

# Anticipated changes in caries prevalence in South Africa

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There has been a deterioration in dental health in ourselves compared with our ancestors, in developing compared to developed nations and in immigrants to developed countries compared with non-immigrants. This trend appears to be worldwide (Barnes 1977).

We in South Africa are fortunate that, over the past 70 years, several pioneers of the dental profession have recorded their observations on the dental health of various groups. Friel (1910) appears to be the first to have published such a record. Writing in the *British Dental Journal* he described his findings on the "Teeth of African Natives in Johannesburg". Friel took advantage, as he put it, of the unique opportunity offered in Johannesburg through the congregation there of a large number of natives from different parts of South Africa. He believed that these people had largely adopted the food and manner of life of Europeans. On examining their teeth, initially with mirror and probe, and later, after they had objected to Friel putting something in their mouths to make their teeth bad, with mirror only, he found that 66,3 per cent of adults had dental caries. In males the prevalence was 53,8 per cent and in females it was 78,7 per cent. In children 2 to 15 years old 49,4 per cent had caries. Friel believed that this high prevalence was due to eating the food of white people, to drinking hot tea and coffee, or to both causes, and that heredity did not enter into the matter.

Following on the work of Friel, a number of investigators published reports on groups of South Africans, particularly Blacks, Indians and Whites. Following examination of these publications this paper attempts to anticipate future trends in caries prevalence within South Africa.

## MATERIALS AND METHODS

Material came from two sources, firstly from examination of available literature and secondly, from surveys undertaken by the authors.

Because there is little long-standing evidence on dental caries among the Coloured community this paper has been restricted to 3 ethnic groups namely, Blacks, Indians and Whites. Within each of these groups sub-groups comprised the preschool child (1-5 years) and adolescents/young adults (13-30 years).

Two broad questions have been asked to aid in the prediction of future trends.

1. How has the percentage prevalence of dental caries altered since 1910?

2. Has the severity of dental caries within the ethnic groups changed?

It is not intended to deal with dietary studies within the groups under consideration.

## SOUTH AFRICAN BLACKS

### (i) Preschool children

Little evidence is available within this group, i.e. around the age of 5 years. Both Leipoldt (1926) and Till (1927) studied Black children of less than 10 years. In the Transvaal Leipoldt (1926) recorded caries present in 87 per cent of his patients, whose tribes were not specified, in contrast to the prevalence of 63 per cent reported by Till (1927) in Swazi children. Caries was therefore common.

No other reports are available until that of De Villiers and his colleagues (1967). In their report (Commission of Enquiry into the Training of Non-White Dentists) they recorded varying caries prevalences. In the Transvaal, for instance, among six year old Vendas 27 per cent had caries; for Tswanas the figure was 20 per cent. Caries was reported as being more common among Xhosas (73 per cent) and Pondos (65 per cent) in the Cape Province and rife in Zulus in Natal (94 per cent). Numbers of children in these groups ranged from 25 to 98, no details of examination technique were recorded and it appeared that different dentists were responsible for data from each group.

Some 10 years later Cleaton-Jones, Richardson and Rantsho (1978) reported the results of investigations in 5 year old urban and rural Black children in the Transvaal. Urban children had caries in 72 per cent compared to 40 per cent of rural children. These present-day caries prevalences are similar to those recorded by De Villiers *et al* (1967) in children from the Cape but are higher than those for the Transvaal groups.

Regarding the severity of dental caries reported dmft values were fairly similar. The following dmft scores for 6 year old children were reported by de Villiers and his co-authors (1967); Xhosas — 2,6, Pondos — 2,1, Zulus — 3,5, with Vendas and Tswanas having remarkably low values of 0,7 each. For 5 year olds Cleaton-Jones and colleagues' figures were 4,4 for urban children and 3,0 for their rural counterparts.

To better estimate the severity of caries, the mean dmft per carious mouth was calculated. As anticipated this has the effect of increasing the dmft scores as caries-free mouths are not included. For 6 year olds scores

became Vendas — 2,6, Tswanas — 3,7, Xhosas — 3,6, Pondos — 3,3, Zulus — 3,7 (De Villiers *et al* 1967) and for 5 year old rural Blacks — 7,4, while urban Blacks were now, 6,1 (Cleaton-Jones *et al* 1978). The more recent surveys have thus shown an increased severity of caries compared to the figures of 10 years ago and an interesting reversal of the usual trend, namely a greater dmft score in rural than urban Blacks.

