Impact of Socioeconomic Status on Dental Neglect: A Comprehensive Cross-Sectional Study in Western Maharashtra, India

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ABSTRACT

This study investigated the impact of socioeconomic status (SES) on dental neglect among adults in Karad, India. In a cross-sectional survey, 200 participants were classified by SES using the Modified Kuppuswamy Scale and assessed for oral hygiene behaviors via a structured questionnaire, with data analyzed using ANOVA and correlation tests. Results revealed a significant social gradient in dental neglect (p<0.001), where lower SES groups exhibited higher neglect scores. A "health cliff" effect was evident, with the upper-middle class showing significantly better outcomes than both the lower-middle and upper-lower classes. Income emerged as the strongest predictor of neglect, starkly illustrated by the fact that 76.9% of the upper-middle class prioritized dental care despite cost, compared to 0% of the upper-lower group. The study concludes that financial barriers, more than knowledge, drive dental neglect in this population, suggesting that public health interventions must incorporate structural changes to improve financial access to achieve equitable oral health.

Keywords— Socioeconomic Status, Dental Neglect, Western Maharashtra, Oral Health

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INTRODUCTION

Oral health is a fundamental component of general health and well-being, influencing individuals' quality of life, self-esteem, physical appearance, psychological well-being and overall physiological functioning [1]. It encompasses a range of factors, from the absence of dental diseases such as caries and periodontitis to the ability to chew, speak, and socialize without discomfort or embarrassment [2,3]. Despite its significance, oral health is often neglected, particularly in emerging countries like India, where healthcare priorities tend to focus more heavily on acute illnesses and communicable diseases [4,5].

Within this context, dental neglect emerges as a critical but underexplored concern. Dental neglect refers to the persistent failure to seek or maintain appropriate oral healthcare, despite the availability of services and the presence of clear symptoms requiring intervention [6]. It includes both attitudinal neglect—where individuals deprioritize oral health—and behavioural neglect, such as infrequent brushing or avoidance of dental professionals. According to a study, dental neglect is a multidimensional phenomenon that is both a cause and consequence of broader health inequities [6].

In India, where socio-demographic variables such as income, education, and employment significantly influence health-seeking behaviours, dental neglect is particularly prevalent among vulnerable populations. Existing literature strongly supports the association between socioeconomic status (SES) and oral health outcomes [7]. SES is a complex construct that includes indicators such as household income, educational attainment, and occupational status. It has been widely reported that people with lower socioeconomic status are more likely to exhibit poor oral hygiene habits, delay or avoid dental visits, and suffer from untreated dental problems which may also lead to systemic challenges if underestimated. For instance, a study by in urban Delhi found a high prevalence of dental neglect among slum dwellers, linking it to lower availability of dental care and lower oral health literacy [8]. Similarly, a survey conducted in Haryana identified education level and employment status as significant predictors of oral hygiene behaviour [9].

Despite the public health relevance, very few surveys have been conducted in Western Maharashtra, particularly in Karad to evaluate the effect of SES on dental neglect in adults. This study aims to fill that gap by conducting a large-scale, cross-sectional survey to analyse the correlation between income, education, and employment status and various

indicators of dental neglect. By doing so, it highlights the need for public health interventions and contribute to the growing body of literature that underscores oral health as a vital dimension of social justice and equity [10].

MATERIALS AND METHODS

The survey was as a descriptive cross-sectional study to evaluate the effect of socioeconomic status (SES) on dental neglect and oral hygiene behaviours among adults residing in Karad City, Western Maharashtra. The survey was carried out from May and July 2025 at the School of Dental Sciences, which serves patients from Karad City and surrounding rural areas.

A. Study Population and Sampling Methodology
200 adults from 18 to 60 years of age participated in the survey. Random sampling was done to ensure proportional representation of different SES groups. The inclusion criteria were being a permanent resident of the selected districts for at least one year, willingness to participate, and ability to give informed consent. Individuals with cognitive impairments, severe systemic illnesses, or those undergoing intensive dental treatments were excluded.

