An Investigation into the Prevalence of Dental Caries and its Treatment Among the Adult Population With Low Socio-Economic Status in Baku, Azerbaijan

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Abstract

Aim: The aim of this study was to assess the prevalence of dental caries and its treatment among the adult population of Baku, Azerbaijan, with low socio-economic status (SES). ***Methods:*** Home-based and workplace dental examinations were performed on 681 adults (of whom 338 were male and 343 were female) from the age groups 15-19 years, 20-29 years, 30-39 years, 40-49 years, 50-59 years, 60 years and older, all of whom resided in Baku city. The subjects were workers and unemployed people with low incomes. The World Health Organization 1997 criteria were used for diagnosis and recording of Decayed, Missing, or Filled Teeth (DMFT) index. Dental caries was diagnosed at the caries into dentine at the (D3) threshold, using a visual method with mouth mirrors, dental probes and daylight illumination. ***Results:*** Results demonstrated an overall average caries prevalence of 96.7%. The lowest prevalence (86.1%) was in the 15-19 years group. Prevalence increased with age. The mean DMFT for all ages was 9.12, of which the M element was 6.81 and the F element only 0.35, resulting in a very low Care Index of 3.8%. There was a mean of 0.41 teeth per subject, which manifested symptoms of either pulpitis or periapical infection and a mean of 0.72 teeth per subject present as retained roots. In general, the subjects exhibited very low motivation for undergoing dental treatment and a poor level of hygiene. ***Conclusion:*** The study demonstrated a very high prevalence of caries among Baku's population with low SES, a very high proportion of missing teeth, and a very low proportion of filled teeth, resulting in an extremely low Care Index, demonstrating the inadequacy of the dental health service and the need to develop a programme aimed at improving the dental health service provided for those from the lowest SES in Baku.

Key Words: Epidemiology, Dental Caries, DMFT, Socio-Economic Status, Baku, Azerbaijan

Introduction

Recent studies in an elderly population in Brazil [1], young army recruits in Australia [2], labourers in India [3] and adolescent migrants in Germany [4] have reported a varying prevalence of dental caries. Different factors can influence prevalence, including socio-economic status (SES) [5] and income [6]. Studies in Brazil [7,8] and Romania [9] have investigated the association between parents' SES and the prevalence of caries in their children and have found that it is higher (worse) in the children whose parents have a low SES. There have been far fewer studies of the prevalence of dental caries in adults with a low SES.

In Azerbaijan, there have been few comprehensive epidemiological studies of dental caries and only one since 1989. Those that have taken place have invariably been related to research for doctoral degrees [10-13]. Studying the epidemiology of dental caries enables the assessment of its prevalence, helps to determine peoples' need for dental care, and informs the development of prevention and treatment programmes. In countries such as Azerbaijan, which are experiencing rapid economic development, there is the possibility of funding such programmes in the near future, once the relevant epidemiological data have been produced.

The Care Index, defined as the ratio of filled teeth (F) to the total DMF [14] component of the

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Decayed Missing Filled Teeth (DMFT) index, can be used to show treatment patterns in a population. As such, it has been used to monitor changes in treatment provision and to highlight inequalities in the provision of care [15]. It is a practical application of the DMFT index to aid in planning the provision of publicly funded dental services and can help in targeting these services at areas with people who have the greatest need.

Aim

The aim of this study was to assess the prevalence of dental caries and its treatment among the adult population of Baku with low socio-economic status.

Methods

The sample

The population sample was drawn in two stages. In the first stage, within an overall sample size of 1000, the number of subjects within each of the seven age groups (under 15 years, 15-19 years, 20-29 years, 30-39 years, 40-49 years, 50-59 years, and 60 years and older) was proportional to the number of people within that age group in the population of Baku according to the latest population census for the city. This indicated that the sample size of those aged 15 years and older should be 681. In the second stage, 681 subjects were recruited from employees of businesses (unqualified workers) and the unemployed living in different districts of the city. Inclusion criteria were residence in Baku for more than 10 years and no more than primary education or attendance at a technical school. As far as possible, men and women were recruited in equal numbers. The owners of businesses and health authorities publicised the study and encouraged those who met the criteria to volunteer to take part in the survey.

