥ 60,000 ≤120,000 (~ 1000 to 2000 US $)	53 (34.4)	62 (39.5)	
≥ 120,000 (~ 2000 US $)	05 (3.2)	11 (7)	
Total	154 (100)	157 (100)	

*1US $ = ~ 61.60 Indian Rupees.

Ethical clearance was taken from Institutional Ethics Committee, All India Institute of Medical Sciences (AIIMS), Bhopal, Central India. Research had been conducted in full accordance with the World Medical Association Declaration of Helsinki. Informed written consent was taken from parents and children prior to conducting the survey. The survey was scheduled between the months of July 2014 and September 2014. Training and calibration of examiner was conducted in Department of Dentistry, AIIMS, Bhopal. A pilot study was conducted on 30 children each to see the feasibility of study. All examinations were performed by a single examiner and duplicate examinations were conducted on one of every ten subjects throughout the survey. Intra- examiner reliability for indices was assessed using kappa statistic which was in range of 0.92 – 0.94.

Statistical analysis

Data was collected, entered and analyzed using SPSS version 16.0 (SPSS Inc., Chicago, Illinois, USA) for windows. Mean and standard deviations were used as basic descriptive statistics. Chi Square test was used to compare between categorical variables. Mann – Whitney U-test was used for comparison between two groups for quantitative variables. Analysis of Variance (ANOVA) was used to compare the mean dmft/DMFT scores among the three age groups. Linear and logistic regression analysis was performed to determine the factors associated with dmft/DMFT status. A set of independent variables including age, gender, parent's education, annual family income, frequency of cleaning teeth, frequency of between meal sugar consumption (previous day) and utilization of dental care was considered in the regression model. Odds ratio was calculated for all variables with 95% confidence intervals. All the dependent variables to be included in the regression analysis were dichotomized.

Table 2: Oral health behavioural characteristics among study subjects.

Oral health related behaviour variables		Gender			
		Male (%)	Female (%)	P value	Total (%)
Mode of cleaning teeth	Finger	3 (1.9)	6 (3.8)		9 (2.9)
	Toothbrush	151 (98.1)	151(96.2)	0.324	302 (97.1)
Frequency of cleaning teeth	Once daily	143 (92.8)	141(89.8)		284 (91.3)
	≥ 2 times a day	11 (7.2)	15 (10.2)	0.449	26 (8.7)
Material used for cleaning teeth	Toothpaste	145 (95.2)	151 (96.1)		296 (95.1)
	Toothpowder	9 (4.8)	6 (4.9)	0.405	15 (4.9)
Dietary Habits	Vegetarian diet	90 (58.4)	78 (49.6)		168 (54)
	Mixed diet	64 (51.6)	79 (50.4)	0.121	143 (46)
Frequency of between meal sugar consumption the previous day	Once a day	74 (48.1)	88 (56.1)		162 (52)
	Two times a day	40 (25.9)	27 (17.2)	0.081	67 (21.5)
	≥ Thrice daily	40 (26)	42 (26.7)		82 (26.5)
Utilization of dental care	Never visited	145(94.2)	146 (93)		291 (93.6)
	Visited once in last one year	9 (5.8)	11 (7)	0.945	20 (6.4)
Reason for visit	Routine check up	0	0		0
	Pain with teeth/gums	9 (5.8)	11(7)	0.172	20 (6.4)

Table 3: Dental caries status among study subjects.

Clinical variables		Male N (%)	Female N (%)	P Value	Total (%)
decayed teeth (dt) N (%)	Absent	108 (70.1)	110 (70)	0.85	228 (73.3)
	Present	46 (29.9)	47 (30)		93 (26.7)
missing teeth (mt) N (%)	Absent	150 (97.4)	154 (98.1)	0.83	304 (97.7)
	Present	04 (2.6)	03 (1.9)		07 (2.3)
filled teeth (ft) N (%)	Absent	154 (100)	156 (99.4)	0.32	310 (99.7)
	Present	0 (0)	01 (0.6)		01 (0.3)
Mean dmft		0.64 ±1.21	0.73 ± 1.60	0.37	0.69 ± 1.42
Range dmft N (%)	0	107 (69.4)	107 (68.1)	063	214 (68.8)
	1-3	42 (27.2)	43 (27.4)		85 (27.3)
	>3	5 (3.2)	7 (4.5)		12 (3.86)
Decayed teeth (DT) N (%)	Absent	117 (76)	134 (85.3)	0.21	251 (80.7)
	Present	37 (24)	23 (14.7)		60 (19.3)
Missing teeth (MT) N (%)	Absent	154 (100)	157 (100)	0.28	311 (100)
	Present	0 (0)	(0)		0 (0)
Filled teeth (FT) N (%)	Absent	153 (99.4)	157 (100)	0.31	310 (99.7)
	Present	1 (0.6)	0 (0)		1 (0.3)
Mean DMFT		0.40 ± 0.85	0.31 ± 0.94	0.037	0.35 ± 0.90
Range DMFT N (%)	0	116 (75.3)	133 (84.7)	**0.05**	249 (80)
	1-3	36 (23.3)	22 (14)		58 (18.6)
	> 3	2 (1.3)	2 (1.3)		4 (1.28)