B. Ethical Approval
This study received approval from the Ethics Committee of Krishna Vishwa Vidyapeeth. Participants voluntarily took part in this survey after they were informed about the objectives and details of the survey. Literate participants gave informed consent in a written format before participation, while verbal consent with witness attestation was secured from illiterate participants

C. Data Collection and Instruments
A structured, 10-item questionnaire was distributed to assess dental neglect and oral hygiene behaviours. Each question's response was calculated on a 5-point Likert scale ranging from "Definitely no" (1) to "Definitely yes" (5). For illiterate participants, questions were read and explained, and responses were recorded by interns. Additional demographic data was collected (age, gender) and the components required for SES classification.

D. Socioeconomic Status (SES) Classification
To ensure a standardized and robust analysis, Modified Kuppuswamy Scale was used to establish socio economic status. This validated scale calculates a composite score based on three key parameters:
1) Education: This component captures an individual's or head of household's formal educational attainment, which is a proxy for knowledge, skills, and health literacy. Scores are assigned on a descending scale, from professional degrees to illiteracy.
2) Occupation This component reflects the nature of an individual's or head of household's work, which is closely tied to social prestige, working conditions, and stability. Scores range from professional and managerial roles to unskilled labour and unemployment.
3) Income: This component measures the total monthly family income, representing the material resources available to the household.

E. Statistical Analysis
Data was entered into Microsoft Excel and further analysed.
1) Descriptive Statistics: Frequencies, percentages, means, and standard deviations were used to create a profile of the participants based on social status and demographic details.
2) Composite Dental Neglect Score: A composite dental neglect score was calculated for each participant by summing their preferences to the 10 Likert-scale items. Questions where agreement indicated positive behaviour were reverse-coded, so a higher score (range 10-50) reflects poor oral health practices (more neglect).
3) Inferential Statistics: A one-way Analysis of Variance (ANOVA) with Tukey's HSD post-hoc test was used to evaluate mean composite dental neglect scores across the different SES classes. The Chi-square ($\chi 2$) test was used to link the frequency of positive oral health behaviours (dichotomized as Likert scores 4-5) across SES classes. Spearman's rank-order correlation (ρ) was used to assess the association between the continuous Kuppuswamy scores (Total, Education, Occupation, Income) and the composite dental neglect score.

Each parameter is assigned a score, and the sum of these three scores constitutes the Kuppuswamy Total Score. This composite score is then used to stratify individuals or families into distinct socioeconomic classes, typically categorized as Lower SES, Upper-Lower SES, Lower-Middle SES, Upper-Middle SES, and Upper SES.

RESULTS

A. Socio- Demographic Details of the Study Cohort
The study cohort comprised 200 adult participants, with a slight male predominance (105 males, 52.5%; 95 females, 47.5%). The mean sample age was 37.44 years, and standard deviation was observed as 12.11 years. (Fig. 1)

The 200 participants were stratified into three distinct socioeconomic classes: Upper Middle (Class II), Lower Middle (Class III), and Upper Lower (Class IV), according to the Total Kuppuswamy score. It was observed that more than half of the participants (n=117, 58.5%) belonged to the Upper Middle (Class II), Lower Middle Class (Class III) constituted the second-largest group with 63 participants (31.5%), while Upper Lower Class (Class IV) was the smallest, comprising 20 participants (10.0%). There were no participants from other Socioeconomic classes.

A one-way Analysis of Variance (ANOVA) confirmed that the differences in mean total Kuppuswamy scores, and in the component scores for education, occupation, and income, were statistically significant across the three groups (p<0.001). In contrast, there were no significant differences observed in the distribution of gender ($\chi2$=0.49, p=0.784) or mean age (F=1.50, p=0.225) across the three SES classes, indicating these variables were well-balanced. (Table 1,2)
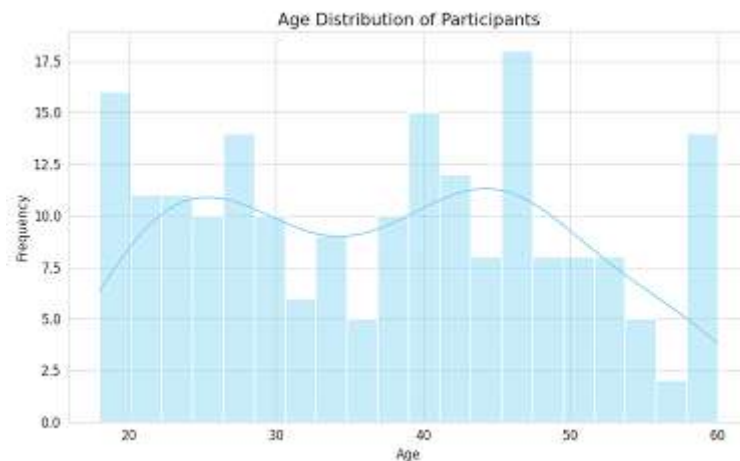

