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Heights and Weights and  
Eating Habits of Rarotongan  
School Children, 1982.

by

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## 1. INTRODUCTION

From 1 - 28 September 1982 the Ministry of Health in conjunction with the Education and Statistics departments of the Cook Islands Government, carried out a survey on heights and weights and eating habits of primary and secondary school children in Rarotonga.

Rarotonga is the main island of the Cook group and is the Administrative Centre. It is of volcanic origin and is surrounded by a fertile plain about 1 km in width where the population lives and the plantations are found. The population of Rarotonga was 9,477 at the 1981 Census. There is a constant migration of people from the outer islands to Rarotonga. According to the 1976 Census 61% of the Rarotongan population were born in Rarotonga, 26 per cent in other islands of the group, and 13 per cent overseas.

Agriculture is an important industry in Rarotonga. The main exports are fruits and vegetables. Subsistence farming and fishing are carried out and the crops grown include a variety of root vegetables, other vegetables, fruits and coconuts.

In Rarotonga there are eleven schools including 2 private schools directed by their missions. The school roll at the 2nd February 1982 was 1,888 primary school and 1,049 secondary school students.

A five-year health education plan for the Cook Islands (1982 - 1986) has been approved and the primary school stage is underway. Public health and dental nurses are assigned to schools to perform treatment and preventive work. "Local lunch days" are held in the schools.

## 2. OBJECTIVES

The aim of the survey was to obtain qualitative information on foods consumed by pupils before and during school hours. Information on the source of the food eaten, the type of food eaten, and the cost of food was collected. Height and weight of the children was also recorded.

## 3. METHODS

The survey designed by the Statistics Office was conducted on a randomly selected sample. A 10% sample was drawn from the primary school roll, and a 20% was selected from the secondary school roll.

Prior to use the proposed interview form was circulated to the senior medical officers, the Statistics Office, and Education department administrative staff for their comments. The interviewers were the authors, public health and hospital nursing staff, and student nurses.

A pre-test of the questionnaire was carried out on 50 primary school children and slight modifications were incorporated.

The survey was conducted on days considered to be usual diet days - Monday was excluded because it followed a feasting day, and "local food days" were avoided.

Children were interviewed immediately after lunch, and were asked to recall all food and drink consumed on that day.

For the purpose of data analysis foods were classified into the following groups: protein, fats and oils, carbohydrate starch by type, fruit, other vegetables, food high in sugar or fat, drinks with added sugar, and drinks without added sugar. (Appendix 1)

The Rarotongan school children were measured in bare feet against a wall marked in inches. The mean height was calculated in centimetres for each one year age group 5 to 17 years inclusive. Weight was measured to the nearest pound with subjects in light clothing, and converted to kilograms. The results were compared with the 1972 Busselton survey (Western Australia); the subjects of this survey constituted 90% of the population and were predominantly of British descent.

#### 4. RESULTS

Figure 1 illustrates the eating habits of the children at breakfast and lunch and the source of the food. The breakfast results show that in 4 out of 9 primary schools a significant number of children were not eating breakfast (> 20%). In secondary schools the number of students who ate nothing at breakfast was between 10% and 20%. Overall, the number of students missing lunch was less than at breakfast; however, in one primary school a large number of students (22%) missed lunch. In secondary school the number of students missing lunch was higher than the number in the primary school, and in one secondary school 27% of students ate nothing at lunch.

A large proportion of primary school children brought lunch from home - more than 60% in all schools. In all the secondary schools less than 50% of students brought food from home, and the overall proportion of secondary students bringing a home lunch was 25%.

In the primary schools there was a wide range in the number of children who bought foods or drinks at the shop. In two primary schools over 70% of children bought food from the shop, and at one school no children bought food at the shop because there was a school ruling against it. All secondary schools registered over 50% attendance at the shop.

Primary schools showed a wide range in the amount of money spent. Three schools were considered to have a high rate of spending at the shop (70c or more). On the average the secondary school students spent a lot more money at the shop than the primary school children. The average amount spent by students who bought food at the shop was 60c in the primary schools and 90c in the secondary schools.

Figure 2 illustrates the frequency of consumption of breakfast foods. The number of students eating protein foods was small. Fats came mainly from imported sources (butter, margarine and oil), and only a small amount of coconut was consumed by the primary school students. Very few primary school children ate root vegetables and starchy fruits and vegetables for breakfast and the number of secondary school students eating these foods was negligible. A small number of primary and secondary school children ate wholegrain or enriched starch, and most of the primary school children eating foods from this group came from one school. A high proportion of children ate refined starch at breakfast, mostly white bread. The proportions were 65% of primary school children, and 58% of secondary school children.