The examination

The examinations took place either in the volunteers' homes or at their workplace. Three trained and calibrated examiners performed the examinations. Calibration of the examiners was carried out by the principal investigator (AChP) in the Department of Therapeutic Dentistry of Azerbaijan Medical University, Baku. The World Health Organization (WHO) 1997 criteria for caries diagnosis were used to diagnose and record the DMFT index [16]. Dental caries was diagnosed at the caries into dentine (D3) threshold, using a visual method with mouth mirrors, blunt dental probes and daylight illumination. Within the overall D component, teeth were subdivided into three classes:

Class A: caries into dentine but no evidence of pulpitis or periapical infection.

Class B: teeth with caries into dentine with evidence of either pulpitis or periapical infection.

Class C: carious teeth present as retained roots.

Pulpitis was diagnosed when a tooth with a carious cavity was painful when thermally stimulated. A periapical infection was diagnosed if a tooth with a carious cavity was tender to percussion.

Mean scores for each of these three subdivisions of the D component of DMFT were calculated, as was the Care Index.

Ethical approval

Ethical permission to conduct the study was given by Ethical Committee of the Medical University of Baku. Written consent was obtained from the local public health authorities and from local administration authorities and verbal consent from the subjects who took part in the survey.

Results

In the sample of 681 sujects, 338 were men and 343 were women. The results are not subdivided by gender. The level of oral hygiene, prevalence of caries, level of education and housing conditions were broadly similar for both men and women. Data were therefore not analysed by gender, because the aim of the survey was to obtain basic information on caries prevalence in the adult population with a low SES to aid planning a future oral health strategy.

The prevalence of caries by age group is presented in *Table 1*. The overall prevalence for all 681 subjects was 96.7%. The prevalence was high in all age groups but was lowest in the youngest age group and increased with age.

Table 1. *Prevalence of caries (percentage of subjects with one or more Decayed, Missing or Filled Teeth) among the study population*

Age groups	Subjects (n)	Prevalence of caries (%)
15-19	86	86.1
20-29	105	98.1
30-39	126	98.4
40-49	194	98.0
50-59	95	99.0
60 and older	75	99.8
Mean for all ages	681	96.7

Table 2. *Mean DMFT and its components' score per subject in the six age groups*

Age groups	Subjects (n)	Mean DMFT	Components of DMFT		
			D	M	F
15-19	86	3.61	1.85	1.54	0.21
20-29	105	5.22	2.21	2.63	0.38
30-39	126	6.56	2.32	3.88	0.36
40-49	194	7.25	2.19	4.70	0.36
50-59	95	12.8	1.78	10.7	0.36
60 and older	75	19.9	1.25	18.5	0.16
Average of all ages	681	9.12	1.96	6.81	0.35

D=decayed, M=missing, F=filled

The overall mean DMFT index was 9.12. The mean DMFT values were lowest in the 15-19 year olds (3.61) and rose with age to 19.9 in the 60 years or older age group *(Table 2).*

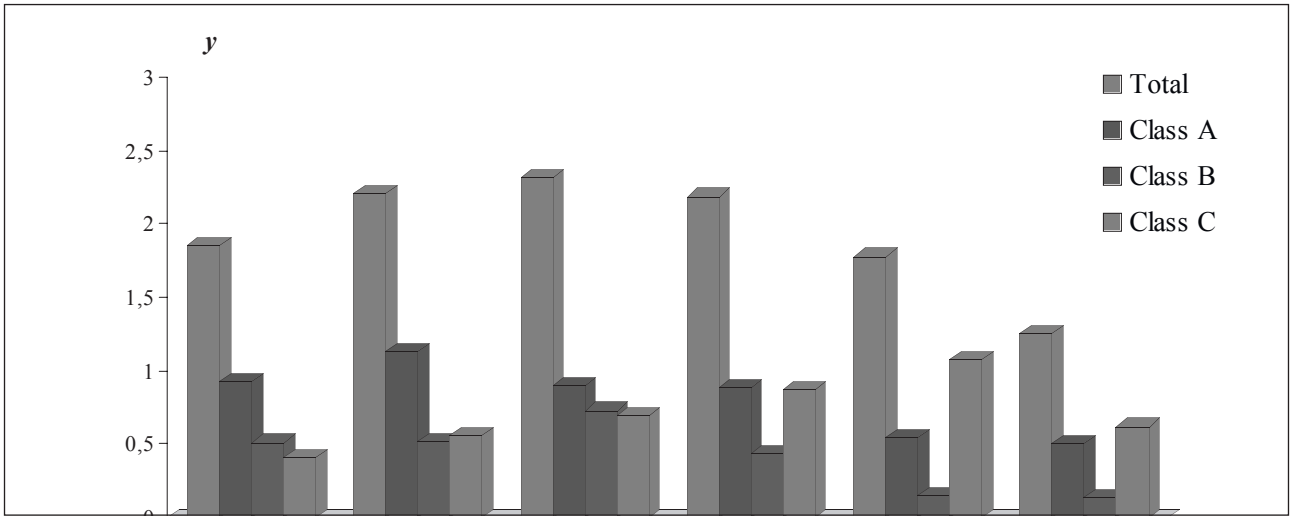
Analysis of the DMFT's components provided a clearer picture of caries prevalence among the 681 subjects. Of the mean overall DMFT for all ages of 9.12, the overall mean D component was 1.96, the overall mean M component was 6.81 and the overall mean F component was 0.35 *(Table 2).* Thus the mean number of missing (invariably extracted) teeth per subject (6.81 teeth) accounted for 74.7% of the overall mean DMFT.

