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**Malnutrition**  
in  
**Preschool**  
**Children**  
in  
**Fiji**

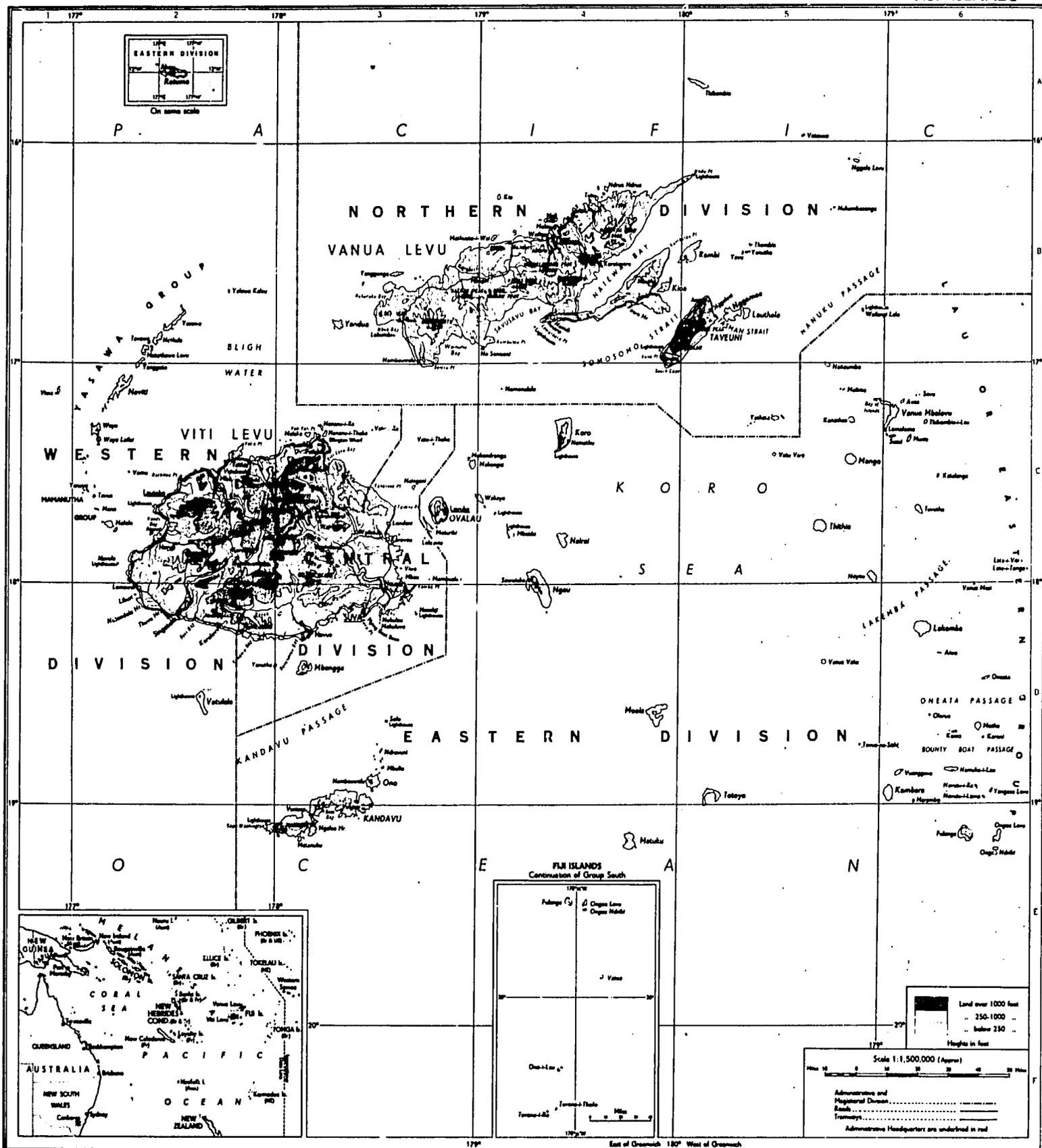
**Verona E. Lucas**

12/84

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The Foundation for the Peoples of the South Pacific

# FIJI ISLANDS



MALNUTRITION IN PRESCHOOL CHILDREN IN FIJI

A COMPARISON OF  
URBAN AND RURAL NUTRITION PROBLEMS IN  
CHILDREN SIX YEARS & UNDER IN FIJI

BY

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REPORT OF A STUDY OF THE CAUSES OF PROTEIN  
ENERGY MALNUTRITION IN PRESCHOOL CHILDREN IN  
FIJI CARRIED OUT BY THE FOUNDATION FOR THE  
PEOPLES OF THE SOUTH PACIFIC IN COLLABORATION  
WITH THE GOVERNMENT OF FIJI

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AUGUST, 1978

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## FOREWORD

The research into the causes of protein energy malnutrition in preschool children in Fiji on which this report is based, was initiated in 1976 at the request of the Government of Fiji. Action against these roots of malnutrition is still continuing.

The Foundation for the Peoples of the South Pacific launched the program with funding from Specific Support Grant Number AID/TA-G-1304 from the Technical Assistance/Nutrition Office of the United States Agency for International Development.

As the program grew it received generous support from many sources and the Foundation expresses its appreciation to these partners which include:

- \*The Government of Fiji
- \*The Fiji National Nutrition Committee
- \*The YWCA of Fiji
- \*The YMCA of Fiji
- \*Mrs Susan Parkinson, Program-Advisor
- \*The Catholic Mission of Namosi
- \*Amax (Australia)
- \*The Australian Freedom From Hunger Campaign
- \*New Zealand Catholic Overseas Aid Committee/  
Pacific Fund for Human Development
- \*New Zealand Red Cross

In the final analysis however, there would have been no program without the concern of the leaders and people of the Namosi Valley to save their children from malnutrition - nor without Ms Amelia Rokotuivuna who voiced these concerns.

The Foundation is proud to present this report of the many-faceted fight against malnutrition coordinated by the Program Administrator, Ms Verona Lucas, and her dedicated staff of nurses: Ms Asena Mateiwai, Ms Roslyn Dutt and Ms Elenoa Misikini.

THE FOUNDATION FOR THE PEOPLES  
OF THE SOUTH PACIFIC

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I would like to thank Dr. B. Hosie for his guidance and administration of the project on behalf of the FSP.

I wish to express my thanks and appreciation to Mrs. S. Parkinson, Nutritionist and Advisor to the FSP Nutrition Program, for her assistance. Mrs. Parkinson's experience as a Nutritionist in Fiji and her concern for the problem of malnutrition there, led her to establish the YWCA Nutrition Committee through which the Nutrition Project came into being. I also thank the Young Women's Christian Association which assisted with the launching of the Program and remained as a close working partner throughout the project.

The work of gathering data, consulting the communities and guiding the development of the ideas proposed by the villagers into the various projects, was carried out under the leadership of the Nutritionist Programmer by a staff of dedicated women who were qualified and experienced Fiji trained nurses. I wish to thank Miss Asena Mateiwai, who developed the rural Namosi program, and Miss Roslyn Dutt and Mrs. Elenoa Misikini, who worked on the urban Tovata program. I also thank the people of the two communities, who were very friendly and co-operative partly because the teams followed the accepted custom of presenting yagona to the elders, consulting their chiefs and asking permission to work with the communities, and partly because the people were interested in developing healthier and more prosperous communities.

I would also like to thank and acknowledge other agencies and individuals who were consulted and who freely gave their time and advice based on their experience in Fiji and with the communities concerned. These include:

Ratu C. Matanitobua, the Paramount Chief of Namosi (Tui Namosi), without whose support the project in Namosi could not have become established.

Dr. M. Leggo, Project Manager of Amax to January 1978, and other members of the staff of Amax, including workers at the camp site who helped the Nutritionist and staff out of physical difficulties (such as land slides and vehicle breakdowns) when asked.

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The Young Men's Christian Association (YMCA) also supported the Nutrition Program and lent their assistance on several occasions as well as training a field worker from Namosi who then established two Clubs in the area.

I would like to thank the various Government Ministries, including the Ministry of Health, without whose support the project could not have begun; the Ministry of Agriculture whose field staff attended to requests from the rural communities through the Nutrition Program and established the feasibility of agricultural projects in the area; the Ministry of Fijian Affairs and Rural Development supported the project and its philosophy of allowing the people to determine their needs, together with its program to assist them to achieve their aims. The District Commissioner and staff covering the Namosi area, under the Ministry of Fijian Affairs, have also given their assistance in effecting projects requested by the communities through the Nutrition Program. Other Ministries interested in the nutritional problems of Fiji expressed their opinions and gave advice through the National Food and Nutrition Committee, to which the FSP Nutrition Program gave reports of its activities.

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August, 1978

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## SUMMARY

The Foundation for the Peoples of the South Pacific (FSP) (Appendix I), with funds from the Agency for International Development of the U.S. Government (AID), undertook a study of the causes of protein energy malnutrition in preschool children (aged six years and under) in a rural and an urban community in Fiji in 1976-1978. Several intervention projects were established to improve the nutritional status of the children in the study.

The study and intervention projects were carried out in close co-operation with the Fiji YWCA, YMCA and Government Departments of the Ministry of Health, Ministry of Agriculture and the Ministry of Fijian Affairs and Rural Development, as well as with Amax Exploration (Australia) Inc., the Tui Namosi (Paramount Chief of Namosi), the Catholic Priest at Namosi and the rural communities in the Namosi and Naitasiri Districts, and the Tovata urban community. In the rural community 203 Fijian children and in the urban community, 88 Fijian and 33 Indian children, were studied.

In the initial survey, 66.7% of Indian urban, 7.6% Fijian urban and 32.4% Fijian rural children were underweight and "at risk", or malnourished. Eight (11%) of the rural children were very ill with chronic diarrhoea, respiratory tract infection and skin infections, with loss of flesh over the buttocks symptomatic of severe malnutrition. The urban community studied did not have any cases of malnutrition as severe as those seen in the rural community, although cases of severe malnutrition are admitted to hospital from urban communities, as evidenced by medical statistics of the Fiji Medical Department.

Fifteen months after the initial survey, 40% of the Indian urban, 2.4% Fijian urban and 7.4% Fijian rural children were underweight and there were no cases of severe malnutrition.

Intervention projects undertaken in the URBAN community were:

1. The provision of medical treatment by the referral of sick children to the Health Centres, with follow-up to ensure that prescribed treatments were used;
2. The provision of fullcream and skim milk powder, a service later taken over by the Medical Department (World Food Program skim milk powder distribution project);
3. The establishment of Mothers' Clubs to improve the economic situation for some families by acquiring cash earning skills such as craft and sewing as well as to teach the mothers how to use their money to provide a well balanced diet for their children. A balanced mid-day meal was produced by the mothers at the Clubs for their preschool children, each Club day.
4. The purchase of a Club House on a quarter acre of Native Land Lease in the Tovata community and to use the house for the Indian community and the garden to produce wing bean seed for distribution and promotion of its use throughout the urban communities.

The RURAL intervention projects were:

1. The provision of medical attention for all the sick children by arranging for a paediatrician to visit the villages, with follow-up to supervise the treatments prescribed and to give penicillin injections;
2. Changing the treatment for diarrhoea from the use of plain boiled water with no food, to coconut water from seven-months nuts or WHO electrolyte rehydration mixture plus proper feeding;
3. The provision of fullcream milk powder, later taken over by the Government skim milk powder project;
4. The provision of day-old Queen variety chickens to be raised for egg production. This project failed, but the experience would permit a successful project using different methods to raise the birds. Such a project would also require growing or supplying chicken feed from other agricultural projects by the villagers;

5. To encourage new agricultural projects such as growing a variety of vegetables and the introduction of wing beans;
6. The establishment of Health Committees in each village and the provision of basic first-aid kits which are to be replaced as used, by fund-raising in the villages;
7. The training of four girls, three at the YWCA on three-month courses and one at the South Pacific Community Training Centre on a one-year course, to educate the village women in such matters as cooking, nutrition, infant feeding, health and hygiene, craft, sewing and home improvement;
8. The formation of Youth Clubs and Women's Clubs in which the girls trained in the above skills would act as community leaders.
9. The sponsoring of an Adult Education Workshop for a six-day period at the Namosi Junior Secondary School. Subjects covered included leadership training, responsible parenthood and machinery maintenance, in addition to those mentioned in paragraph 7.

In the next phase of the project in the RURAL community, the Nutrition Program aims to provide a Nutrition Education Centre at Namosi, with education programs to be developed by the girls mentioned in paragraph 7 above. In conjunction with the Centre it is planned to organise a demonstration pig and poultry project to educate the villagers in the raising of these animals. It is also planned that the girls establish preschool programs at the Centre at which children will be fed a well balanced mid-day meal.

In the URBAN community, it is planned to examine the viability of the Clubs and to develop the production, distribution and use of wing beans (*Psophocarpus tetragonolobus*).

## INTRODUCTION

In August 1976 a study of nutritional problems in urban and rural children aged six years and under was commenced to determine the major causes of malnutrition in Fiji and to produce suitable intervention programs to overcome these problems.

Malnutrition in Fiji has been studied by various groups in the last decade (Jansen, 1972; Goodall, Jansen and Kurusagila, 1973; Lal, 1975; Wassif, 1975; Matthews, 1976; Singh, 1976a, 1976b; Kurusagila, 1977; Reddy, 1978). The YWCA Nutrition Committee decided to investigate possible solutions to the problem and approached The Foundation for the Peoples of the South Pacific (FSP) (Appendix I) for funds. A substantial grant was provided by the American Government Agency for International Development (AID), through FSP, to investigate the causes and to provide solutions to the malnutrition problems in Papua New Guinea (PNG) and Fiji over a two-year period. The Fiji program was known as the FSP Nutrition Program.

In 1976 the Fiji Government established a National Food and Nutrition Committee to co-ordinate all activities in nutrition throughout Fiji, particularly those of related Government departments. It was decided that the FSP Nutrition Program should be developed in co-operation with this Committee.

A Workshop on Nutrition Planning was held in November 1976 in Port Moresby, with representatives of PNG, Cook Islands, Fiji and New Hebrides who were interested in the nutritional status of those countries. The meeting was called by the FSP under conditions of the AID grant, which stipulated that an International Workshop be held to consider the nutritional problems of the South Pacific area and the programs funded by the FSP and AID. The Fiji delegation consisted of representatives of the Government Departments of Health, Agriculture, Central Planning and Education, together with the YWCA, which had prepared two proposals for the FSP study in Fiji (Appendices II and III) as well as a Nutrition Strategy for Fiji (Appendix IV).

The proposals of the YWCA were presented to the National Food and Nutrition Committee, which decided that the FSP Nutrition Program should work on the problem of protein energy malnutrition in children aged six years and under.

When staff recruitment for the FSP Nutrition Program was completed it consisted of a Nutritionist Planner and Programmer, and three Fiji trained nurses, one working in the rural program and two in the urban program, plus a volunteer Nutritionist Advisor.

The primary aim of the study was to produce a program, after field testing, which could be adapted and applied to the problem of malnutrition in Fiji. The basic causes of malnutrition in Fiji had been clearly defined (Jansen and Bailey, 1972; Kurusagila, 1976; Sisifa, 1978) and the Nutrition Program needed only to define the specific problems in the areas of study before developing and implementing suitable intervention programs.

#### AIMS.

The plan submitted by the YWCA for the FSP Nutrition Program and accepted by the National Food and Nutrition Committee is shown in Appendix II. This conformed with the Nutrition Strategy for Fiji proposed by the Fiji delegation to the Nutrition Planning Workshop held in Port Moresby (Appendix IV). Based on this proposal, the following aims were selected:

1. That one urban and one rural community be studied;
2. That the specific causes of malnutrition in preschool children be established for each community;
3. That suitable intervention activities be implemented in close co-operation with the communities concerned. The specific activities would be defined only when the communities had defined each project and were willing to commit themselves to the work involved.

## MATERIALS AND METHOD

### 1. AREAS SURVEYED

#### 1.1 Urban Community

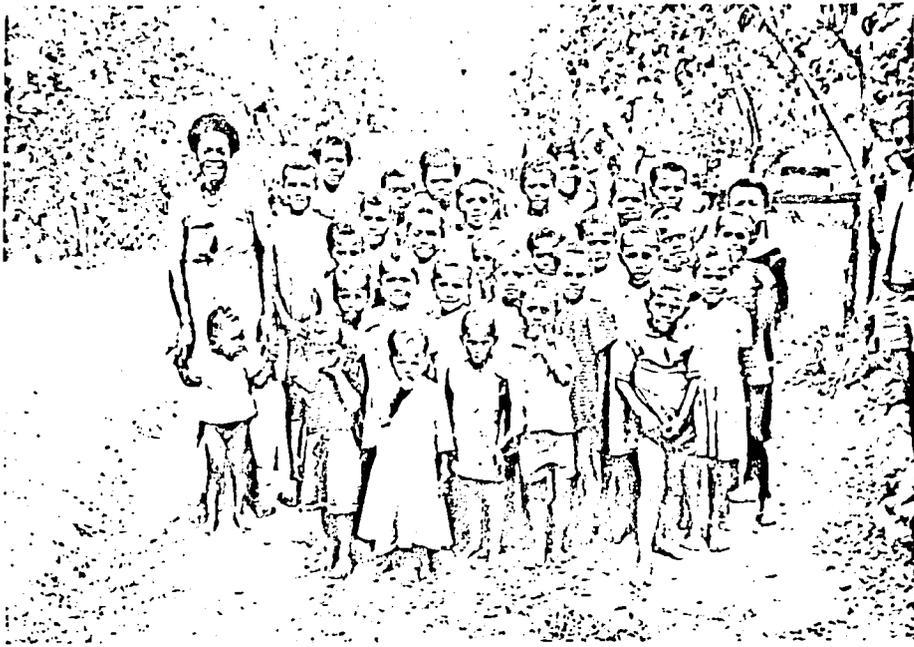
The Nutrition Program selected an area known as Tovata in Kalabu, 6½ miles from Suva (Figs. 1 and 2). It was possible in this area to study both Fijian and Indian communities to provide some contrast and comparisons of different lifestyles.

#### 1.2 Rural Community

A preliminary visit was made to the Naitasiri/Namosi area on the Waidina River. Because many children there showed signs of overt malnutrition it was decided to investigate the causes and prevention of malnutrition in eight villages in this area, the location of which is shown in Figs. 15 and 16. From Suva to Namosi village is 35 miles by road, and Nasele and Waisigia villages, on the other boundary of the project area, are another 15 miles by road and river.