(ii) Adolescents/young adults

In South Africa the majority of epidemiological studies of dental caries have been carried out in this group which can conveniently be classified as those individuals aged 13 to 30 years.

The subjects in the various studies have come either from the Transvaal or from the Cape, the latter group being mainly Xhosas. It is possible to subdivide them into rural and urban groups.

Fig. 1 is a bar chart, showing prevalences of dental caries in rural and urban groups. it was not possible to determine from the report of De Villiers *et al* (1967) whether the groups of 15 year old subjects, often few in number, were rural, urban or a mixture of the two, Consequently their results have not been included.

(a) Rural Blacks. From Fig. 1 it can be seen that more groups of rural Blacks have been studied than urban Blacks. The first available report, a particularly comprehensive one on rural Zulus, is that of Suk (1919) who found caries present in 26 per cent of those he examined. Till (1927) reported that 14 per cent of subjects of more than 10 years of age had caries, considerably

lower than the 26-56 per cent recorded in rural groups by Oranje, Noriskin and Osborn (1935). Staz (1938) described a prevalence of 39 per cent in mine recruits, similar to the 40 per cent prevalence of Retief, Cleaton-Jones and Walker (1975) in high school pupils and lower than surveys in the Rustenburg area — 60 per cent. Recently in a group of mine recruits (Cleaton-Jones — unpublished results) a prevalence of 71 per cent was noted, considerably higher than that of Staz (1938). All the above values were from areas with low concentrations of fluoride in the drinking water (~0,2ppm). In rural areas with higher concentrations of fluoride, prevalences were 35 per cent (~2,7ppm Bischoff *et al* 1976) and 33 per cent (~1ppm Cleaton-Jones and Walker — unpublished results).

(b) Urban Blacks. Earlier studies reported caries prevalences ranging from 46 per cent (Oranje, Noriskin and Osborn 1935) to 90 per cent (Staz 1938) in urban Blacks. In more recent investigations the figures were from 63 per cent (Retief *et al* 1975) to 85 per cent (Cleaton-Jones and Walker — unpublished results). In comparable groups caries prevalences in urban Blacks were higher than in rural Blacks.

Severity of caries, indicated by mean DMFT values for the groups are shown in Fig. 2. All groups had low DMFT scores, the highest being 4,3 (Staz 1938), and urban scores were greater than in corresponding rural groups. The differences in severity between rural and urban subjects was less marked when the mean DMFT values per carious mouth were compared (Fig. 2). From this illustration it can be seen that in rural subjects, although less often affected, when caries was present the severity was not much less than in affected

