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1989

https://hdl.handle.net/10539/34816

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The Southern African Journal of Epidemiology and Infection 1989; 4 (3): 39-43

Social class and dental caries in 11-12-year-old South African schoolchildren

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The objective of this study was to examine effects of social class on dental caries in five African populations. Definitions of social class that could be used for the different ethnic groups are outlined. A total of 1 154 children from rural black, urban black, urban Indian, urban coloured and urban white groups were clinically examined and classified into social class by parental occupations. Within group comparisons showed no statistically significant differences in DMFT or DMFS scores by social class. Comparison of the urban white children to a similar group in South Wales showed slightly lower caries in South African children of similar social class. The complexity of the different ethnic groups in South Africa, in respect of social classification, is difficult to assess for comparison with social systems in developed countries. It is recommended that an appropriate social classification be developed for South Africa's developed/developing population mixture. Also as we enter the 1990's sound baseline caries data need to be collected for longitudinal evaluation of changes in the disease pattern.

Introduction

Dental caries is one of many diseases in which differences in prevalence have been noticed between social classes. Some recent examples from Europe include studies on the primary dentition in England and Finland,[1,2] as well as studies involving the permanent dentition in these same countries.[3,4,5,6] These reports have shown a higher prevalence of caries among lower social classes as defined for these European communities.

In Africa Enwonwu[7] has reported more caries in Nigerian black town dwellers, which reached comparable levels to whites in the same town, when compared with the lower socio-economic peasant villagers. Williams *et al*[8] have shown a greater reduction in dental caries prevalence in the primary dentition, with time, among white children from lower socio-economic areas in a South African industrial city. In white adolescents Theron *et al*[9] noticed more caries in the permanent dentition of those living in lower compared to higher income areas of a large South African city.

Several types of social class classification have been used. European studies[1,2,3,4,5,6] have used social class categories based on occupations[10] while the African investigations have used broad generalizations. For example Enwonwu[11] classified Nigerian children into 'optimal', who were a well-fed, high socio-economic group with parents who were academic staff at the University of Ibadan and University Teaching Hospital. Education had to have been obtained before children were born. The second group consisted of children in a poor rural community. In South Africa, areas in which children lived have been used.[8,9]

Social class is a concept interpreted by some to be primarily education based,[11] by others to be influenced by parents' occupation,[1,2,3,4,5,6,10] while pure socio-economic grading can also be used.[10]

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It is not clear what classification should be used in South Africa since no formal recommendation has been made. Whatever classification is used, however, it should be clearly defined and based on objective criteria.

The present study was undertaken to examine affects of social class on dental caries in five South African populations using a social class classification based on parental occupation.

Materials and methods

Before this study was commenced the protocol was approved by the University of the Witwatersrand Committee for Research on Human Subjects (Clearance 1/1/86).

Population sample

To obtain a representative sample from each of the communities, the local health authorities selected schools in the regions representative of the community as a whole. This was based in the broad general population mixture of children attending them.

All the children aged 11 at their last birthday present in the selected schools were seen (1 154 children). The rural black children (199 were examined) were seen in the Gelukspan district of Bophuthatswana, 179 urban black children were seen in Soweto in the Transvaal, 382 urban Indian children were seen in Lenasia in the Transvaal and 192 urban coloured and 202 urban white children resident in Johannesburg were examined. All regions had less the 0.35 ppm F1 in their drinking water supplies.

Dental caries examination

Each child lay on a reclining chair in the supine position and was examined in good natural light using plane mouth mirrors and curved disposable probes (changed every 20 children). World Health Organisation caries diagnostic criteria[12,13] were used after prior calibration of the four examiners[14] to ensure a modified percentage reproducibility[15] of greater than 90% as well as kappa values of more than 0.80[16] for both within and between

examiner comparisons. In addition, during the field survey 10% of the population sample was re-examined. Inter- and intra-examiner comparisons showed that the calibration diagnostic reproducibility values were maintained.