### 2. EQUIPMENT USED

- 2.1 A Road-to-Health Chart designed by Morley (1973) and published by Teaching Aids at Low Cost Institute of Child Health, London (Figs. 3 and 4).
- 2.2 Transparent Overlay Sheets designed for use with the above Chart were used to assess the effect of the intervention projects (Figs. 5 and 6). *"These are intended to help find out whether a clinic is having any effect on the weight distribution of the children attending it. At a regular interval, perhaps every three or six months, a large series of weights of children attending the clinic is recorded on two weight charts, one for girls and one for boys. When this has been done, the appropriate transparent sheet can be fitted over the chart, and the number of dots falling into the various groups counted (Fig. 7). By comparing the proportion falling in the spaces Z, Y and X it may be*

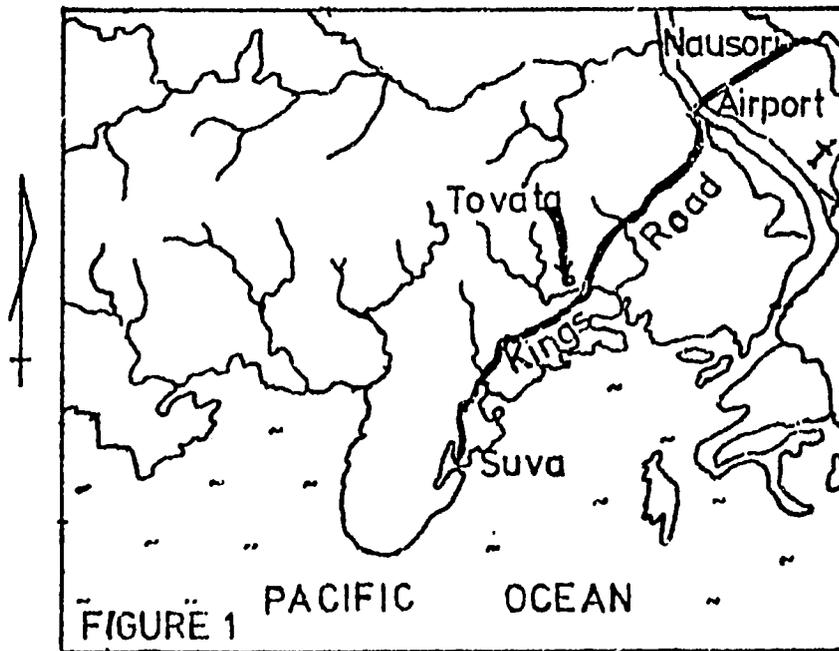


Namosi Children  
3 yrs. at front  
15 yrs. at rear  
6,7,8 & 9 yr.  
olds in centre



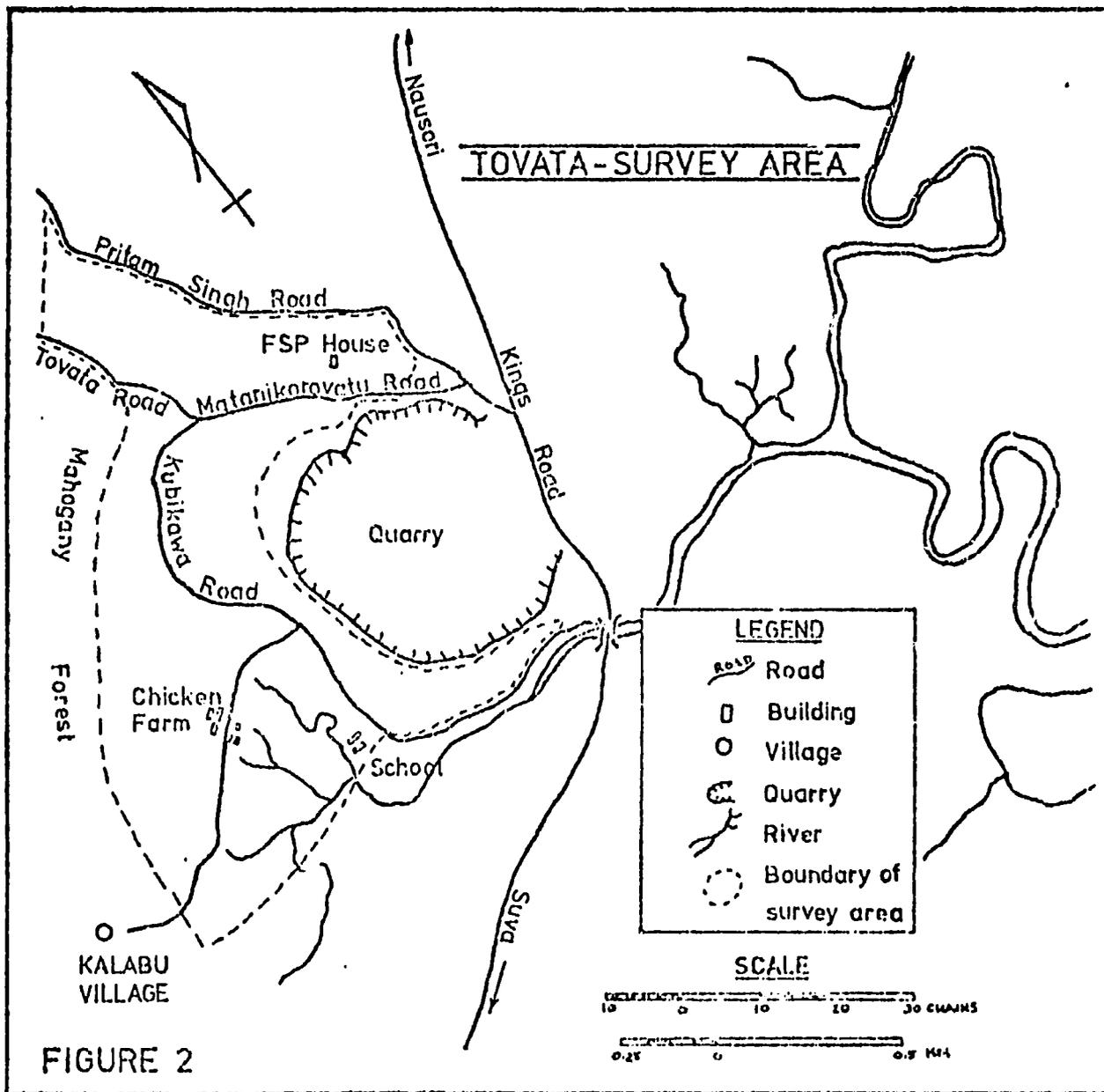
Waivaka Twins -  
Malnutrition Compounded

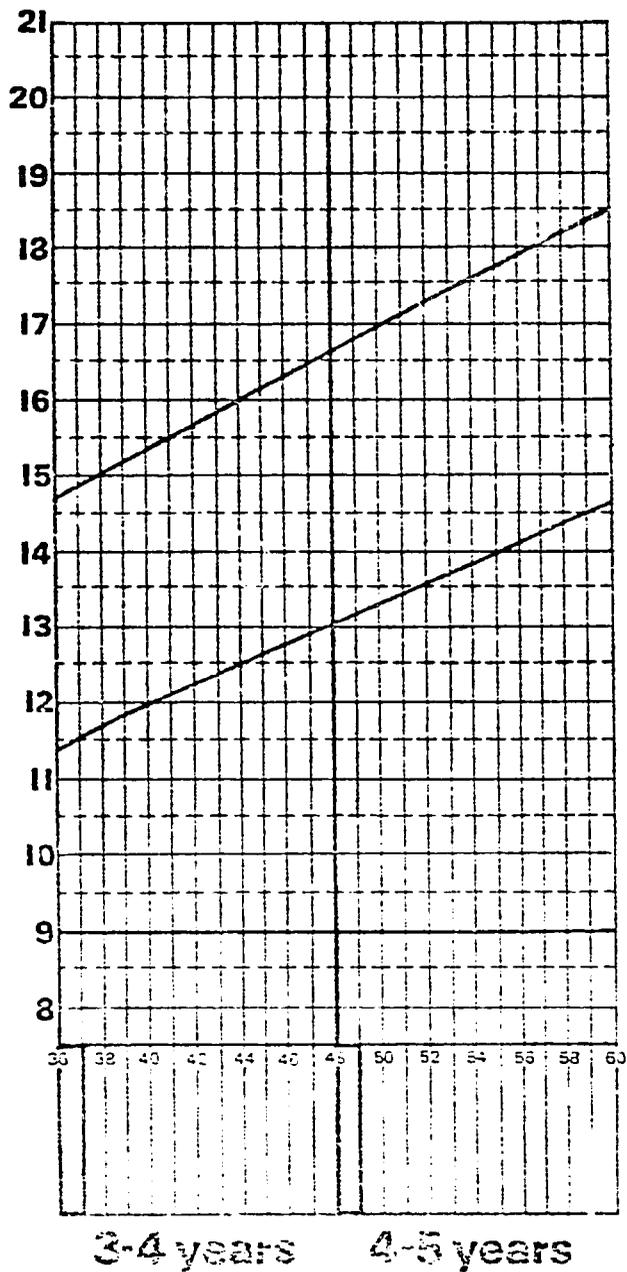
FIGURE 1



Locality Map - Tovata

FIGURE 2





# Road to Health Chart

Clinic		Child's no.	
Child's name			
		Boy/Girl	
Mother's name		Registration No.	
Father's name		Registration No.	
Date first seen	Birthday-birthweight		
Where the family live: address			

BROTHERS AND SISTERS		
Year of birth	Boy/Girl	Remarks

<b>ANTI-TUBERCULOSIS IMMUNISATION (BCG)</b>
Date of BCG immunisation .....
.....

<b>SMALLPOX IMMUNISATION</b>
Date of immunisation .....
Date of scar inspection .....
Date of reimmunisation .....

<b>POLIOMYELITIS IMMUNISATION</b>
Date of first immunisation .....
Date of second immunisation .....
Date of third immunisation .....

<b>WHOOPING COUGH, TETANUS &amp; DIPHTHERIA IMMUNISATION</b>
Date of first immunisation .....
Date of second immunisation .....
Date of third immunisation .....

<b>MEASLES IMMUNISATION</b>
Date of immunisation .....

<b>OTHER IMMUNISATIONS</b>
.....
.....

ROAD TO HEALTH CHART, FRONT.

# Reasons for special care

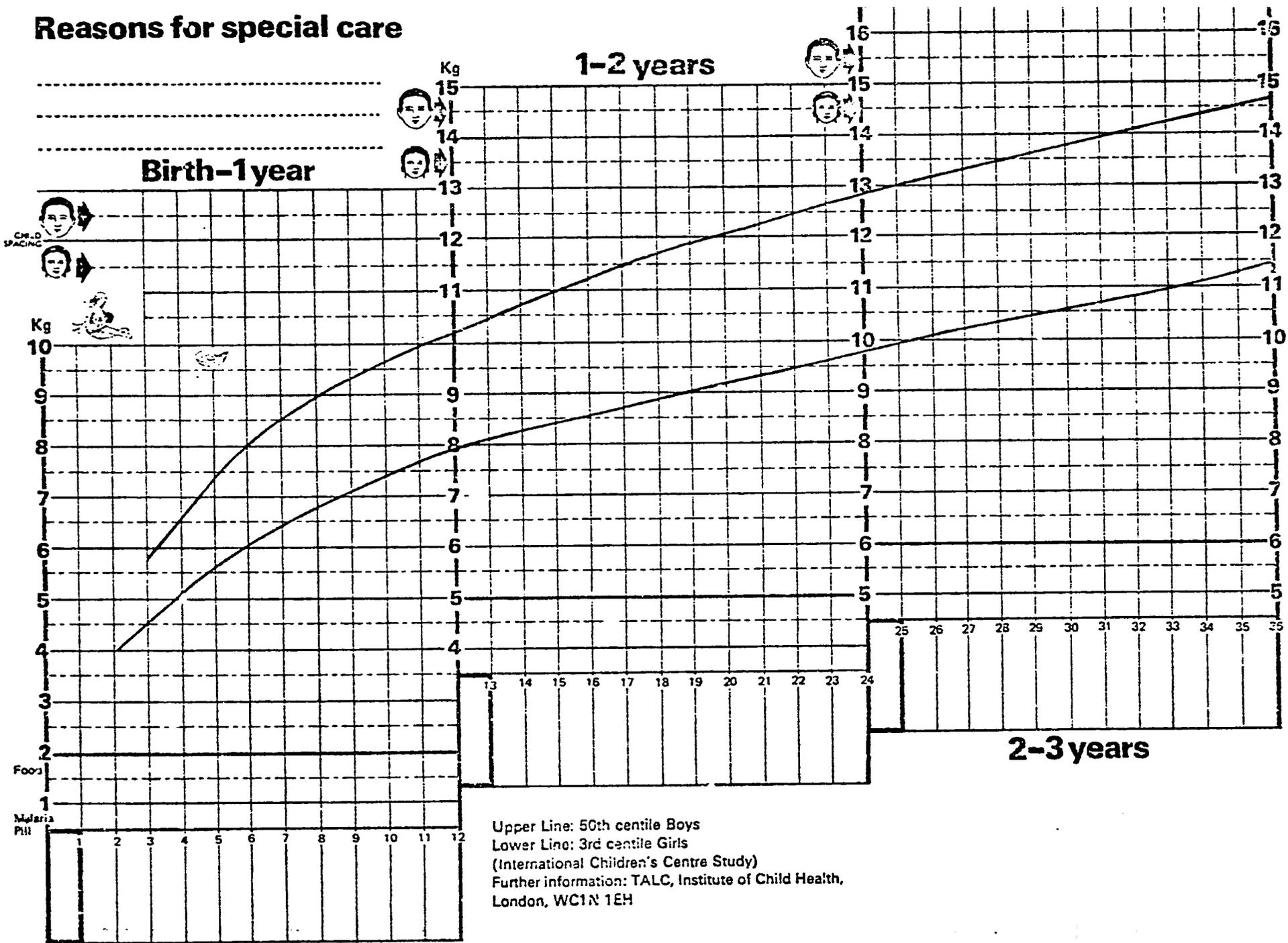


FIGURE 4  
ROAD TO HEALTH CHART, REVERSE.

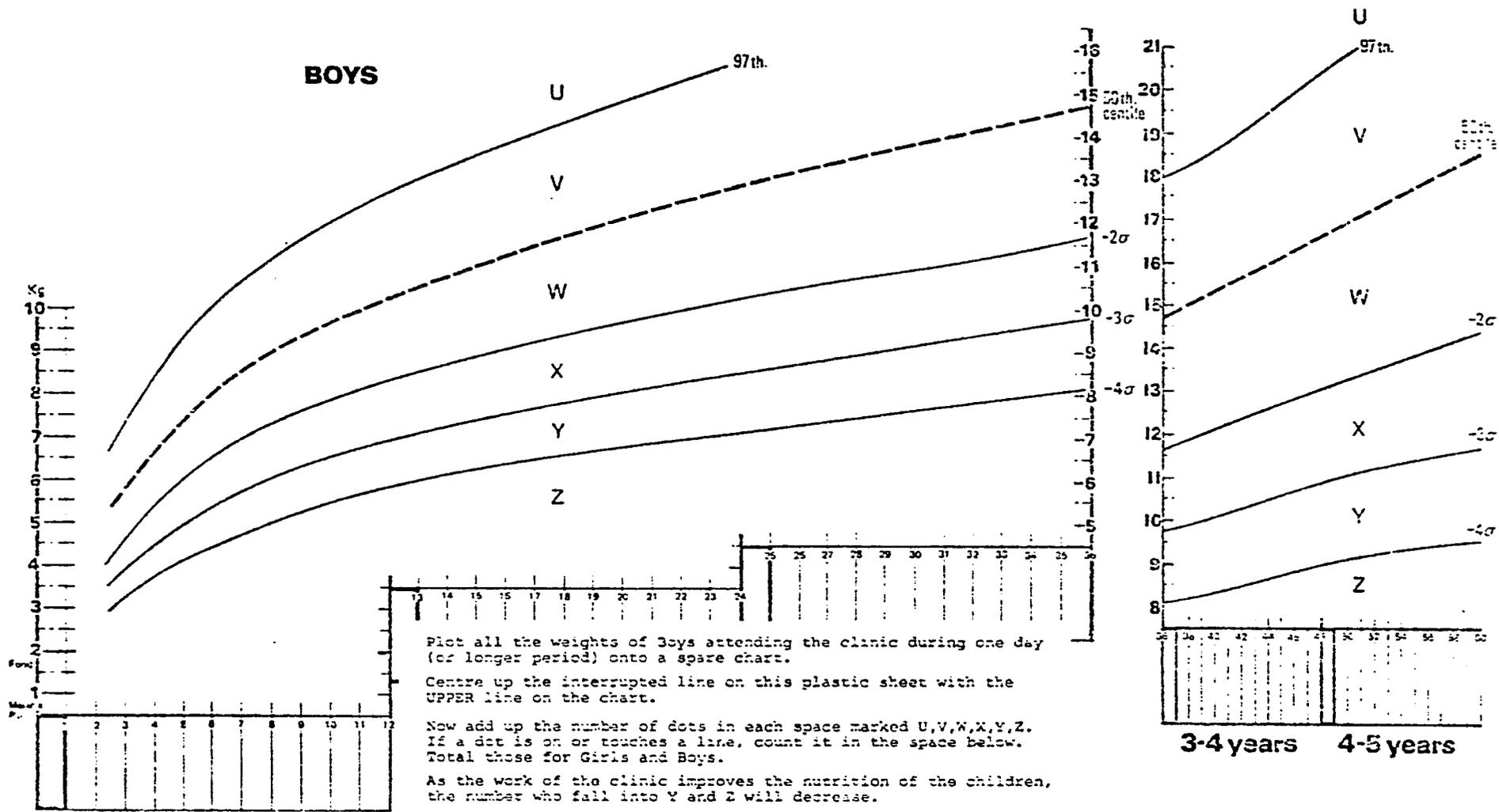


FIGURE 5a  
ROAD TO HEALTH CHART: TRANSPARENT OVERLAY, BOYS.