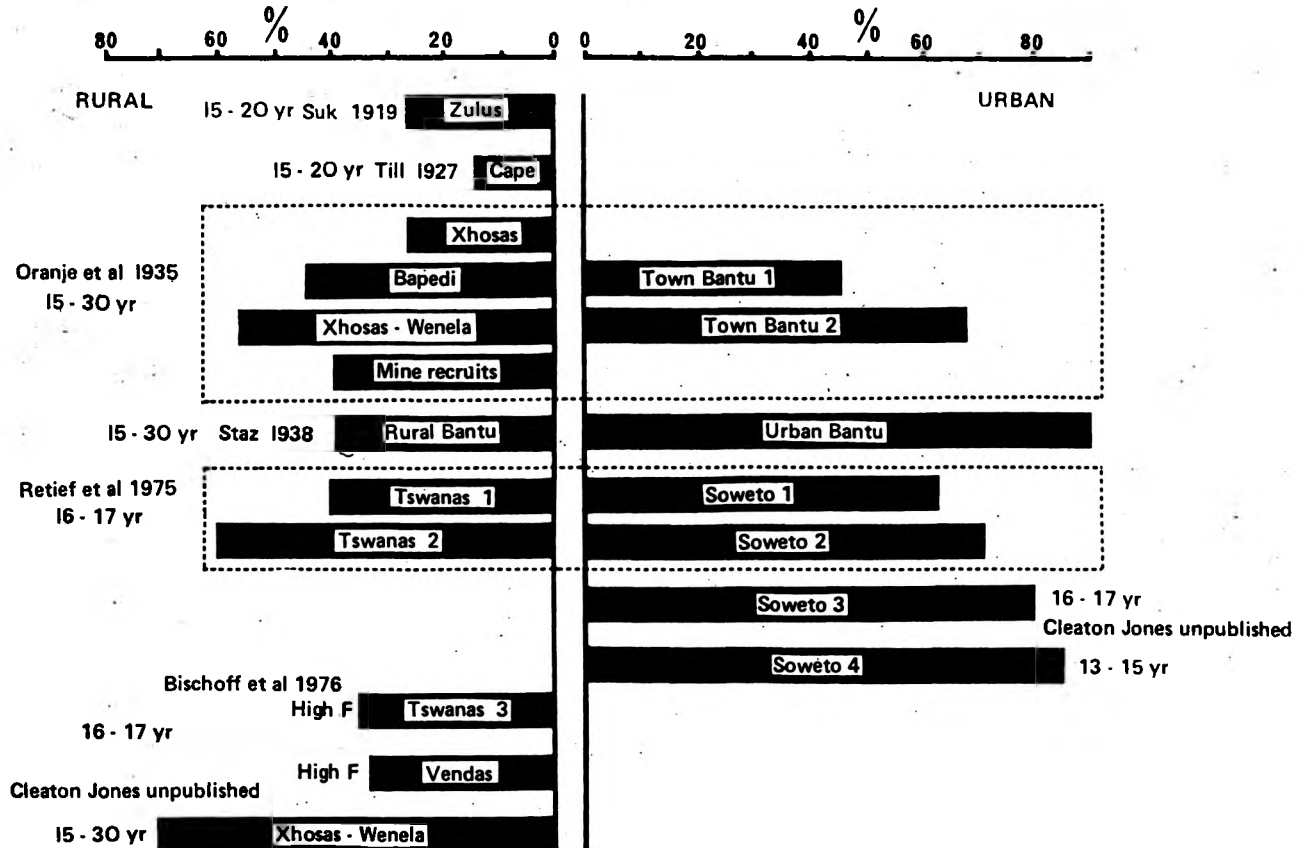


Fig. 1 Bar chart indicating the percentage prevalences in dental caries reported in adolescent and young adult Black South Africans

urban subjects. There was not a marked difference in severity of caries between subjects in high- and low-fluoride areas.

**SOUTH AFRICAN INDIANS**

**(i) Preschool children**

De Villiers *et al* (1967) listed the prevalence in 6 year olds at 93 per cent. A recent survey of children of 1-5 years by Cleaton-Jones, Richardson and Rantsho (unpublished) has recorded a figure of 85 per cent in 5 year olds. Regarding severity of caries, dmft values were 6,5 in 6 year olds (De Villiers *et al* 1967), 7,7 in children of less than 6 years of age (van Wyk, Staz, Farman 1977) and in children of 5 years 6,2 (Cleaton-Jones *et al* unpublished results).

**(ii) Adolescents/young adults**

Jones (1940) studied 2 small groups of Indian adolescents between 15 and 17 years of age, in the Durban area. He found their caries prevalences to be 43 per cent and 70 per cent respectively. Among 15 year olds De Villiers and his colleagues (1967) reported a percentage prevalence of 95 per cent; in 16-17 year old high school pupils in Johannesburg 95 per cent had caries (Retief *et al* 1975) and in Chatsworth in Natal 98 per cent were affected (Cleaton-Jones and Walker unpublished results). Respective DMFT values among the groups were 1,1 and 1,9 (Jones 1940), 4,7 (De Villiers

*et al* 1967), 7,8 (Retief *et al* 1975) and 6,5 (Cleaton-Jones and Walker unpublished results). In Indians from the Cape Peninsula aged 13-19, Van Wyk *et al* (1977) noted a mean DMFT of 14,5, considerably higher compared with other studies.

The DMFT values in mouths with caries were 2,0 and 2,0 (Jones 1940), 5,0 (De Villiers *et al* 1967), 8,2 (Retief *et al* 1975) and 6,6 (Cleaton-Jones and Walker unpublished results).

