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Socioeconomic status and traumatic dental injuries

LETTER TO THE EDITOR

Understanding the web of causality of different health conditions can significantly contribute to the improvement of programs targeted at reducing disease burden in different populations. A number of studies have been carried out throughout the world to investigate risk factors for traumatic dental injuries (TDI). Published data on this subject have recently been summarized in an important review of the literature carried out by Professor Glendor (1).

Despite the agreement regarding some factors, such as the greater prevalence of TDI among male adolescents and children or adolescents with pronounced overjet, conflicting results are still found regarding the influence of socioeconomic status. Some studies have demonstrated that children with a lower socioeconomic status have higher rates of TDI (2–4), while other investigations report a reverse association (5–8). The differences in the findings may be partially explained by the use of different indicators of socioeconomic status (family income, social class, parents' level of education, type of school) as well as the considerable variation in cutoff points. However, it is possible that socioeconomic status exerts an influence in different ways, depending on cultural aspects and issues related to access to safe environments, protective equipment for the avoidance of TDI and healthcare services in each country. Moreover, contextual variables (e.g., social cohesion, social capital, and social vulnerability) may exert an influence on the occurrence of TDI (9–11), which could alter the effect of individual-level variables. Therefore, this important issue needs to be clarified.

An electronic search of recently published articles on the topic in Medline (PubMed) identified a study with a reasonable sample size (412 participants aged 18–22 years) carried out by Fakhruddin and Kawas (12), in which the authors write that 'dental traumas are prevalent among middle and high socioeconomic group' in the United Arab Emirates. The authors describe 'an association between high family income and dental injuries' and justify that this finding is due to the 'predominance of participants from high socioeconomic categories who can afford sports, and other leisure activities, or psychosocial risk factors such as an individual's behavior.' However, further examination of the data demonstrates quite the opposite: TDI were more prevalent among individuals from low socioeconomic status. According to Table 1, 37 of the 83 participants with low income had TDI, whereas 70 of the 329 participants with middle/high income had TDI, indicating a higher prevalence rate among the former group (44.6%, recalculated, Table 2) in comparison with the middle-/high-income group (21.3%, recalculated, Table 2). The error in the interpretation may have occurred because the authors counted the total (100%) in the column and not on the line. When investigating the risk of TDI regarding different independent variables (in this case, household income), the prevalence of trauma in each category of the independent variable should be described and not the prevalence of socioeconomic level in each category of trauma. Thus, percentages should be described in such a manner that the row total becomes hundred rather the column total.

Table 1. Frequency distribution of dental injuries by socioeconomic indicators (as published)

	Dental injury			
Socioeconomic indicators	Yes *n* (%)	No *n* (%)	Odds ratio (95% CI)	*P* value[1]
Educational level of mother				
Less than high school/high school	51 (47.7)	109 (35.7)	0.84 (0.42–1.71)	0.396
College/university education	56 (52.3)	196 (64.3)		
Educational level of father				
Less than high school/high school	34 (31.8)	42 (13.8)	0.54 (0.22–1.08)	0.060
College/university education	73 (68.2)	263 (86.2)		
Family income				
Low income (<AED 10 000 per month)	37 (34.6)	46 (15.1)	3.86 (2.79–6.34)	0.02
Middle/high income (>AED 10 000 per month)	70 (65.4)	259 (84.9)		
Nationality				
Emirati/non-Emirati	35 (32.7) 72 (67.3)	87 (28.5) 218 (71.5)	0.51 (0.12–2.18)	0.324

[1]Chi-square test.

