

https://dspace.org/

# Total sucrose intake and dental caries in Black and White South African children of 1 - 6 years. Part I: Sucrose intake

**Richardson, B. D.; Rantsho, J. M.; Pieters, L.**

**1978**

http://hdl.handle.net/10539/19575

Richardson, B. D., Rantsho, J. M., Pieters, L. 1978. Total sucrose intake and dental caries in black and in white South African children of 1-6 years. Part I: sucrose intake. Journal of the dental asssociation of South Africa; 33(10):533-7

Downloaded from a DSpace repository. https://dspace.org/

Journal of the Dental Association of South Africa, 33, 533-537

# Total sucrose intake and dental caries in Black and in White South African children of 1 - 6 years
## Part I : Sucrose intake

Barbara D Richardson,* Johanna M Rantsho,* Linda Pieters,* and Peter Cleaton-Jones**

* National Research Institute for Nutritional Diseases, South African Medical Research Council, Cape Town; c/o Paediatric Department, Johannesburg Hospital, Private Bag X39, Johannesburg, 2000

**MRC/University of the Witwatersrand Dental Research Institute, Jan Smuts Avenue, Johannesburg, 2001

*Keywords: Caries; diet; ethnic groups; sucrose*

SUMMARY

*Sucrose intake was assessed for 675 Black and 463 White South African preschool children of 1 - 6 years, using a dietary questionnaire. Mean daily sucrose intakes were highest in White children, namely, 88 g, lower in urban Black, (62 g), and lowest in rural Black children, (52 g). Individual intakes were very variable and standard deviations were large in all groups. In rural and urban Black groups, those better-off had higher intakes than those who were poorer but, in White children, poorer groups had higher intakes.*

OPSOMMING

*Die sukrose-inname is bepaal in die geval van 675 Swart en 463 Wit Suid-Afrikaanse voorskoolse kinders tussen 1 en 6 jaar oud deur middel van 'n dieëtkundige vraelys. Die gemiddelde sukrose-inname was die hoogste by Wit kinders (88 g), laer by stedelike Swart kinders (62 g), en die laagste by die plattelandse Swart kinders (52 g). Individuele inname het aansienlik gevarieer en die standaardafwykings was in al die groepe hoog. By die meergegoede plattelandse en stedelike Swart groepe was die inname hoër as by die mindergegoede Swart groepe, maar onder die Wit kinders het die mindergegoede groepe 'n hoër inname getoon.*

There are no reported figures of daily sucrose intake in comparative groups of South African preschool children. In this paper, daily sucrose intake in Black and in White South African preschool children, aged 1 - 6 years is presented.

### Subjects

Daily sucrose intakes in 675 Black (427 rural and 248 urban), and 463 urban White preschool children of 1 - 6 years have been studied.

### Black rural preschool children

Of the 427 Black children examined, 175 aged 2 - 6 years attended the only two rural nursery schools located in the Rustenburg area, and 252 aged 1 - 6 years lived in two villages where all children present were examined.

### Nursery school children.

All 72 children who attended the McGregor Crêche, Thlabane, Rustenburg were examined. They had 2 meals a day at the crêche. These children were from a more privileged group, as parents could afford the R4,00 per month required for their schooling. The second group comprised all 103 children who attended the Maseeng Nursery School at Phokeng, Rustenburg district. This was a play school where children were not given meals. A very low fee of 20c per month was paid.

The two schools are situated about 150 km north-west of Johannesburg.

### Village children

In the village of Tlaseng, Rustenburg district, 160 km north-west of Johannesburg, 73 children were examined. At Motlatla village, Ventersdorp district, 194 km west of Johannesburg, 179 children were examined.

In both villages, all children of 1 - 6 years present on the day of the survey were examined. As far as could be ascertained, this comprised most of the 1 - 6 year-old children living in each village.

**Black urban preschool children**

A random selection was made of 250 children aged 1 - 6 years, living in upper, average and poor areas of Soweto, Johannesburg (as classified by the Johannesburg City Health Department), using six starting points, i.e. 2 for each area. These were selected from 52 random points used during a nutritional survey of Soweto (Richardson, 1977). Points were originally selected from a grid map covering the Soweto area, of 6 364 hectares (26,5 square miles) with an official population recorded as 722 929. Radiating from each point approximately 50 children aged between 1 and 6 years were examined; 86 children lived in the relatively higher income areas of Dube and Rockville and 81 in the average areas of Tladi and Moletsane - both these groups were classified as average for purposes of this paper; and 83 children from the poorest income groups at Phiri and Pimville.

**White urban preschool children**

Examinations were made on 467 children of 1 - 6 years, of whom 371 were attending nursery schools in the Johannesburg area.