Significance was fixed at p value of ≤ 0.05.

Results

A total of 311 children comprised the sample, of them 154 (49.5%) were males and 157 (50.5%) were females. No Significant gender differences were noted between the two groups. Also, no significant gender differences were noted among the three age groups of 5-6 years, 7-10 years and 11-12 years. Only, 16 (5.1%) of the paternal study population and 12 (3.9%) of the maternal population had a graduation or higher level of education. Higher levels of illiteracy, 70 (37.6%) were noted among the mothers, in contrast to their counterparts 117 (22.5%). Significant differences were noted between parental levels of education for the study subjects ($p \leq 0.001$). No gender differences were noted between annual family incomes for study population (Table 1).

Toothbrush was used by 302 (97.1%) children. Toothpaste was the most common method used for cleaning teeth among 296 (95.1%) children. Only, 26 (8.7%) of the children brushed their teeth two or more times a day. Sugar consumption three or more times the previous day was noted among 82 (26.5%) children. Also, only 20 (6.4%) children had visited the dentist and the single associated reason being the pain of teeth or gums. None of the children had taken a routine dental check up. No gender differences were noted for frequency of cleaning teeth, material used for cleaning teeth, type of diet, previous day sugar consumption, utilization for dental care and reason for dental visit (Table 2).

Ninety three (26.7%) children from the study group were having one or more decayed teeth. Only, one (.6%) girl child had filled teeth (ft) in the primary dentition. Mean dmft scores in the primary dentition being 0.69 ± 1.42. Two hundred fourteen (68.8%), 85 (27.3%) and 12 (3.8%) children had a dmft score in range of 0, 1-3 and >3. in the primary dentition. No significant gender differences were noted for decayed teeth (dt), missing teeth (mt), filled teeth (ft), mean dmft scores and dmft range. Sixty children (19.3%) children had Dental Caries (DT) in the permanent dentition. None of the children had Missing Teeth (MT) in the permanent dentition. Again, only 1 (.3%) male child had Filled Teeth (FT) in the permanent dentition. Mean DMFT score for the study population was 0.35 ± 0.90. Also,

Table 4: Distribution of dental caries according to age and gender.

Age Group	Dental Caries (dt)		P value	Total N (%)
	Male N (%)	Female N (%)		
5-6 years	7 (4.5)	11 (7)	0.001	18 (5.7)
7-10 years	34 (22)	32 (20.3)		66 (21.2)
11-12 years	5 (3.2)	4 (2.5)		9 (2.9)
Age Group	Dental Caries (DT)		P value	Total N (%)
	Male N (%)	Female N (%)		
5-6 years	0 (0)	0 (0)	0.001	0 (0)
7-10 years	20 (13)	15 (9.5)		35 (11.2)
11-12 years	17 (11)	8 (5)		25 (8)
Age Group	Mean dmft		P value	Mean dmft
	Male	Female		
5-6 years	0.72 ± 1.53	0.78 ± 1.75	0.001	0.75 ± 1.64
7-10 years	0.82 ± 1.22	0.97 ± 1.81		0.90 ± 1.54
11-12 years	0.21 ± 0.65	0.21 ± 0.57		0.21 ± 0.61
Age Group	Mean DMFT		P value	Mean DMFT
	Male	Female		
5-6 years	0.00 ± 0.00	0.00 ± 0.00	0.001	0.00 ± 0.00
7-10 years	0.44 ± 0.87	0.39 ± 0.90		0.42 ± 0.88
11-12 years	0.68 ± 1.05	0.47 ± 1.38.00		0.58 ± 1.22

no significant gender differences were noted for DT, MT, FT and mean DMFT values. Two hundred forty nine (80%), 58 (18.6%) and 4 (1.2%) children had DMFT score of 0, 1-3 and >3, differences noted being significant for gender ($p \leq 0.05$) (Table 3).

