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Dental caries of 11 to 12 year-old South African children and WHO guidelines for the year 2000

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SUMMARY

Dental caries prevalence data, collected during a field study of 12 year-old children from five groups, were examined in relation to the WHO target for the year 2000 of a DMFT of 3. It is clear that initial carious lesions (WHO 1977) should not be included in the DMFT score. Urban Indian children have the highest mean DMFT currently.

OPSOMMING

Data betreffende die prevalensie van tandkaries, soos versamel tydens 'n veldstudie uitgevoer op vyf groepe twaalfjarige kinders, is ondersoek met betrekking tot die DMFT-doelwit van 3 van die WGO vir die jaar 2000. Dit is duidelik dat karies in die beginstadium (WGO, 1977) nie in die DMFT-telling ingesluit behoort te word nie. Stedelike Indiërkinders toon tans die hoogste DMFT-telling.

INTRODUCTION

The World Health Organisation has selected children who will be twelve years of age in the year 2000 as a target group for which, internationally, dental health should have a DMFT held to, or reduced to, a mean of 3 teeth (FDI report, 1982; Barmes, 1983). Information on the current status of the target group in South African populations is needed in order to plan for the future. The present investigation examines dental caries data in comparable groups of rural black and urban black, coloured, Indian and white schoolchildren in relation to the WHO target.

MATERIALS AND METHODS

The dental caries information used in this investigation formed part of an extensive field study undertaken in 1986 and which will be described in detail elsewhere (Hargreaves and Cleaton-Jones, unpublished work).

In summary the population samples selected were from children attending primary schools in the Gelukspan district of Bophuthatswana (350 km west of Johannesburg, 0,3 ppm fluoride, rural black group), in Soweto (0,3 ppm fluoride, urban black group), in Lenasia (30 km southwest of Johannesburg, 0,3 ppm fluoride, urban Indian group) and Johannesburg (0,3 ppm fluoride, urban coloured and white groups). With the kind co-operation of health and educational authorities cluster sampling of schools in the areas was performed and within each school all 11 to 12-year-old children present on the day were examined.

Dental caries was diagnosed in good natural or natural plus artificial light using plane mirror, curved probe and WHO caries diagnostic criteria, ranging from initial caries to pulpal involvement. Calibration before the study was through the examination of 920 tooth surfaces of 400 extracted carious and caries-free teeth mounted in 40 plaster blocks and stored in a laboratory humidifier (Cleaton-Jones *et al*, 1987). Examinations of these teeth surfaces on two occasions were compared for intra-examiner and inter-examiner reproducibility using the Modified Percentage Reproducibility (Shaw and Murray, 1975), all of which were above 90 per cent, as well as the kappa statistic (Fleiss *et al*, 1979) which ranged from 0,81-0,93.

RESULTS

A total of 1 250 children were examined (Table I), approximately 200 per group. Numbers in the Indian group were larger because of a second study being undertaken simultaneously in the same age group. The ages, recorded in years and months were converted to decimals and ranged from 10,4-12,4 years. The mean ages and standard deviations are listed and are similar within the groups.

The percentage of caries-free children and DMFS and DMFT scores for the groups are shown in Table II. These scores have been subdivided into those that include initial caries and those that exclude initial caries. The lowest caries prevalence was seen in rural black children and the highest in Indian children. The order of prevalence among the remaining three groups varies. When initial carious lesions are excluded there is a considerable improvement in the frequency of caries-free children in the rural black group from 59 percent to 81 percent and improvements of about 12 per cent in the remaining groups. This indicates the influence of the presence of early lesions on the prevalence in each group. Changes in mean

DMFS and DMFT were less marked because of the relatively low scores to begin with.

In Table III the percentages of children with DMFT or DMFS values of greater than 3 with initial caries included or excluded are listed, as are the percentages in each group that are already below the WHO goal of a DMFT of 3 or less. Most rural black children are within the goal. This table clearly shows the influence of exclusion of initial carious lesions, for example the prevalence of Indian children below the goal increases from 50,0 per cent to 76,8 per cent if initial carious lesions are not used in the calculation. The use of a DMFS of ≤ 3 is a stricter assessment of caries prevalence as can be seen from Table III.

The same data is shown in box and whisker plot form in Figure 1, on which the WHO goal of DMFT ≤ 3 has been indicated. For both the mean and median values it is obvious that the Indian group is at present above the goal. This form of plot also shows the highest and lowest values and first and third quartiles. The plot emphasises the skewness of the data towards low DMFT values. The DMFS values are also plotted in Figure 2. This plot shows a similar skewness to the DMFT, and in all groups the third quartile represents a DFMS of 7 or less.

Table I: **General information on children examined**

Group	n	Mean Age in Years (SD)
Rural black	209	11,4 (0,4)
Urban black	203	11,2 (0,4)
Urban coloured	206	11,3 (0,4)
Urban Indian	426	11,5 (0,4)
Urban white	206	11,4 (0,3)
Total	1 250	

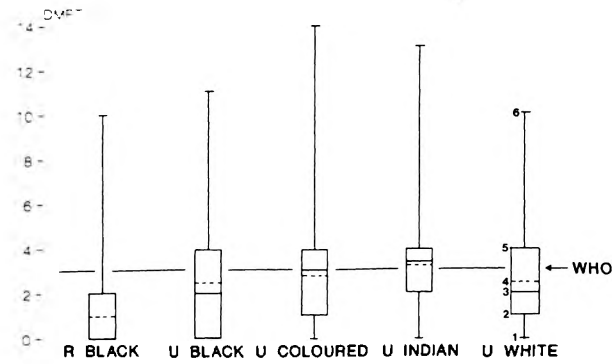


Fig. 1: **Box and whisker plot of DMFT scores by group (1 = lowest DMFT, 2 = 1st Quartile, 3 = median, 4 = mean, 5 = 3rd quartile, 6 = highest DMFT).**

