

# Prevalence and severity of periodontal diseases and dental caries in Bangladesh

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## Summary

This paper reviews the results of studies on periodontal diseases and dental caries in Bangladesh. Almost all subjects aged 12 to 19 years (82–95 per cent) and 35 to 44 years (98–100 per cent) had calculus. The various studies showed a wide range of prevalences (14–65 per cent) of subjects with deep periodontal pockets in the age group of 35 to 44. According to a median estimate of the prevalence of subjects with deep periodontal pockets (26 per cent), it can tentatively be concluded that Bangladesh belongs to the 20 per cent of countries in the world where periodontal conditions of the population are among the worst. To assess the caries experience, median DMFT-values of age cohorts from the various studies were calculated. Twelve year olds had a DMFT of 1.7, 15 to 19 year olds of 1.6, 20 to 34 year olds of 1.0 and 35 to 44 year olds had a DMFT of 1.4. These DMFT-values are considered to be upper limit values since they were almost exclusively obtained from urban and peri-urban populations. The age effects observed indicated that there might have been an upward trend in caries activity in (urban) children before 1980. Cohort effects indicating secular changes in caries experience over the last 15 years have not been observed. It is therefore tentatively concluded that the caries activity in Bangladesh has remained stable in the last 15 years.

The aim of this paper is to describe the present situation regarding the periodontal condition and dental caries of the population of Bangladesh. In addition this paper aims to determine possible secular changes. Therefore, data from previous epidemiological studies were reviewed and analysed.

## Materials and methods

### *Periodontal diseases*

A total of nine cross-sectional studies on periodontal diseases in Bangladesh were traced in reports and publications<sup>1–9</sup> but only five<sup>1–5</sup> recorded periodontal conditions according to the CPITN scoring system<sup>10,11</sup>, or presented the data suitable for recalculation conforming to CPITN-scores. WHO has suggested the 65 to 74

years age group as the key age group for monitoring of periodontal diseases in elderly people<sup>12</sup>. However, none of the studies had included this age group, probably because only approximately 3 per cent of the population in Bangladesh reaches an age of over 65<sup>13</sup>.

### *Dental caries*

Seven cross-sectional studies on dental caries in Bangladesh, presenting DMFT-values, were retrieved in three reports and two publications<sup>2–4,14,15</sup> and are included in this review. The studies in 1978 and 1984 have been conducted by the same researcher<sup>3</sup>. Two other studies have also been performed by one and the same researcher, one in 1980 and one in 1982<sup>4</sup>. Besides these, different researchers have been involved and different criteria and methods have been used in the various

Table 1 Periodontal conditions measured by CPITN of the 35 to 44 years age group

Year of examination	n		Percentage of persons with a highest score of					Mean number of sextants				
			Score*					Score*				
			0	1	2	3	4	0	1+2+ 3+4	2+ 3+4	3+4	4
1982 <sup>1</sup>	78	unskilled workers	2	0	0	34	65	0.2	5.8	5.6	5.2	2.1
1984 <sup>3</sup>	121	unskilled workers & villagers	2	0	27	57	14	0.2	5.8	5.6	2.7	0.3
1990 <sup>4</sup>	73	villagers	0	0	16	49	34	0.5	5.5	5.5	2.8	1.0
	90	urban slum	2	1	38	41	18	0.8	5.2	5.0	1.7	0.4

\*Score 0 = no periodontal diseases, score 1 = bleeding, score 2 = calculus, score 3 = shallow pockets 4&5 mm, score 4 = deep pockets > 5 mm

studies to diagnose caries. The samples in the seven studies almost exclusively represented urban or peri-urban populations. Two studies<sup>3,4</sup> included a small rural sample. Since the differences between urban and rural DMFT-values in these two studies were not statistically significant, average DMFT-values are presented.

## Results

### *Initial forms of periodontal diseases in children and adolescents*

The studies<sup>1-5</sup> carried out between 1982 and 1992 show that only 0-9 per cent of the 12 to 19 years age group had a dentition free of gingival bleeding and calculus, with 82-95 per cent of them exhibiting calculus. Two studies included a rural sample<sup>3,4</sup>. One study<sup>3</sup> reported a slightly lower prevalence of calculus in the urban sample, but another<sup>4</sup> did not report significant differences in calculus prevalence between rural and urban children and adolescents. The various studies of the 15 to 19 year age group reported an average number of sextants with calculus (or higher CPITN-score) of 3.4-3.9. These findings therefore classify Bangladesh as among the 25 per cent of countries in the world where calculus is most prevalent in the age group of 15 to 19<sup>16</sup>.