Fig. 1 Graph Showing the Age Distribution of the Participants.

Table 1: Socio-Demographic Profile Of Participants By Modified Kuppuswamy SES Classification (N=200) Values Are Presented As Mean ± Standard Deviation For Continuous Variables And N (%) For Categorical Variables. Statistical Tests Used Were Chi-Square (X2) For Gender And One-Way ANOVA (F) For Continuous Variables.

Characteristic	Upper Middle (II)	Lower Middle (III)	Upper Lower (IV)	Test Statistic	p-value
No. of Participants (%)	117 (58.5%)	63 (31.5%)	20 (10.0%)		
Age (Mean ± SD)	37.2 ± 11.5	39.1 ± 13.1	33.8 ± 11.8	F = 1.50	0.225
Gender (n, %)				χ^2 = 0.49	0.784
Female	59 (50.4%)	35 (55.6%)	11 (55.0%)		
Male	58 (49.6%)	28 (44.4%)	9 (45.0%)		
Kuppuswamy Total Score (Mean ± SD)	18.7 ± 2.3	13.6 ± 1.3	8.7 ± 0.9	F = 305.46	<0.001
Dental Neglect Score (Mean ± SD)	28.5 ± 4.1	30.7 ± 3.9	32.0 ± 3.6	F = 10.16	<0.001

TABLE 2: MEAN COMPOSITE DENTAL NEGLECT SCORE AMONG THE THREE SES CLASSES

SES Classification	N	Mean	Std. Deviation	95% Confidence Interval
Upper Middle (II)	117	28.52991453	4.067475387	27.79 - 29.27
Lower Middle (III)	63	30.66666667	3.906157257	29.68 - 31.65
Upper Lower (IV)	20	32	3.554093267	30.34 - 33.66

A. Comparative Analysis of Oral Health Behaviours and Attitudes by Socioeconomic Status
The analysis revealed a distinct social gradient for several critical oral health indicators. As shown in Table 3, the most significant disparity was observed in prioritizing dental care. A substantial 76.9% of participants in the Upper Middle Class (Class II) class reported they prioritize dental care despite financial constraints, which dropped to 9.5% in the

Lower Middle Class (Class III) and 0% in the Upper Lower class ($\chi2$=95.04, p<0.001). Significant differences were also found for avoidance of sugary foods (p=0.06), with higher SES groups reporting more favourable practices. In contrast, basic behaviours like brushing two times a day was not significant across SES groups (p=0.546).

TABLE 3: FREQUENCY OF POSITIVE ORAL HEALTH BEHAVIORS AND ATTITUDES BY MODIFIED KUPPUSWAMY SES CLASSIFICATION

PERCENTAGES REPRESENT THE PROPORTION OF PARTICIPANTS WITHIN EACH SES CLASS WHO RESPONDED WITH 'YES' (4) OR 'DEFINITELY YES' (5). STATISTICAL SIGNIFICANCE (P<0.05) IS INDICATED IN BOLD.