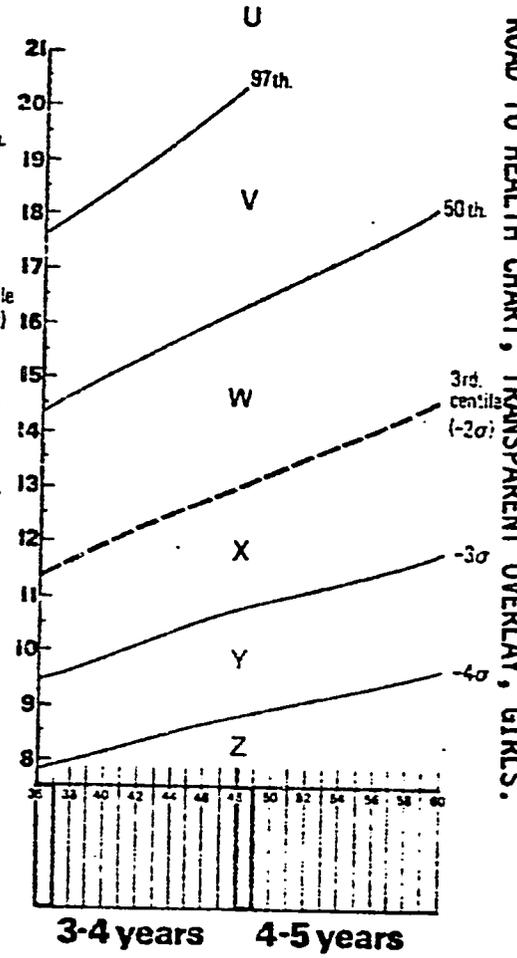
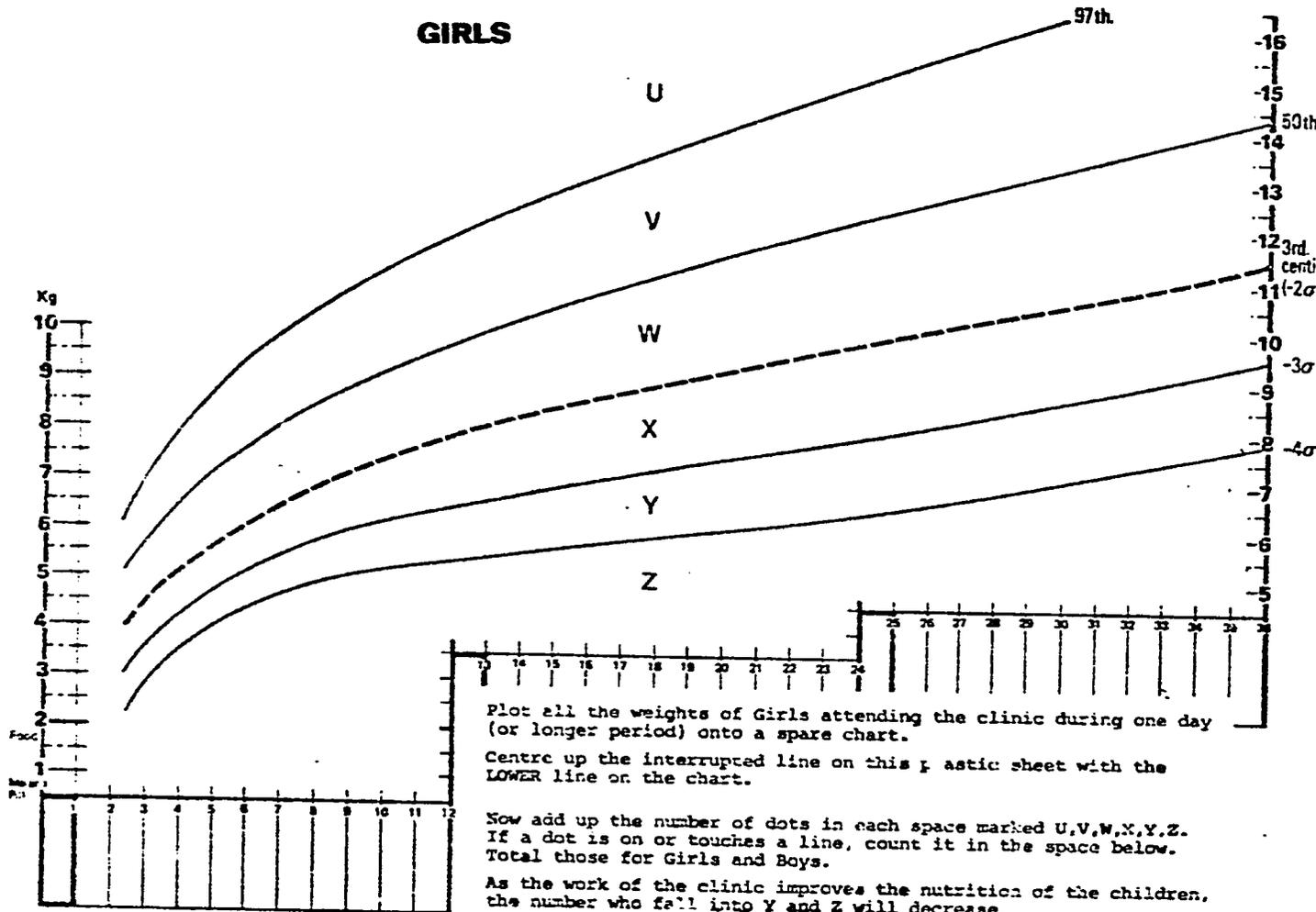
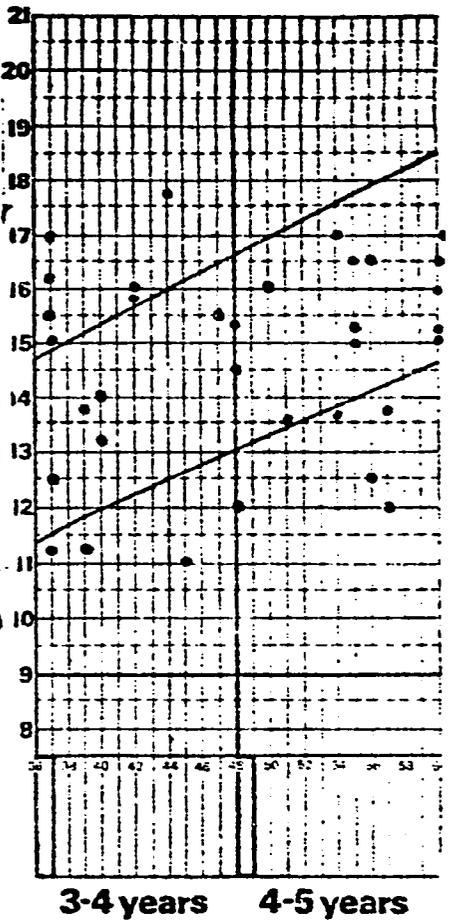
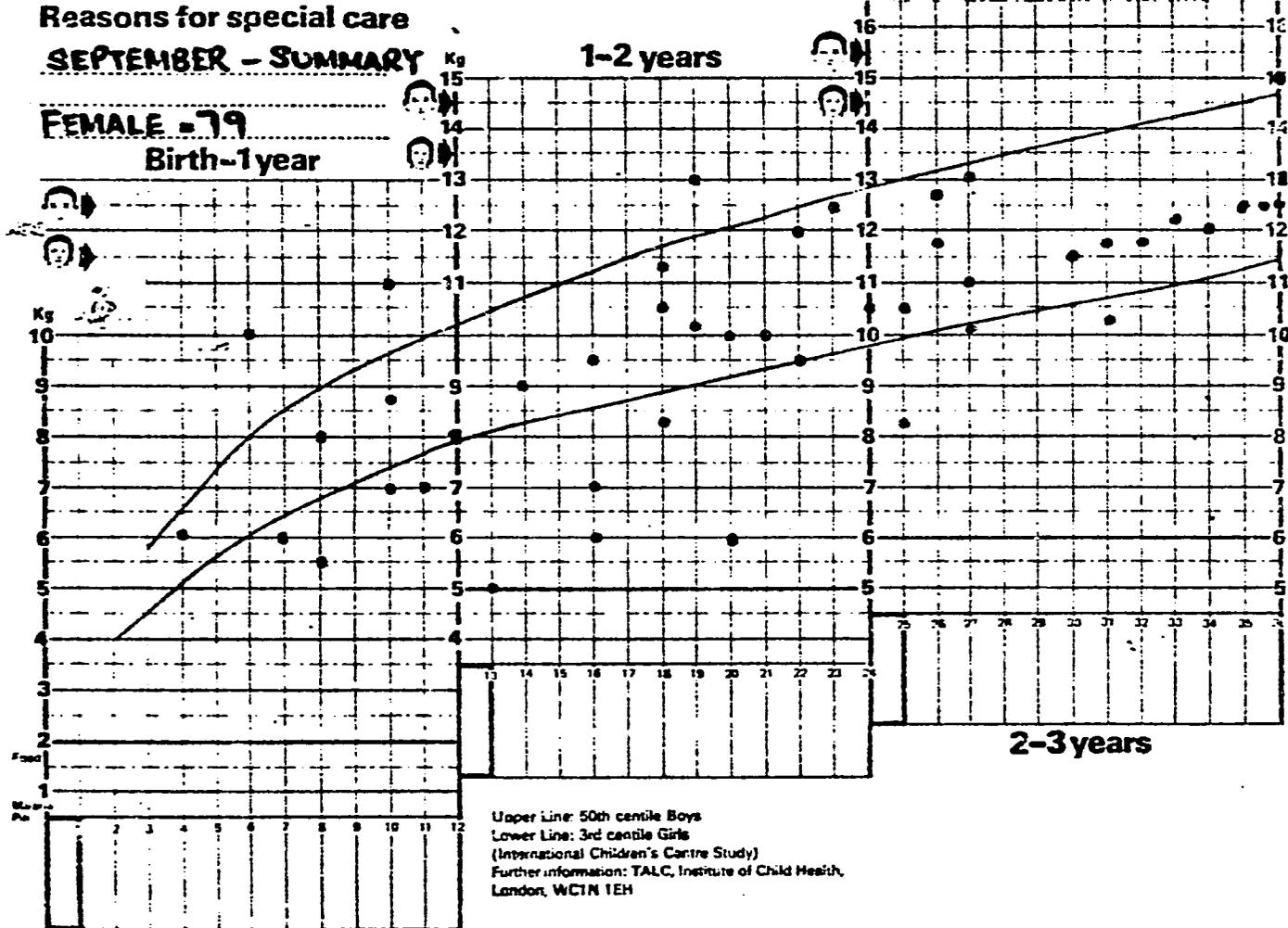


FIGURE 6a



**SIAMOSI DISTRICT**  
**Reasons for special care**  
**SEPTEMBER - SUMMARY**

**FEMALE - 79**  
**Birth-1 year**



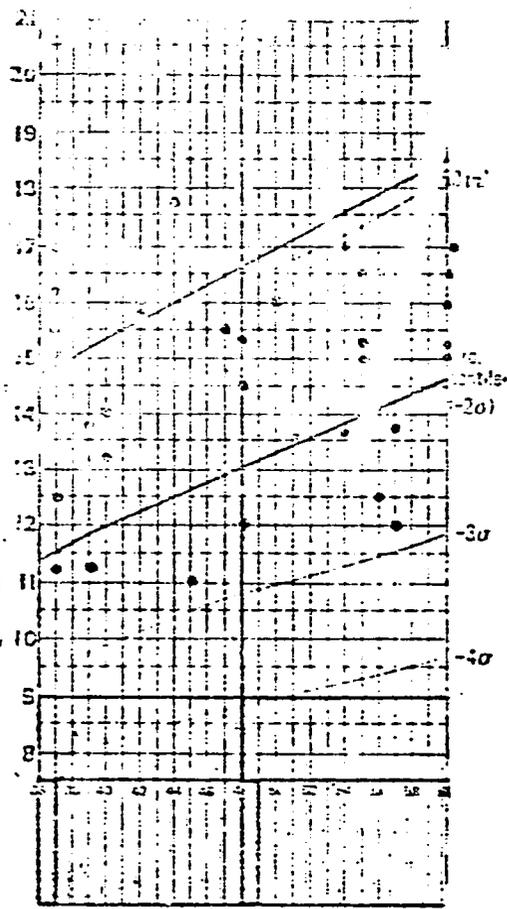
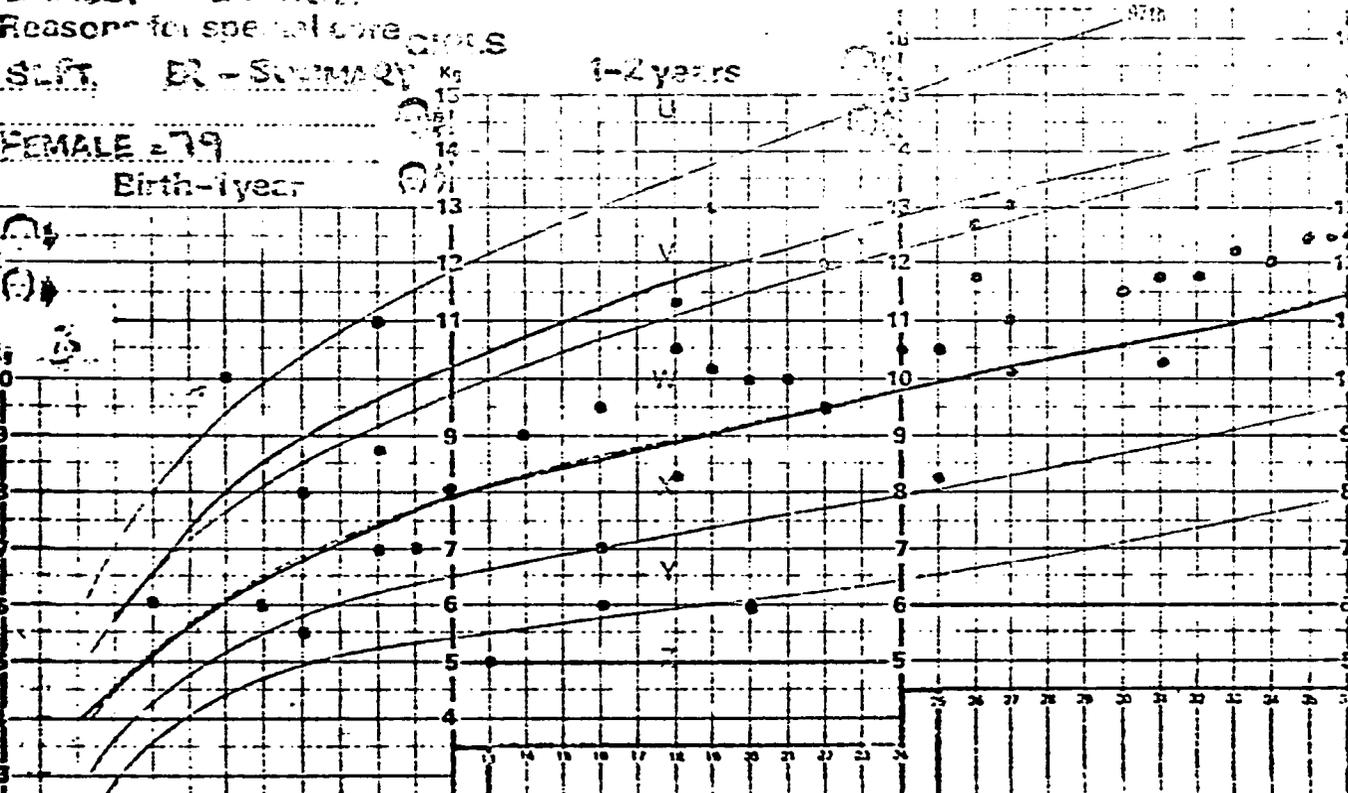
ROAD TO HEALTH CHART: SUMMARY SHEET EXAMPLE.

FIGURE 7a

**RAMOSI (DISTRICT)**  
 Reasons for special care cases  
**SLFT. BR - SUMMARY**

**FEMALE = 79**

Birth-1 year



Plot all the weights of girls attended at the clinic on this plastic sheet with the (or longer period) onto a space chart.  
 Refer to the interrupted line on this plastic sheet with the lower line on the chart.

Upper Line: 50th centile Boys  
 Lower Line: 3rd centile Girls  
 (International Children's Centre Study) as a line, count it in the space below.  
 Further information: I.A.C.C. Institute of Child Health.

Work at the clinic improves the nutrition of the children, the number who fall into Y and Z will decrease.

**Best Available Document**

*discovered if there has been an improvement. This can be confirmed by statistical tests. The lines on this chart are not dissimilar to those used in the past as 70% and 60% of the Harvard median curve. However, for many reasons these lines were not satisfactory and the use of standard deviations, as marked on these transparent sheets, has several advantages" (Morley, 1973).*

- 2.3 Stathmos Physician Scales, Model 304, capacity 130 kg graduated in 100 g, with an accuracy of better than 100 g, were used for weighing all babies and children. Where necessary the children were weighed by difference, weighing the mother and child and subtracting the weight of the mother.
- 2.4 Mid Upper Arm Circumference (MUAC) was measured using one prototype insertion tape designed by Zerfas (1975).
- 2.5 Skinfold thickness was measured using Holtain skinfold calipers.
- 2.6 Height was measured with a Nivotoise No. 4131 Portable Height Measure graded in millimetres. This equipment contains a level and the readings accurate to 0.5 mm are taken directly through a clearly marked clear plastic covered aperture.

### 3. DATA COLLECTION

- 3.1 Information was gathered by trained nurses who examined the children six years and under and interviewed the adults in each household, using questionnaires (Appendices V, VI and VII) covering the composition of the household, type of income, type of living conditions and the foods grown in the garden, together with information on each preschool child giving age, sex, height, weight, MUAC, skinfold thickness and general health at the time of the survey, plus information on breast and bottle feeding.
- 3.2 Physical signs of malnutrition such as muscle wasting, oedema and skin changes were diagnosed by the nurses but were not considered valid until confirmed by a consultant paediatrician

from the Fiji Medical Department through the Colonial War Memorial (CWM) Hospital, who used flesh over the buttocks, hair changes, mental awareness and emotional distress as his criteria. No clinical tests were performed because of limited resources and staff and in the case of the rural survey, distance from laboratories.

- 3.3 The dietary survey consisted of recording kinds of foods eaten on each of three days, being Sunday and any other two days of any one week.
- 3.4 Road to Health Charts (Morley, 1973, Figs. 3 and 4) were used to record the weights of the children. A separate chart was used for each child to show its progress at three monthly intervals. The weights of all the children were recorded on two weight charts, one for girls and one for boys, at three monthly intervals, to assess the effect of the intervention projects (Fig. 7).

## RESULTS

### 1. URBAN SURVEY

#### 1.1 Community Surveyed

##### 1.1.1 Population

One hundred and fifty households in an urban community 6½ miles northeast of Suva on the Kings Road were surveyed (Fig. 1). All the houses within the boundaries defined in the map (Fig. 2) were included, the population consisting of Indians, Fijians and people of mixed race. It was a sample of the kind of communities living in Suva and its environs. This community in Tovata was living on land belonging to the Kalabu Fijian mataqali\*. The Tovata community was

\*Footnote: *Mataqali* - the primary social division in Fiji, larger than *i tokatoka* and smaller than *yavusa*. *I tokatoka* - the enlarged family unit or group descended from brothers. *Yavusa* - the largest kinship and social division of Fijian society, divided into *mataqali* and *i tokatoka*.

divided into Fijian and Indian settlements, and within these were enclaves of people who had migrated from the following areas:

FIJIANS: From the following Provinces of the Kubuna yavusa - Tailevu, Naitasiri, Ra and Lomaiviti; the following Provinces of the Burebasaga yavusa - Rewa, Kadavu, Serua, Nadroga, Nadi and Ba; the following Provinces of the Tovata yavusa - Vanua Levu and Lau. The majority of the Fijians in this study were Methodist, with one or two being Catholic, Seventh Day Adventist and Assembly of God.

INDIANS: The Indian settlement comprised people from North India, South India and the Punjab, representing religions affiliation with Muslim, Methodist, Catholic and Mormon faiths.

#### 1.1.2 Land Tenure

The land tenure for the people living in these areas was in four main categories (Table 1):

- i. The heads of the Provinces have 99-year leases, paying F\$75 per annum for 30 acres of land;
- ii. Fijian land owners, living permanently on their land;
- iii. The rest of the Kubuna, Burebasaga and Tovata people were living on the land at the goodwill of the chiefs of the Kalabu mataqali. They obtained permission to live on this land after the presentation of traditional gifts, and had only sufficient land for house and small garden.
- iv. Indians living on Native Land Lease on a tenancy-at-will for 30 years, paying F\$85 per annum to the mataqali for land which varied in size from just sufficient for their house to up to one acre for house and garden.