### *Periodontal condition of adults*

CPITN-data of the 35 to 44 year age group from three studies in Bangladesh<sup>1,3,4</sup> are listed in Table 1. The 35 to 44 year age group consisted of jute mill workers in Rajshani<sup>1</sup>, workers in a tobacco factory, people from rural areas in the Jessore district<sup>3</sup>, an urban slum group from Dhaka and villagers from Jessore<sup>4</sup>. The latter study also included an urban privileged group from Dhaka with much better periodontal conditions. This group is omitted from Table 1 because it constitutes such a small part of the total population that its contribution to the national average is insignificant. Almost all adults (98-100 per cent) had calculus\*. The three studies of 35 to 44 year age group reported an average 5.3-5.6 sextants with calculus or higher scores (Table 1). These data therefore

classify Bangladesh as among the 15 per cent of the countries in the world where calculus in the age group of 35 to 44 is most prevalent<sup>16</sup>.

Table 1 shows that 14-65 per cent of the subjects aged 35 to 44 years has deep periodontal pockets; on average 0.3-2.1 sextants in this age group have deep periodontal pockets. According to the lowest prevalence (14 per cent) of deep pockets in Table 1 Bangladesh would still be classified among the 33 per cent of the countries in the world where deep periodontal pockets in the age group of 35-44 is most prevalent. A median estimate of the prevalence of deep pockets (26 per cent) would rank Bangladesh as among 20 per cent of the countries in the world where deep periodontal pockets in the age group of 35 to 44 is most prevalent<sup>16</sup>.

### *Dental caries*

Figure 1 depicts average DMFT-values for age cohorts at various periods of time over the last 15 years. The y-axis represents the DMFT-score. Each x-axis represents a specific age cohort. Each z-axis shows cohorts of increasing age examined in one study. The DMFT-value in Bangladesh consists almost exclusively of D (decayed) teeth in the early-age groups, since fillings are almost absent and the number of missing teeth due to caries is very low until the age of 34<sup>2-4,14</sup>.

## Discussion

### *Periodontal diseases*

The data from the various studies are consistent regarding the high prevalence of calculus from childhood to

\*The percentage of subjects with calculus was computed from Table 1 by summing the percentage with scores 2, 3 and 4, assuming that a score higher than 2 indicates the presence of calculus. This assumption seems reasonable since studies addressing the validity of the hierarchical characteristic of CPITN-score in Hong Kong, Kenya and Tanzania<sup>17-19</sup> have shown that adding score 3 and 4 to 2, results in negligible overestimates of the prevalence of calculus.