Overall, the number of students eating fruit and other vegetables (non-starchy) at breakfast was considered to be very low, with less than 12% of students eating these foods. The number of children eating foods high in fat or sugar was fairly low, less than 20%, but there was a heavy consumption of drinks with added sugar at breakfast.

Figure 3 illustrates the frequency of consumption of lunch foods. There is a slight increase in the amount of protein foods consumed at lunch compared to breakfast and the difference was more marked in the secondary schools. A large number of students at one secondary school ate protein foods. Most fat came from imported butter, margarine or oil, and a small amount came from coconut; however one primary school had over 50% pupils bringing coconut to school for lunch.

Overall few children ate root vegetables or starchy fruits and vegetables for lunch, and less root vegetables are consumed by secondary school students. In one school many students ate starchy vegetables which were sold at the school shop. Wholegrain consumption was negligible in both primary and secondary schools. The fruit consumption at lunch of the primary school students was considered fair (50%), while that of the secondary school students was low (11%).

Generally, a high proportion of children ate refined starch foods, and high fat and sugared foods at lunch, but the children at one primary and one secondary school did not eat any snack foods at lunch. Many of the students at some schools consumed sweetened drinks. However in two primary schools and one secondary school no sweetened drinks were consumed. In one of the primary schools the unsweetened drinks included drinking nuts (nu) and in this school there is a rule against buying food from the shop, and consumption of nutritious local food is officially encouraged. In the other primary and secondary school no sweetened drinks are sold at the school shop. Overall, more students in the secondary schools consumed sweetened drinks than primary school students.

Figure 4 illustrates the mean height by age in males. There was a small difference in the mean height between the Rarotongan boys and the Busselton standard with the exception of the 17 years old age group. Rarotongan males are slightly taller than the Busselton males. The growth rate of the Rarotonga and Busselton males is similar from 13 to 15 years of age, but after 15 years the Rarotonga group showed lesser increase in mean height.

Figure 5 illustrates the mean weight by age in males. There is only a small difference in weight between the Rarotongan and Busselton boys. The Rarotongan boys are slightly heavier up to 16 years of age, but by age 17 years there is no difference in mean weight.

Figure 6 shows the mean height by age of females. The mean height of the Rarotonga primary school girls surveyed aged 5 to 12 years inclusive showed a regular and constant increase in height across the age groups. There was a marked increase in height between 13 and 14 years for the Rarotongan girls. The mean height of the Busselton girls showed a marked increase from 13 to 15 years followed by a small increase up to 17 years. By age 17 years the Rarotongan and Busselton groups showed the same mean height.

Mean weight by age for females is set out in Figure 7. There was very slight difference in the mean weight of the Rarotongan and Busselton 6

to 10 year old age groups, but a marked difference in weight was obvious in the 11 to 17 years old age groups, with the Rarotongan girls being heavier. These differences were statistically significant for the 13 to 17 year age groups.

The results show that for the age groups 5 to 10 years of age, there is little difference in the mean heights and weights of the Rarotongan and the Busselton groups. The Rarotongan girls 11 to 17 years of age are similar in height, but are significantly heavier than the Busselton girls. The Rarotongan boys are slightly taller and heavier than the Busselton boys, but by age 17 years there is very little difference between the two groups.

It is accepted that Polynesians have a larger frame size than Caucasians, however the higher weight than the standard is much more marked in the Rarotongan adolescent girls than the boys. Furthermore, although the Rarotongan females were taller than standard from ages 13 to 16 years, this difference had disappeared by age 17 years. Thus, the greater mean weight than standard for Rarotongan girls probably indicates some degree of adolescent obesity.

## 5. SUMMARY

The survey showed that many of the Rarotongan school children have eating habits which suggest poor nutrition. To a significant extent Island foods have been supplanted by imported foods. These are frequently of poor nutritional quality since they are often high in sugar, fat and salt, and low in natural carbohydrate containing fibre.

A high proportion of students are no longer reliant on food brought from home, and are buying food at the school or local shop. The presence of a school shop does influence the quality of the school lunch, and a well advised school shop can have a beneficial effect on the children's nutrition. This was apparent in the two schools where nutritious foods were sold at the shop.

Nutrition education and promotion activities in the schools influence the quality of the childrens diet. The staff within the primary school with the best overall record for good eating habits are very active in promotion of health/nutrition activities such as local food day and parent and student education. There is a strong co-operation in this school between parents, teachers, and the community health nurse. In addition, this school has "outlawed" the local shop, as the foods sold there are considered inadvisable for the students.

The survey highlighted the need for guidelines to be established on what constitutes a nutritious diet for school children, and for these to be circulated to parents, teachers, shopkeepers and students. The school shop can set a good example by preferential selling of nutritious foods. The children are taught in the classroom what constitutes a healthy diet under the 5 year Health Education Plan, and this important activity needs to be illustrated and reinforced in a particular way by promotion, encouragement and possibly rulings to ensure that the food eaten by children at school is nutritionally sound.