Social class classification

The British Registrar General's Social Class Classification I-V[10] was modified for application in South Africa (Table 1) through using the local occupational groupings described by Schlemmer and Stopforth.[17] The social class of each child was determined by the father's occupation which was obtained directly from the child or from school records. If the father was unemployed or there was no father in the household, the mother's occupation was used.

Table 1: **Broad occupational categories used in study**

Social Class	Occupational Group
I	Independent and high professional and equivalent status. High managerial, executive and administrative in large organisations and equivalent status.
II	Salaried professional and equivalent status. Semi-professional and equivalent status. Lower executive and administrative and equivalent status. Production managers, technical executives, works foremen, executive inspectors and equivalent status. Representatives, agents salesmen and equivalent status.
IIIN	Owners and executives in small commerce and services and equivalent status. Owners and executives in small technical and equivalent status. Senior clerical and equivalent status. Less senior clerical and equivalent status.
IIIM	Working proprietor in small commerce and services and equivalent status. Farmers (excluding very large and industrialised operators). Manual foremen and highcraft and status equivalent. Skilled artisan/craft in manufacturing. Skilled artisan/craft in construction.
IV	Routine non-manual and equivalent status. Semi-skilled manual and equivalent status.
V	Unskilled manual and equivalent status. Menial routine and labour activities.

Data management

The data were analysed using SAS.[18] Statistical evaluation used the Chi-square test for comparison of numbers of children with and without dental caries, and the Kruskal-Wallis test for comparison of caries index scores. The critical level of statistical significance chosen was $p<0.05$.

Since it is not yet clear whether comparisons between individuals in the same social class but in different ethnic groups is valid for African populations, comparisons in this study have only been made vertically within a particular ethnic group.

Dental caries data have been presented in two ways. Firstly, as uncorrected data (only for the permanent teeth erupted in each mouth), and secondly, to correct for varying numbers of erupted permanent teeth between the subjects, the results have been adjusted to 28 erupted teeth (128 erupted tooth surfaces) as described by Dummer *et al.*[5] In this method equal weighting is given to all tooth surfaces.

Results

The proportions of each social class recorded within the samples of each ethnic group are shown in stacked bar form in Figure 1. The most common social classes were rural and urban black children - V; Indian children - IIIN and coloured and white children - IIIM. No black children in social class I were seen. Because no statistically significant differences were found between the results for boys and girls the observations have been pooled.

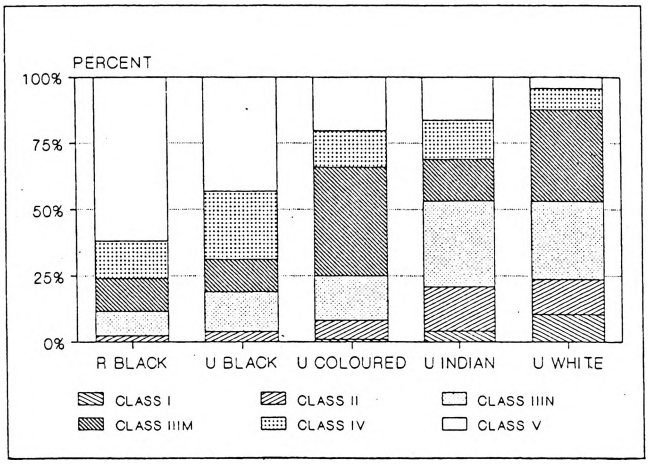


Figure 1: **Proportional composition of the six social classes for each ethnic group**

Table 2 lists the percentage of caries-free children as well as the Decayed, Missing and Filled Teeth (DMFT) results subdivided to include all mouths or only mouths with dental caries, together with DMFT scores for all erupted teeth and DMFT scores corrected for 28 erupted teeth. Only social class groups containing 10 or more children have been presented and included in the statistical analysis. There was variation in the percentages of caries-free children in each social class within each ethnic group, but the most irregular pattern was seen among Indian children. White children showed a decreasing number of caries-free children as social class lowered. None of the differences noted were statistically significant within each ethnic group. When the mean DMFT scores were examined, only in the urban white group was a definite trend seen. Here the mean DMFT score in class I was approximately half that in V. Classes between the two had gradually increasing DMFT scores. Correction for erupted teeth produced higher scores in each ethnic group but did not alter the patterns. Correction for caries-free individuals by considering those with carious mouths increased the mean DMFT scores by 1-2 DMFT.