When the overall mean D component for all ages of 1.96 was subdivided according to the extent of caries, it was seen that more teeth in Class B (caries and either pulpitis or a periapical infection, mean 0.41) and Class C (carious retained roots, mean 0.72) had advanced caries than in Class A (caries into dentine but no evidence of pulpitis or periapical infection, mean 0.83) *(Table 3).*

Table 3. *Components of the D mean scores in the six age groups*

Age groups	Mean D	Class A	Class B	Class C
15-19	1.85	0.93	0.51	0.41
20-29	2.21	1.13	0.52	0.56
30-39	2.32	0.90	0.73	0.69
40-49	2.19	0.89	0.43	0.87
50-59	1.78	0.55	0.15	1.08
60 and older	1.25	0.50	0.13	0.62
Average of all ages	1.96	0.83	0.41	0.72

The total mean number of teeth needing treatment for caries rose from a mean of 1.85 per sub-



Class A: Decay in dentine but with no evidence of pulpitis or periapical infection.
Class B: Decay into dentine with evidence of either pulpitis or periapical infection.
Class C: Advanced decay such that only roots remain.

Figure 1. *Mean number of teeth (per subject requiring treatment with caries (Class A), pulpitis or periapical infection (Class B) and teeth present as roots (Class C).*

ject in the 15-19 year olds to a maximum of 2.32 teeth per subject in the 30-39 year olds. It then fell with age to a mean of 1.25 teeth per subject in the 60 years and older group (*Table 3* and *Figure 1).*

Apart from in the two youngest age groups, the mean number of teeth with advanced caries (Classes B and C) was greater than the mean number with "simple" caries in dentine but with no symptoms of either pulpitis or periapical infection (Class A) *(Table 3).* The mean number of teeth per subject with caries and evidence of either pulpitis or periapical infection (Class B) was highest in the 30-39 year old age group (*Table 3* and *Figure 1).* The mean number of teeth per subject present as retained roots (Class C) was highest in the 50-59 year old age group (*Table 3* and *Figure 1).* The mean number of missing teeth increased with age and was highest in the 60 years and older group *(Table 2).*

It was noticeable that the mean number of filled teeth was remarkably similar (between 0.36 and 0.38) in all age groups, other than in the youngest age group (15-19 year olds) where it was 0.21 and the oldest age group (60 years and older) where it was 0.16 *(Table 2).*

The mean Care Index for each of the age groups is at *Table 4.*

Table 4. *Mean Care Index in the six age groups*

Age groups	DMFT per subject	Care Index	Teeth filled within total DMFT (%)
15-19	3.61	0.058	5.8
20-29	4.94	0.077	7.7
30-39	6.27	0.057	5.7
40-49	7.25	0.049	4.9
50-59	12.8	0.028	2.8
60 and older	19.9	0.008	0.8
Average of all ages	9.12	0.038	3.8

Disussion

This was the first study of caries in adults with a low SES in Azerbaijan. Its purpose was to provide a simple assessment of its treatment need. Therefore a simple methodology was used and other oral diseases such as periodontitis and lesions of the oral mucosa were not specifically assessed. It can be criticised for a number of reasons, including the lack of a totally random sample, not dividing the participants by gender, and the simplistic criteria that were used to diagnose pulpitis and periapical infection. However, the resulting data have provided an overview of caries prevalence in the population that was surveyed and this can inform oral health care planning in Baku. In this respect, it will also be necessary to assess the periodontal status and the oral mucosal health of the population.