The height and weight data presented suggest that there is no cause for concern with respect to undernutrition in Rarotongan school

children. Rather there is reason to suspect that adolescent obesity may be a problem in females. This is probably related to dietary and exercise habits.

TABLE 1.

Heights and Weights of Rarotongan  
School children, 1982

<u>MALES</u>					
<u>Age (years)</u>	<u>NUMBER</u>	<u>HEIGHT (cm)</u>		<u>WEIGHT (kg)</u>	
		<u>MEAN</u>	<u>SD</u>	<u>MEAN</u>	<u>SD</u>
5	10	111.1	5.6	21.9	2.3
6	18	119.2	7.6	24.2	3.1
7	10	122.6	5.1	26.4	2.0
8	12	130.0	5.0	30.4	4.3
9	11	133.9	5.4	31.3	4.2
10	17	139.5	5.6	35.3	4.2
11	-	-	-	-	-
12	14	149.9	5.3	42.7	5.0
13	16	160.5	6.1	49.6	7.2
14	33	165.1	7.8	55.1	7.9
15	20	172.9	7.9	62.0	8.6
16	15	176.1	5.7	65.2	5.2
17	14	175.9	7.7	67.3	6.0

<u>FEMALES</u>					
<u>AGE (years)</u>	<u>NUMBER</u>	<u>HEIGHT (cm)</u>		<u>WEIGHT (kg)</u>	
		<u>MEAN</u>	<u>SD</u>	<u>MEAN</u>	<u>SD</u>
5	10	113.9	7.0	23.3	3.0
6	11	121.3	6.8	24.6	3.5
7	10	121.1	5.5	25.0	2.4
8	13	125.9	6.5	27.7	3.1
9	11	133.0	6.7	32.0	4.5
10	10	138.7	7.0	34.4	4.3
11	14	145.6	7.7	41.3	9.3
12	10	153.9	4.9	47.4	6.0
13	17	157.1	6.9	54.5	7.9
14	25	162.0	5.2	58.0	7.6
15	26	161.5	6.0	60.9	7.7
16	19	162.1	7.0	63.5	7.1
17	14	165.1	5.7	65.8	6.8

APPENDIX 1RAROTONGA SCHOOL SURVEY FOOD CLASSIFICATION GROUPS.1. PROTEIN

Meat  
Fish  
Egg  
Milk  
Cheese  
Peanut butter  
Poultry  
Lentils

2. FAT AND OILSImported:

Butter  
Margarine  
Oil

DrippingLocal:

Coconut cream  
Dried coconut

3. CARBOHYDRATES/STARCH(i) Root vegetables

Taro  
Maniota  
Kumara  
Tarua

(ii) Starchy fruit and vegetables

Cooking banana  
Breadfruit  
Corn

(iii) Whole Grain or Enriched Starches

e.g. - Wholemeal bread  
- Brown bread  
- Weetbix  
- Cornflakes  
- Porridge

(iv) "Refined" Starch

White bread  
White rice  
Scones  
Cabin bread  
Spagetti

4. OTHER VEGETABLES

e.g. Rukau  
Tomato  
Cabbage  
Lettuce  
Capsicum  
Cucumber  
Beans  
Salad vegetables

5. FRUIT

Pawpaw  
Orange  
Banana  
Guava  
Apple  
Sugar cane  
Tamarind  
Applestar  
Flesh of nu  
Uto

6. FOOD HIGH IN FAT AND SUGAR

Sugar e.g. on cereal  
Jam  
Honey  
Ice blocks  
Lollies  
Cakes  
Sweet biscuits  
Topsy  
Ice cream  
Twisties  
Rashun  
Doughnut  
Pancake  
Bread buns  
Pies

7. DRINKS WITH ADDED SUGAR

Cordial  
Lemonade  
Zap milk  
Tea with sugar  
Coffee with sugar



8. DRINKS WITHOUT ADDED SUGAR

Tap water

Nu

Tea without sugar

Coffee without sugar

Milo without sugar

FIGURE 1: EATING PATTERNS OF RAROTONGA SCHOOL CHILDREN (1982)