Neither category 3 nor 4 had any security, and were loosely referred to as 'squatters', although

TABLE 1  
URBAN LIVING CONDITIONS

	INDIAN (N=16)	FIJIAN (N=47)
<u>TYPE OF LIVING QUARTERS</u>		
Single unattached house - wood with tin roof	14	27
- all tin	3	15
House in attached row of housing	0	1
Bure	0	5
Makeshift housing (shack)	0	1
<u>SIZE OF LIVING QUARTERS</u>		
Number of rooms in dwelling - one	3	21
- two	0	10
- three	5	7
- four or more	9	10
<u>FACILITIES</u>		
Kitchen - inside dwelling	15	18
- outside dwelling	2	26
- none	0	4
Source of drinking water -		
Piped outside (own use)	0	8
Piped outside (shared)	0	12
Well	17	18
Source of washing water -		
Rainwater	9	29
River, lake, stream	0	21
Toilet facilities -		
Flushed or water sealed (own use)	4	13
Flushed or water sealed (shared)	4	6
Pit latrine (own use)	8	21
Pit latrine (shared)	1	5
Cooking facilities - electricity	1	0
- gas	1	3
- kerosene stove	14	16
- wood	7	22
- primus	5	29
- lovo (earth oven)	0	15
<u>TENURE OF DWELLING</u>		
Owned and being paid for by instalment	0	1
Occupied rent free (mataqali)	0	46
Rent or mortgage	16	0

they had more rights than actual squatters in other parts of the city (Reddy, 1976). The main advantage of living in this area was that where there was no Native Land Lease there was no rent to pay.

## 1.2 Housing

All but one household were living in single unattached houses (Table 1). The majority of homes were of wood with a tin roof, but a few were made of iron nailed to a wooden frame. Most houses would be described as being in poor condition.

The Fijian homes usually had one or two rooms, but one third had three, four or more rooms. Most Indian homes had three, four or more rooms. These rooms were generally very small. One of them in an Indian house is usually the kitchen, where most cooking is done with a kerosene stove or primus. In contrast, the majority of Fijians had a kitchen outside the house, with about half this community having an indoor kitchen for use in the wet weather. Most of the Fijians used a wood fire for cooking and on Sunday the lovo (earth oven) was used. Kerosene stoves and primuses were used in the wet weather.

## 1.3 Income

Some of the people had regular employment in government or commerce, but there were many who were at subsistence level. The sale of excess garden produce provided some cash. Other items which were sold for cash were visili (a stem used for Chinese medicine, sold at the rate of \$1 for six inches), eggs and fowls, pigs and chicken manure.

## 1.4 Transport

Adequate bus transport was available in addition to some private vehicles. A bus company serviced the entire area, but people also walked about one mile to the main Kings Road to use one of the many buses travelling between Nausori

and Suva. Bus fares were very high for people with little or no income and it was found that some families could not afford to travel to health services, particularly for minor ailments.

## 1.5 Water Supply

Table 1 shows the sources of water for the urban community. Water for drinking came from pipes, wells and rainwater, and washing was done in rain water or the river.

Sources of drinking water were very good in the Nasogo area, as the homes were piped, but those in the Kubukawa Road areas were very poor, with no pipes in the homes and few tanks to collect rainwater for drinking. Some was collected from the roofs in drums for drinking and other water was obtained from shallow wells for drinking and cooking, but for washing small streams, lakes and rivers were used. These lakes and small streams were fast flowing in rainy seasons but deteriorated to stagnant pools in dry weather. In spite of these conditions this water was still used for bathing, washing clothes and dishes. The wells also dried up in the dry season.

In the Tovata and Pritam Singh Road areas the situation was quite different, as there were deep wells in the yards in the Indian settlement. The water was very good for drinking but the wells dried up in dry seasons, when water was carted by the Public Works Department and stored in 44-gallon drums.

## 1.6 Hygiene

### 1.6.1 Toilets

Most households in both communities had a pit latrine for each dwelling (Table 1). One quarter of the Fijians had water-sealed toilets for their own use. A minority of households shared a toilet, either pour-flush or pit latrine.

### 1.6.2 Rubbish Disposal

Householders on the edge of the settlement threw their rubbish into the adjacent mahogany forest. After discussions with the Program staff on hygiene, this was cleaned up and proper pits dug.

### 1.6.3 Flies

A very heavy fly infestation in this community resulted from the presence of a commercial poultry farm which was not controlling its fly breeding. The problem was discussed with the Poultry Advisor, Ministry of Agriculture, and the Ministry of Health, but no solution was obtained.

### 1.6.4 Health

The use of stagnant creek pools for bathing and household washing was considered to be a contributing factor to endemic scabies and epidemics of diarrhoea. The custom of using only one towel for all members of the family also contributed to these problems.

In the Nasogo area, diarrhoea was aggravated by the fly problem. Nurses from the Raiwaqa Health Centre paid special visits to people who had been referred by the Hospital or doctors for particular attention, and regularly conducted child welfare clinics in one of the homes.

All children in classes 1 and 2 at the Kalabu Fijian School were examined in one week. Height, weight, MUAC and general health were recorded. A total of 187 children were examined (Figs. 9 and 10, ages 6 to 11). The following health problems were seen:

5 cases of ringworm  
 7 cases of dhani (skin fungus)  
 39 cases of scabies  
 78 cases of influenza  
 37 cases of bad sores and boils

Thirty five of these children were referred for treatment at Raiqqa Health Centre. The main problem at the school was lack of hygiene, both at school and at home.

### 1.7 Size of Family and Birth Frequency

Of the Fijian families in the urban community (Table 2), 57% had one or two children and 31% five or more children, two families having 10 and 12 respectively. Table 3 shows that 39% of the children were born two years apart, 30% three years and only 17% one year apart.

This contrasted with the Indian families (Tables 4 and 5), of whom 33% had four children and only 19% five or more children, with the largest family having seven. Birth spacing was one year apart for 35% of the children, two years for 29% and three years for 20% of the children.

### 1.8 Nutrition

#### 1.8.1 Food Supply

Table 6 describes the food grown in both urban and rural communities.

URBAN FIJIANS: Nearly all urban Fijians grew food of some kind, particularly as many had sufficient land on which to plant. Most Fijians grew starchy root vegetables, and 58% were self sufficient in these items. This is characteristic of the Fijian diet, which showed very little variety. Chinese cabbage and bele were the two green vegetables grown in their gardens (Table 6 - 14.6% and 66.7% respectively).

URBAN INDIANS: Although 87% of the Indians did not



Nutrition Project -  
Chicken Raising Equipment



Waivaka Children  
With FSP worker at extreme right

TABLE 2

SIZE OF URBAN FAMILIES: FIJIAN

NO. OF CHILDREN IN FAMILY	NO. OF FAMILIES	PERCENT
1	20	32.8
2	15	24.6
3	2	3.3
4	5	8.2
5	8	13.1
6	4	6.6
7	3	4.9
8	2	3.3
10	1	1.6
12	1	1.6
TOTAL	61	100.0

TABLE 3

FREQUENCY OF BIRTHS IN URBAN FAMILIES: FIJIAN

NO. OF CHILDREN IN FAMILY	BIRTH SPACING (YEARS)								TOTAL
	0 (TWINS)	1	2	3	4	5	6	7	
2	0	1	5	6	2	1	0	0	15
3	0	1	3	0	0	0	0	0	4
4	1	3	3	5	2	1	1	0	16
5	0	8	13	6	3	1	1	1	33
6	0	2	7	6	4	0	1	0	20
7	0	6	10	1	0	1	0	0	18
8	0	0	4	10	0	0	0	0	14
10	0	1	4	4	0	0	0	0	9
12	0	2	5	3	0	0	0	0	10
TOTAL	1	24	54	41	11	4	3	1	139
PERCENT	0.7	17.3	38.8	29.5	7.9	2.9	2.2	0.7	100.0

TABLE 4SIZE OF URBAN FAMILIES: INDIAN

NO. OF CHILDREN IN FAMILY	NO. OF FAMILIES	PERCENT
1	4	19.0
2	3	14.3
3	3	14.3
4	7	33.3
5	3	14.3
7	1	4.8
TOTAL	21	100.0

TABLE 5FREQUENCY OF BIRTHS IN URBAN FAMILIES: INDIAN

NO. OF CHILDREN IN FAMILY	BIRTH SPACING (YEARS)								TOTAL
	0 (TWINS)	1	2	3	4	5	7	8	
2	0	0	0	3	0	0	0	0	3
3	1	2	0	0	1	1	0	1	6
4	0	9	4	6	1	1	0	0	21
5	0	4	8	0	0	0	0	0	12
7	0	2	2	1	0	0	1	0	6
TOTAL	1	17	14	10	2	2	1	1	48
PERCENT	2.1	35.4	29.1	20.8	4.2	4.2	2.1	2.1	100.0

TABLE 6

## ANALYSIS OF FOOD GROWN IN OWN GARDENS

	RURAL		URBAN			
	FIJIAN N = 127		INDIAN N = 16		FIJIAN N = 48	
	NO.	%	NO.	%	NO.	%
<b>QUESTION 10 in Questionnaire</b>						
Number growing sufficient food for themselves	120	94.5	1	6.3	28	58.3
Number growing food to supplement purchased food	3	2.4	1	6.3	14	29.2
†No answer to this question	4	3.1	14	87.4	6	12.5
<u>FOODS GROWN</u>			<u>NUMBER OF PEOPLE GROWING FOOD</u>			
<u>STARCHY VEGETABLES</u>						
Dalo ( <i>Colocasia esculenta</i> )	127	100.0	8	50.0	40	83.3
Cassava (Tavioka)	121	95.3	8	50.0	42	87.5
Kumala (Sweet potato)	3	2.4	0	0	8	16.7
Yam ( <i>Dioscorea alata</i> )	7	5.5	0	0	5	10.4
Other roots	10	7.9	0	0	0	0
Breadfruit	2	1.6	1	6.3	28	58.3
Vudi (Plantain)	0	0	0	0	28	58.3
Ivi ( <i>Inocarpus edulis</i> )	0	0	1	6.3	0	0
<u>GREEN LEAFY VEGETABLES</u>						
Chinese cabbage	0	0	11	68.8	7	14.6
Indian cabbage	0	0	2	12.5	0	0
European cabbage	3	2.4	3	18.8	2	4.2
Rou rou (Dalo leaves)	106	83.5	8	50.0	39	81.3
Bele ( <i>Hibiscus manihot</i> )	21	16.5	2	12.5	32	66.7
Spinach	1	0.8	0	0	0	0
<u>OTHER VEGETABLES</u>						
Tomatoes	6	4.7	2	12.5	2	4.2
Beans	2	1.6	7	43.8	4	8.3
Egg plant	16	12.6	8	50.0	4	8.3
Pumpkin	0	0	1	6.3	4	8.3
Cucumber	2	1.6	1	6.3	0	0
Other	0	0	6	37.5	0	0
<u>FRUITS</u>						
Avocado	1	0.8	0	0	0	0
Guava	0	0	4	25.0	7	14.6
Citrus	78	61.4	2	12.5	18	37.5
Pineapples	70	55.1	2	12.5	27	56.3
Pawpaw	80	63.0	9	56.3	36	75.0
Bananas	114	89.8	9	56.3	38	79.2
Passionfruit	0	0	1	6.3	2	4.2
Sugar cane	3	2.4	1	6.3	3	6.3
Coconuts	Not recorded		1	6.3	12	25.0
<u>OTHER PRODUCE</u>						
Yagona ( <i>Piper methyaticum</i> )	5	3.9	0	0	14	29.2
Seremaia ( <i>Annona muricata</i> )	0	0	0	0	3	6.3
Chickens	0	0	0	0	2	4.2

† Those who did not answer Question 10 were growing food, but it is not known whether production was self-sufficient.

answer Question 10 (Appendix V) it was clear from their answers to other questions that most of them grew green vegetables of some kind. As many do not have much land, the home grown food was a spasmodic supplement to their diet. Much Chinese cabbage could be seen growing and it was expected that a high proportion of the produce of even the smallest plots would be sold for cash and not eaten. In addition to Chinese cabbage and bele, the Indian population grew two other varieties of cabbage, and tomatoes, beans, eggplant and a variety of other vegetables. Cassava and dalo were also grown by 50% of the Indians either for sale or their own consumption.

OTHER FOODS AVAILABLE: Fruits such as guava, citrus, pawpaw, bananas and coconuts grew wild and the use of these depended on whether such a fruit tree was growing on the land allocated to that household for food production, and rarely on a planned planting. Pineapples (and to some extent bananas) had to be planted in prepared plots and were grown for sale as well as home consumption. A private poultry farm was established in the area from which people purchased eggs at half the Suva prices. One or two individuals had small poultry runs and pig pens.

### 1.8.2 Dietary Survey

Table 7 shows the results of the dietary survey. It was found that 89 different food items were mentioned as being consumed by 107 children on a 24-hour recall covering three days of the week, being Sunday and two other random days. The list of food items consumed was reduced to items which appeared more frequently than 10% of the foods consumed at a particular meal (Table 8).

At any one meal the urban children consumed

## URBAN DIET PATTERN (89 ITEMS)

(N = 321)\*

ITEM	BREAKFAST		LUNCH		DINNER		OTHER	
	No.	z	No.	z	No.	z	No.	z
Biscuit, plain	17	5	-	-	13	4	16	5
Biscuit, plain sweet	1	-	-	-	3	-	13	3
Bread	128	40	5	1	20	6	40	12
Farofa	4	-	-	-	-	-	2	-
Cornflakes/Weetbix	4	1	-	-	2	-	-	-
Rice	46	14	45	14	51	16	5	1
Roti	30	9	9	3	10	3	6	2
Pancake	23	7	3	-	4	1	5	1
Cake	2	-	1	-	-	-	5	1
Purini	11	3	-	-	2	-	1	-
Topoi	6	2	-	-	-	-	2	-
Oatmeal porridge	30	9	2	-	1	-	2	-
Arrowroot	-	-	-	-	1	-	-	-
Breadfruit	-	-	8	2	1	-	-	-
Cassava	5	1	130	40	123	38	-	-
Potatoes	3	1	24	7	25	8	2	-
Ivi	-	-	1	-	-	-	-	-
Dalo	2	-	55	17	26	8	1	-
Yam	-	-	11	3	11	3	-	-
Yudi	-	-	3	1	2	-	-	-
Rou rou	-	-	56	17	31	10	-	-
Maize	-	-	-	-	1	-	-	-
Frozen mixed vegetables	2	-	8	2	1	-	-	-
Bele	-	-	43	14	18	6	-	-
Collage	11	3	18	6	13	4	1	-
Pumpkin	-	-	2	-	1	-	-	-
Okra	-	-	2	-	-	-	-	-
Cucumber	1	-	2	-	2	-	-	-
Baigan (egg plant)	-	-	2	-	2	-	-	-
Ota (edible fern)	-	-	-	-	-	-	-	-
( <i>Andropogon esculentum</i> )	-	-	1	-	-	-	-	-
Radish	-	-	1	-	1	-	-	-
Palusami (rou rou in coconut)	-	-	1	-	-	-	-	-
Tomato	-	-	5	1	-	-	-	-
Duraka ( <i>Sesuvium esule</i> )	-	-	2	-	4	1	-	-
Carrot	-	-	4	1	3	1	-	-
Fruit juice	-	-	16	5	4	1	7	2
Coconut	-	-	-	-	-	-	2	-
Paspaz	-	-	4	1	2	-	32	10
Sugar cane	-	-	-	-	-	-	4	1
Orange	2	-	3	1	2	-	13	4
Guava	-	-	-	-	-	-	40	12
Pear	-	-	1	-	-	-	6	1
Apple	-	-	4	1	3	1	16	5
Banana	9	3	6	2	10	3	131	56
Mandarin	3	1	16	5	-	-	65	20
Watermelon	-	-	1	-	-	-	-	-
Tarasau ( <i>Brasiconotaria vittense</i> )	-	-	-	-	-	-	1	-
Grapes	-	-	-	-	-	-	19	6
Other fruits	-	-	-	-	-	-	17	3
Beef, fresh	-	-	16	5	28	9	-	-
Beef, canned	-	-	3	1	7	2	-	-
Eggs	14	4	28	9	15	5	42	3
Poultry	-	-	29	9	10	3	-	-
Beef pie	-	-	2	-	-	-	-	-
Pork	-	-	-	-	3	1	-	-
Button, fresh	2	-	8	2	6	2	-	-
Button, canned	-	-	2	-	-	-	-	-
Fish, fresh	2	-	23	7	23	9	-	-
Fish, canned	1	-	70	22	61	19	-	-
Kai (shell fish)	-	-	2	-	2	-	-	-
Prawns	-	-	-	-	1	-	-	-
Milk	223	69	51	16	136	42	227	71
Cocoa	2	-	2	-	3	1	3	1
Milo	18	6	4	1	8	2	21	9
Ice cream	-	-	9	3	-	-	23	7
Sugar	90	28	24	7	36	11	24	7
Cordial	2	-	1	-	1	-	2	-
Del rosa syrup	-	-	1	-	1	-	-	-
Butter	80	25	8	2	11	3	27	8
Lolo (coconut milk)	-	-	65	20	47	15	-	-
Dripping	-	-	Used in trying to prepare dinner meals					
Dhal (pea soup)	-	-	14	4	20	6	-	-
Soup	1	-	51	16	35	11	1	-
Custard	-	-	-	-	1	-	-	-
Snack foods	-	-	1	-	4	1	104	32
Glucose	1	-	-	-	-	-	-	-
Almonds	1	-	-	-	-	-	-	-
Sofol	1	-	2	-	1	-	-	-
Venatico	3	-	-	-	-	-	1	-
Peanut butter	4	-	-	-	1	-	-	-
Platles	-	-	1	-	-	-	1	-
Jelly	-	-	-	-	-	-	1	-
Heinz egg & vegetable	1	-	-	-	1	-	-	-
Tea	111	34	5	14	14	4	112	35

TABLE 8

## MOST FREQUENTLY CONSUMED FOOD ITEMS

BREAKFAST	URBAN (N=321)*		RURAL (N=420)*	
	TOTAL	%	TOTAL	%
Porridge	30	9	-	-
Rice	46	14	85	20
Pancake or roti	53	16	56	13
Bread	128	40	-	-
Biscuit	-	-	76	18
Butter	80	25	-	-
Milk	223	69	86	20
Cassava	-	-	48	11
Dalo	-	-	49	12
Tea	211	66	303	72
Sugar	90	28	229	55
LUNCH				
Rice	45	14	-	-
Cassava	130	40	78	19
Dalo	55	17	259	62
Eggs	28	9	-	-
Milk	51	16	29	7
Fish, tinned and fresh	98	31	55	13
Prawns	-	-	20	5
Chicken and meat	60	18	47	11
Soup	51	16	-	-
Bele	43	14	42	10
Rou rou	56	17	210	50
Lolo	65	20	78	19
Tea	46	14	30	7
Sugar	23	7	33	8
DINNER				
Rice	51	16	-	-
Cassava	123	38	80	19
Dalo	26	8	237	56
Milk	136	42	37	9
Fish, tinned and fresh	84	28	78	18
Prawns	-	-	25	6
Chicken and meat	54	17	60	14
Soup	35	11	-	-
Bele	-	-	41	10
Rou rou	31	10	131	31
Lolo	47	15	34	8
Tea	132	41	152	36
Sugar	36	11	135	32
BETWEEN MEALS				
Snacks	104	32	-	-
Ice cream	23	7	-	-
Fruit	461	147	136	34
Bread	40	12	-	-
Biscuits	29	8	-	-
Milk and Milo	251	81	-	-
Eggs	12	3	-	-

\* See Tables 7 and 18 for N figures.