In Table 3 the Decayed, Missing and Filled Surface (DMFS) results are presented. As must be expected the absolute values are higher than the DMFT scores. The urban coloured children now showed increasing mean DMFS scores from social class I to V. Correction for erupted teeth and for caries-free children raised the absolute mean scores but maintained the relative patterns between social classes. No statistically significant results were seen.

Discussion

The present investigation has clearly shown that within each of five ethnic groups studied no statistically significant differences were found between the caries prevalences of children

Table 2: **Percentage caries-free and Decayed, Missing and Filled Teeth (DMFT) scores by ethnic group and social class for all mouths and carious mouths only. Uncorrected data and data corrected to 28 erupted teeth are listed for social groups where n ≥ 10.**

Group	Social class	n	caries-free %	DMFT mean (SD)	DMFT/28 erupted teeth mean (SD)	n	DMFT mean (SD)	DMFT/28 erupted teeth mean (SD)
Rural black	I	0				0		
	II	5				2		
	IIIN	18	78	0.8 (2.0)	1.1 (2.3)	4		
	IIIM	25	44	1.4 (1.7)	1.7 (2.1)	14	2.5 (1.5)	3.1 (2.3)
	IV	28	46	1.5 (2.1)	1.7 (2.3)	15	2.8 (2.2)	3.2 (2.2)
	V	123	61	1.1 (1.9)	1.3 (2.2)	48	2.8 (2.2)	3.3 (2.3)
		199						
Urban black	I	0				0		
	II	7				4		
	IIIN	27	22	2.6 (2.5)	3.2 (2.8)	21	3.3 (2.3)	4.1 (2.6)
	IIIM	22	36	2.6 (3.2)	3.3 (3.8)	14	4.1 (3.1)	5.3 (3.5)
	IV	46	41	2.2 (2.5)	3.1 (3.3)	27	3.8 (2.2)	5.2 (2.6)
	V	77	36	2.4 (2.6)	3.1 (3.4)	49	3.8 (2.3)	4.9 (3.0)
		179						
Urban coloured	I	2				1		
	II	14	14	3.4 (2.1)	3.9 (2.4)	12	4.0 (1.7)	4.6 (1.8)
	IIIN	32	28	2.7 (2.7)	3.4 (3.2)	23	3.8 (2.4)	4.7 (2.8)
	IIIM	79	20	2.9 (2.9)	3.8 (3.4)	63	3.7 (2.8)	4.8 (3.2)
	IV	26	23	2.3 (1.7)	3.1 (2.5)	20	3.0 (1.3)	4.0 (2.1)
	V	39	23	3.1 (2.8)	3.8 (3.2)	30	4.0 (2.6)	5.0 (2.7)
		192						
Urban Indian	I	16	19	3.2 (2.2)	4.1 (2.6)	13	3.9 (1.7)	5.0 (1.9)
	II	64	19	3.1 (2.1)	4.2 (3.0)	52	3.8 (1.6)	5.2 (2.4)
	IIIN	123	14	3.3 (2.4)	4.4 (3.0)	106	3.9 (2.1)	5.2 (2.6)
	IIIM	61	8	3.8 (2.4)	4.6 (2.9)	56	4.1 (2.2)	5.4 (2.7)
	IV	56	23	3.4 (2.6)	4.2 (3.1)	43	4.4 (2.1)	5.4 (2.3)
	V	62	13	3.3 (1.9)	4.4 (2.7)	54	3.8 (1.5)	5.1 (2.2)
		382						
Urban white	I	21	33	1.9 (1.6)	2.6 (2.3)	14	2.8 (1.1)	4.0 (1.5)
	II	27	33	2.1 (2.3)	2.9 (2.9)	18	3.2 (2.1)	4.4 (2.5)
	IIIN	59	31	2.5 (2.2)	3.5 (3.0)	41	3.6 (1.8)	5.0 (2.3)
	IIIM	70	14	2.7 (2.0)	3.9 (3.0)	60	3.2 (1.8)	4.6 (2.7)
	IV	16	25	3.6 (2.9)	5.0 (3.6)	12	4.7 (2.3)	6.7 (2.4)
	V	9				8		
		202						
Total		1 154						