Oral Health Behavior	Upper Middle (II)	Lower Middle (III)	Upper Lower (IV)	Test Statistic (χ^2)	p-value
Brush teeth twice a day	50 (42.7%)	27 (42.9%)	6 (30.0%)	1.21	0.546
Visit dentist annually	50 (42.7%)	27 (42.9%)	8 (40.0%)	0.06	0.972
Use fluoride toothpaste	45 (38.5%)	28 (44.4%)	9 (45.0%)	0.75	0.686
Floss teeth regularly	44 (37.6%)	25 (39.7%)	7 (35.0%)	0.16	0.923
Replace toothbrush regularly	49 (41.9%)	22 (34.9%)	9 (45.0%)	1.06	0.589
Avoid sugary foods	50 (42.7%)	26 (41.3%)	3 (15.0%)	5.62	0.06
Aware of oral hygiene impact	49 (41.9%)	22 (34.9%)	10 (50.0%)	1.66	0.437
Seek care for tooth pain	49 (41.9%)	20 (31.7%)	7 (35.0%)	1.87	0.393
Satisfied with oral hygiene	53 (45.3%)	26 (41.3%)	7 (35.0%)	0.85	0.653
Prioritize dental care	90 (76.9%)	6 (9.5%)	0 (0.0%)	95.04	**<0.001**

B. Analysis of Composite Dental Neglect Score Across Socioeconomic Status

A one-way ANOVA revealed a highly significant difference in mean composite dental neglect scores across the three SES classes (F $(2,197)$ =10.16, p<0.001). As shown in Figure 2 and Table 4, the mean score decreased with lower SES, indicating higher neglect. A Tukey's HSD post-hoc test showed that the Upper Middle Class (Class II) score was significantly better than both Lower Middle Class (Class III) (p<0.001) and Upper Lower Class (Class IV) (p<0.001). The difference between Lower Middle Class (Class III) and Upper Lower (Class IV) was not statistically relevant (p=0.3921).
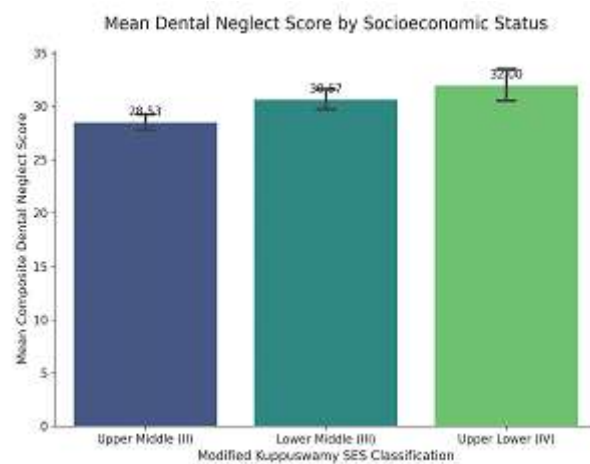

Figure 2: Mean Composite Dental Neglect Score by Modified Kuppuswamy SES Class

A Bar Chart Showing Three Bars for the SES Classes on the X-Axis and "Mean Composite Dental Neglect Score" On The Y-Axis. The Bar For "Upper Middle (II)" Is Lowest (28.53), "Lower Middle (III)" Is Intermediate (30.67), And "Upper Lower (IV)" Is Highest (32.00), With Error Bars Representing 95% Confidence Intervals.

Table 4: One-Way Anova of Composite Dental Neglect Scores by Modified Kuppuswamy Ses Classification And Subsequent Post-Hoc Tukey Hsd Test

ANOVA RESULTS: F-STATISTIC = 10.16, DF = (2, 197), P-VALUE < 0.001. POST-HOC (TUKEY'S HSD) RESULTS: UPPER MIDDLE VS. LOWER MIDDLE (P<0.001); UPPER MIDDLE VS. UPPER LOWER (P<0.001); LOWER MIDDLE VS. UPPER LOWER (P=0.3921).

Source of Variation	Sum of Squares (SS)	Df	Mean Square (MS)	F-statistic	p-value
Between Groups (SES)	320.35	2	160.18	10.16	<0.001
Within Groups (Residual)	3105.15	197	15.76		
Total	3425.5	199			

group1	group2	meandiff	p-adj	lower	upper	reject
Lower Middle (III)	Upper Lower (IV)	1.3333	0.3921	-1.073	3.7397	FALSE
Lower Middle (III)	Upper Middle (II)	-2.1368	0.001	-3.6019	-0.6716	TRUE
Upper Lower (IV)	Upper Middle (II)	-3.4701	0.0011	-5.7387	-1.2015	TRUE