A Namosi Family Meal



Waivaka Twins

between nine and 14 different items, as under:

<u>BREAKFAST:</u>	Bread or pancake with butter and tea with milk and sugar
<u>MID-DAY:</u>	Cassava with fish, meat, chicken or eggs
<u>EVENING:</u>	Similar to mid-day
<u>BETWEEN MEALS:</u>	A large number of items with fruit and commercially made snacks being the major foods.

### 1.8.3 Breast Feeding

Table 9 shows that in the urban population studied, a larger proportion of Indian mothers totally bottle fed their babies, and after six months 59% had stopped breast feeding. A small group of Indian women did continue breast feeding up to three years. Fijian mothers breast fed between nine and 12 months, reflecting the teaching of the Public Health nurses, with whom the urban mothers were in close contact. Figure 8 shows comparative breast feeding patterns between urban and rural Fijian and Indian communities studied.

Changes from breast feeding to bottle feeding are a matter of concern to nutritionists throughout the world (Berg, 1973) and in Fiji the medical profession and nutritionists are concerned that bottle feeding will become more prevalent with increasing urbanisation.

### 1.9 Malnutrition

One hundred and ten children six years and under were examined, being the total population of preschool children present in the community surveyes (Tables 10,11,12, Figs. 9 and 10). It is shown in these Tables that not all children were present at each weighing session, and as few as 83 were weighed in December 1977. Sixteen cases of overt malnutrition

TABLE 9

BREAST FEEDING PATTERN

	BOTTLE FED	BREAST FED									TOTAL
		MONTHS FED									
		1	2	3-6	6-9	9-12	12-15	15-18	18-24	24-36	
<u>URBAN</u>											
INDIAN	2	3	2	6	0	2	0	0	4	3	22
FIJIAN	2	1	1	9	28	16	4	0	1	0	62
<u>RURAL</u>											
FIJIAN	4	0	0	3	14	21	31	32	25	1	131
<u>PERCENTAGES</u>											
URBAN INDIAN	9.1	13.6	9.1	27.3	0	9.1	0	0	18.2	13.6	100.0
URBAN FIJIAN	3.2	1.6	1.6	14.6	45.1	25.8	6.5	0	1.6	0	100.0
RURAL FIJIAN	3.0	0	0	2.3	10.7	16.0	23.7	24.4	19.1	0.8	100.0

BREAST FEEDING PATTERN

TABLE 9

BREAST FEEDING PATTERN  
 AGES TO WHICH CHILDREN WERE BREAST FED EXPRESSED AS PERCENTAGE OF POPULATION EXAMINED.

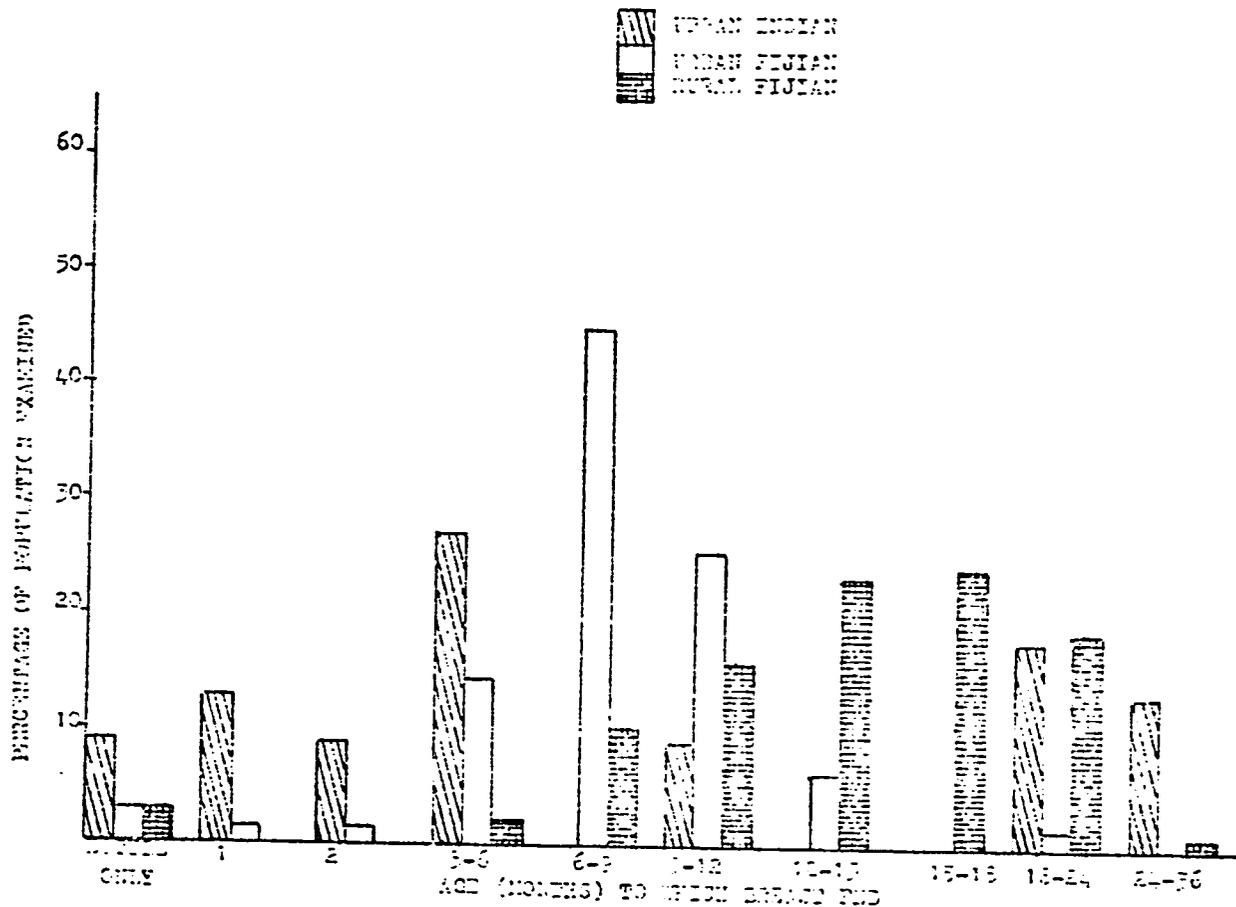


FIGURE 8  
 BREAST FEEDING PATTERN

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TABLE 10NUMBER OF CHILDREN SURVEYED IN EACH PERIOD  
IN THE URBAN COMMUNITY

PERIOD	INDIAN	FIJIAN	TOTAL
APRIL, 1977	30	66	96
JULY, 1977	33	74	107
OCTOBER, 1977	30	88	118
DECEMBER, 1977	25	58	83
MARCH, 1978	31	68	99
JUNE, 1978	30	83	113

TABLE 11  
TOVATA (URBAN) WEIGHT ANALYSIS  
APRIL 1977 - JUNE 1978

INDIAN

PERIOD	CLASS	MALE	FEMALE	TOTAL	PERCENT	
<u>APRIL, 1977</u>	U	1	0	1	3.3	
	V	1	0	1	3.3	
	W	3	5	8	26.7	
	X	7	7	14	46.7	
	Y	4	2	6	20.0	
	Z	0	0	0	0	
	TOTAL	16	14	30	100.0	
	<u>JULY, 1977</u>	U	1	0	1	3.0
		V	1	1	2	6.0
W		4	7	11	33.4	
X		8	5	13	39.4	
Y		3	3	6	18.2	
Z		0	0	0	0	
TOTAL		17	16	33	100.0	
<u>OCTOBER, 1977</u>		U	0	0	0	0
		V	0	1	1	3.3
	W	7	5	12	40.0	
	X	7	6	13	43.3	
	Y	3	1	4	13.4	
	Z	0	0	0	0	
	TOTAL	17	13	30	100.0	
	<u>DECEMBER, 1977</u>	U	0	0	0	0
		V	0	0	0	0
W		3	4	7	28.0	
X		6	5	11	44.0	
Y		3	3	6	24.0	
Z		0	1	1	4.0	
TOTAL		12	13	25	100.0	
<u>MARCH, 1978</u>		U	0	0	0	0
		V	0	1	1	3.2
	W	10	9	19	61.3	
	X	5	5	10	32.3	
	Y	1	0	1	3.2	
	Z	0	0	0	0	
	TOTAL	16	15	31	100.0	
	<u>JUNE, 1978</u>	U	0	0	0	0
		V	1	1	2	6.7
W		7	9	16	53.3	
X		4	4	8	26.7	
Y		2	2	4	13.3	
Z		0	0	0	0	
TOTAL		14	16	30	100.0	

TOVATA (URBAN) WEIGHT ANALYSISAPRIL 1977 - JUNE 1978FIJIAN

PERIOD	CLASS	MALE	FEMALE	TOTAL	PERCENT
<u>APRIL, 1977</u>	U	1	1	2	3.0
	V	13	24	37	56.1
	W	10	12	22	33.3
	X	0	5	5	7.6
	Y	0	0	0	0
	Z	0	0	0	0
	TOTAL	24	42	66	100.0
<u>JULY, 1977</u>	U	1	1	2	2.7
	V	14	16	30	40.5
	W	13	21	34	45.9
	X	2	5	7	9.5
	Y	0	1	1	1.4
	Z	0	0	0	0
	TOTAL	30	44	74	100.0
<u>OCTOBER, 1977</u>	U	1	0	1	1.1
	V	13	15	28	31.8
	W	23	26	49	55.7
	X	2	8	10	11.4
	Y	0	0	0	0
	Z	0	0	0	0
	TOTAL	39	49	88	100.0
<u>DECEMBER, 1977</u>	U	0	0	0	0
	V	3	5	8	13.8
	W	14	24	38	65.5
	X	4	7	11	19.0
	Y	0	1	1	1.7
	Z	0	0	0	0
	TOTAL	21	37	58	100.0
<u>MARCH, 1978</u>	U	0	0	0	0
	V	14	9	23	33.8
	W	20	19	39	57.4
	X	0	5	5	7.3
	Y	1	0	1	1.5
	Z	0	0	0	0
	TOTAL	35	33	68	100.0
<u>JUNE, 1978</u>	U	0	3	3	3.6
	V	12	9	21	25.3
	W	25	32	57	68.7
	X	0	2	2	2.4
	Y	0	0	0	0
	Z	0	0	0	0
	TOTAL	37	46	83	100.0

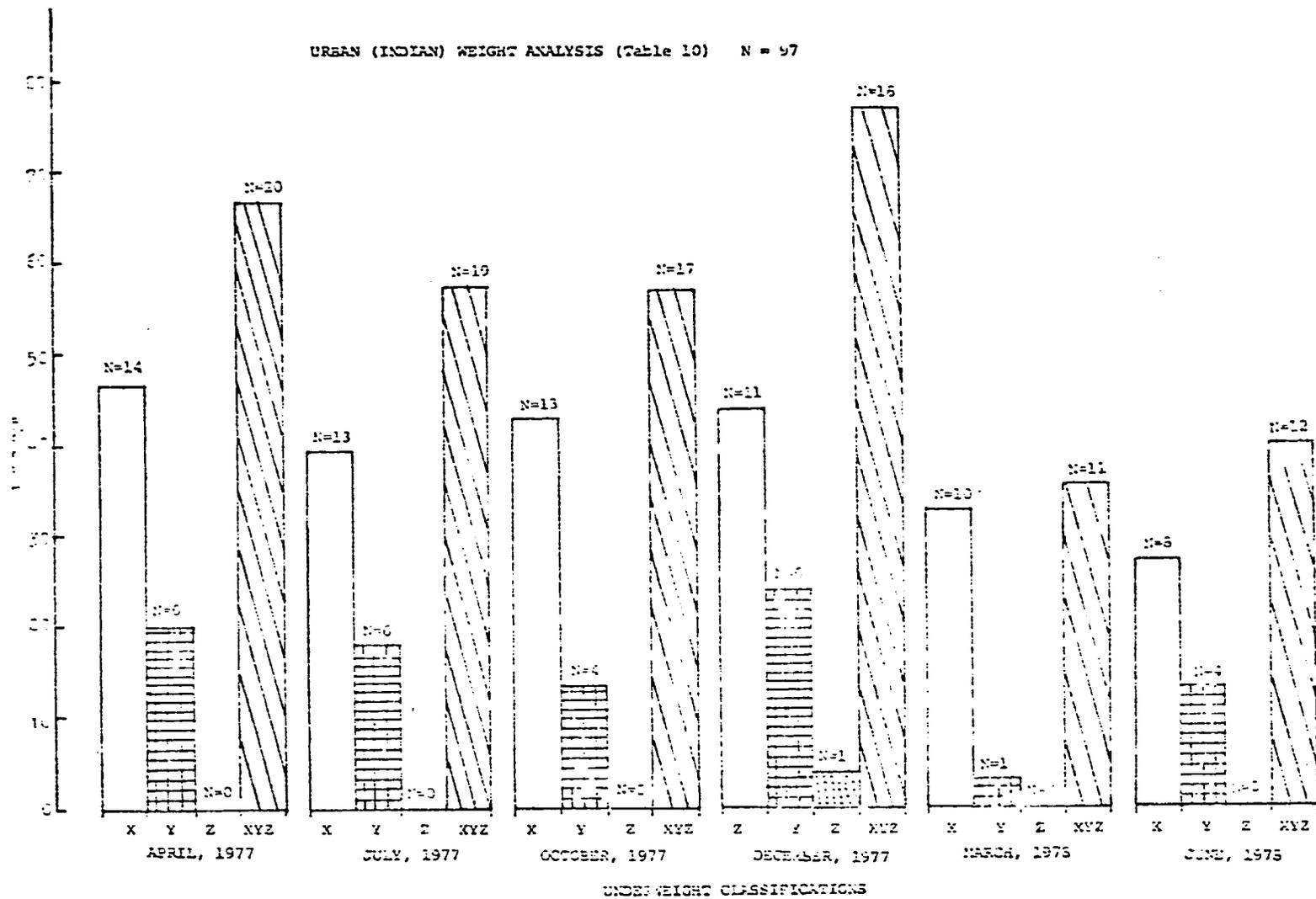
and five borderline cases were found in this population in the initial survey. These children came from homes of poor families earning \$10-\$12 per week with large numbers of people to support. Many had no land for domestic gardens. Some children were neglected by their mothers, who either did not cook food for their children or who were deserted mothers or widows with neither income nor land to grow food. In all cases there was insufficient food and especially a deficiency of protein foods.

#### 1.9.1 Weight Analysis

Figures 5, 6 and 7 show the Road to Health Chart with the clear overlay superimposed on it. The proportion of weights falling in the spaces Z, Y and X were determined (Tables 11 and 12). These are displayed as histograms (Figs. 9 and 10). Children in the "ZXY" zone will be defined as 'underweight' for the purpose of the discussion. Children in the "Z" zone are defined as 'severely underweight'.

In the entire period of the survey only one child in December 1977 was severely underweight. In the initial survey (April, 1977), 67% of the Indian children (in the "X" and "Y" categories) and only 7.6% of Fijian (in "X" category), were underweight.

In July and October 1977 there were more children in the surveys but there was no significant change in the proportion of underweight children. In December there was a reduction in the number of children in the community, which is normal as many families return to their home villages in the rural areas during the school holidays. This accounts for the apparent increase in the proportion of underweight children, especially among the Fijians. The proportion of underweight children in the Indian population had dropped from 66.7% in April 1977 to 40% in June 1978,



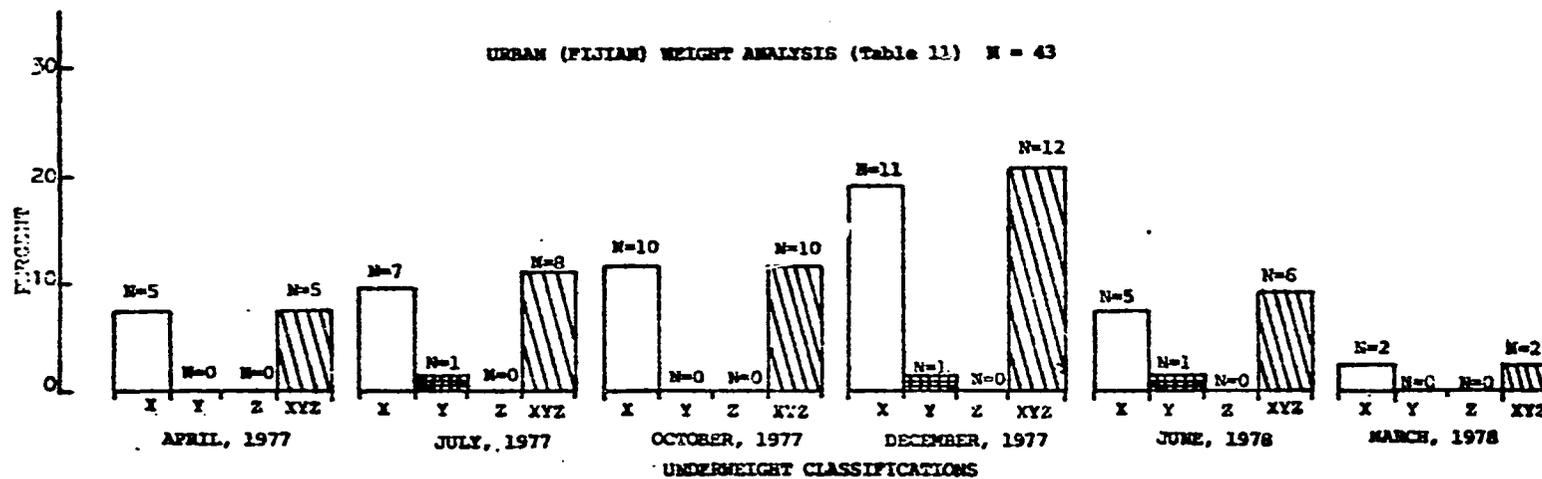
URBAN (INDIAN) HEIGHT ANALYSIS

FIGURE 9

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FIGURE 10

URBAN (FIJIAN) WEIGHT ANALYSIS



Best Available Document

and in the Fijian population from 7.6% in April 1977 to 2.4% in June 1978.