Table 3: **Details of Decayed, Missing and Filled Surfaces (DMFS) scores by ethnic group and social class, for all mouths and carious mouths only. Uncorrected data and data corrected to 128 erupted surfaces are listed for social class groups where n ≥ 10.**

Group	Social Class	n	All mouths DMFS mean (SD)	DMFS/128 erupted surfaces mean (SD)	n	carious mouths only DMFS mean (SD)	DMFS/128 erupted surfaces mean (SD)
Rural black	I	0			2		
	II	5			4		
	IIIN	18	1.1 (2.6)	1.4 (2.9)	14	2.6 (1.5)	
	IIIM	25	1.4 (1.7)	1.9 (2.6)	15	3.4 (2.6)	3.3 (2.6)
	IV	28	1.8 (2.5)	2.1 (2.8)	48	3.3 (2.7)	3.9 (2.7)
	V	123	1.3 (2.3)	1.5 (2.7)			3.9 (2.9)
		199					
Urban black	I	0			4		
	II	7			21	4.3 (3.0)	
	IIIN	27	3.4 (3.2)	4.2 (3.8)	14	6.1 (6.0)	5.4 (3.4)
	IIIM	22	3.9 (5.6)	5.0 (6.5)	27	5.4 (4.1)	7.9 (6.6)
	IV	46	3.2 (4.1)	4.5 (5.3)	49	5.4 (3.7)	7.6 (4.8)
	V	77	3.5 (3.9)	4.5 (5.2)			7.1 (4.8)
		179					
Urban coloured	I	2			1		
	II	14	4.3 (2.5)	5.1 (2.9)	12	5.0 (1.9)	5.9 (2.2)
	IIIN	32	3.8 (3.8)	4.9 (4.7)	23	5.3 (3.5)	6.8 (4.2)
	IIIM	79	4.2 (4.9)	5.7 (6.3)	63	5.3 (5.0)	7.2 (6.3)
	IV	26	3.3 (3.1)	4.6 (4.9)	20	4.3 (2.8)	5.9 (4.6)
	V	39	4.8 (4.2)	6.2 (5.4)	30	6.2 (3.8)	8.0 (4.7)
		192					
Urban Indian	I	16	4.7 (3.9)	6.1 (4.9)	13	5.8 (3.6)	7.5 (4.4)
	II	64	5.0 (4.3)	7.0 (5.8)	52	6.2 (3.9)	8.6 (5.3)
	IIIN	123	4.9 (4.4)	6.8 (5.9)	106	5.7 (4.3)	7.9 (5.7)
	IIIM	61	5.7 (4.6)	7.0 (5.8)	56	6.2 (4.5)	7.6 (5.6)
	IV	56	5.0 (4.5)	6.4 (5.9)	43	6.5 (4.1)	8.3 (5.4)
	V	62	4.9 (3.3)	6.7 (4.8)	54	5.7 (2.8)	7.7 (4.4)
		382					
Urban white	I	21	2.5 (2.5)	3.6 (3.7)	14	3.7 (2.2)	5.5 (3.2)
	II	27	3.1 (3.9)	4.2 (4.7)	18	4.6 (3.9)	6.4 (4.5)
	IIIN	59	3.6 (4.0)	5.0 (5.3)	60	5.2 (3.8)	7.2 (4.9)
	IIIM	70	3.5 (2.7)	5.3 (4.4)	12	4.1 (2.5)	6.2 (4.1)
	IV	16	5.2 (5.7)	7.2 (6.3)	8	6.9 (5.6)	9.5 (5.5)
	V	9					
		202					
Total		1 154					

in social classes I to V. Apart from the white group, in which there was a small but steady increase of DMFT and DMFS with decreasing social class, the pattern was irregular. The same observation held whether or not caries-free individuals were included in the computations.