Nursery schools were selected according to their socio-economic situation, 3 being in the upper-middle (average for purposes of this paper), and 2 in the lower socio-economic areas. Selections were made in consultation with Nursery School Inspectresses of the Johannesburg City Health Department. All children attending each school were examined. Sucrose questionnaires, together with an explanatory letter, were sent home to parents to complete and were collected later.

**General population children**

During home visits to representative groups in the same areas in which the schools were situated, 96 children of the general population were examined, 49 from the average and 47 from the lower group.

## METHODS

*Daily sucrose intake* was assessed for each child using a dietary questionnaire, based on that of Bett, Morland and Yudkin (1967) but modified for young children (Appendix 1). There were two sections in the questionnaire. The first dealt with sucrose intake of the age period from birth to 2 years, and the second from 2 - 6 years. Birth date, height and weight were recorded for each child, also a dental caries examination was carried out either by, or under the tutelage of, P.E.C-J. (see Part II).

*Sucrose intake assessment.* The questionnaire method of assessing sucrose intake has been tested by Yudkin (1964) and found to be reliable. Although not ideal, it is the best practical method available. The authors were cognisant of the many difficulties that arise in assessing sucrose intake such as reliability of information on amounts, vitamin syrups given at clinics (see note*), s crose from sources unknown to the parent in individ cases. These factors are common to any dietary rec method, including the 24 hour and 7 day recall (Nut tion Reviews, 1976). The calculation of the amount sucrose in prepared foods and drinks was made fr analyses published in food tables (Williams, 1969; Co position of Foods: Documenta Geigy, 1962) or fr figures supplied by the manufacturers. For examp one teaspoon of sugar was taken to contain 5 g sucr - no attempt was made to divide this into heaped or vel teaspoons; 1 portion cake, 12 g; 1 teaspoon jam, 5 and 'fizzy drinks' such as Fanta or Coca-Cola, etc., glass (250 ml) 30g (19 per cent sucrose - data suppli by manufacturers).

**Data recording**

For *Black children* trained interviewers recorded da intakes of food and drink. During home interviews w mothers or grandmothers, in rural areas, sucr questionnaires were individually completed for all ch dren attending the only two nursery schools in the R tenburg district at (i) the McGregor Crèche, Thlaba and (ii) Maseeng Nursery School, Phokeng. At our r quest, village mothers with children aged 1 - 6 yea were asked by the headman to meet at a central ven the local school, for examination. The response of t village mothers was excellent and most families w preschool children were present. Sucrose questionn res were filled in for each child by trained Black staff the time of examination.

In the urban Black area of Soweto, Johannesbu J.M.R. completed all sucrose questionnaires during h me visits.

In the *White group,* a trained interviewer (L.P.), fill in sucrose questionnaires for children of the gene population during home visits. As the majority of p rents of nursery school children went out to work, dividual home visits were not possible; accordin questionnaires, together with an explanatory lett were sent home with the children for completion by t parents. These were later collected from the schoo

All sucrose consumption data, together with dental c ries observations, were transferred on to punch ca and analysed in an IBM 370/158 computer using t Statistical Package for the Social Sciences (Nie *et* 1975). The statistical tests used were Student's t test a the Chi-square test; the level of statistical significan chosen was $p < 0,01$.

## RESULTS

*Table I* gives the mean daily sucrose intake in gramm at two age periods, namely infants of under 2 years a children of 2 - 6 years.

*Table II* gives mean daily sucrose intakes for p school boys and girls.

*NOTE No enquiries were made regarding vitamin syrups given at clinics. In Black r areas well-baby clinic attendance was poor or virtually nil, as clinics, when present, v too far away from many families and transport facilities non-existent or difficult in ur Black and urban White groups this could well have been an extra source, but attenda are usually on a weekly basis before age one and thereafter sporadic.

*Table III* presents mean daily sucrose intakes, also mean intakes one standard deviation above and one below the mean in preschool children.

In *Table IV* preschool children were divided into average (upper-middle) and lower socio-economic groups; their mean daily sucrose intakes are presented.

*Table I.* Mean daily sucrose intake (in grammes) at two age periods in infants (under 2 years) and preschool children of 2 and 6 years.

| Group | | Sucrose intake g/d | |
|---|---|---|---|
| | | Infants | Preschool children |
| Black rural | N | 51 | 376 |
| | Mean | 38,4 | 54,1 |
| | S.D. | 34,6 | 33,6 |
| Black urban | N | 33 | 215 |
| | Mean | 46,7 | 64,2 |
| | S.D. | 21,7 | 15,9 |
| White urban | N | 27 | 436 |
| | Mean | 71,5 | 88,8 |
| | S.D. | 51,7 | 48,0 |

S.D. - Standard deviation (used throughout tables)
N - Number of subjects (used throughout tables)

*Table II.* Mean daily sucrose intakes (in grammes) according to age and sex.