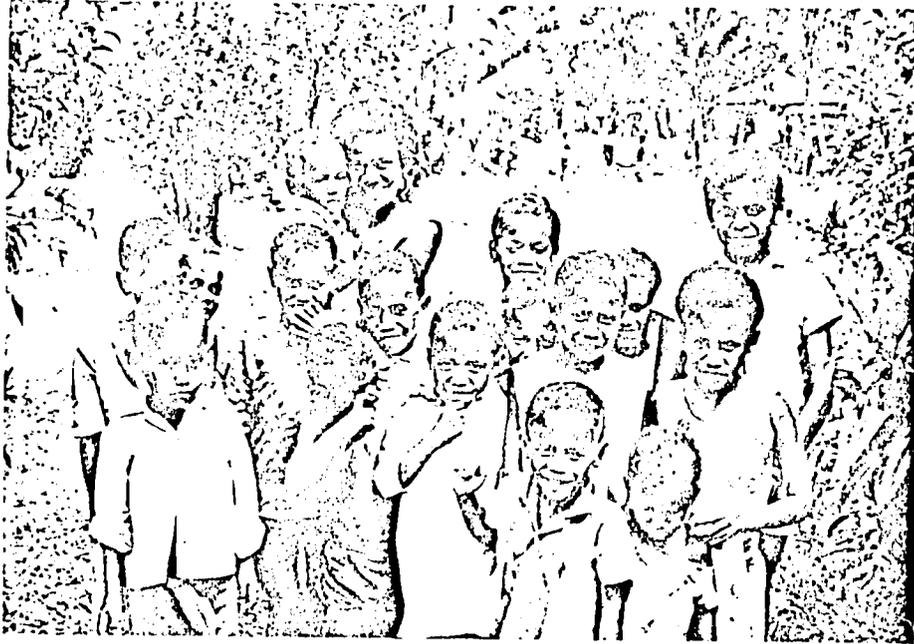
During 1977, FSP was providing some full cream milk powder and skim milk powder to the needy families in this area. The supply was irregular. In January 1978 the Medical Department of the Fiji Government began distributing skim milk powder given through World Food Program to these families on a regular basis at the rate of one pound of powder per week per child.

### 1.9.2 Height Analysis

Figs. 11, 12, 13 and 14 show the height for age of urban Indian and Fijian children. The standard line through these figures was constructed from data in Jelliffe (1966) (page 222) and derived from Harvard Standards (Stuart and Stevenson, 1959). Although many Indian children were below the standard height, a number of Fijian children over five years of age were well above this.

### 1.9.3 Other Parameters

Other parameters used in the survey to determine malnutrition included Mid Upper Arm Circumference (MUAC), skinfold thickness, and current general health (see Materials and Method, 2). It was decided that skinfold measurements were not sufficiently accurate for use. All births are registered in Fiji and there was no problem in establishing the exact age of a child. The principal advantage of MUAC measurements is in populations where age cannot be determined. MUAC measurements below 14.2cm indicate malnutrition (Harvard Standard, Stuart and Stevenson, 1959), therefore a plot of the weights of children with MUAC

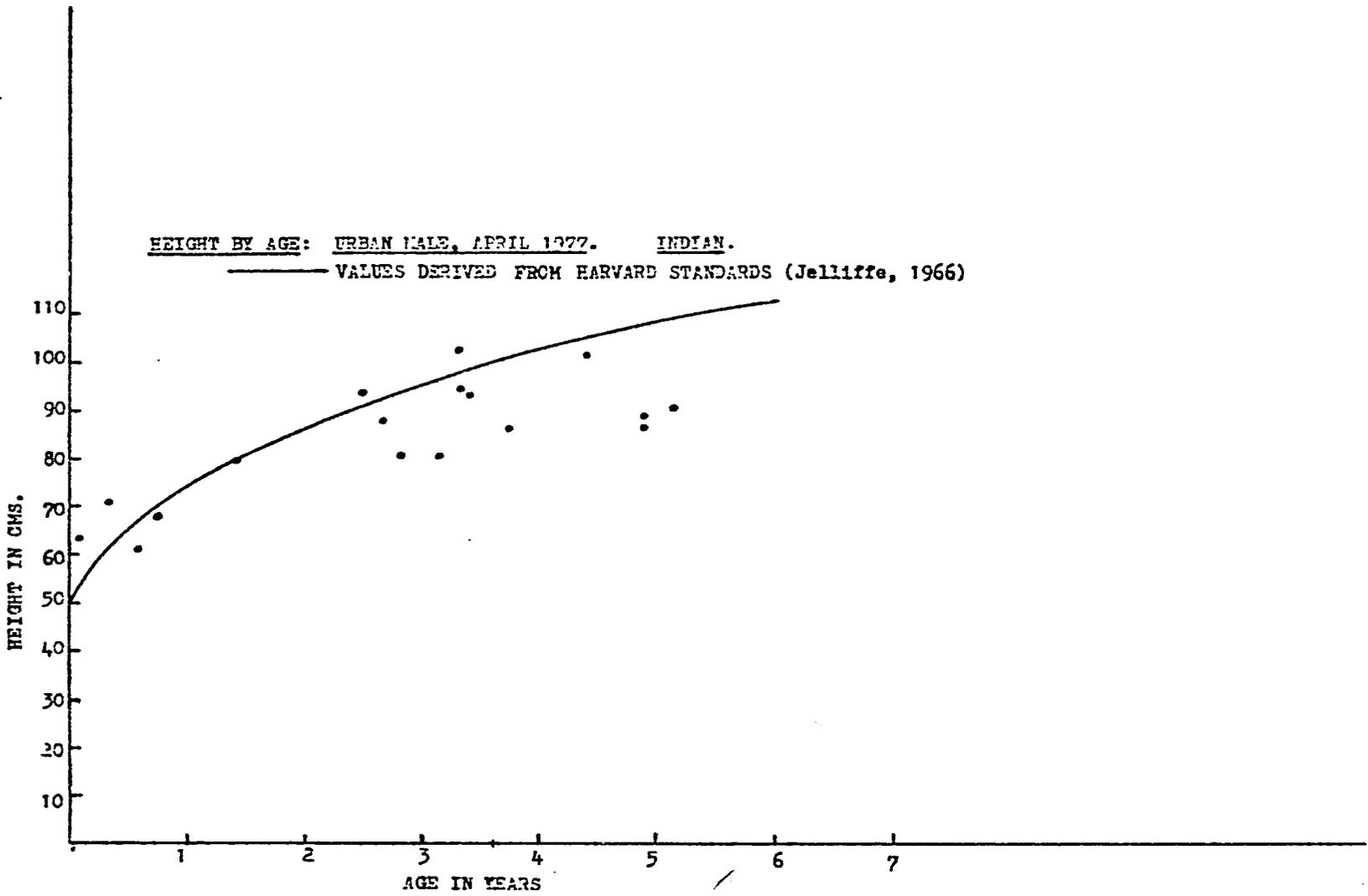


Children at Namosi



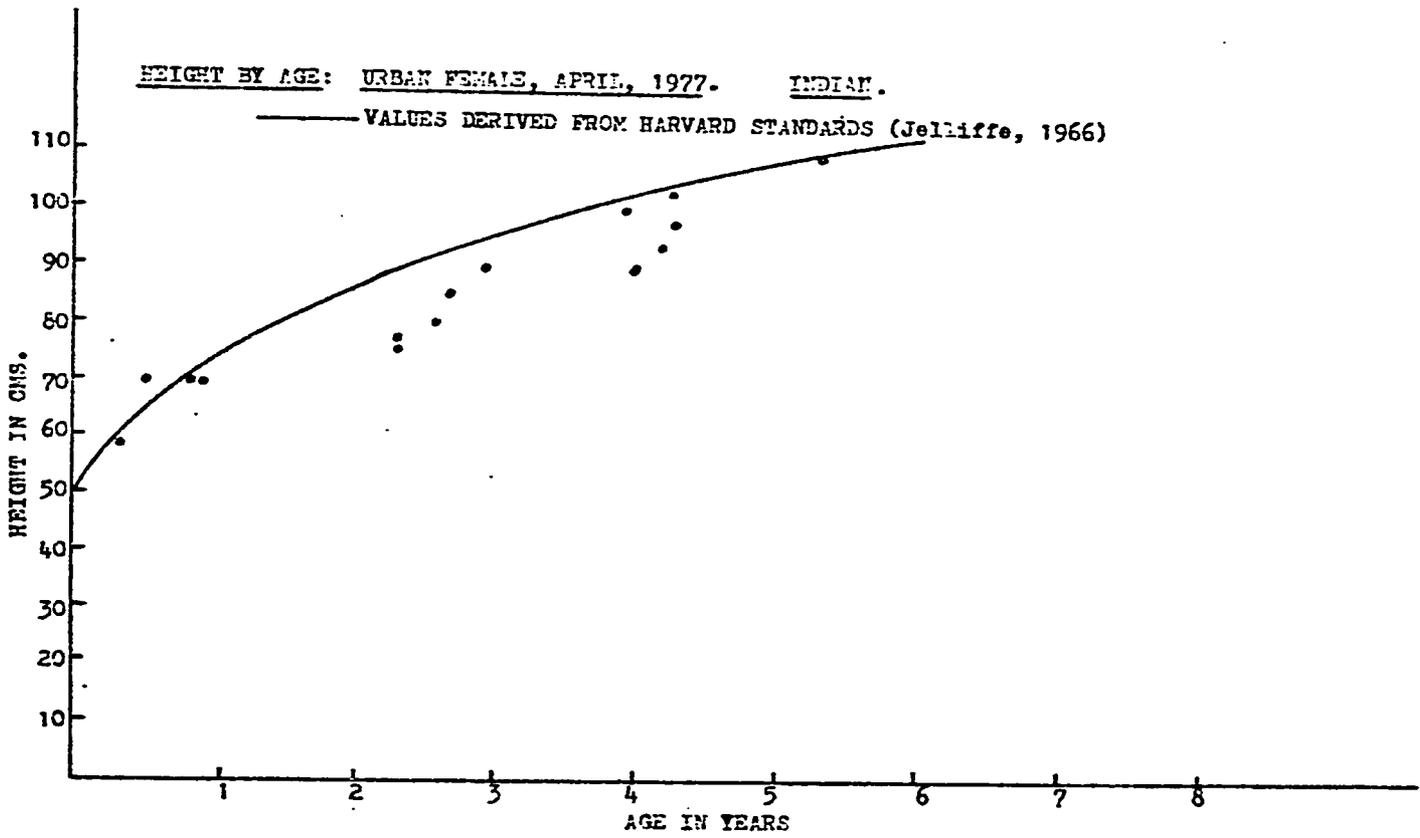
Children seen at first visit

HOA



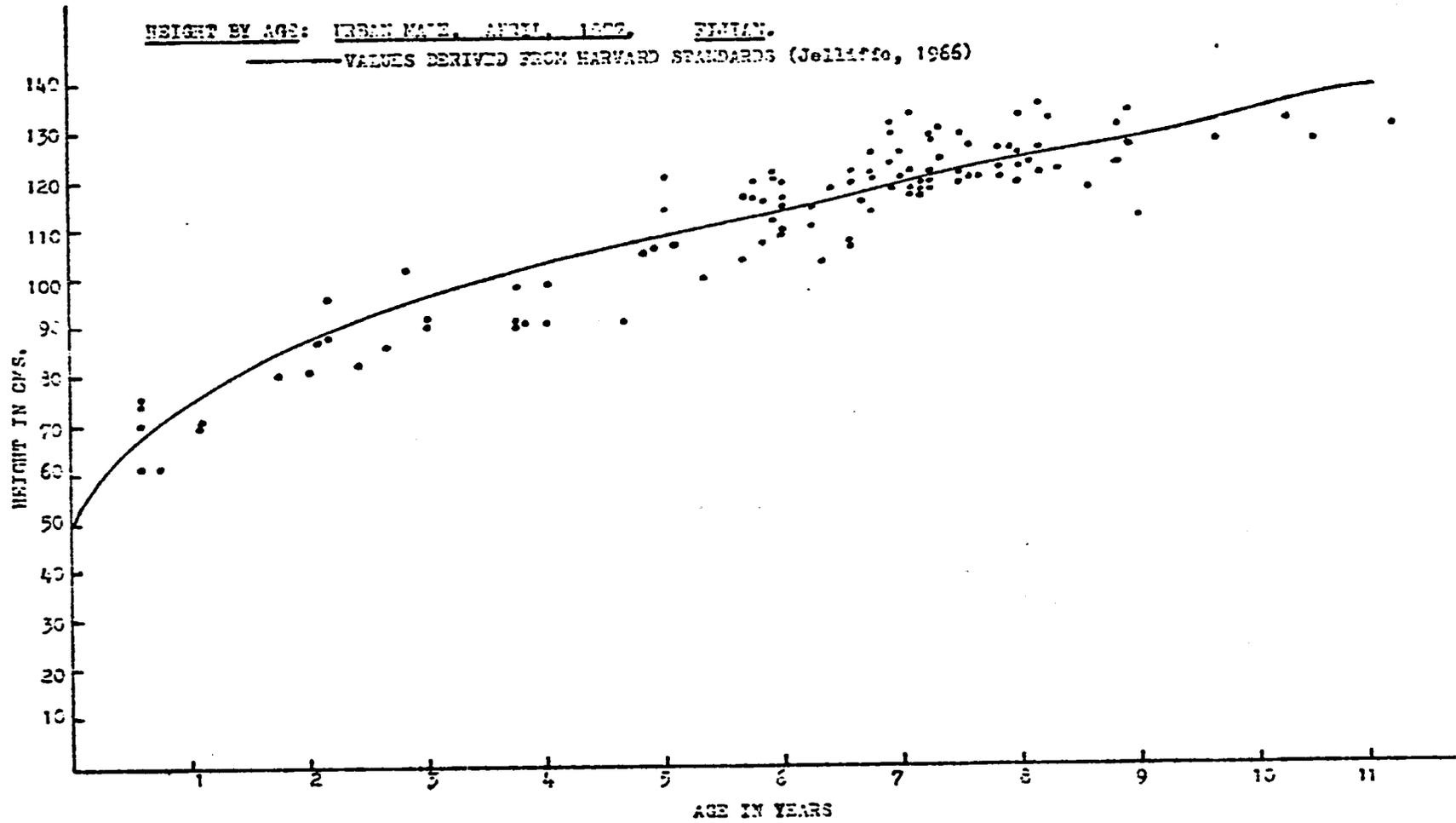
HEIGHT BY AGE URBAN MALE (INDIAN)

FIGURE 11



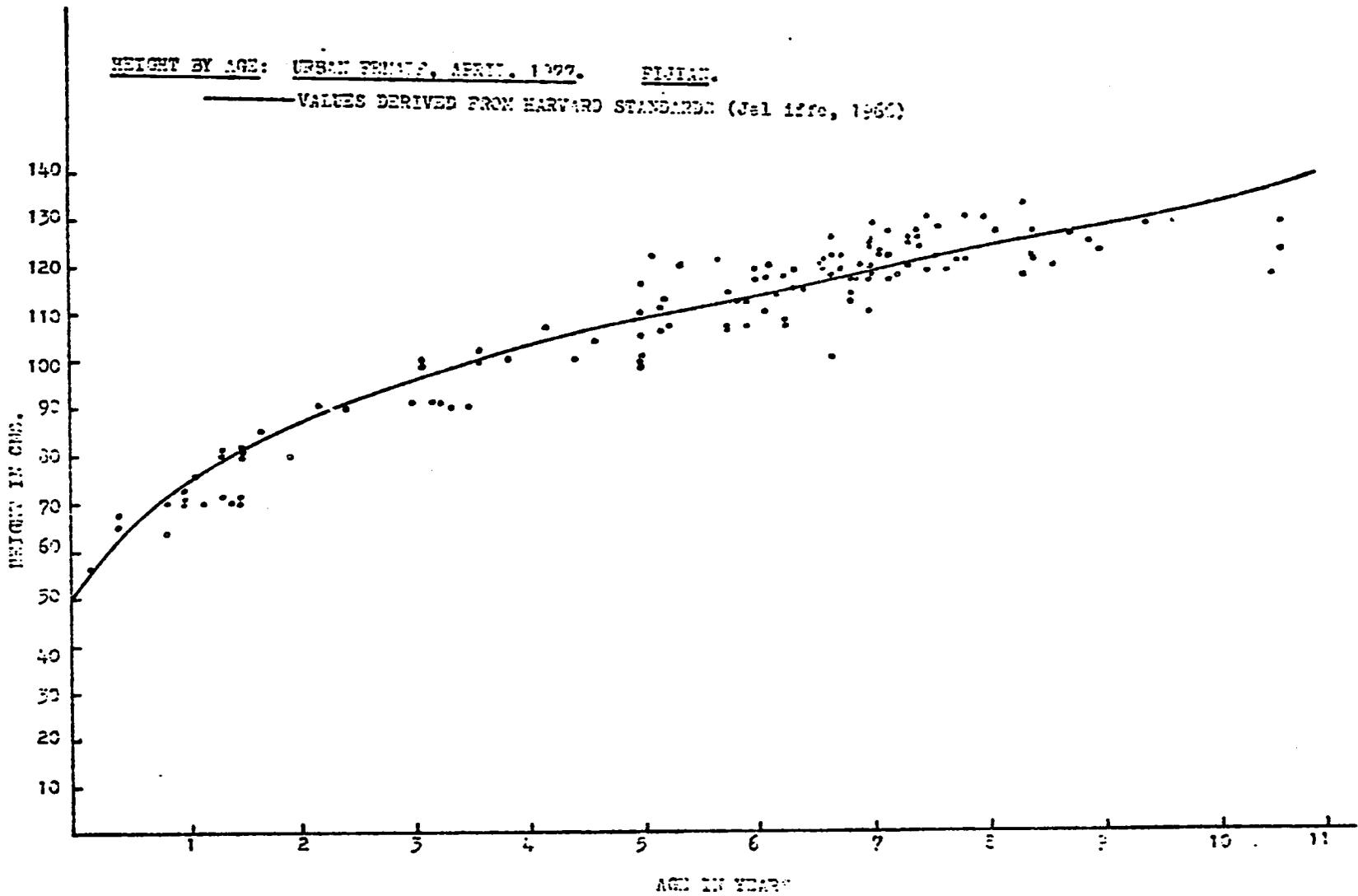
HEIGHT BY AGE URBAN FEMALE (INDIAN)

FIGURE 12



HEIGHT BY AGE URBAN MALE (FIJIAN)

FIGURE 13



HEIGHT BY AGE URBAN FEMALE (FIJIAN)

FIGURE 14

measurements below 4.25 cm was made on the Road to Health Chart, and their statistical position determined. Table 13 shows that some children with borderline MUAC readings had weights well within the Road to Health "W" category, although the majority were in the "X" category. All children whose weights were in the "Z" category had low MUAC readings.

### 1.10 Socioeconomic Development

The people were familiar with the concept of Clubs for recreation and education, as evidenced by the existence of two Youth Clubs meeting weekly in Tovata, the Methodist Young Men's Fellowship and the Tovata Youths' Club. Disunity had destroyed an Indian Women's Club which had been operating in the area. Because Clubs were a method of gathering the people together, a number were set up to educate them in nutrition, health and other subjects of interest, including crafts, which could provide a small income through a handicraft outlet in Suva.

Four Fijian Mother's Clubs, meeting in members' homes, were started in the area. As it was not possible to use the homes of the Indians for meeting places, a small house was purchased by the FSP to provide accommodation for an Indian Women's Club.

The Government Women's Interest Officer and an officer from the YWCA assisted with the education programs in these Clubs. Classes for nutrition and infant feeding, cooking, sewing and crafts, and discussion groups, were the main activities undertaken and members gained experience in committee procedure. They also held fund-raising activities and were thereby financially independent.

The Nutrition Program encouraged these Women's Clubs to have a well balanced mid-day meal for the pre-school children who attended with their mothers.

