A Study of Dental Caries in Rural and an Urban Primary School in Zambia

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SUMMARY

320 children, 160 from a rural and 160 from an urban primary school were examined for dental caries.

The urban children were found to have twice as much caries as their rural counterparts. Their D.M.F./df indices were also much higher. No significant sex difference was noted. The tribal distribution shows that the Tonga are the most susceptible tribe while the Lenje have the least caries. The relationship between caries and brushing habits, as well as consumption of confectionary was established. The commonest teeth affected and their relationship to age was also noted.

It was concluded that urbanization has definitely contributed to the higher caries prevalence in the urban school children. Although the situation is not as bad as in the West, if it remains unchecked, 90% of the population may have caries in another 15 years.

INTRODUCTION

Much work has been carried out on the epidemiology of dental caries around the world. Human skulls before 12,000 B.C. were found totally free from caries, but by 9,000 B.C. caries had made its appearance (Von lenhossek 1919). Worldwide investigations found that the less sophisticated people such as the Eskimos and the Masai had little or no caries until they came into contact with "Civilized" diet. MacGregor 1963 found a significantly higher caries incidence in the Europeanised coastal areas in Ghana, than in the North where consumption of sugar was restricted. This led to the popular concept of the "immunity" of the African against caries, a view eroneously held for so long.

In Zambia, except for the work of Ukeje 1971, no work has been done, hence the necessity for such a project.

MATERIALS AND METHODS

Sample populations were obtained from a primary school in Lusaka urban and another primary school at Mwachisompola, in Kabwe rural. The pupils were examined in adequate natural light using 1 mouth mirrors and tooth probes. In each school 20 pupils were selected for each age group and examined employing the half-jaw system. The data was recorded on a sampling form using the W.H.O. pattern.

RESULTS

TABLE 1

% D.M.F. AT LUSAKA AND MWACHISOMPOLA

Total No. of children (7–14 years)		% with DMF or df teeth
1. Lusaka	160	36.5
2. Mwachisompola	160	17.5

TABLE 2

% D.M.F. SEX-WISE AT LUSAKA AND MWACHISOMPOLA

	Total	Male	Female	Males with Caries	%	Females with caries	%
Lusaka	160	90	70	28	31	33	47
Mwachisompola	160	89	71	13	13	9	13

TABLE 3

TRIBAL CARIES DISTRIBUTION LUSAKA

Tribes	Total	No. with Caries	% with Caries
Bemba	36	13	36
Tonga	27	14	50
Nyanja	25	9	36
Nsenga	22	8	36
Lozi	13	4	30
Tumbuka	10	4	40

TABLE 4

TRIBAL CARIES DISTRIBUTION MWACHISOMPOLA

Tribe	Total	No. with Caries	% with Caries
Lenje	89	6	7
Shona	26	5	20
Nyanja	9	2	22
Bemba	9	1	11

TABLE 5

RELATIONSHIP OF CARIES TO BRUSHING HABITS AT LUSAKA

Brushing Pattern	Total	No. with Caries	% with Caries
Daily: twice	10	1	10
Daily: once	22	6	27
At least weekly	100	40	40
Infrequently	28	14	50

NOTE: Brushing was accepted to mean use of conventional tooth brush as well as roots and twigs that are traditionally employed. This information was not reliably obtained at Mwachisompola, hence omitted.

TABLE 6

RELATIONSHIP OF CARIES TO CONSUMPTION OF CONFECTIONARY (LUSAKA)

Confectionary Consumption	Number	No. with Caries	% with Caries
Daily	18	12	66.7
At least once a week	110	14	40
Less than once a week	32	5	15.6

NOTE: *"Confectionary"* was taken to mean sweets, toffees, chocolates, cakes, lollipops and soft drinks. Chewing gum was excluded. The information was not reliably obtained at Mwachisompola hence omitted.

DISCUSSION

Very little work has been done on dental caries in Africa. In Zambia, apart from Ukeje's work (1967–71) no other data is available. This project is the first one aimed at measuring DMF indices and comparing population groups in Zambia.

As shown in Table 1, the Urban population has a much higher caries rate than the rural one. This may be attributed to the effects of urbanization, such as the readily availability of refined carbohydrate, replacement of the traditional "chewing

TABLE 7

LOTUS PRIMARY SCHOOL, LUSAKA AGE-WISE BREAKDOWN OF CARIES

Age	Total Examined	Total Caries	% Caries	♂s % Caries	♀s % Caries	D	M	F	DMF	d	f	df	DMF	Commonest Teeth Involved 1	2	3
7	20	9	45	16	57	0.3	–	–	0.3	1.4	0.1	1.5	1.8	$2^{nd}1^{o}m$	$1^{st}1^{o}m$	$1^{st}2^{o}m$
8	20	8	40	37	41	0.5	–	–	0.5	1.0	–	1.0	1.5	$1^{st}1^{o}m$	$1^{st}2^{o}m$	$2^{nd}1^{o}m$
9	20	7	35	50	20	0.4	–	–	0.4	0.6	–	0.6	1.0	$2^{nd}1^{o}m$	$1^{st}1^{o}m$	$1^{st}1^{o}m$
10	20	7	35	36	33	0.9	–	–	0.9	0.2	–	0.2	1.1	$1^{st}2^{o}m$	$2^{nd}2^{o}m$	$2^{nd}1^{o}m$
11	20	6	30	18	44	1.0	–	–	1.0	0.1	–	0.1	1.1	$1^{st}2^{o}m$	$2^{nd}2^{o}m$	$2^{nd}1^{o}m$
12	20	6	30	42	23	0.8	–	–	0.8	0.3	–	0.3	1.1	$1^{st}2^{o}m$	$2^{nd}1^{o}m$	$2^{nd}2^{o}m$
13	20	11	55	62	50	1.0	0.2	–	1.2	0.1	–	0.1	1.3	$1^{st}2^{o}m$	$2^{nd}2^{o}m$	$2^{nd}2^{o}m$
14	20	4	20	20	20	1.0	–	0.1	1.1	0.9	–	0.0	1.1	$1^{st}2^{o}m$	$2^{nd}2^{o}m$	$2^{nd}2^{o}m$