It is difficult to compare the present dental caries findings to the results of earlier workers. Many studies have used the term "social class" loosely sometimes basing it on income levels, sometimes on ill-defined criteria and other times without any classification although in other instances investigators such as French *et al*[19] have clearly defined their social class grouping using the occupational classification of the British Registrar General.[10] After having modified this British system for South African occupations[17] we found it convenient to use and had little difficulty with obtaining parental occupation information from the children examined. In the few instances in which there was some uncertainty, school records provided clarification. The same system has been used in a large community health project elsewhere in South Africa.[20] These workers found the system useful since there is no single adequate measure of social class. It is hoped, however, that in time experts in the field will develop a system suitable for an African developed/developing population mixture which will take into account income, education and environment. The most appropriate study in a developed country with which to compare our results is that of Dummer *et al*,[6] in South Wales, who used similar methodology. These authors showed significantly less caries among social class I children that lower classes although their statistical test was not mentioned. In the present study, such significance was not confirmed although a similar trend was found with the white children. Cross-comparison of white Johannesburg children with their counterparts in the same social classes in South Wales showed slightly higher caries scores in South Wales.

The importance of taking social class into account when considering the needs of a community is probably valid in developed European and North American communities. At the present time in Africa, with the complexity of developed and developing community criteria, South African data do not show the same pattern of dental caries through the social classes suggested by recent European data. Longitudinal data from both developed and developing countries, using these established criteria, should give additional information on this complex issue with a particular need to explain why social class appears influential in some groups and not in others. It is recommended, as countries enter the 1990's that sound base line data for longitudinal evaluation of changes in the dental caries pattern be collected.

Acknowledgements

Gratitude is expressed to the school pupils and principals for their co-operation and help, to Mrs H Ball for her word processing skills and to Professor LP Fatti, Head of the Department of Statistics, University of the Witwatersrand for his statistical advice.

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RHEUMATOLOGY-IMMUNOLOGY CONGRESS 1990

The joint Congress of the SA Rheumatism and Arthritis Association and of the SA Immunology Society takes place in Pretoria from 12 to 15 March 1990 at the Burgers Park Hotel. The hotel is centrally situated and within walking distance of major shops and other attractions in the city centre.

A full day teach-in on 11 March has been arranged to precede the Congress. This is both a teach-in and update, foccussed mainly on primary care physicians but also on physician specialists interested in the area.

A number of outstanding overseas visitors from both groups have accepted invitations and a wide range of topics will be covered.

The overseas guests invited by the Immunology Society will present lectures on a variety of topics including entry and function of macrophages in tissues, macrophage cytokine gene expression, phagocyte physiology and function, anti-tumour defence mechanisms, as well as updates on complement and auto-immunity.

In Rheumatology a wide field will likewise be covered dealing with etiology, pathogenesis, diagnostics, the clinical picture, as well as therapy. A number of special symposia on cartilage and its metabolism, metabolic bone disease, infective arthritis, sero-negative spondarthropathies and others have also been arranged.

Combined sessions of interest to both groups will take place as well as a teleconference (sound link-up) with an overseas authority.

A lively social programme including a welcome cocktail party should keep delegates both stimulated and relaxed.

Post congress tours optionally to game parks or Sun City are envisaged. Registration forms should be out during November with a follow-up congress update. Direct further enquiries on the Rheumatology-Immunology Congress 1990 to The Secretariat, c/o Department of Rheumatology, P O Box 667, Pretoria 0001, South Africa. Tel: (012) 21-3211 x 2409; Fax (012) 26-2401.