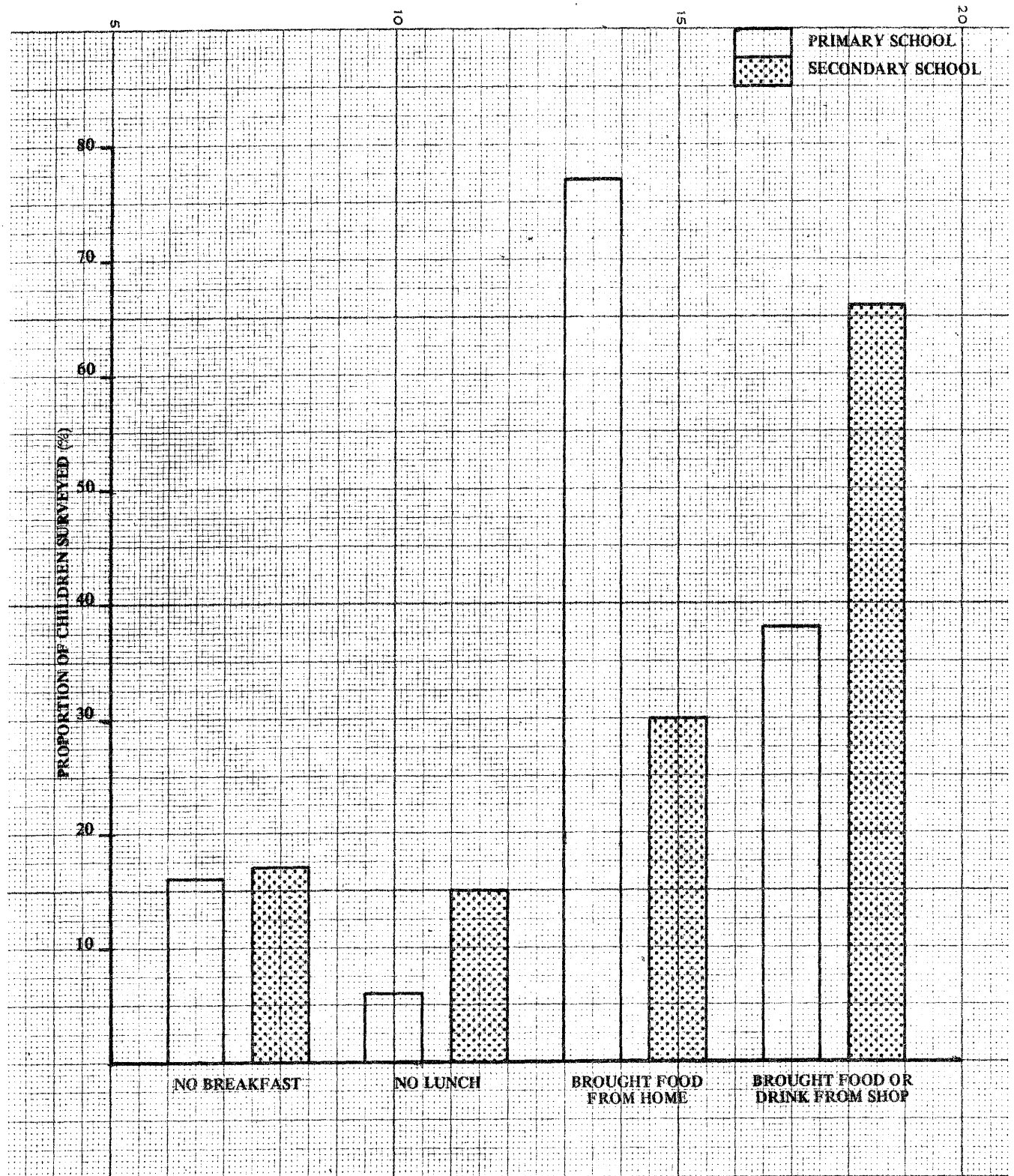


FIGURE 2: FOOD GROUPS CONSUMED AT BREAKFAST BY RAROTONGAN SCHOOL CHILDREN (1982)