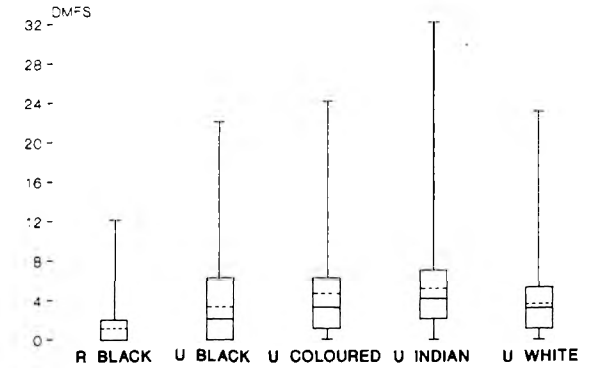


Fig. 2: **Box and whisker plot of DMFS scores by group, using the same notation as in Figure 1.**

Table II: **Percentage caries-free children and mean (SD) DMFS and DMFT values. I = initial caries included. E = initial caries excluded.**

	Caries-free		DMFS		DMFT	
Group	I	E	I	E	I	E
Rural black	58,9	80,9	1,4 (2,4)	0,6 (1,7)	1,1 (1,9)	0,4 (1,1)
Urban black	36,0	48,3	3,6 (4,3)	2,6 (3,9)	2,6 (2,8)	1,7 (2,3)
Urban coloured	21,4	31,1	4,3 (4,4)	3,2 (4,1)	2,9 (2,6)	2,0 (2,1)
Urban Indian	15,3	28,9	5,0 (4,3)	3,2 (3,9)	3,3 (2,3)	2,1 (2,0)
Urban white	24,3	33,5	3,5 (3,5)	2,9 (3,4)	2,6 (2,2)	2,1(2,0)

Table III: **Percentages of children with DMFS > 3, DMFT > 3. I = Initial caries included. E = initial caries excluded.**

	DMFS > 3		DMFT > 3		WHO goal of DMFT < 3	
Group	I	E	I	E	I	E
Rural black	13,9	7,7	10,0	2,9	90,0	97,1
Urban black	43,3	27,1	36,0	20,7	64,0	79,3
Urban coloured	48,1	31,3	38,3	21,4	61,7	78,6
Urban Indian	60,1	34,5	50,0	23,2	50,0	76,8
Urban white	41,3	35,4	35,9	29,6	64,1	70,4

DISCUSSION

The age range examined between 10,4 and 12,4 years, provides, we believe, reasonable information to state the conditions found by the child's twelfth birthday (that is during the child's twelfth year of life). An analysis was made of the subgroup of data for the children who were 11,0 to 11,9 years of age and the results obtained did not differ significantly from the total group.

If the mean DMFT for the year 2000 is to be achieved, i.e. a mean of 3 DMFT, this will mean maintaining the present dental caries prevalence of the rural and urban blacks, the urban coloureds and the urban whites. The urban Indians are marginally above this figure which will need to be reduced. When the numbers of children with DMFT scores greater than 3 are considered 10 per cent of rural black children and about one-third of the other groups would have needed greater preventive care to fit in with the WHO goal. If carious surfaces are examined rather than carious teeth, all save the rural black group have a mean above 3 DMFS and 40-50 per cent of the children have more than 3 DMFS.

From this investigation the high priority groups are the urban Indians and the urban coloureds who could benefit from additional preventive measures to reduce the current caries levels for these children in their first twelve years of life. The urban black and urban white groups would benefit if their "at risk" groups (about 36 per cent of all children) were identified. Methods for determining the at risk groups still need to be defined and should include current caries activity tests, oral flora tests and nutrition assessments. The suggestions by Bader *et al*, 1986; Barmes *et al*, 1985; Saparamadu, 1984; meet some of these requirements in a practical way.

If the DMFT values are re-examined excluding the "caries 1" lesions (that is those lesions which are identified as an enamel catch or small white decalcified lesion with an intact surface), the WHO goal mean value of 3 has been achieved; all groups fall below this mean level.

If these criteria are used for the DMFS values only the urban coloured and urban Indian are above a mean of 3 DMFS and these only marginally. The caries-free children also would increase significantly – approximately 50 per cent of the rural and urban black groups would be caries-free and about 30 per cent of the other three groups; urban coloureds, urban Indians and urban whites.

Exclusion of the "caries 1" data would follow closely to basic criteria suggested by WHO (1986) who state: a tooth should be classified as decayed if it has a detectably softened floor, undermined enamel or softened wall – the explorer must enter a lesion with certainty and where doubt exists, caries should not be recorded as present.

Our classification is more detailed with different grades of caries detection. These criteria we consider important when following children longitudinally to see subtle changes in caries progression and the stage that dentists may decide they have to restore the tooth with a restoration. In aiming for the WHO guideline for a mean of 3 DMFT by age 12 years it may be more realistic to use findings excluding "caries 1" detection.

Current preventive measures could prevent a "caries 1" lesion from developing further and could recalcify such a lesion. In practice these lesions commonly are not restored but are observed by clinicians for possible later treatment.

Using these criteria, the main aim for South African children of all ethnic groups is to continue current preventive measures and make sure the present good dental health condition of the children does not deteriorate further. It is realistic from our findings that the children who have caries values above 3 DMFT at their twelfth birthday are looked at as "an at risk group" and should be given more extensive preventive measures.

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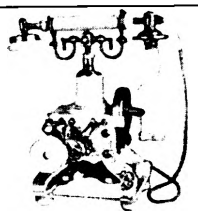
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