SES is known to be influenced by a number of factors, including level of education, qualifications, occupation, living conditions, and income [6]. In the current study, low levels of education and qualification and low or no wages (unemployment) were used as criteria to select the subjects because these factors were relatively easy to assess.

As expected, the mean DMFT score increased with age, as did the mean number of missing teeth. It was noticeable that in all age groups, except for the 15-19 year olds, missing teeth (M) accounted for over 50% of the mean DMFT score and that this percentage rose with age to the extent that in the 60 years and older age group, M accounted for 93% of the mean DMFT score. This feature, plus the number of retained roots, the number of teeth with either pulpitis or periapical infection in those under 50 years of age, and the very low percentage of filled teeth within the mean DMFT scores, indicated that the subjects had received very little oral health care other than extractions. As a result, the Care Index in all age groups was very low.

When compared with the results of other studies into the impact of low SES on caries prevalence, some similarities can be seen. A study in South Vietnam found high numbers of missing teeth at all ages but low numbers of the population with decayed and filled teeth, in that the mean number of filled teeth was extremely low in all age groups [17]. The same study also found that low SES significantly increased the chances of missing molar teeth and that subjects with high SES more often had fillings [17]. A study in Monte Negro (Brazil) that investigated DMFT in 15-19 year olds, 35-44 year olds, and 65-74 year olds living in both rural and urban areas, found scores of 5.96, 16.00, and 25.96, respectively, which were higher than those for comparable groups in the current Baku study [18]. The Care Index percentages for the 15-19 year olds and the 35-44 year olds in Monte Negro were far higher than those in the Baku study, at 29.4% and 25.0%, respectively. However, the Care Index of 1.41% for the 65-74 year olds was not so different to that seen in the Baku study (0.2%), indicating that in both populations, subjects in the 60+ age group had very few restored teeth and had received

very little oral health care other than extractions. In both populations, dental caries increased with age and the main dental problem of adult and elderly groups was tooth loss [18].

However, in a developed country such as the United Kingdom, with far greater access to oral health care for all the population and awareness of the importance of oral health, the situation is somewhat different. The results of the 1998 Adult Dental Health Survey [19] indicated a mean DMFT for all adults of 12.9, within which D=1.2, M=3.8 and F=7.9. The mean DMFT score for the two groups with the lowest SES was little different at 13.7, within which D=1.2, M=5.4 and F=7.1 [19]. Thus apart from having slightly more missing teeth, overall the subjects from the two lowest SES groups had similar numbers of decayed and missing teeth to the national mean. The high F component gave a mean Care Index of 61% for all adults and of 52% for those from the lowest two SES groups.

The very low number of filled teeth among those from the lowest SES in Baku and the high number of missing teeth could be accounted for by a number of factors including low motivation for undergoing dental treatment due to disinterest in oral hygiene, and an inability or unwillingness to pay for dental treatment. The generally poor level of oral hygiene seen in the mouths of the 681 subjects suggested poor personal oral hygiene (irregular toothbrushing) and a lack of professional cleaning.

Thus, the current study has identified a link between poor oral health and low SES in the adult residents of Baku, exemplified by a high prevalence of caries, very few filled but many extracted teeth, and poor levels of oral hygiene.

In order to address this problem, it will be necessary to develop an oral health aid programme for the adult population that should seek to:

- Raise the awareness of the importance of oral health at workplaces and also wherever people gather together, in order to motivate people to visit dental clinics and to improve their oral hygiene and diet.
- Encourage dentists to provide dental examinations and oral hygiene advice for all members of the community at regular intervals.
- Identify funds to enable this to happen, possibly by encouraging employers to establish contracts with dental clinics for the oral care of their employees and their families and to either pay for or subsidise the costs.
- Fund and maintain mobile dental units which could provide oral health care at workplaces.

Conclusions

The current study has identified:

- A very high prevalence of caries among Baku's population with low socio-economic status.
- A very high proportion of missing teeth and a very low proportion of filled teeth, resulting in an extremely low Care Index, which demonstrate the inadequacy of the dental health service.
- The need to develop a programme aimed at improving the dental health service provided for those from the lowest SES in Baku.

Contribution of each author

All three authors performed the clinical examinations.

ACP planned the study and wrote the paper.

Statement of conflict of interests

As far as the authors are aware, there is no conflict of interest.

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