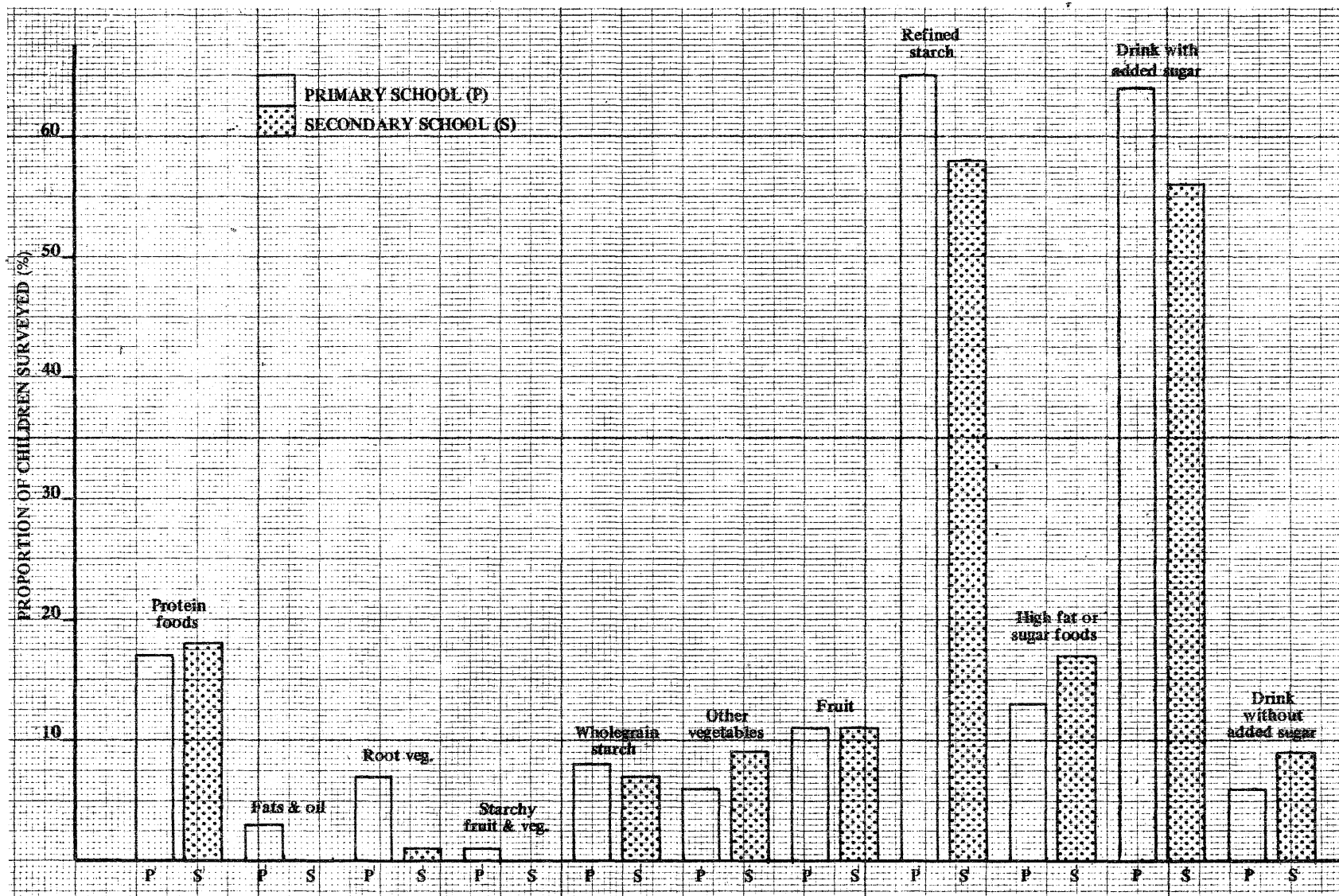


FIGURE 3: FOOD GROUPS CONSUMED AT LUNCH BY RAROTONGAN SCHOOL CHILDREN (1982)

