

# Diet of children in urban and rural Fiji

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## Abstract

The aim of this study was to identify differences in the diet of 10-15 year olds in urban and rural Fiji. One hundred and ninety three children were interviewed. They were divided into an urban sample of one hundred children from three primary schools in Suva, and a rural sample of ninety-three children from four primary schools served by the Navua Health Centre.

The project showed that the urban sample consumed significantly more imported foods with a higher proportion of saturated fats, protein and refined sugar. The rural sample consumed more foods of Fijian origin. These findings were consistent during the week and at the weekend. The study investigated whether there were any differences in diet associated with a difference in height or weight and to educate the children in the benefits of a healthy diet.

## Introduction

Fiji has a population of 665,000 and is made up of 49% Melanesians and 49% Indians, with a remaining 2% made of Europeans, Rotumans and Orientals. This study conducted during 1994 looked at the indigenous Fijian Melanesians.

The incidence of non-insulin dependent diabetes mellitus (NIDDM) has increased in Fiji in recent years. In 1974, the Fiji Diabetic Association found the prevalence of glucosuria to be 12.3%<sup>1</sup>. In 1980, the National Diabetic and Cardiovascular disease survey found that there was a higher incidence of NIDDM in the urban communities (male 3.5%, female 7.1%), as compared to the rural communities (male 1.1%, females 1.2%)<sup>2</sup>. In 1985, another survey found a higher prevalence of NIDDM in the urban areas<sup>3</sup>. The rate of NIDDM is now in the region of 12%.

Many risk factors have been associated with NIDDM including:

- **Age.** NIDDM is known to increase with age.
- **Sex.** Females have a higher incidence of NIDDM than males in Melanesians, but this may be related to other risk factors, such as obesity and exercise<sup>3</sup>.
- **Ethnicity.** It has been shown that the Micronesians in Nauru have a rate of 30% NIDDM<sup>4</sup>, and it has been suggested that Polynesians, Melanesians and Fijian Indians have a higher genetic susceptibility to NIDDM. This is now becoming manifest as these nations become more westernised<sup>2, 4, 5</sup>.
- **Obesity.** In one study it was found that in American blacks, the risk of developing NIDDM was increased by 70% if their body weight was over 150% of their ideal weight as compared to the American whites<sup>6</sup>. The prevalence of obesity has also been shown to be high in Pacific populations<sup>7</sup>.
- **Exercise.** This may be connected with obesity, but exercise does seem have an advantageous effect on metabolism<sup>8</sup>.
- **Diet.** With increasing westernisation leading to higher calorie foods and increasing wealth, the diet of Fijians is moving away from a traditional diet of high fibre and carbohydrate. The resulting increased calorific intake leads to obesity and increased incidence of NIDDM especially in urban areas<sup>7</sup>. This may also be associated with the higher intake of western foods and their effect on metabolism<sup>7, 8</sup>.

In view of the above risk factors, this study in 1994 concentrated on the difference in diet between urban and rural areas. Its aim was to find if there were any major differences which may contribute to the different prevalence rates of diabetes in urban and rural areas of Fiji.

## Method

All of the 193 children interviewed were of Fijian Melanesian origin and aged between 10-15 years. The sample children came from primary schools in an urban area (Suva) and the rural area covered by the Navua health centre. The 100 children in the urban sample were drawn from the Gospel Intermediate School (30), Gospel Primary School (40) and Dirvana Primary School (30). The 93 children in the rural sample were drawn from Rampur College (25), Deuba Primary School (25), Nabukavesi School (24) and Yanuca Island School (19).

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The children were weighed using a pair of recently calibrated spring scales. The children removed their shoes and their weight was measured to the nearest kilogram (kg). The height of the children was measured by using a tape measure against a straight wall. They removed their shoes and their height recorded to the nearest centimetre (cm). These measurements were taken by a student nurse to whom the technique had been demonstrated.

The blood pressure of each child was recorded by a qualified nurse using an aneroid sphygmomanometer.

The children were then interviewed by the author. Firstly, they were asked about any family history of diabetes. This was explained as being "sugar in the blood", as this is how most children in Fiji understand diabetes. They were then asked to remember what they had eaten the previous day (a weekday, Friday was used if the interview was carried out on a Monday), and also at the weekend.

A list of common foods available in Fiji was compiled. The list of foods was then read to the children, to which they had to respond 'yes' or 'no' to whether or not they had eaten the food the previous day. This was then repeated for the weekend. An interpreter was available if the children did not understand English.

Following the interviews, the children were given an educational talk about diabetes, its risk factors and prevention. This was achieved by using visual aids, discussion and questions.

## Results

Table 1 shows the age, weight, height and BMI by sex and location. There was a significant difference in age between the urban and rural population. The urban group being younger by almost one year. There was no difference between the urban and rural groups for systolic and diastolic blood pressure. There was no significant difference between the urban and rural areas when considering the children's family history of diabetes.