In primary dentition 18 (5.7%), 66 (21.2) and 9 (2.9%) of the children had dental caries in the three respective age groups of 5-6 years, 7-10 years and 11-12 years ($p \leq 0.001$). Similarly, significant differences in the permanent dentition were noted among 0 (0), 35 (11.2%) and 25 (8%) children for Dental Caries (DT) in the three age groups ($p \leq 0.001$). Mean dmft scores for the 5-6 years, 7-10 years and 11 to 12 years age groups in primary dentition were 0.75 ± 1.64, 0.90 ± 1.54 and 0.21 ± 0.61 respectively. Mean DMFT scores for the permanent dentition being 0.00 ± 0.00, 0.42 ± 0.88 and 0.58 ± 1.22 for the respective age groups. Significant differences were found for primary and permanent dentition (dmft/ DMFT) between the three age groups of 5-6 years, 7-10 years and 11 to 12 years ($p \leq 0.001$) (Table 4).

Table 5 depicts the stepwise multiple linear regression analysis for the dmft (primary dentition) and DMFT (permanent dentition) scores in relation to several independent variables, which includes age, gender, paternal education, maternal education, annual family income, frequency of cleaning teeth, sugar consumption (previous day) and utilization of dental care. Variables in the model explained only 18.3% of the variance in dmft status for the primary dentition. Increasing age, higher in between meal sugar consumption and lower utilization of dental care attributed for 2.4%, 5.7% and 8.8% of the dmft scores ($p \leq 0.001$). Similarly, only 8% of the variance was explained by all the variables for the DMFT scores in the permanent dentition. Increasing age contributed 5.6% and lower levels of

Table 5: Multiple Linear Regression model for dmft (Primary dentition) and DMFT (Permanent Dentition).

Multiple Linear Regression model for dmft						
Model	R	R^2	Adjusted R^2	SE	R^2 Change	P
1	0.15[a]	0.024	0.021	1.41	0.024	0.001
2	0.157[b]	0.025	0.018	1.41	0.001	0.021
3	0.165[c]	0.027	0.018	1.41	0.002	0.07
4	0.170[d]	0.029	0.016	1.41	0.002	0.36
5	0.171[e]	0.029	0.013	1.41	0.00	0.107
6	0.194[f]	0.038	0.019	1.41	0.009	0.069
7	0.308[g]	0.095	0.074	1.37	0.057	0.001
8	0.428[h]	0.183	0.161	1.30	0.088	0.001
Multiple Linear Regression model for DMFT						
Model	R	R^2	Adjusted R^2	SE	R^2 Change	P
1	0.236[a]	0.056	0.053	0.87	0.056	0.001
2	0.239[b]	0.057	0.051	0.88	0.001	0.58
3	0.272[c]	0.074	0.065	0.87	0.017	0.001
4	0.272[d]	0.074	0.062	0.87	0.00	0.27
5	0.28[e]	0.077	0.062	0.87	0.003	0.34
6	0.277[f]	0.077	0.059	0.87	0.00	0.38
7	0.279[g]	0.078	0.056	0.87	0.001	0.43
8	0.283[h]	0.080	0.055	0.87	0.002	0.47

a. Predictors: Age,
b. Predictors: Age, Gender
c. Predictors: Age, Gender, Paternal education
d. Predictors: Age, Gender, Paternal Education, Maternal education
e. Predictors: Age, Gender, Paternal Education, Maternal Education, Annual Family Income,
f. Predictors: Age, Gender, Paternal Education, Maternal Education, Annual Family Income, Frequency of cleaning teeth
g. Predictors: Age, Gender, Paternal Education, Maternal Education, Annual Family Income, Frequency of cleaning teeth Fathers, Sugar consumption (previous day)
h. Predictors: Age, Gender, Paternal Education, Paternal Education, Annual Family Income, Frequency of cleaning teeth, Sugar consumption (previous day), Utilization of dental care

paternal education attributed 1.7% to the DMFT scores in the present study ($p \leq 0.001$).

Logistic regression analysis was employed to determine the contribution of age, gender, paternal education, maternal education, annual family income, frequency of cleaning teeth, sugar consumption (previous day) and utilization of dental care towards dmft/DMFT status. The results of logistic regression showed that age, previous day sugar consumption and utilization of dental care were significantly related to dmft scores. Children aged nine and above were more likely to have higher dmft score than the 5 to 8 years old (OR = 1.62; $P \leq 0.001$). High frequency of between meal sugar consumption was also related to higher dmft sores (OR = 2.68; $P \leq 0.001$). Low utilization of dental care was associated with higher dmft scores (OR = 2.68; $P \leq 0.001$). In the permanent dentition among the variables only increasing age was significantly associated to DMFT scores (OR = 4.3; $P \leq 0.001$) (Table 6).