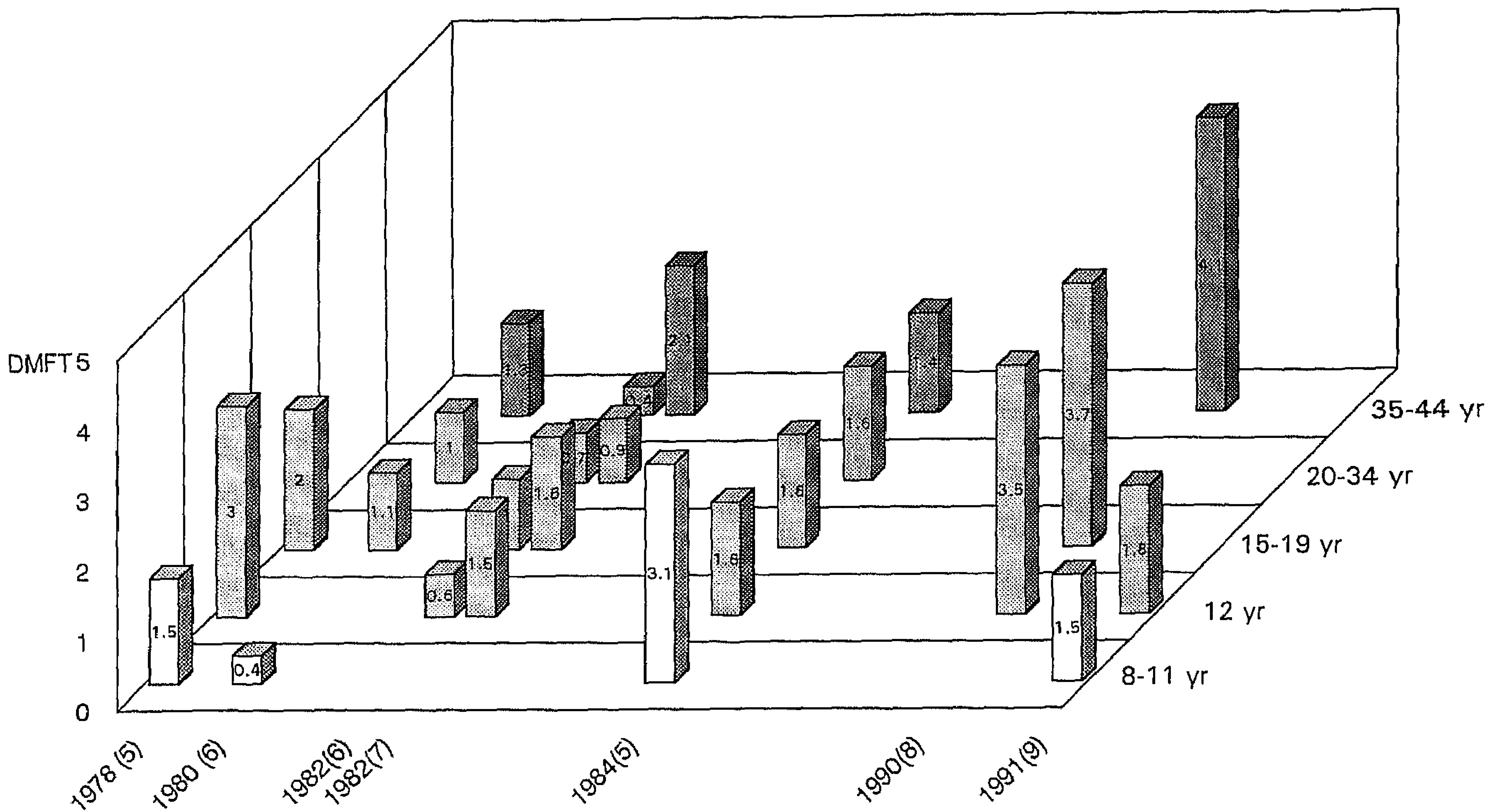


Figure 1

- DMFT values of various age cohorts examined at different times.
- Valeurs de CAOD pour des cohortes de différents âges étudiées à différentes périodes.
- DMFT-Werte bei verschiedenen Altersgruppen über unterschiedliche Zeiträume.
- Valores CPOs de cohortes de varies edades examinados en periodos diferentes.

maturity. Almost all subjects, irrespective of age, appeared to have calculus. At the age of 12 to 19 an average of 3.7 sextants exhibit calculus and at the age of 35 to 44 the average number of sextants with calculus has increased to 5.5. In the majority of people in Bangladesh calculus is never removed, which explains its widespread and chronic occurrence.

A large variation both in the prevalence of deep periodontal pockets and in the average number of sextants affected, which cannot easily be explained, was observed between the various studies. The fact that different population groups were examined by different researchers who were not calibrated with each other, has certainly contributed to the observed variations. None of the studies provided national data, thus a national estimate of the prevalence of deep periodontal pockets cannot yet be assessed and therefore the data (Table 1) should be considered with caution. Moreover, loss of attachment as the ultimate parameter of the periodontal condition is not recorded by the CPITN. However, it can tentatively be concluded on the basis of the CPITN score that Bangladesh belongs to the 20 per cent of countries in the world where periodontal conditions of the population are among the worst.

The use of tobacco particularly in combination with betelquid-chewing is an important aspect of daily life in Bangladesh. This widespread habit among Bangladeshes may attribute to the appalling periodontal conditions

but a relationship has not yet been substantiated.

Although the prevalence of deep periodontal pockets in the reviewed studies varied widely, the results clearly indicate that only a fraction of the population develop deep pockets in only a limited part of their dentition at an advanced age. Thus the widespread presence of calculus at early age and its chronic existence does not explain the presence of deep periodontal pockets in a minority of the 35 to 44 years age group in Bangladesh. The lack of any association between the chronic presence of calculus and the occurrence of deep pockets suggests that presence of calculus in itself does not lead to deep periodontal pockets. This view seems to be supported by WHO global data<sup>16</sup> indicating a comparable prevalence of deep periodontal pockets in industrialised and developing countries, despite the more widespread existence of calculus in developing countries.