| Age Years | | Black rural | | Black urban | | White urban | |
|---|---|---|---|---|---|---|---|
| | | M | F | M | F | M | F |
| 1-1,11* | Mean | 35,4 | 41,3 | 46,2 | 47,4 | 69,0 | 74,6 |
| | S.D. | 31,5 | 37,7 | 22,2 | 21,9 | 33,4 | 69,8 |
| | N | 25 | 26 | 18 | 15 | 12 | 15 |
| 2-2,11 | Mean | 47,1 | 50,7 | 57,8 | 54,7 | 92,8 | 93,5 |
| | S.D. | 31,3 | 38,6 | 13,9 | 12,7 | 47,1 | 61,8 |
| | N | 37 | 15 | 32 | 24 | 52 | 40 |
| 3-3,11 | Mean | 79,9 | 59,2 | 66,1 | 63,8 | 94,1 | 81,3 |
| | S.D. | 46,6 | 35,1 | 12,7 | 14,8 | 51,3 | 49,9 |
| | N | 44 | 46 | 30 | 35 | 44 | 53 |
| 4-4,11 | Mean | 49,8 | 47,9 | 67,7 | 66,0 | 94,7 | 83,0 |
| | S.D. | 31,3 | 25,4 | 19,5 | 13,8 | 44,5 | 37,3 |
| | N | 54 | 64 | 15 | 26 | 72 | 55 |
| 5-5,11 | Mean | 60,1 | 45,3 | 68,4 | 73,1 | 85,0 | 91,2 |
| | S.D. | 33,8 | 34,6 | 18,4 | 25,7 | 44,7 | 55,2 |
| | N | 44 | 41 | 16 | 16 | 57 | 48 |
| 6-6,11 | Mean | 40,8 | 45,5 | 64,9 | 71,1 | 66,2 | 82,4 |
| | S.D. | 23,6 | 15,7 | 16,8 | 16,1 | 15,7 | 27,4 |
| | N | 14 | 17 | 10 | 11 | 8 | 7 |
| Total group | Mean | 55,2 | 49,1 | 61,3 | 62,4 | 89,5 | 85,9 |
| | S.D. | 37,5 | 31,9 | 17,9 | 18,5 | 45,5 | 51,2 |
| | N | 218 | 209 | 121 | 127 | 248 | 215 |

1 - 1 year 11 months, etc.

As socio-economic status is a relative concept, meaningful in its own context, and within each individual group, it was considered desirable to divide data into average and lower groups rather than into upper, middle and lower socio-economic classes.

## COMMENTS

### *Mean daily sucrose intakes*

In White groups, as the mean daily sucrose intake for the general population did not differ significantly from that of the nursery school group, the sucrose questionnaires completed by the parents were accepted as reliable. This was also true of the mean intakes within the various Black groups, assessed by different trained interviewers.

During home visits which took place following the anthropometric and dental examination at the various nursery schools, a total of 95 per cent of sucrose questionnaires were completed for Black groups; in the interim period the remaining 5 per cent of children had left school and their parents could not be traced. For White groups, there was an 89 per cent response, with 4,3 per cent refusals; the remaining 6,7 per cent of children had left school prior to completion of the questionnaire and could not be contacted.

*In infants* mean daily sucrose intakes of Black rural and urban groups were not significantly different. However, compared with Whites, intakes in the Black rural and urban groups were significantly lower ($p < 0,001$). In all groups, infants had significantly lower intakes ($p < 0,001$) than older children.

*Table III.* Mean daily sucrose intakes of groups of Black and White preschool children with intakes one standard deviation above and one below the mean.

| Group | | Mean sucrose intake | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 S.D. above mean | | 1 S.D. below mean | | Mean | |
| | | N | g/d | N | g/d | N | g/d |
| Black rural | Mean | 53 | 122,1 | 24 | 11,4 | 427 | 52,2 |
| | S.D. | | 28,5 | | 5,5 | | 35,0 |
| Black urban | Mean | 32 | 92,6 | 25 | 40,9 | 248 | 61,9 |
| | S.D. | | 12,9 | | 2,7 | | 18,2 |
| White urban | Mean | 61 | 181,2 | 45 | 28,9 | 463 | 87,8 |
| | S.D. | | 42,2 | | 8,9 | | 48,2 |

*Table IV.* Mean daily sucrose intakes in average and lower socio-economic groups of Black and of White preschool children

| Group | | Sucrose intake in socio-economic groups | | | | | |
|---|---|---|---|---|---|---|---|
| | | Average | | Lower | | Total | |
| | | N | g/d | N | g/d | N | g/d |
| Black rural | Mean | 154 | 76,4 | 273 | 38,6 | 427 | 52,2 |
| | S.D. | | 40,4 | | 21,8 | | 35,0 |
| Black urban | Mean | 165 | 65,7 | 83 | 54,3 | 248 | 61,9 |
| | S.D. | | 19,0 | | 13,8 | | 18,2 |
| Wht urban | Mean | 262 | 82,4 | 201 | 94,9 | 463 | 87,8 |
| | S.D. | | 45,8 | | 50,5 | | 48,2 |

*In older groups* Black children had significantly lower mean sucrose intakes than White children ($p<0,001$). Intakes were significantly lower ($p<0,001$) in rural compared with urban Black children.