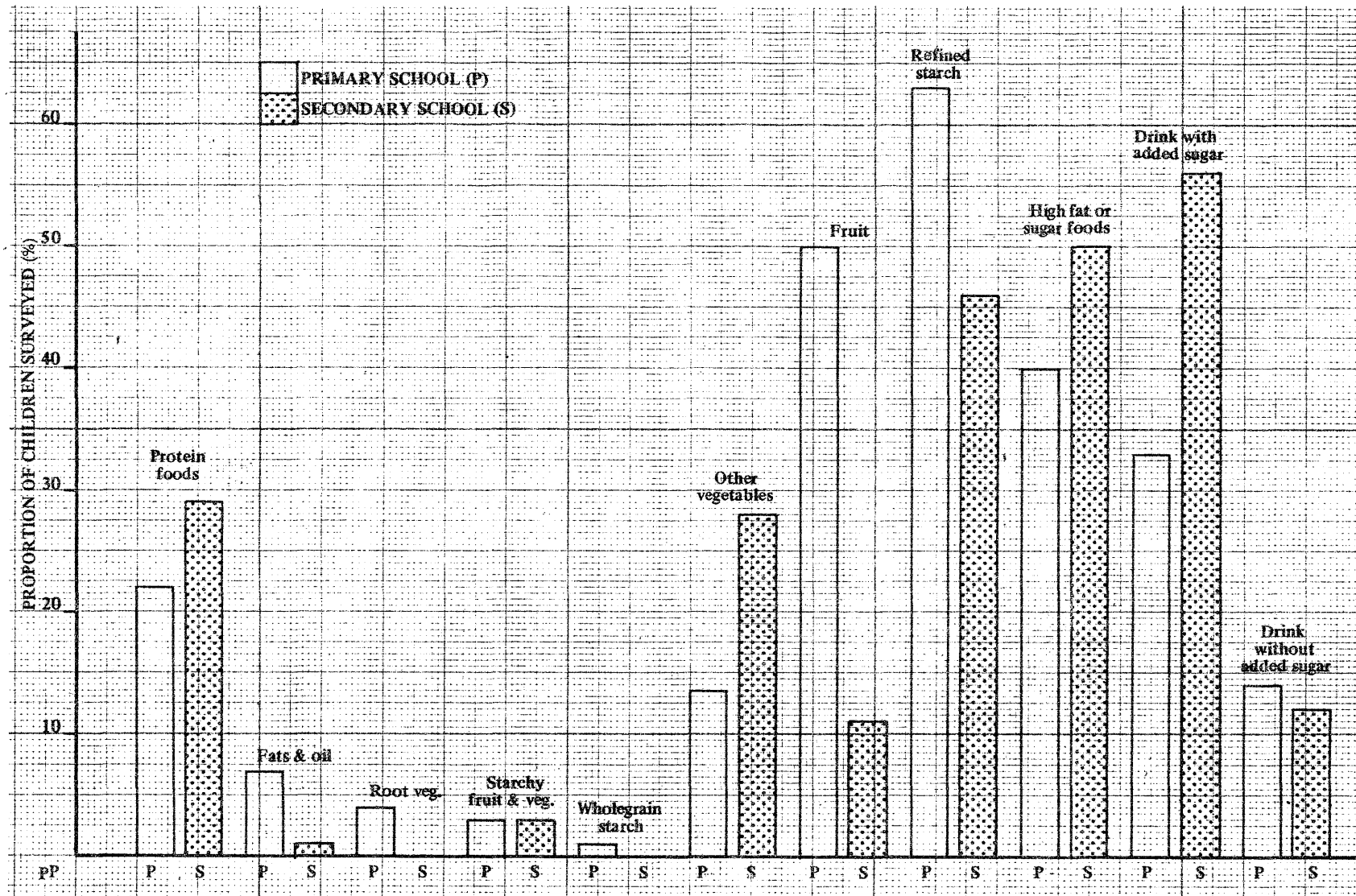


FIGURE 4: HEIGHTS OF MALE RAROTONGAN SCHOOL CHILDREN BY AGE COMPARED TO CAUCASIAN NORMS (1982)