TABLE 13

THE RELATIONSHIP BETWEEN MID UPPER ARM CIRCUMFERENCE  
(MUAC) READINGS AND WEIGHT FOR AGE, WITH MUAC READINGS  
14.25cm AND LOWER, INDICATING MALNUTRITION

CATEGORY	NO. CHILDREN AGED 1 YEAR TO 5 YEARS, MUAC BELOW 14.25cm
W	6
X } Underweight	13
Y }	2
Z }	3 = all Z readings March and September, 1977
TOTAL	24

## 1.11 Intervention

The following steps were taken by the Nutrition Program as a result of the survey:

- 1.11.1 A report was given to the health authorities regarding the problem of flies generated by the poultry farm, and advice was requested on this problem. No action was taken by the authorities on this matter.
- 1.11.2 Eight families had tap water prior to the survey. A request from the villagers endorsed by the FSP was made to the Public Works Department and to the Native Land Trust Board (NLTB) to extend the piped water into the area, and a further six taps were installed. Following this the NLTB refused permission for more taps on the grounds that this would encourage more people to settle in the area.
- 1.11.3 During the dry season of the year surveyed, with the probable pollution of the shallow wells and streams, the Health Inspector was asked to take water samples for chemical and biological analysis. The results are shown in Table 14. The Health Inspector expressed surprise at the low bacterial counts and negative faecal coli in the samples collected, but considered that the water should be treated as suspect. People were therefore advised to boil the water before drinking it.

## 2. RURAL SURVEY

### 2.1 Communities Surveyed

#### 2.1.1 Population

Eight villages at the head of the Waidina River, 35 miles from Suva at the foot of the Korobasabasaga Range in Viti Levu in the two Provinces of Namosi and Naitasiri were surveyed (Figs. 15 and 16). These villages were Namosi, Vuniasitu, Narukunibua and Waivaka in the Namosi

TABLE 14WATER SPECIMENS TAKEN FOR EXAMINATION FROM KUBUKAWA AREA

SAMPLE NUMBER	SAMPLING POINT NO.	PLACE SAMPLE TAKEN	LAB. NO.	B. COLI	FAECAL COLI
A31/77	Tovata	Pond	265	1800+	Negative
A33/77	Tovata	Shallow well	266	130	Negative
A35/77	Tovata	Shallow well	267	1600	Negative

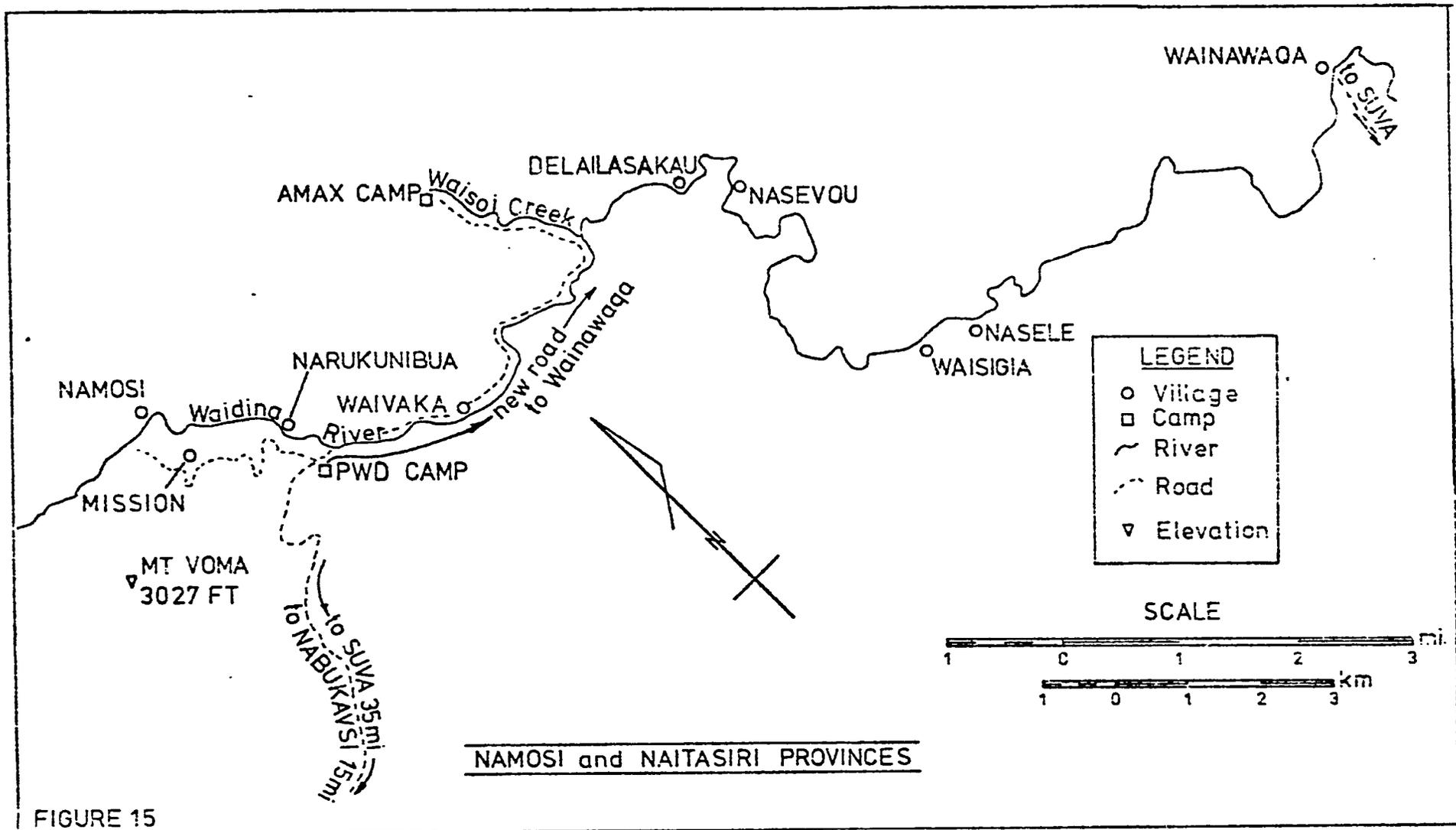


FIGURE 15  
SURVEY AREA, NAMOSI





Transport - Horse



50a

Province, and Delailasekau, Nasele, Waisigia and Nasevou in the Naitasiri Province. Although no health survey had previously been conducted, the Medical Department had during the past 20 years sent nutritionists into the area who had seen cases of malnutrition. This could also be suspected from reference to the Births and Deaths Register kept by the Catholic priests, which showed the high proportion of deaths of young children. The entire population was Fijian, predominantly related to the Namosi yavusa and divided into many mataqalis, ranging from chiefly to warrior clans. Namosi village contained eight mataqalis (Table 15). Other villages were comprised of fewer mataqalis, for example the majority of residents at Narukunibua were of the Vanuaca mataqali. All Fijians in the area were of the Catholic faith.

#### 2.1.2 Land Tenure

The people in these communities lived on and worked the mataqali land allocated to them.

### 2.2 Housing

Housing was mainly of two types - the traditional bure of bush materials (walls of bamboo with thatched roofs, now replaced with corrugated iron), and homes built of imported timber with raised wooden floors on posts. The majority of homes would be considered average by Mamak's scale (see below) but most of the villages contained better homes than those found in Namosi.

#### 2.2.1 Housing Standards (Mamak's Scale)

*"Housing standards were coded using a three point rating - below average, average and above average. In the eyes of most informants small, traditional thatch or flat tin-roof houses with packed earth floors and traditional walls constructed with interwoven split bamboo or thatched reeds are considered below average. Large, corrugated-iron roof houses with woven bamboo or concrete-slab floors*

TABLE 15

## DISTRIBUTION OF NAMOSI VILLAGE POPULATION BY SEX AND LINEAGE\*

PATRILINEAGE	MALES	%	FEMALES	%	TOTAL	%
Nabukebuke-Narukutabua	97	(60.2)	92	(56.1)	189	(58.1)
Nabukebuke-Nasilime/Navutusila	17		11		28	
Natuvora	2	77.0	3	71.3	5	74.1
Naqelekautia	0		2		2	
Navunisei	8		9		17	
(subdivisions of the dominant patrilineage)						
Warriors and junior clans:						
Solo-i-ra	23	14.3	14	8.5	37	11.4
Vanuaca-Burekalou	12	7.5	23	14.0	35	10.8
Nadakuni	0	0	5	3.0	5	
Loma	0	0	3	1.8	3	
Sasana	0	0	1	0.7	1	3.7
Nabuacoka	2	1.2	1	0.7	3	
TOTAL	161	100.0	164†	100.0	325	100.0

\* (Mamak, 1966, page 42)

† Does not include two adult females from Kandavu and Tailevu

are considered above average. Average houses are of medium size and constructed along semi-traditional lines". (Mamak, 1977, page 12).

## 2.3 Income

There were four major sources of income in the rural area surveyed:

- 2.3.1 Regular employment with Amax, with wages between F\$30 and F\$80 per week.
- 2.3.2 Regular employment as labourers with the Public Works Department, with wages similar to those paid by Amax.
- 2.3.3 Land rents paid to the different mataqalis, which may be divided between the individuals belonging to each mataqali.
- 2.3.4 The sale of agricultural produce, predominantly yagona, with some dalo and vegetables, oranges and mandarins, and duruka, the latter three from March to May.

Although employment with Amax and the Public Works Department has been of a temporary nature depending on the projects in hand at the time, the expansion of the activities of these two employers and consequent staff increases offers increased potential for the sale to them of vegetables and fruits. Now that there is a road into the area the produce can also be sent to the Suva market for sale more readily than by the river transport previously available.

## 2.4 Transport

### 2.4.1 Traditional Transport

In the past, transport in this area was by foot, horseback and boats of two types, flat bottomed 'long boats' previously poled and more recently fitted with an outboard motor, and rafts named 'bilibili' made by tying lengths of bamboo together, which were used to transport all the agricultural produce to Navua or Nausori. River transport was dependent on the rainfall in the area.

#### 2.4.2 Road Transport

The road which was constructed to facilitate mining exploration by Amax, joined the main Queens Road (Suva to Nadi) at Nabukavesi, 15 miles from Suva. It was completed in November 1976, damaged by floods in March 1977 and reconstructed and opened in May 1977, since when it has been blocked by landslides on occasions but has not been closed for more than 24 hours for repair. It was continuously maintained by the Public Works Department, which had plant operating permanently in the area.

#### 2.4.3 Public Transport

There was no bus route on the new road because of the small population to be served and the difficulty of travelling over the mountainous, narrow and winding road. A road now being built from Wainiwaqa to Waivaka along the river flats (Fig. 15) will enable buses to travel to the area.

#### 2.4.4 Other Transport

Two private utilities, a co-operative truck and Suva-based taxis and carriers provided road transport for the villagers. Amax and the Public Works Department provided transport to the Queens Road when no other was available. The Catholic priest has provided emergency transport for the sick to Navua or Suva Hospitals in the Mission Toyota land-cruiser. Helicopters provided by Amax have been used to lift critically ill people out of the area.

### 2.5 Water Supply

All villages except Narukunibua had piped water provided by damming a small stream in the hills near each village and piping the water into the village, terminating in a number of community taps and showers. This was installed by the Public Works Department and paid for by the villagers. Six months after the FSP Project started in the area, Narukunibua also had piped water. The main river running past these

villages was also used for bathing, dish washing and laundry. With a high rainfall (average 360 inches per annum) water supply is not a problem.

## 2.6 Hygiene

### 2.6.1 Toilets

The Villages have either a number of community toilets or each home has its own. The majority of these toilets are pour-flush squat or pedestal latrines.

### 2.6.2 Rubbish Disposal

This was mainly achieved by throwing rubbish into the bush around each village. Following the FSP Nutrition Program activities, a community pit was dug for each village.

### 2.6.3 Drainage

In most villages, water flowing from the taps and showers passed down open earth drains, where it could lie stagnant. In some villages these drains were cement lined during the period of the Nutrition Project. In these drains there was sufficient fall so that the water did not lie stagnant. Drain clearing was one of the projects undertaken by the Youth Clubs. Compound tidiness and cleanliness also improved during the Nutrition Program activities.

### 2.6.4 Flies

There was a fly problem during the hot season which contributed to the large number of cases of diarrhoea in the villages at that time.

### 2.6.5 Health

There was a Health Centre and nurse stationed at Waivaka village. This nurse served the entire area and her only means of transport was by foot, or boat when possible. She was fully occupied treating minor emergencies from infected cuts, scabies, influenza, complications of pregnancy, and had little

time for teaching preventive medicine and nutrition. The Catholic priest had a first-aid post at the Namosi Mission three miles from the Health Centre and also treated minor cuts and fevers and transported patients to the Health Services when needed.

## 2.7 Size of Family and Birth Frequency

Fifty percent of rural Fijian families (Table 16) had one or two children and 28% had five or more children, two families having ten and one family twelve children. Table 17 shows that 53% of the children were born two years apart, 23% three years and 14% one year apart. These figures are similar to the urban Fijian family pattern.

## 2.8 Nutrition

### 2.8.1 Food Supply

Table 6 shows that all people grew their own food, which included dalo and cassava roots, rou rou, bele and other green leaves plus various fruits during different seasons of the year, including citrus in May followed by wi, with pineapple during November and December. Protein foods were scarce and these consisted of eels, prawns and fish from the rivers, beef and poultry raised on the villagers' land and wild pig from the bush. There were very few coconuts available which meant that the fat intake was also very low. Foods imported into the area included flour, sugar, rice, tea, canned fish and meat, but as these were expensive they were not often consumed.

### 2.8.2 Dietary Survey

One hundred and forty children were surveyed in this community and it was found that there were only 44 different food items recorded as consumed by these children (Table 18). As with the urban community, when the items were reduced to those appearing more frequently than 10% of the foods consumed at a particular meal (Table 8), there were between nine and 14 items mentioned at any one meal,

TABLE 16

## SIZE OF RURAL FAMILIES: FIJIAN

NO. OF CHILDREN IN FAMILY	NO. OF FAMILIES	PERCENT
1	41	42.3
2	8	8.2
3	11	11.3
4	6	6.2
5	9	9.3
6	6	6.2
7	9	9.3
9	4	4.1
10	2	2.1
12	1	1.0
TOTAL	97	100.0

TABLE 17

## FREQUENCY OF BIRTHS IN RURAL FAMILIES: FIJIAN

NO. OF CHILDREN IN FAMILY	BIRTH SPACING (YEARS)								TOTAL
	0 (TWINS)	1	2	3	4	5	6	7	
2	2	6	4	6	0	1	0	0	19
3	0	7	21	10	1	0	1	0	40
4	0	3	10	3	2	0	0	0	18
5	1	2	28	8	1	0	0	1	41
6	0	3	15	9	2	0	1	0	30
7	0	7	31	13	3	2	0	0	56
9	0	3	20	6	2	0	0	0	31
10	2	2	8	5	1	0	0	0	18
12	1	4	3	1	1	1	0	0	11
TOTAL	6	37	140	61	13	4	2	1	264
PERCENT	2.3	14.0	53.0	23.1	4.9	1.5	0.8	0.4	100.0

TABLE 18

## RURAL DIET PATTERN (44 ITEMS)

(N = 420)\*

ITEM	BREAKFAST		LUNCH		DINNER		OTHER	
	No.	%	No.	%	No.	%	No.	%
Biscuit, plain	76	18	3	1	15	4	-	-
Biscuit, plain sweet	1	-	-	-	-	-	-	-
Bread	7	1	1	-	2	-	-	-
Farex	2	-	-	-	-	-	-	-
Rice	85	20	5	1	9	2	-	-
Roti	19	4	2	-	1	-	-	-
Pancake	37	9	1	-	2	-	-	-
Porridge (oatmeal)	10	2	-	-	1	-	-	-
Breadfruit	6	1	9	2	13	3	-	-
Cassava	48	11	78	19	80	19	-	-
Potatoes	-	-	1	-	-	-	-	-
Dalo	49	12	259	62	237	56	-	-
Yam	1	-	-	-	-	-	-	-
Vudi	3	-	2	-	-	-	-	-
Rou rou	12	3	210	50	131	31	-	-
Bele	-	-	42	10	41	10	-	-
Onion	-	-	1	-	2	-	-	-
Other green vegetables	5	1	6	1	2	-	-	-
Banana	5	1	1	-	-	-	40	10
Pineapple	-	-	1	-	-	-	40	10
Sugar cane	-	-	-	-	-	-	2	-
Green coconut	-	-	2	-	-	-	3	1
Pawpaw	-	-	4	1	4	1	15	4
Orange	-	-	2	-	-	-	36	9
Beef, fresh	10	2	27	6	32	8	-	-
Poultry	-	-	13	3	2	-	-	-
Pork	1	-	7	2	26	6	-	-
Eggs	-	-	-	-	1	-	-	-
Fish, fresh	-	-	1	-	10	2	-	-
Fish, canned	6	1	54	13	68	16	-	-
Lel	-	-	-	-	4	1	-	-
Prawns	-	-	20	5	25	6	-	-
Milk	86	20	29	7	37	9	-	-
Milo	2	-	-	-	-	-	-	-
Cheese	-	-	1	-	-	-	-	-
Cocoa	4	1	-	-	-	-	-	-
Sugar	229	55	33	8	135	32	-	-
Butter	9	2	-	-	1	-	-	-
Lolo (coconut milk)	1	-	78	19	34	8	-	-
Soup	1	-	3	-	5	1	-	-
Vakalolo	-	-	1	-	-	-	-	-
Tea	303	72	30	7	152	36	-	-
Coffee	2	-	-	-	-	-	-	-
Lemon leaves infusion	3	-	2	-	-	-	-	-

\* 420 represents 140 children x 3 days' intake.



Transport - Foot



Amax Mining Camp at Namosi

as follows:

<u>BREAKFAST:</u>	Cassava or dalo with black tea, often with no sugar and rarely with milk
<u>MID-DAY:</u>	Dalo and/or cassava plus green leafy vegetables
<u>EVENING:</u>	As for mid-day with occasional fish or meat
<u>BETWEEN MEALS:</u>	Fruit

The frequency with which protein foods such as fish, meat, eggs or chicken appeared in the rural diet was significantly less than in the diet of the urban child. In addition, the rural child had very little fat in its diet (Table 18).

### 2.8.3 Breast Feeding

Table 9 shows that few rural mothers bottle fed their babies. Mothers in Namosi breast fed for from 12 to 18 months, with a number continuing for two years and over.

## 2.9 Malnutrition

The total population of 200 children aged six years and under in the eight villages was examined. The numbers fluctuated from 70 children in March 1977 to 200 children in December 1977, with an average of 150 in the district (Table 19). Table 20 shows that 22.6% of the children in this area were considered to be malnourished in the March survey by the criteria mentioned in Materials and Method, 3.