There were no significant sex differences (Table II). There was a gradual increase in mean daily sucrose intake with age, with some individual exceptions. The high intake at 3 years in rural Black males was not significantly different to the other groups.

*High and low sucrose intakes*

Approximately 12 per cent of children had high sucrose intakes, i.e. intakes 1 S.D. above the mean. It was of considerable interest that of these high sucrose eaters Black rural children had significantly greater ($p<0,001$) intakes than Black urban children, but the intake of both groups were significantly lower ($p<0,001$) compared with Whites (Table III). Among the 5-10 per cent of low sucrose eaters, i.e. intakes below 1 S.D., Black urban children had significantly higher ($p<0,001$) intakes than either Black rural or White children.

*Socio-economic status and sucrose intake*

In Black children, the average groups had a significantly higher ($p<0,001$) mean daily sucrose intake than the lower groups (Table IV). This was more noticeable in the country and possibly related to the greater amount of money available in those better-off for the purchase of sugar, sweets, etc. This was not the case with the White groups where the lower groups had higher mean sucrose intakes - differences were not significant.

## DISCUSSION

*Mean daily sucrose intakes*

These were lower in groups of rural compared with urban Black children, and both were lower compared with White children. Daily consumption in rural groups was lower due to (i) lack of money to buy greater quantities, (ii) distances from the local shop.

*High and low sucrose eaters*

As expected, mean intakes of children, divided according to those one standard deviation above (high sucrose eaters) and one below the mean (low sucrose eaters), varied markedly. Of interest is the fact that when sucrose intakes were high, it was rural rather than urban Black children who had greater intakes, but not greater than those of White children. When intakes were low, urban Black children had intakes higher than either rural or White children. It was not apparent why these differences existed, but it would appear that in the urban context sucrose formed a more stable part of the household diet than in country areas. It is again a question of economics and availability, in other words a socio-economic pointer. This would be borne out by the fact that at the more privileged Black rural nursery school (McGregor Crèche) sucrose intakes were found to be high, indeed, similar to those of White urban groups.

*Socio-economic status and sucrose intake*

Studies on White adult groups (Walker, Holdsworth and Walker, 1971) showed that better-off groups had lower mean sucrose intakes than poorer groups; this was true of the White children studied. The opposite, however, was the case with Black children, where better-off groups had higher intakes than poorer groups.

## CONCLUSIONS

Sucrose intakes in preschool groups were highest in White, lower in urban Black and lowest in rural Black children. Individual intakes were very variable, and standard deviations large. Unexpectedly, the mean intake of high sucrose eaters was greater in rural than in urban Black children, but not as high as in Whites. Among those with low intakes, Black urban children had the higher intakes. Reasons for these differences are obscure, but may be socio-economically determined, although mean sucrose intakes did not appear to be related to socio-economic level. In rural and urban Blacks, better-off children had higher intakes than those who were poorer; but in White children poorer groups had higher intakes.

Further studies are being undertaken to characterise sucrose intake patterns, as well as frequency of intake and the relationship to dental caries in young children.

## ACKNOWLEDGEMENTS

This study was supported by a grant from the South African Sugar Association.

## REFERENCES

Anon. (1976) The validity of 24-hour dietary recalls. *Nutrition Reviews*, **34**, 310-311.

Bett, D.G.G., Morland, J. & Yudkin, J. (1967) Sugar consumption in acne vulgaris and seborrhoeic dermatitis. *British Medical Journal*, **3**, 153-155.

Composition of Foods (1962) *Documenta Geigy : Scientific Tables*, 6th ed., Basle, Switzerland, J.R. Geigy, p.501.

Nie, N.H., Hull, C.H., Jenkins, J.G., Steinbrenner, K. & Bent, D.H. (1975) *Statistical Package for the Social Sciences*, 2nd ed., New York, McGraw Hill.

Richardson, B.D. (1977) Underweight - a nutritional risk? *South African Medical Journal*, **51**, 42-48.

Walker, A.R.P., Holdsworth, C.M. & Walker, E.J. (1971) Investigations on the consumption of sugar by South African populations. *South African Medical Journal*, **40**,516-524.

Williams, S.R. (1969) *Nutrition and Diet Therapy*, Saint Louis, The C.V. Mosby Company. p.584.

Yudkin, J. (1964) Dietary fat and dietary sugar. *Lancet*, **2**, 478-479.