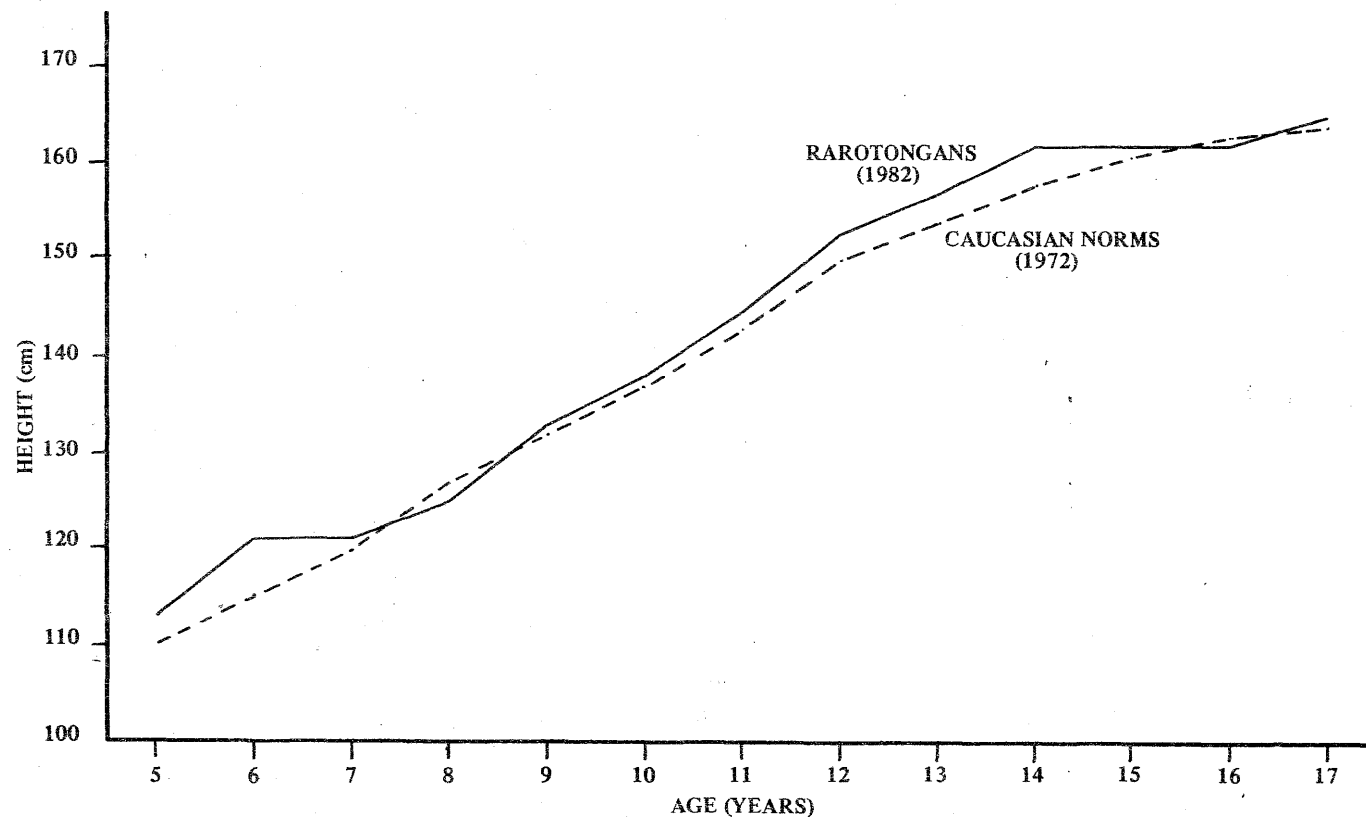


FIGURE 5: WEIGHTS OF MALE RAROTONGAN SCHOOL CHILDREN BY AGE COMPARED TO CAUCASIAN NORMS (1982)

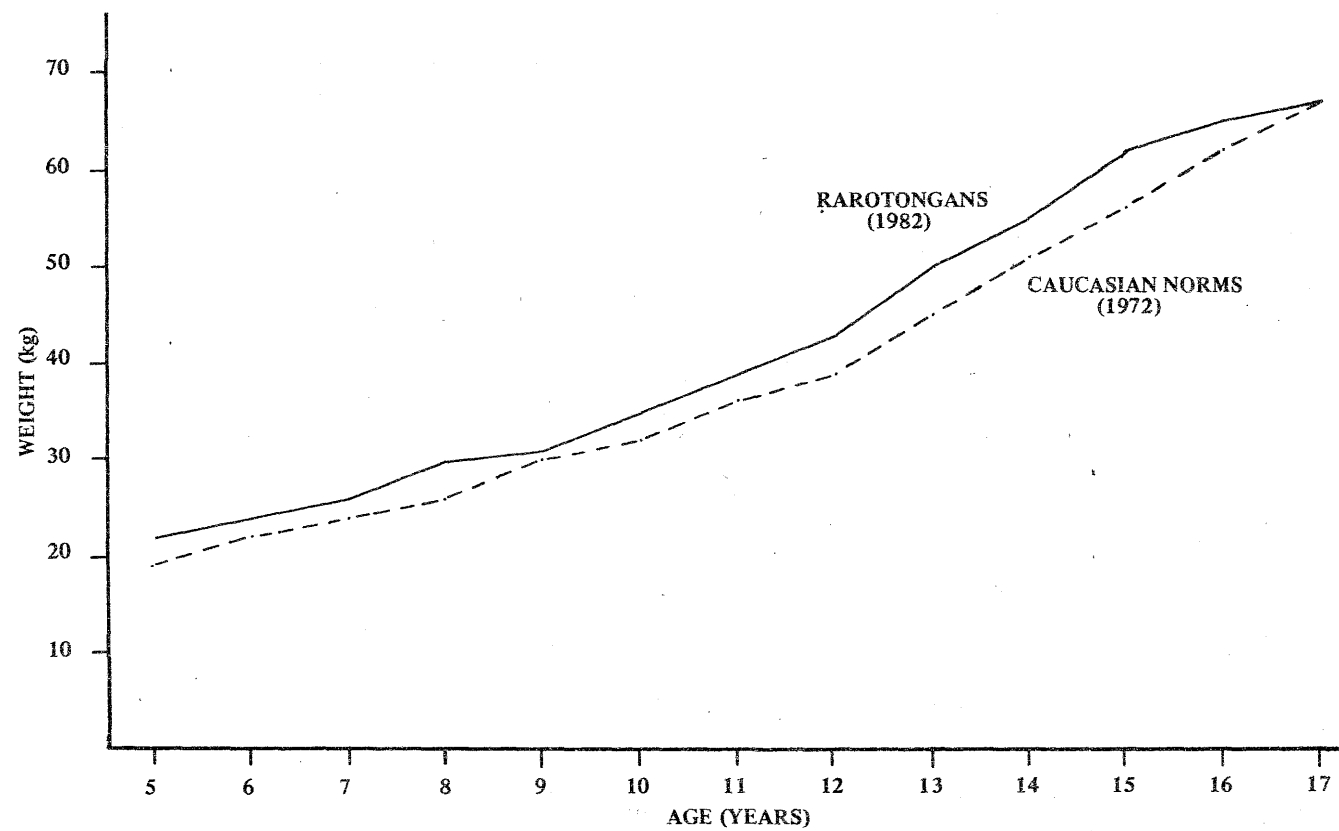


FIGURE 6: HEIGHTS OF FEMALE RAROTONGAN SCHOOL CHILDREN BY AGE COMPARED TO CAUCASIAN NORMS (1982)