Discussion

Equity is an ethical concept grounded in the principle of

Table 6: Risk factors associated with dmft (Primary dentition) and DMFT (Permanent dentition).

A. Risk factors associated with dmft Dependent variable (dmft =0 *Vs.* dmft ≥ 1)			
Variables	B	P	OR (95%CI)
Age	-.467	0.001	1.62 (1.83, 1.54)
Gender	.168	0.51	1.18 (0.70, 1.97)
Annual Family income	-.209	0.45	.81 (0.47, 1.39)
Paternal Education	-.107	0.76	.89 (0.45, 1.79)
Maternal education	.236	0.58	1.27 (0.54, 2.95)
Frequency of cleaning teeth	-.847	0.095	.42 (0.15, 1.15)
Sugar consumption pattern	.98	0.001	2.68 (1.58, 4.53)
Utilization of dental care	1.00	0.001	2.74 (1.03, 11.33)
B. Risk factors associated with DMFT Dependent variable (DMFT =0 Vs DMFT ≥ 1)			
Variables	B	P	OR (95%CI)
Age	1.46	0.001	4.3 (2.22, 8.37)
Gender	-.541	0.08	.68 (0.31, 1.06)
Annual Family income	.173	0.59	1.18 (0.63, 2.24)
Paternal Education	.095	0.76	.89 (0.45, 1.79)
Maternal education	-1.18	0.08	.30 (0.07, 1.17)
Frequency of cleaning teeth	.234	0.67	.1.26 (0.42, 3.75)
Sugar consumption pattern	-0.29	0.92	.97 (0.52, 1.80)
Utilization of dental care	.77	0.33	2.16 (0.45, 10.33)

Variables- Age: ≥ 5- 8 years and ≥ 9-12 years, Gender: Male or Female, Annual Family Income (Rs): ≤ 60,000 (<1000 US $) > 60,000 (≥1000 US $), Paternal education: High school or lesser, Maternal education: High school or lesser, Frequency of cleaning teeth: once a day and more than once, Sugar consumption pattern (previous day): three or more times a day and less than 3 times a day, Utilization of dental care: utilized in previous one year and not utilized in previous one year.

distributive justice. Equity in health reflects an apprehension to reduce disparate opportunities to be healthy associated with affiliation in less privileged social groups, such as poor people, disenfranchised racial, ethnic, religious groups, gender, rural and slum residents [12]. In functioning terms, pursuing equity in health means eliminating health disparities that are systematically associated with underlying social disadvantage or marginalization. An equity framework systematically focuses interest on socially disadvantaged and marginalized within and between countries [13].

By 2030 all developing regions, including India will have more people living in urban than rural areas [14]. State of the World's Cities Report 20006/07 finds that the world's one billion slum dwellers specifically children are more likely to die earlier, attain less education and experience more hunger and disease than the other urban residents. The report shows remarkable similarities between slums and rural areas in health, education, employment and mortality [4].

Achieving equal opportunity for health necessitate not only safeguarding the health-damaging effects of poverty and marginalization, it also requires reducing disparities between populations in conditions such as education, living standards, and environmental exposures necessary to be healthy. Human rights and equity perspectives require health institutions to deal both with poverty and health and not in isolation. Care needs to be provided to improve the health of the poor and also to amend the circumstances that generate and perpetuate poverty and marginalization.

Majority of the slum children (> 95%) in the present study used tooth brush and toothpaste for cleansing their teeth. Singh et al (2011) reported similar results in a study conducted in Southern India among 5 and 12- year old marginalized and disadvantaged tribal children where all used toothbrush and toothpaste for tooth cleansing [1,3]. On the contrary tribal children few decades back used only datum (chewing stick from tree) for cleansing their teeth [15].

Sugar consumption three or more times the previous day was noted only among 26.5% children. On the contrary, three or more times sugar consumption was noted at 40% to 100% children in National oral health survey India (2003) Southern India (2011) and Thailand (2001) [2,10,16].