The present epidemiological data suggest that regular removal of calculus for the sake of preventing periodontal pockets should not be advocated.

### Dental caries

Figure 1 depicts a rather irregular pattern of DMFT-values in subjects of the same cohorts (age), which is due to period effects (examiners, variance) and sample

Table 2 Median DMFT-values of cohorts.

Age	DMFT
8-11 yr	1.5
12 yr	1.7
15-19 yr	1.6
20-34 yr	1.0
35-44 yr	1.4

differences. Consequently, an accurate estimate of DMFT-values of the various cohorts could not be given. However, by taking arbitrary median DMFT values of each cohort, DMFT-values were computed and they are presented in *Table 2*. These estimated values indicate the caries experience of the urban and peri-urban population, representing only about 15 per cent of the population in Bangladesh<sup>13</sup>. The only two studies with a small rural sample<sup>3,4</sup> showed DMFT-values similar to the urban sample. The finding is in contrast to the global pattern of caries experience which is usually higher in urban areas than in rural areas<sup>20,21</sup>. The most probable explanation for a higher caries experience in urban populations is that the urban population has easier access to sweet snacks than the rural population. A recent study carried out in Dhaka indicated that urban primary school children consumed more sweet snacks than their rural counterparts<sup>22</sup>. So the finding of a similar caries experience in urban and rural populations in Bangladesh needs to be substantiated. Taking the foregoing into account it seems fair to consider the estimated median DMFT-values as upper limit values for the whole country.

With an estimated upper limit DMFT-value of 1.7 for 12 year olds, Bangladesh meets the proposed WHO/FDI global oral health goals for the year 2000<sup>23</sup>. Nevertheless a DMFT of 1.7 for 12 year olds is unexpectedly high for a *per capita* consumption of 3kg sugar and 5kg gur/molasses per year<sup>13</sup>. However, the population may

consume carbohydrates other than sugar and particularly when these carbohydrates are sticky they can contribute to the caries activity. Moreover, no fluoride preparations or fluoride toothpaste are available. There is recent evidence that malnutrition, which is prevalent in Bangladesh, increases caries risk in primary teeth<sup>24</sup>. Whether this is also true for permanent teeth has yet to be clarified.

An increase or decrease in caries experience over a period of time in subjects of the same age (cohorts) would indicate that caries is on the increase or decrease, respectively. Neither an increase nor a decrease is manifest in the cohorts since 1978. The likely strong period effects (examiners, variance) may mask possible cohort effects. Another indication for secular changes in caries experience can be derived from cross-sectional DMFT-values of different age groups. Since the DMFT-value is cumulative, it increases with increasing age. Hence cross-sectional data should reveal higher DMFT-values in advanced age groups than in early age groups, if the caries activity remained stable over a period of time. *Figure 1* shows five studies in which advanced age groups were included in the sample. Each of these studies shows approximately the same DMFT-values in subjects aged 8 to 12 years as in the 20 to 44 years age group, indicating an upward trend in caries activity in children before 1980.

A decade ago it was generally assumed that dental caries was on the increase in developing countries<sup>25,26</sup>. This increase was attributed to changes in lifestyle and a concurring increase in sugar consumption<sup>20,26</sup>. However, a more recent review on caries studies in African countries and China provides controversial evidence about trends in caries experience in developing countries<sup>21</sup>. Because a clear secular trend in caries experience could not be determined from the data of the reviewed studies, it is tentatively concluded that the caries activity in Bangladesh has remained stable over the last 15 years.

## La prévalence et la gravité des maladies parodontales et des caries dentaires au Bangladesh

### Résumé

Cet article analyse les résultats d'études sur les maladies parodontales et les caries dentaires, au Bangladesh. Presque tous les sujets, âgés de 12 à 19 ans (82-95%) et de 35 à 44 ans (98-100%) ont du tartre. Les diverses études montrent une vaste majorité (14-65%) de sujets présentant des poches parodontales profondes, dans la catégorie des 35-44 ans. D'après une estimation moyenne du nombre de sujets ayant des poches parodontales profondes (26%), on pourrait en conclure que le Bangladesh fait partie des 20% de pays au monde où l'état de santé parodontal de la population est parmi les pires existant. Pour évaluer la prévalence des caries, on a calculé les valeurs moyennes DMFT des tranches d'âge étudiées. Les enfants de 12 ans ont un indice de 1,7, les jeunes de 15 à 19 ans de 1,6, les personnes de 20 à 34 ans de 1 et les gens de 35 à 44 ans ont un indice de 1,4. Ces valeurs DMFT sont considérées comme des valeurs-limites supérieures car elles ont été enregistrées uniquement sur des populations vivant dans les villes ou en périphérie. L'influence de l'âge indique qu'il pourrait y avoir eu une tendance à l'augmentation des caries sur les enfants vivant dans les villes, avant 1980. Il n'a pas été observé d'influence de la tranche d'âge, synonyme d'un changement, au cours de ces 15 dernières années, en matière de caries. On pourrait donc en conclure que les caries au Bangladesh sont restées à un niveau stable, ces 15 dernières années.