F. Correlational Analysis of Socioeconomic Factors and Dental Health Outcomes

Spearman's rank-order correlation revealed a notable positive correlation between the Kuppuswamy_Total_Score and the Composite Dental Neglect Score (ρ=0.23, p<0.001). Analysing the components, the Kuppuswamy_Income_Score had the strongest correlation with the neglect score (ρ=0.24, p<0.001), followed by education (ρ=0.18, p<0.001) and occupation (ρ=0.07, p<0.001). The correlation between the total score and prioritizing care despite finances was also strong (ρ=0.76, p<0.001). (Fig. 3)
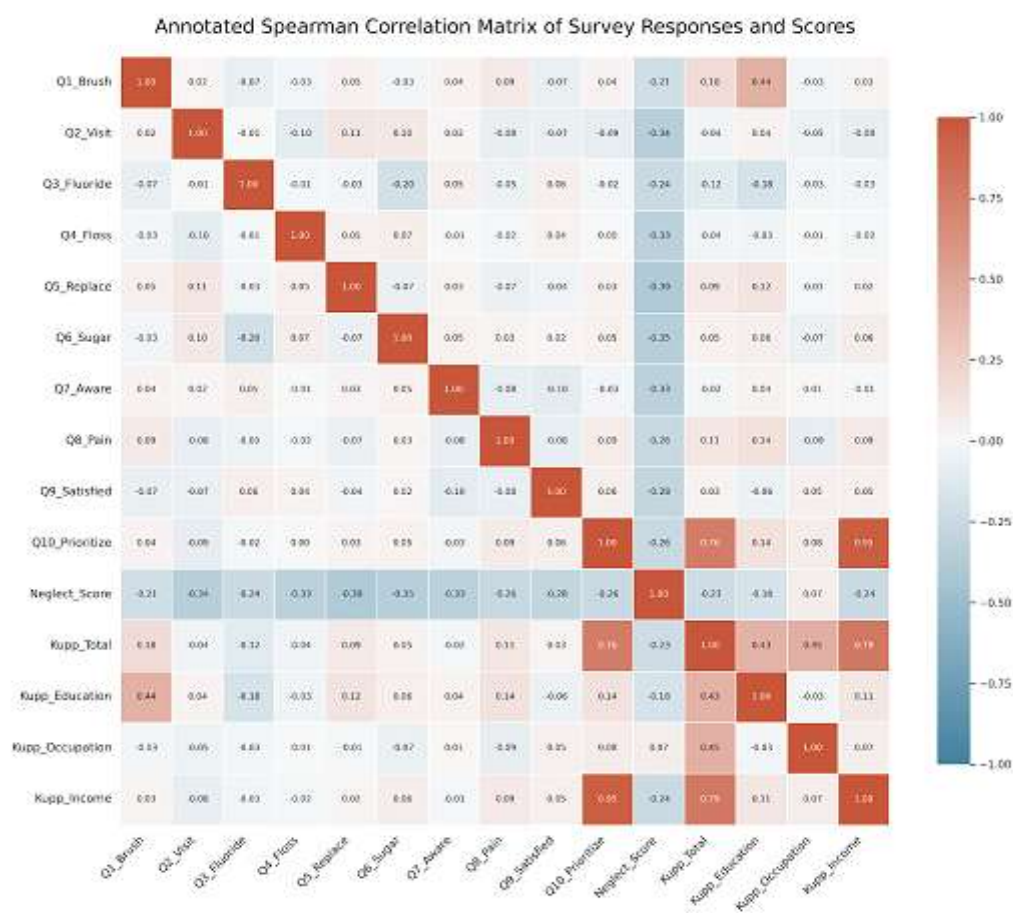

Annotated Spearman Correlation Matrix of Survey Responses and Scores

FIGURE 3: SPEARMAN'S CORRELATION MATRIX OF KUPPUSWAMY SCORES AND KEY DENTAL HEALTH OUTCOMES

DISCUSSION

This study, utilizing the standardized and validated Modified Kuppuswamy Scale, was designed to understand the influence of socioeconomic status (SES) on dental neglect among adults in Karad City, Western Maharashtra. The re-analysis of the data provides a more nuanced and robust understanding of this relationship, confirming that a significant social gradient in oral health practices exists within this population. The findings reveal that individuals in lower socioeconomic strata exhibit significantly higher levels of dental neglect, a conclusion that aligns with the broader framework of social determinants of health articulated by Marmot and Wilkinson (2005). [11]