TABLE 8

NACHIYABA PRIMARY SCHOOL, MWACHISOMPOLA AGE-WISE BREAKDOWN OF CARIES

Age	Total Examined	Total Caries	% Caries	♂s % Caries	♀s % Caries	D	M	F	DMF	d	f	df	DMF	Commonest Teeth Involved 1	2	3
7	20	3	15	0	23	0.30	–	–	0.30	0.20	–	0.20	0.50	$1^{st}2^{o}m$	$1^{st}1^{o}m$	$2^{nd}1^{o}m$
8	20	5	25	35.5	7	0.40	–	–	0.40	0.50	–	0.50	0.90	$1^{st}1^{o}m$	$2^{nd}1^{o}m$	$1^{st}1^{o}m$
9	20	5	25	25	25	0.30	–	–	0.30	1.00	–	1.00	1.30	$2^{nd}1^{o}m$	$1^{st}1^{o}m$	$1^{st}2^{o}m$
10	20	5	25	30	20	0.10	–	–	0.10	0.80	–	0.80	0.90	$2^{nd}1^{o}m$	$1^{st}1^{o}m$	$1^{st}1^{o}m$
11	20	5	25	22	27	0.50	–	–	0.50	0.40	–	0.40	0.90	$1^{st}2^{o}m$	–	–
12	20	5	15	11	18	0.30	–	–	0.30	0.00	–	0.30	0.30	$1^{st}2^{o}m$	–	–
13	20	1	5	7	0	0.20	–	–	0.20	0.00	–	0.00	0.29	$2^{nd}2^{o}m$	–	–
14	20	1	7	0	0	0.20	–	–	0.20	0.00	–	0.00	0.20	$2^{nd}2^{o}m$	–	–

stick" by inferior quality toothbrushes, ignorance of dental hygiene, etc.

Although no sex difference is seen in the rural area, the females in the Lusaka school have a higher caries rate than male counterparts. (Table 2) This obviously may be due to some environmental factor which needs investigation. The wide difference in caries prevalence between unrelated tribes such as the Tonga and the Lozi and the narrower difference between the related tribes such as the Nyanja and the Nsenga lends evidence to the belief that caries is genetically pre-determined (Table 3). This theory proposes that when the correct environmental factors act upon this genetic predisposition, caries results. The fact that the Bemba have as low a prevalence as 11% (Table 4) in the rural area and as high as 36% (Table 3) in the Urban area provides evidence for this theory. That poor dental hygiene is a major contributory factor has been clearly demonstrated in Lusaka children where it was seen that daily brushers have only a 10% caries prevalence rate, while infrequent brushers have as high a rate as 50% (Table 5). A similar pattern has been reported by American workers.

The role of refined carbohydrate (Table 6), is of major significance. Its easy availability in large amounts in the city may be the reason for a much higher caries rate.

From Tables 7 and 8 it is evident that caries are higher at lower ages. This is probably due to the higher susceptibility of primary dentition to decay. It is also noted that the teeth with the largest surface

area and maximum fissures are most commonly involved Viz, the molars. This is obviously due to easy accumulation of food debris on these teeth as well as difficulty in keeping them clean due to their situation.

In conclusion, it must be accepted that dental caries is a major health problem. Health education, directed at highlighting the disadvantages of refined carbohydrates, proper dental hygiene especially among the most vulnerable groups will go along way in solving the problem. Flouridation of water though not considered in this study is an important factor. It is a known fact that lack of flouride causes caries and decay. Excessive flouride causes motling. In this study dental caries and decay was found in both the communities. Proper and improper flouride balance could be one of the factors responsible in addition to the other factors already mentioned above. It would, therefore, be interesting to carry out a detailed study to find out the role of flourides in a Zambian community along with other.

Dental caries must, therefore, receive its proper place on the National Health Programme if meaningful goals have to be achieved.

REFERENCES

1. *Klein H. et al (1941). Study on dental caries J. dent. Res 20, 203.*
2. *Fosdic (1950) Reduction in the incidence of dental caries J. Amer. dent. Ass. 40, 133.*
3. *Jacobson L.E. et al (1967) E. Afr. Med. J. Vol. 44 No.5 p.221.*
4. *Ukeje M.A.S. (1971) Trends in Dental diseases among Lusaka school children – Zambia Medical Journal 5, 195.*
5. *Scotch D.B. (1944). Study of bilateral incidence of carious lesions, J. dent. Res. 23, 105.*
6. *Oral Health Surveys, Basic methods, WHO (1971).*
7. *Moser et al (1962) Dental health and dental services – An assessment of available data; Nuffield Trust Report.*