**SOUTH AFRICAN WHITES**

**(i) Preschool children**

There is only one report on dental caries in White children aged 1-5 years, that of Cleaton-Jones *et al* (1978) although several authors have investigated slightly older children. For instance Brown (1924) studied children of 7-8 years in the Cape Province. He found 94 per cent in urban areas to have caries compared to 83 per cent in rural communities, the overall prevalence being 89 per cent. These figures were similar to that 88 per cent prevalence reported by Ockerse (1947) in 6-8 year old children from throughout the country. In the report of de Villiers and his colleagues (1967) the caries prevalence in 6 year old children varied according to the geographic area in which they lived. In the George and Humansdorp districts of the Cape Province figures were 97

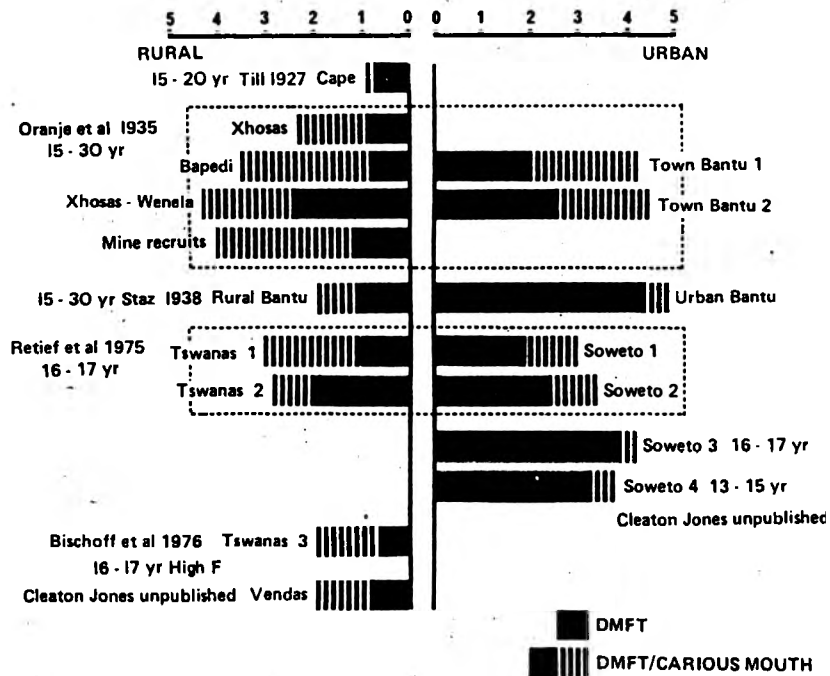


Fig. 2 Bar chart showing the mean DMFT per mouth and the mean DMFT per carious mouth reported in adolescent and young adult Black South Africans

per cent and 91 per cent, in Walvis Bay 87 per cent, while in neighbouring South West Africa small groups in the Tsumeb and Keetmanshoop areas had values of 39 per cent and 57 per cent. More recently the caries prevalence in 5 year old children in Johannesburg was reported to be 74 per cent (Cleaton-Jones *et al* 1978).

Reported mean dmft values also showed a variation from area to area. The dmft in 6 year olds in George was 7,8, in Humansdorp — 6,7, in Walvis Bay — 7,5, in Tsumeb — 1,9, in Keetmanshoop — 2,6 (De Villiers *et al* 1967). In 5 year old Johannesburg children the dmft was 5,2 (Cleaton-Jones *et al* 1978). The mean dmft per carious mouth was calculated for each of the 6 areas. Respective values are, for George — 8,0, Humansdorp — 7,4, Walvis Bay — 8,6, Tsumeb — 3,1, Keetmanshoop — 4,6, and Johannesburg — 5,3.

#### (ii) Adolescents/young adults

The earliest study in well defined age groups appears to be that of Brown (1924) who examined 14 and 15 year olds in the Cape Province. The caries prevalence in urban areas was 83 per cent compared to 59 per cent in rural areas, the overall percentage having caries being 72 per cent. In 1938 Staz investigated 300 Whites from Johannesburg aged from 15-30 years and found all to have dental caries. De Villiers and his colleagues (1967) recorded the percentage prevalence of caries in 15 year old children from various areas of the country as follows: in the Cape Province — George 93 per cent, Humansdorp 95 per cent, Walvis Bay 89 per cent, in South West Africa — Tsumeb 47 per cent, Keetmanshoop 76 per cent and Windhoek 83 per cent. More recently, in Johannesburg, Retief *et al* (1975) reported caries in 96 per cent of 16-17 year old high school pupils studied.