Only, 20 (6.4%) 5 to 12 year old slum children had visited the dentist. Similarly, none of the tribal children aged 5 and 12 year old had visited a dentist in Southern India (2011) [1,3]. Petersen et al. in a study among 6-year-old school children in Thailand reported that as high as 66% school children had visited a dentist the previous year [16]. Badri et al (2014) conducted a systematic review to assess children's adherence to dental attendance. Factors identified at the patient level included parents' education, socioeconomic status, behavioural beliefs, perceived power and subjective norms. At the system level, collaborations between communities and health care professionals were imperative [17].

Low level of dental caries was reported despite perfunctory oral health care system with no fluoridation of water supply among the slum children. Only, 93 (26.7%) slum children had dental caries in the primary dentition. Mean dmft scores in the primary dentition was striking low at 0.69 ± 1.42. Increasing age, higher frequency of previous day between meal sugar consumption and lower utilization of dental was associated with higher dmft scores. Similar, low prevalence and mean dmft scores of 50% and 1.94 ± 2.81 were reported in primary dentition among orphan children in China [18]. National oral health survey, 2003 reported dental caries among 51.9% of the Indian 5 year old children. Higher mean dmft scores for 5- year old tribal children of 4.13 ± 3.90 was reported in a study conducted in southern India (2011) [1]. Similar mean dmft scores were reported from children in marginalized communities in Australia and West Indies [19,20]. Oulis et al reported 36% of 5 year old having dental caries and a mean dmft of 1.44 in a national pathfinder survey in Greece [21]. Higher mean dmft values were reported by Petersen et al in a study in Southern Thailand. At age 6, 96.3% of children had caries and mean dmft of 8.1 [16]. Rajab et al (2014) reported caries prevalence of 76.4% and dmft o f 3.3 among 6 year old school children in Jordan [22]. Pitts et al (2007) demonstrated a wide variation in disease prevalence and care strategies across Great Britain. Mean dmft across England was 1.47, across Wales the corresponding values were 2.38 and in Scotland 2.16. Overall, 39.4% children in Great Britain had dental caries [23]. Frazao et al (2014) reported approximately 80% children having dental caries in the primary dentition among 7-9 year old school children in Brazil and the mean dmft scores were 3.63 ± 3.26. Gender, household wealth, mother's education level, and food-insecurity was associated with dental caries [24]. Carta et al in a study conducted among 6 year old Italian school children concluded that mothers' educational level is a useful indicator for caries in Italian children living in a low-income population [25]. Present study found no association between gender, paternal and maternal education levels with dmft scores among the marginalized slum dwelling children.

Only, 16 (19.3%) children had Dental Caries (DT) in the permanent dentition among the slum children. Mean DMFT score

for the study population was again unusually low at 0.35 ± 0.90. Similar, low prevalence and mean DMFT scores of 39.5%, 40%,0.90 ± 1.38 and 0.66 were reported in permanent teeth among orphan and rural children from low socio economic status in China (2014) and Zimbawe (2013) [18,26]. Pieper et al (2013) in National survey, Germany reported akin low caries prevalence scores of 31% and .71 mean DMFT [27]. Similarly, Zander et al reported low DMFT value of 1 among rural Australian children [28]. Rajab et al (2014) reported caries prevalence of 45.5% and DMFT of 1.1 among 12 year old school children in Jordan [22]. Higher mean DMFT scores and caries prevalence were noted in India [29], Arab league [30] and Poland [31].

Apart from the low dental caries scores an additional leading finding of the study was that only 2 (.6%) among the 311 children had restoration in one or more teeth. Regardless of the low utilization of dental care, low socioeconomic status, poor literacy status of parents the disadvantaged slum children still had an extremely low level of dental caries in both primary and permanent dentition. Similar findings had been reported in many other marginalized, disadvantaged and rural communities [1,3,18,19,20,26]. Although, the basic diet of marginalized communities is changing yet rationale for the lower dental caries scores in these communities may be the dietary factors; specifically lower exposures to the cariogenic diet due to the lack of affordability in lower socioeconomic strata or geographic remoteness in out of reach areas.

While most public health efforts are intended to benefit the disadvantaged and vulnerable, nonetheless a deliberate approach is necessary to overcome the predisposition for the poor or marginalized to gain too little from even the best efforts [1]. Consequential participation of those who represent the poor and disadvantaged from all relevant sectors including civil society and policy makers is essential. Addressing marginalization will require a responsive and a caring workforce on the part of regional health authorities and government.

Conclusion

The present study reveals exceptionally low dental care utilization and dental caries levels among slum dwelling children. Findings from the study reflect a need to conduct further studies among slum children in to confirm the association between marginalization and low prevalence of dental caries.

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