## Prävalenz und Schwere von Parodontalkrankheiten und Zahnkaries in Bangladesch

### Zusammenfassung

Dieser Beitrag prüft die Ergebnisse von Studien über Parodontalkrankheiten und Zahnkaries in Bangladesch. Fast alle Probanden in den Altersgruppen von 12–19 (82–95%) und 35–44 Jahren (98–100%) hatten Zahnstein. Die verschiedenen Studien zeigten einen weiten Bereich von Prävalenzen (14–65%) bei Probanden mit tiefen Parodontaltaschen in der Altersgruppe der 35- bis 44-Jährigen. Nach einer mittleren Schätzung der Prävalenz von Probanden mit tiefen Parodontaltaschen (26%) kann vorläufig geschlossen werden, daß Bangladesch zu den 20% von Ländern in der Welt gehört, in denen der Parodontalzustand der Bevölkerung mit am schlechtesten ist. Um den Kariesbefall zu bewerten, wurden mittlere DMFT-Werte von Alterskohorten aus den verschiedenen Studien berechnet. Zwölfjährige hatten eine DMFT von 1,7, 15- bis 19-Jährige von 1,6, 20- bis 34-Jährige von 1,0, und 35- bis 44-Jährige hatten eine DMFT von 1,4. Diese DMFT-Werte werden als obere Grenzwerte betrachtet, da sie fast ausschließlich von städtischen oder stadtnahen Bevölkerungsgruppen gewonnen wurden. Die beobachteten Alterseffekte deuteten darauf hin, daß vor 1980 möglicherweise eine steigende Tendenz in der Kariesaktivität bei (städtischen) Kindern bestand. Kohorteneffekte, die ein Hinweis auf tendenzielle Veränderungen im Kariesbefall in den letzten 15 Jahren sein könnten, wurden nicht beobachtet. Es wird daher vorläufig geschlossen, daß die Kariesaktivität in Bangladesch in den letzten 15 Jahren stabil geblieben ist.



## Prevalencia y severidad de las enfermedades dentales y de la caries dental en Bangladesh

### Resumen

Este artículo revisa los resultados de los estudios sobre enfermedades periodontales y caries dental en Bangladesh. Casi todos los individuos de 12 a 19 años de edad (82–95 por ciento) y de 35 a 44 años (98–100 por ciento) presentaban cálculo. Los distintos estudios mostraron un alta rango de variación en la prevalencia de sujetos con bolsas periodontales profundas en el grupo de 35 a 44 años de edad (14–65 por ciento). De acuerdo a una estimación media de la prevalencia de sujetos con bolsas periodontales profundas (26 por ciento), se puede concluir tentativamente que Bangladesh se encuentra entre el 20 por ciento de países del mundo con peores condiciones periodontales entre la población. Para evaluar la experiencia de caries se calcularon los valores medios del CPOD por grupos de edad, basados en diferentes estudios. Los niños de 12 años de edad tenían un CPOD de 1,7, los de 15 a 19 años de 1,6, los de 20 a 34 años de 1,0 mientras que los de los de 35 a 44 años presentaron un CPOD de 1,4. Estos valores del CPOD pueden ser considerados como los valores en el límite superior, ya que fueron obtenidos casi exclusivamente en poblaciones urbanas y peri-urbanas. Los efectos observados de acuerdo a la edad indicaron que podría haber habido una tendencia ascendente en la actividad de caries en los niños urbanos antes de 1980. No se observaron efectos de cohortes que indiquen cambios seculares en la experiencia de caries en los últimos 15 años. Por lo tanto, se concluye tentativamente que la actividad de caries en Bangladesh ha permanecido estable en los últimos 15 años.

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