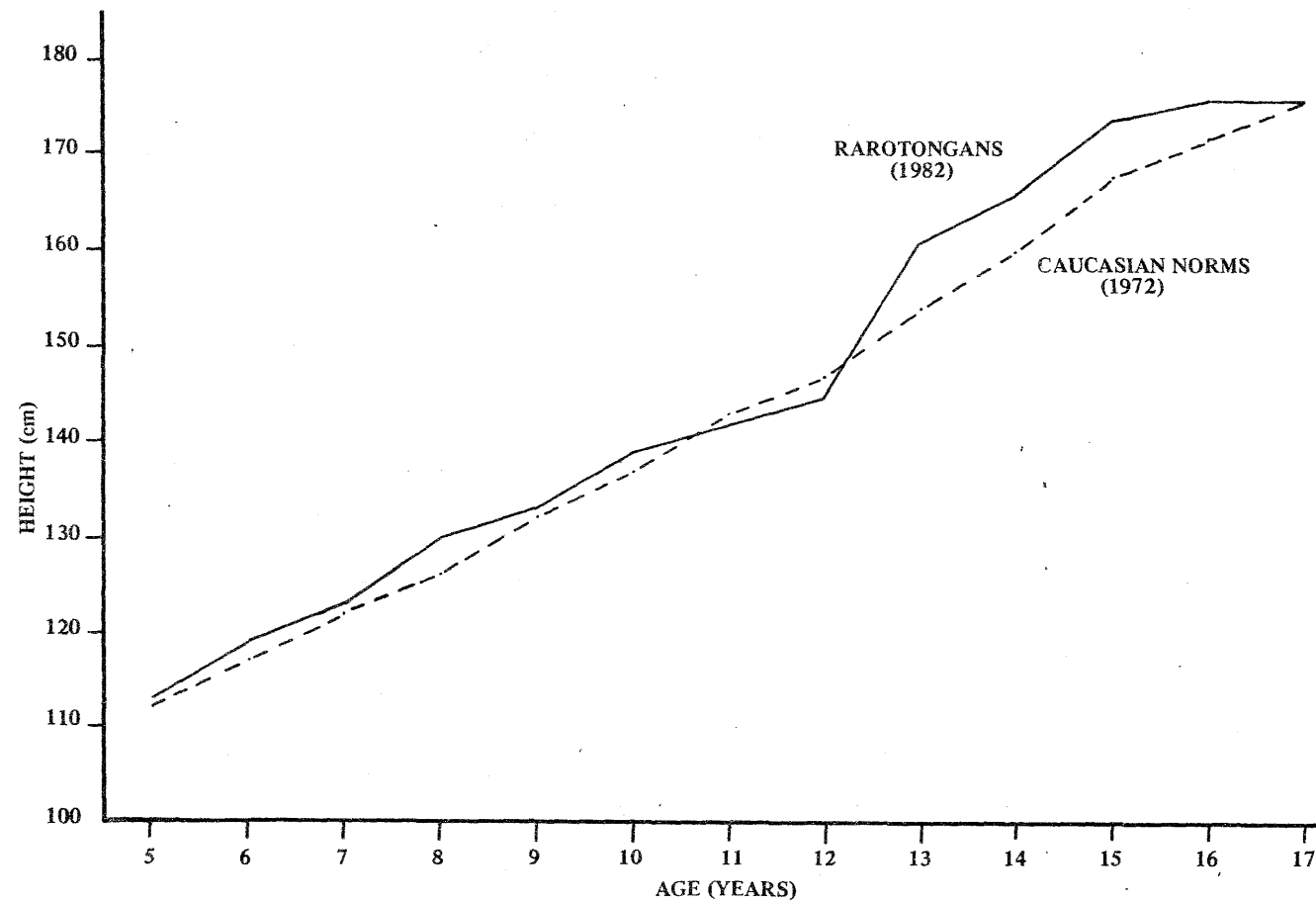


FIGURE 7: WEIGHTS OF FEMALE RAROTONGAN SCHOOL CHILDREN BY AGE COMPARED TO CAUCASIAN NORMS (1982)