Table 2. Frequency distribution of dental injuries by socioeconomic indicators (reanalyzed)

Socioeconomic indicators	Dental injury: Yes *n* (%)	Dental injury: No *n* (%)	Odds ratio (95% CI)	*P* value[1]
Educational level of mother				
Less than high school/high school	51 (31.9)	109 (68.1)	1.64 (1.02–2.62)	0.029
College/university education	56 (22.2)	196 (77.8)		
Educational level of father				
Less than high school/high school	34 (44.7)	42 (55.3)	2.92 (1.68–5.07)	<0.001
College/university education	73 (21.7)	263 (78.3)		
Family income				
Low income (<AED 10 000 per month)	37 (44.6)	46 (55.4)	2.98 (1.74–5.10)	<0.001
Middle/high income (>AED 10 000 per month)	70 (21.3)	259 (78.7)		
Nationality				
Emirati/non-Emirati	35 (28.7)	87 (71.3)	1.22 (0.74–2.01)	0.414
	72 (24.8)	218 (75.2)		

[1]Chi-square test.

Moreover, the authors describe a *P* value of 0.02, when in fact the probability of the difference found between categories being by chance with the chi-square test is much smaller: $P = 0.000015$.

The authors also describe the odds ratio, a measure of effect that represents 'the ratio of the odds of the outcome event in the exposed group compared to the odds in the unexposed group' (13). The odds ratio calculated manually $[(37 \times 259)/(70 \times 46)]$ or with the aid of the Epi-Info software is 2.98 (and not 3.86, as described), indicating that the odds of TDI for individuals with a low family income were three times higher (95% CI: 1.74–5.10). Moreover, while Table 1 and the text indicate no statistically significant differences regarding the other socioeconomic variables, this in fact occurred with educational level of mother (*P* value = 0.029, recalculated, Table 2) and educational level of father ($P < 0.001$, recalculated, Table 2), consistently indicating a greater chance of TDI among individuals with a lower socioeconomic status in the population in question.

The authors could also opt to invert reference category. In this case, the odds ratios for educational level of mother, educational level of father and nationality would be 0.61 (95% CI: 0.38–0.98), 0.34 (95% CI: 0.20–0.60) and 0.82 (95% CI: 0.50–1.36), respectively, indicating a protective effect of a higher socioeconomic status regarding the former two variables.

In the multivariate model, the authors report an adjusted odds ratio of 1.98 (95% CI: 1.15–3.45) for household income. In this case, the reference category was 'middle/high income,' indicating a twofold greater chance of TDI among individuals with 'low income.' Thus, if the frequencies of TDI are correctly described in Table 1, the results of the study should demonstrate a greater chance of TDI among individuals with a lower socioeconomic status, unlike what the authors state in the Results and Discussion sections.

In conclusion, the present reanalysis of the data from the study by Fakhruddin and Kawas (12) can contribute to knowledge on factors associated with TDI in different populations. Comprehensive research and the correct interpretation of the findings in different populations are essential to a broader understanding of the web of causality of this important outcome.

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Response from the authors

We would like to thank the author of "letter to editor" and thank you for your e-mail regarding our paper published in Dental Traumatology in 2010 by Fakhruddin & Al Kawas.

In our result we have mentioned that "Of 412 subjects, clinical evidence of dental trauma to anterior dentition was observed in 107 (25.9%) young adults." Out of 107 we have 71 (66.4%) male and 36 (33.6%) female. In Table 1, we investigated the relationship between dental injuries and socio-economic indicators. We have 37 (34.6 %) subjects out of a total 107 with dental injuries from family with low income and 70 (65.4%) subjects out of a total 107 with dental injuries from family with middle/high income. In this comparison we are comparing the subjects with dental injuries (107) only we are not comparing the total subjects which is (412) subjects.

However, the author of the "letter to editor" had used different method in calculation as he/she has considered the original sample size of (412) participants and not just the sample of subjects with dental injuries (107) and their distribution between low and high income families. Both approaches are possible and we agree that this is a more accurate way to analyze and describe the data. So Table 1 should be replaced with the table the author of the Letter to the Editor has suggested. We appreciate his/her comments and details indicated.

Finally, we do value the effort that the author had put in writing the letter and demonstrated interest in this area of research.

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