Both male and females in the rural area were significantly older than their counterparts in the urban area. There was a difference in height between males from the urban and rural areas. The urban males were significantly taller than their rural counterparts. There was no significance difference in the height between the urban and rural females. There was no significant difference in the weight or BMI of either sexes weight when comparing urban to rural areas.

Table 2 shows that the food consumption of the rural population was significantly higher than the urban popula-

tion on weekdays and weekends. Most of the foods which were consumed by rural populations were of local origin. The type of food and the percentage of rural and urban consumption are given in these tables. (Tables 2, 3, 4).

Tables 3 and 4 illustrate the foods which were consumed in greater amounts by the urban population. There were significantly more of the imported variety compared with the rural population on weekdays and weekends.

## Discussion

In undertaking this study, it was hoped that a difference would be found in the diets of the urban and rural populations in Fiji which may help to explain the differences in the prevalence of NIDDM found in these areas. This was not found to be the case which may suggest that the types of food are important in the development of diabetes. This was found to be the case in a study on Japanese Americans which found that those with NIDDM did not have a higher calorific intake, but they did consume more fat and protein<sup>9</sup>. Within Fiji it was also shown that the urban population had a higher intake of fat and refined carbohydrate<sup>11</sup>. It has been proposed that poor nutrition during pregnancy predisposes the infants to NIDDM in later life, as the pancreas cannot deal with the extra load of carbohydrate and obesity. Thus, the damage may be occurring prior to birth and it may take a generation of people with improved nutrition before a decrease in NIDDM occurs<sup>10</sup>.

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eration of people with improved nutrition before a decrease in NIDDM occurs<sup>10</sup>.

This study found that the mean age of the rural children in this sample was one year older than the urban sample. The age difference was significant in both the male and female populations. In this study we were unable to determine whether this implies a difference in school starting age, slower progression through the school system, or is in some way related to diet. Also, urban males were significantly taller than their rural counterparts. The reasons for these differences could be due to the differences in diet. Further research would be needed to investigate the different age groups, their height, weight and onset of puberty in relation to their diet.

The rural areas consumed more Fijian staple food than the urban areas during the week and at the weekend. This is due to most rural areas growing their own root crops whereas the urban sample has to purchase these from the market. The root crops are not commercially grown in large amounts and are therefore expensive to buy in the urban area. The foods were divided into weekday and weekend foods because the weekend, and especially Sunday is important to the Fijians and they tend to eat their best foods at this time.

**Table 1. Age, weight, height and BMI, by sex and urban vs rural (n=193)**

	urban		rural		P value*
	male Mean (S.D.)	female Mean (S.D.)	male Mean (S.D.)	female Mean (S.D.)	
Age	12.40 (1.15)	12.64 (1.05)	13.20 (1.05)	13.35 (1.18)	0.0006 (m) 0.0048 (f)
Height	158.93 (9.53)	159.48 (6.60)	151.88 (9.94)	156.26 (8.19)	0.0005 (m) n/s (f)
Weight	47.10 (12.3)	48.90 (10.4)	43.71 (9.4)	51.10 (12.0)	n/s (m) n/s (f)
BMI	18.48 (3.71)	19.07 (3.12)	18.73 (2.22)	20.67 (3.32)	n/s (m) n/s (f)

\* Student's T Test, m= male, f= female, n/s = not significant S.D. = Standard Deviation

**Table 2. Foods consumption, in a urban and rural settings. (n=193)**

Food	urban consumption %	rural consumption %	Food type
<b>Weekday</b>			
Dalo	30	48	Fijian staple
Mackerel	25	65	Fijian protein
Fresh milk	2	8	Fijian protein
Banana	5	14	Fruit
<b>Weekend</b>			
Bread fruit	10	26	Fijian staple
Yam	21	46	Fijian staple
Rice	72	85	Imported staple
Noodles	7	49	Imported staple
Coconut cream	67	87	Fijian fat
Mackerel	34	66	Fijian protein
Fresh milk	1	8	Fijian protein
Dalo leaves	34	55	Vegetable
Water cress	11	22	Vegetable
Bele	53	71	Vegetable
Mango	35	51	Fruit

**Table 3. Foods consumed in greater amounts in an urban setting - on weekdays**

Food	Urban consumption %	Rural consumption %	Food type
Breakfast crackers	39	21	Imported staple
Bread	86	48	Imported staple
Cereal	17	0	Imported staple
Rice	62	38	Imported staple
Coconut cream	40	25	Fijian staple
Butter	86	55	Imported fat
Oil	60	13	Imported fat
Sweets	55	32	Snacks
Preserves	31	10	Snacks
Peanut butter	37	17	Snacks
Fizzy drinks	49	22	Drink
Chicken	15	5	Fijian protein
Beef	22	9	Fijian protein
Cream	7	0	Imported protein
Ham	9	0	Imported protein
Bacon	5	0	Imported protein
Cheese	15	3	Imported protein
Long life milk	47	15	Imported protein
Powdered milk	37	22	Imported protein
Lettuce	10	0	Vegetables
Cucumber	24	5	Vegetables
Carrots	40	4	Vegetables
Capsicum	6	0	Vegetables
Onion	39	6	Vegetables
Pineapple	23	11	Fruit

It can be seen that during the week the urban dwellers use more coconut cream than the rural, however, this finding is reversed at the weekend.