The DMFT scores reported showed considerable variation from group to group. Brown (1924) in his study of 14-15 year olds noted DMFT of 3,6 in urban subjects, 2,5 in rural subjects with a value for the combined group of 3,1. In subjects of 15-30 years of age Staz (1938) reported a mean DMFT of 14,97. The mean DMFT scores in 15 year olds in the report of De Villiers *et al* (1967) were George 15,6, Humansdorp 14,2, Walvis Bay 7,3, Tsumeb 3,2, Keetmanshoop 4,3 and Windhoek 6,3. In Johannesburg the mean DMFT in 16-17 year olds was 10 (Retief *et al* 1975).

The mean DMFT score per carious mouth in each of the groups are as follows: (i) Cape Province — urban 4,3, rural 4,2, both areas 4,3 (Brown 1924); (ii) (Staz 1938) Johannesburg 14,97; (iii) (De Villiers *et al* 1967) George 16,7, Humansdorp 14,9, Walvis Bay 8,2, Tsumeb 6,9, Keetmanshoop 5,7, Windhoek 7,6; (iv) (Retief *et al* 1975) Johannesburg 10,3.

## DISCUSSION

It is clear from the results presented in this paper that in South Africa there is a lack of published data on which to base a firm prediction of future trends in caries prevalence. The evidence which is available is, unfortunately, difficult to use for comparative purposes because of variations in age groups, in geographic areas in which samples were examined and in terminology used. Thus any predictions for the future made on this evidence must be treated with considerable reserve.

#### (i) Deciduous dentition

The percentage prevalence of dental caries appears to have changed little over the years in the 3 ethnic groups with which this paper is concerned. Similarly the severity of caries per subject has not altered a great deal. There is, we believe, little reason to suppose that this situation will worsen. Indeed, should fluoridation of drinking water supplies be introduced in South Africa, the caries prevalence and severity should decrease.

#### (ii) Permanent dentition

In the permanent dentition the situation is more complex and each ethnic group will be dealt with independently.

(a) **Blacks.** Here 2 distinct groups exist, namely rural and urban. Elsewhere in Africa there has been an increase with time in dental caries prevalence (Henshaw and Adenubi 1977). In South Africa in rural areas the caries prevalence seems to have undergone a greater increase between 1919 and 1935 than between 1935 and 1978. This suggests that the percentage caries prevalence may remain static or increase only slightly. Among urban Blacks the percentage caries prevalence appeared to increase slightly between 1935 and 1938 and then to remain static. This *status quo* will probably continue. Regarding severity of caries indicated by mean DMFT values, particularly mean DMFT per carious mouth, over the approximately 40 year period from 1935 to the present, there has been a slight reduction in caries severity. This too should continue and may even be further improved through the increased use of fluoride toothpastes or even the addition of fluoride to drinking waters.

(b) **Indians.** In this group the percentage of individuals with caries increased by approximately one-third between 1940 and the present. There has also been a 3-4 fold increase in caries severity over the same period. The percentage prevalence is now so high that little further increase is likely but it is anticipated that the severity of caries, i.e. DMFT values, will continue to rise.

(c) **Whites.** With the exception of some rural areas both the prevalence and severity of dental caries in this group is high, although lower than in other westernized countries. In other parts of the world the caries prevalence continues to increase. However, the apparent decrease in mean DMFT between 1938 and the present as well as the probably beneficial effects of the Dental Association of South Africa's National Dental Health Weeks (Evian, Weinberg, Cleaton-Jones 1978) it is hoped that no further increase will occur and that the present downward trend will continue. This would be made possible, we believe, by the introduction of fluoridation of public drinking water supplies.

## SUMMARY

Available literature concerning dental caries in Black, Indian and White South Africans was reviewed with a view to predicting possible future trends in caries prevalence in these groups. There is considerable variation in the results reported by different authors but it is anticipated that dental caries will increase in Indians and remain at the same level or decrease in Blacks and Whites.

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