A critical finding of this analysis is the nature of the socioeconomic gradient, which appears less as a smooth continuum and more as a "health cliff." The ANOVA post-hoc tests revealed that the mean composite dental neglect score of the Upper Middle Class (Class II) was significantly better than those of both the Lower Middle Class (Class III) and Upper Lower Class (Class IV). However, the difference between the Lower Middle Class (Class III) and Upper Lower Class (Class IV) was not statistically significant. This suggests that the most substantial drop-off in positive oral health behaviours occurs when moving from the middle-to-upper echelons of society to the middle-to-lower strata, identifying the broad non-Upper Middle Class population as a key vulnerable group requiring targeted intervention.

The correlational analysis further deconstructed the drivers of neglect, revealing that while all components of SES (education, occupation, and income) were significant predictors, income emerged as the most powerful factor. The Kuppuswamy income score had the strongest correlation with the overall composite dental neglect score ($\rho=0.24$) and an even stronger correlation with the self-reported ability to prioritize dental care despite financial constraints ($\rho=0.95$). This strongly corroborates the findings of other studies [12,13,14], who identified cost as a primary barrier to dental care in Indian communities. The starkest evidence of this was that while 76.9% of the Class II prioritized care despite cost, this figure dropped to 9.5% for the Lower Middle Class (Class III) and an alarming 0% for the Upper Lower class. This implies that financial capacity is a primary determinant of whether knowledge and attitudes translate into action.
The policy implications of these refined findings are profound. The presence of a "health cliff" instead of a linear gradient indicates that public health schemes must be broad enough to support not just the poorest, but all who fall below the upper-middle socioeconomic threshold.

Moreover, the dominant role of income as a barrier underscores that awareness campaigns alone are insufficient. As suggested in a study, education fosters better understanding, but our survey show this does not necessarily ensure better outcomes without financial means [15]. Therefore, interventions must be multi-pronged, combining culturally tailored health literacy programs with structural changes that improve financial access. Integrating comprehensive oral health services into national schemes like Ayushman Bharat, subsidizing essential hygiene products, and expanding mobile dental clinics in underserved areas are critical steps [16]. Despite the strengths of using a validated SES scale and a diverse sample, the study's cross-sectional design remains a limitation, preventing causal inference. Future research should employ longitudinal methods to track how changes in SES affect oral health over time and incorporate qualitative studies to explore the cultural and social beliefs that underpin the observed behaviours. To sum it up, this study provides concrete evidence that dental neglect in Karad is deeply intertwined with socioeconomic disadvantage, driven primarily by financial barriers that create a sharp divide in health outcomes.

CONCLUSIONS

The undertaken study provides concrete evidence that socioeconomic status, as assessed by the Modified Kuppuswamy Scale, significantly influences dental neglect and oral hygiene behaviours among adults in Karad City. Individuals with lower income, limited formal education, and unstable or informal employment were found to exhibit poorer oral health practices, including infrequent brushing, minimal use of oral hygiene aids, and reluctance or delay in seeking dental care leading to poor oral hygiene.

These findings are in alignment with similar studies conducted in other parts of India and internationally, which have consistently reported that socioeconomic disadvantage is a vital determinant of oral health disparities. The association between higher educational levels and improved oral hygiene practices observed in our survey indicates that education plays a key role in shaping oral health behaviour. Educated group of people are more likely to be aware of preventive dental practices and recognize the importance of regular dental check-ups and maintaining healthy oral cavity. Similarly, higher income earning individuals are more capable of affording dental care services and purchasing oral hygiene products.

Given the evidence presented, it is imperative that public health authorities implement targeted interventions aimed at reducing dental neglect among vulnerable populations. Community-based oral health awareness programs, integration of dental services in primary health care, mobile dental units for rural outreach, and subsidized treatment schemes are potential strategies that could bridge the gap in dental care access and utilization. Ultimately, addressing the socioeconomic determinants of oral health requires a multidisciplinary approach involving dental professionals, public

health practitioners, educators, and policy makers. Only through such collaborative and inclusive efforts can we hope to reduce dental neglect and achieve equitable oral health outcomes across diverse populations.

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