The high consumption of fresh fish in the rural area was mainly due to their reliance on fishing as the main source of protein. Fresh milk is only usually consumed in the rural areas, however, it is rarely used on a daily basis. Fresh milk is available in the urban areas but is expensive. The long-life or powdered varieties are cheaper. The fruit and vegetables that are eaten in the rural areas are produced locally.

All of the rural areas had access to a town. The Rampur College was located close to the town of Navua where many

**Table 4. Foods consumed in greater amounts in an urban setting - on weekends**

Food	Urban consumption %	Rural consumption %	Food type
Bread	86	62	Imported staple
Cakes	41	22	Imported snack
Butter	88	69	Imported fat
Oil	60	13	Imported fat
Peanut butter	38	24	Imported snack
Fizzy drinks	45	28	Drinks
Tuna	23	11	Imported protein
Chicken	44	17	Imported protein
Cream	10	0	Imported protein
Ham	13	4	Imported protein
Long life milk	52	22	Imported protein
Powdered milk	50	35	Imported protein
Lettuce	25	9	Vegetables
Cucumber	43	19	Vegetables
Carrots	54	26	Vegetables
Capsicum	10	0	Vegetables
Onion	44	25	Vegetables
Pineapple	34	13	Fruit

of the imported goods are available. The Deuba Primary School was situated in a village, approximately twenty minutes away from the town. Access was available by bus, however, this was a relatively poor area and therefore, few imported goods were purchased. The Nabukabesi School in the interior was two hours away from Navua on a dirt track. The villagers were able to travel to the town on a truck. Children attending the school were boarders from neighbouring villages and therefore had all their week day meals at school. All of the children returned home at the weekend. Yanuca Island School was situated on an island, one hour away from the mainland of Viti Levu. Access was available once a week. The population of the island were generally affluent, as they were involved in the tourist trade (fire walking). Therefore, sweets and snacks were brought home for the children. The children attending both, Yanuca Island School and Deuba Primary School went home for lunch. As can be seen from Tables 1 and 2, there was no difference in the consumption of sweets at the weekend, but the urban group consumed more during the week.

The location of the village schools and their ability to return home for lunch or have meals provided resulted in them not consuming many imported foods. However, the schools in Suva had canteens where the children could buy

lunch. Sweets, crisps and fizzy drinks were readily available and about fifty percent of the children consumed these. The fizzy drinks consumed were mainly Coke which has a high sugar content. Their families are more affluent enabling them to buy imported foods. The urban group was shown to purchase more imported proteins, fats and staple foods as well as snacks. The vegetables that the urban group ate were all purchased from the market, some of which were imported.

The above findings have important implications for Fiji. Firstly, there should be a government policy controlling the selling of food in school. This would make sure healthy foods are available. This is especially important because although, health education now forms part of the curriculum and as shown in this study, children have a good knowledge about this disease, it does not affect their consumption of imported foods. Secondly, advertising and sponsoring of events by companies such as, Coca-Cola and Tip-Top Ice Cream need to be carefully considered as these are promoting the consumption of highly refined carbohydrate foods. Finally, it must be remembered that food plays an important role in the Fijian culture and traditional diets seem to be overall healthier than Western diets<sup>8,11</sup>.

It should be noted that the list of foods used in the interview was not all inclusive of every food consumed in Fiji. Therefore, a complete database was not obtained as many of the urban Fijians have incorporated Indian food into their diet. A more comprehensive list of foods may show other differences in the urban-rural comparison of diet. Also, the urban schools were located in a small area, whereas the rural schools were from different areas of Fiji. This may have resulted in differences between the rural areas as well as between the rural and urban areas. This could not be analysed, as the sample group from each rural school was too small. Differences between the rural areas could be studied if a larger sample size was used. In further studies a follow up questionnaire could be used to assess the children's diet a year later to find if the education was successful.

## Conclusions

This study demonstrated that children in the urban area of Fiji consumed more imported foods with a higher intake of saturated fats, protein and refined sugar, in comparison with the rural group who ate mainly Fijian produce. It is postulated that these differences in diet form a risk factor in the development of NIDDM. This has many implications for the health of Fijians where diabetes is becoming more prevalent. The Fijian Government should continue its health education programme in schools, monitor the promotion of refined foods and instigate a policy for the selling of food in schools. Fijians should also be encouraged to return to their traditional foods as much as possible.

## Acknowledgements

I would like to thank the following without whom this project would not have been possible. The British Diabetic Association for funding and Dr. Clara Lowy and Julie Simpson from St. Thomas's hospital London, for supervising this project. The Ministry of Health of Fiji for permission to do the study and the Navua and Suva school health teams for their assistance. Dr. Joseph Kado and the Sotutu family gave special support and Mr John Rys Evans for typing.

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