### 2.9.1 Weight Analysis

Table 21 and Fig. 17 show that 32% of the children were in the underweight category in the March 1977 survey. This was reduced to 24% in September, with a further reduction to 17% in December. However, in March 1978 there was a minor increase to 19%, falling to 7% in June, 1978. The increase in the population of

TABLE 19NUMBER OF CHILDREN SURVEYED IN EACH PERIOD  
IN THE RURAL COMMUNITY

PERIOD	NO.
MARCH, 1977	71
SEPTEMBER, 1977	147
DECEMBER, 1977	203
MARCH, 1978	136
JUNE, 1978	149

TABLE 20

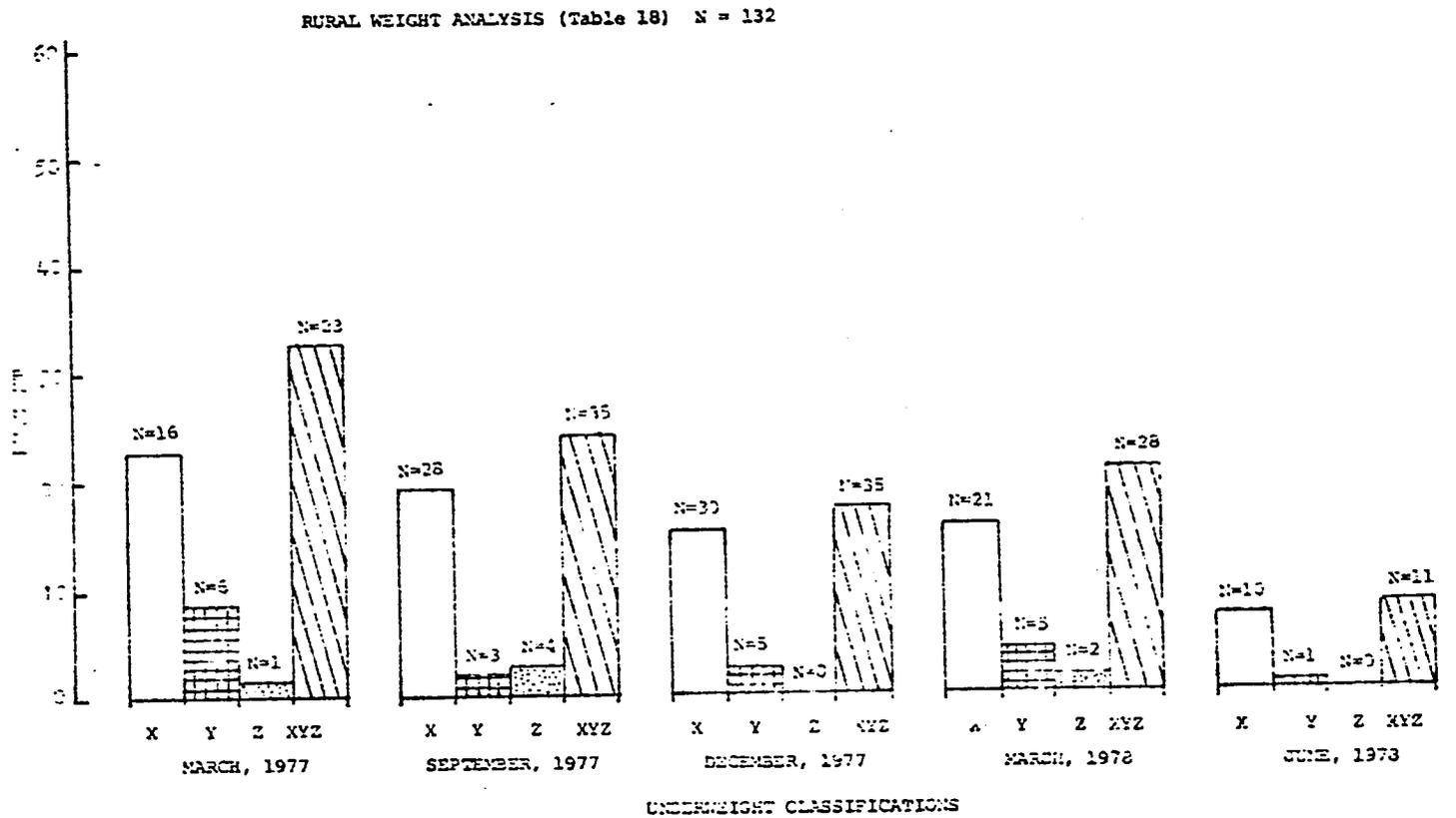
CASES OF RURAL MALNUTRITION DEFINED BY PAEDIATRICIAN

VILLAGES	POSSIBLE MALNUTRITION AT RISK CASES NUMBERS AS DETECTED BY NURSE	DIAGNOSIS CONFIRMED BY DOCTOR	NUMBER OF CHILDREN SEEN BY DOCTOR
WAIVAKA	8	8	20
WAISIGIA	9	4	6
NARUKUNIBI'A	6	4	4
NASELE	12	6	12
NAMOSI	8	8	12
VUNIYASIH/VUNINIUSAWA	1	1	1
NASEVOU	5	3	6
DELAILASAKAU	0	0	0
TOTAL	41	34	45

Although 71 children were weighed, the total population of children averaged 150, therefore 34 children = 22.6%.

NAMOSI (RURAL) WEIGHT ANALYSISMARCH 1977 - JUNE 1978FIJIAN

PERIOD	CLASS	MALE	FEMALE	TOTAL	PERCENT
<u>MARCH, 1977</u>	U	0	2	2	2.8
	V	3	3	6	8.5
	W	21	19	40	56.3
	X	7	9	16	22.5
	Y	2	4	6	8.5
	Z	0	1	1	1.4
	TOTAL	33	38	71	100.0
<u>SEPTEMBER, 1977</u>	U	0	1	1	0.7
	V	7	15	22	15.0
	W	47	42	89	60.5
	X	12	16	28	19.1
	Y	1	2	3	2.0
	Z	2	2	4	2.7
	TOTAL	69	78	147	100.0
<u>DECEMBER, 1977</u>	U	2	1	3	1.4
	V	23	21	44	21.7
	W	60	61	121	59.6
	X	17	13	30	14.8
	Y	2	3	5	2.5
	Z	0	0	0	0
	TOTAL	104	99	203	100.0
<u>MARCH, 1978</u>	U	1	0	1	0.7
	V	12	15	27	19.9
	W	40	40	80	58.8
	X	9	12	21	15.4
	Y	5	0	5	3.7
	Z	2	0	2	1.5
	TOTAL	69	67	136	100.0
<u>JUNE, 1978</u>	U	3	2	5	3.4
	V	11	30	41	27.5
	W	46	46	92	61.7
	X	6	4	10	6.7
	Y	0	1	1	0.7
	Z	0	0	0	0
	TOTAL	66	83	149	100.0



RURAL WEIGHT ANALYSIS

FIGURE 17

Not Available Document

children in December 1977 reflected the movement of the Fijian people from the urban to the rural communities for the Christmas school holidays. The reduction in the percentage of children in the underweight category could be attributed to the supply of full cream milk powder from FSP in 1977, followed by the World Food Program skim milk powder in 1978. The minor increase of low weights in March 1978 in these children could be accounted for by the increase in diarrhoea and other sicknesses prevalent during the wet season in Fiji.

### 2.9.2 Height Analysis

Figs. 18 and 19 show the height for age of the Namosi children from birth to ten years of age. The standard through these graphs was the same as that discussed in 1.9.2 and it can be seen that the average height for Namosi children was below this line. This contrasts with the average height of the Fijian population in the urban community.

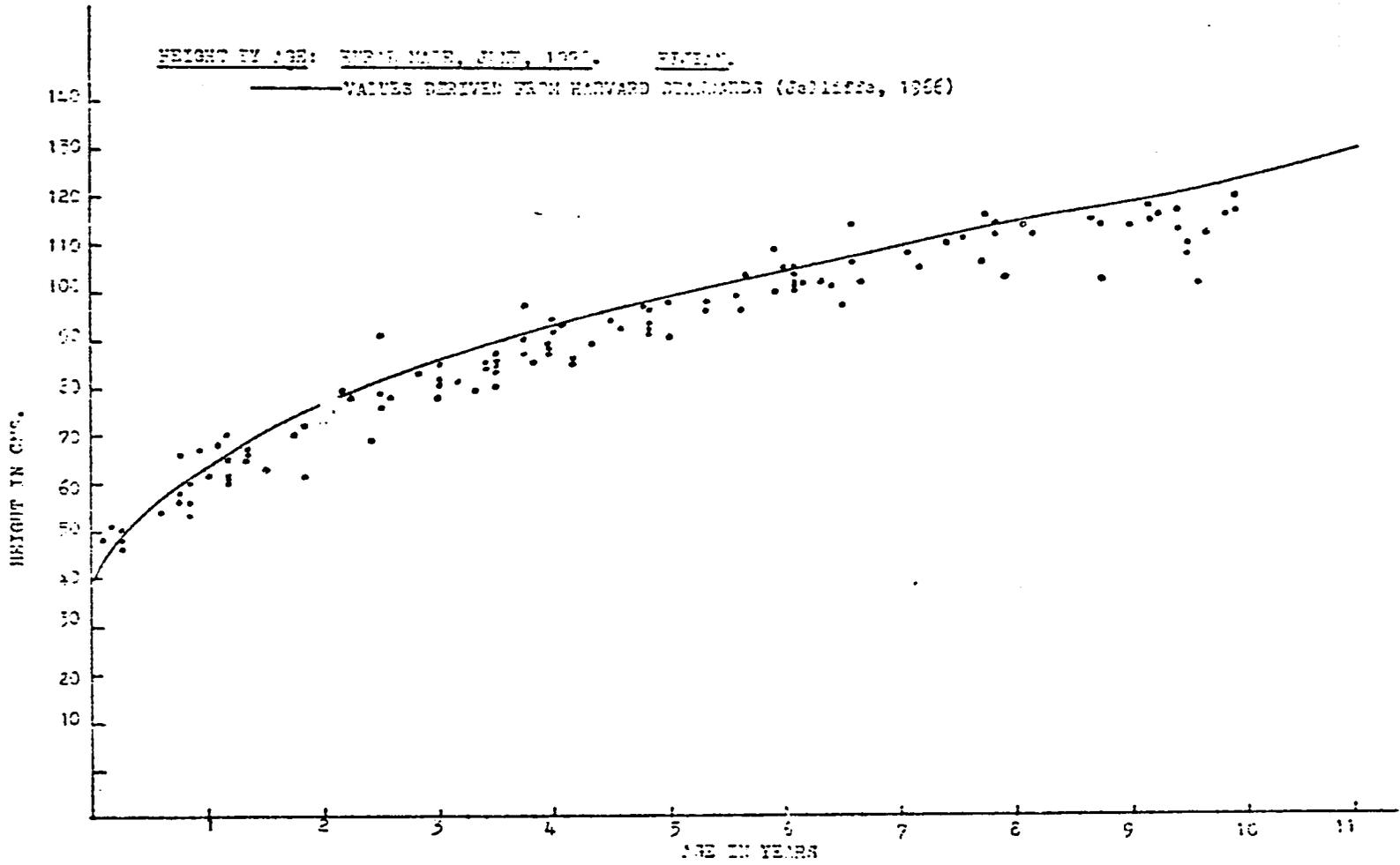
### 2.9.3 Other Parameters

MUAC, skinfold thickness and current general health were also measured in the Namosi children and the same conclusions were reached as in the urban community (1.9.3).

## 2.10 Socioeconomic Development

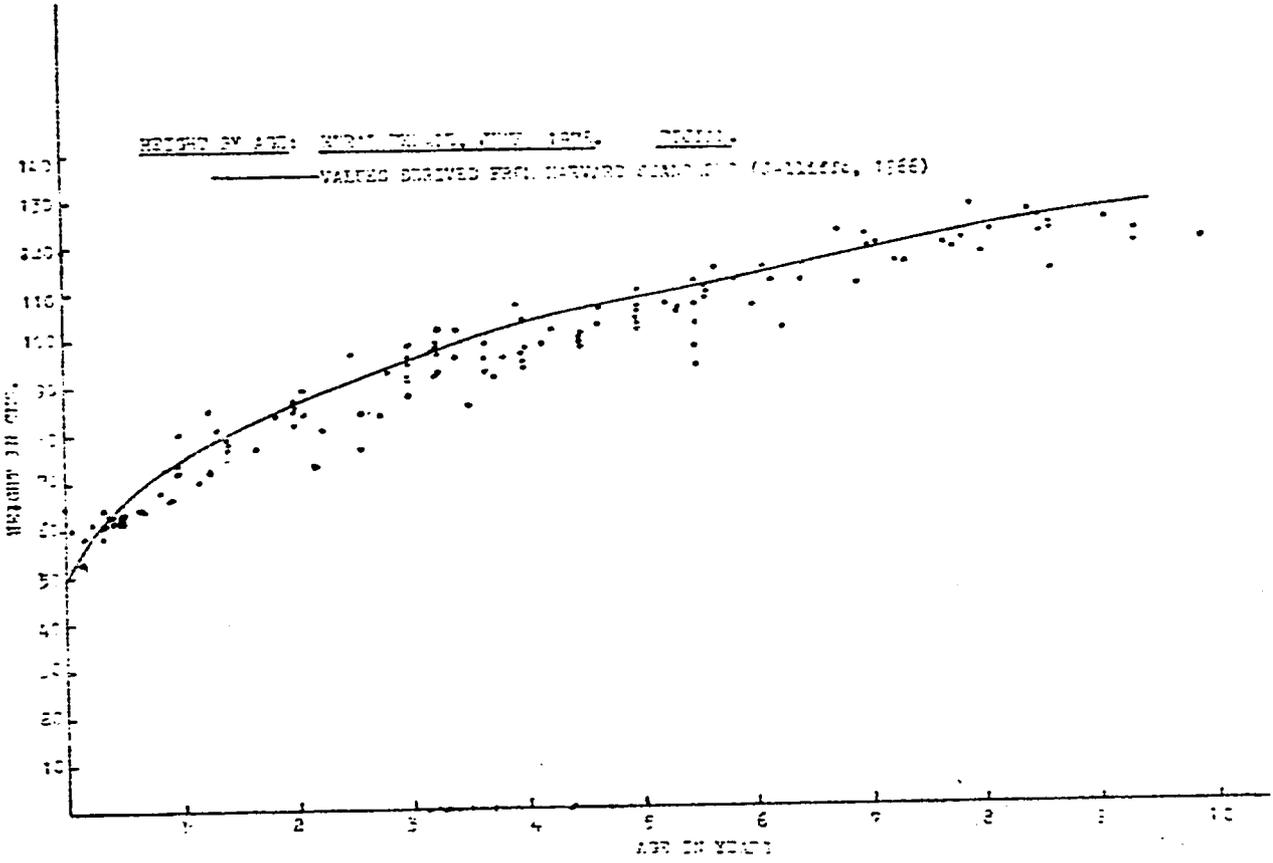
A Youth Club had operated for one year at Waivaka but was inactive at the time the Nutrition Program commenced. This Club was reactivated. The YMCA was invited to assist in this community and trained one worker who has developed two Clubs, one in Namosi and one in Narukunibua.

Women's Clubs were formed to promote sewing and crafts as a source of income, and to provide means of educating the women in nutrition, infant feeding, household cleanliness, cooking and other matters of interest to them. The Women's Clubs were developed with the assistance of the



HEIGHT BY AGE RURAL MALE

FIGURE 18



HEIGHT BY AGE RURAL FEMALE

FIGURE 19

Government Women's Interest Officers, the South Pacific Commission Community Training Centre's staff and students, and the YWCA.

## 2.11 Intervention

The following action was taken by the Nutrition Program as a result of the survey:

- 2.11.1 The findings concerning the state of health in this community were reported to the Health Department.
- 2.11.2 Full cream milk powder was given to all children whose weights were in the underweight category from April to December 1977. This was followed by the skim milk powder supplied through the Government from the World Food Program.
- 2.11.3 A Government team consisting of officers from Departments of Agriculture, Health, Fijian Affairs and Rural Development (District Administration and Women's Interest Officers), Commerce and Industry (Co-Operatives) and Consumer Council visited the area at the invitation of the Nutrition Program to teach the villagers what the various Departments have to offer the rural communities.
- 2.11.4 Girls from this area have been trained in craft, sewing, cooking and nutrition, three with the YWCA and one with the South Pacific Commission Community Training Centre. They are to develop an on-going educational program for the women of this area.
- 2.11.5 Chickens of the Queen variety bred for egg production were introduced into the area. Of the 400 chickens supplied, 30 survived in Delailasakau, but were consumed at Christmas time, 100 survived in Namosi village but were so badly nourished, and suffered from several diseases including gapeworm\*, that the villagers were advised to use them for meat, and only 12 have survived to be able to lay eggs (Appendix VIII).

\* See Appendix IX.

- 2.11.6 At the villagers' request a variety of new vegetables was introduced including Chinese cabbage, beans and tomatoes. Some of these were very successful and the surplus was sold to Amax, and overall the villagers appreciated the added variety provided for their diet.
- 2.11.7 Toilets were requested by the villagers to replace the pour-flush squat latrines with the pour-flush pedestal type. The Project Manager of Amax offered to meet half the cost and transport of materials to the area and the owners provided the other half of the costs plus the labour, to instal the toilets. Free plastic bowls were provided by the Medical Department.
- 2.11.8 Women's Interest Officers and students from the South Pacific Commission Training Program visited these villages and conducted courses on nutrition, infant feeding, cooking, making smokeless stoves, crafts and sewing.
- 2.11.9 FSP put first-aid kits into each village and trained women in Health Committees to manage these. It was anticipated that this would allow the Government nurse more time to attend to health problems of a more serious nature.
- 2.11.10 An Adult Education Workshop was held using the Namosi Junior Secondary School classrooms. Courses for women were offered in budgeting, meal planning, nutrition, infant and child feeding, cooking, sewing and craft. Men were given courses in group leadership and machinery maintenance. General talks and discussions were given on health and family planning through the Catholic Responsible Parenthood Council.
- 2.11.11 A pilot study on wing bean (*Schultes et al.* 1977) cultivation was set up at Narukunibua village. Seeds obtained from this plot are to be distributed throughout the villages.



FSP Nutrition Program Vehicle



Nutrition Project - Village Vegetable Garden

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## DISCUSSION

### 1. COMMUNITIES SURVEYED

The population of Fiji is a multiracial, multi-religious community, within which are various groups enjoying differing living conditions. These include:

- 1.1 Coastal Fijian villages on the large islands with fresh water, land for growing food and the sea to provide a variety of sea foods;
- 1.2 Fijian communities on small islands with acute fresh water problems, very little land suitable for cultivation, and plenty of sea foods;
- 1.3 Inland Fijian communities with varying degrees of access by road, river, horse and foot, whose food supply also varies according to location on or near rivers with or without a good supply of river foods, and with varying degrees of good agricultural land;
- 1.4 Indian farming communities dependent on cash cropping (mainly sugar) for a livelihood;
- 1.5 Urban communities without the cohesion of the rural groups and whose districts range from areas with very wealthy homes to clusters of squatter shacks with or without good access to roads, water and transport.

One quarter of the total population of Fiji lives in Suva and its environs (1976 Census). Urban drift, an international problem, is occurring in Fiji as in overseas cities (McCreary, 1977).

The settlement studied at Tovata is a relatively stable urban community with few destitute families, and good access to the city of Suva. There are a number of similar communities of people moving into the urban area from the outlying islands and mainland rural communities, with the same characteristic living conditions as those at Tovata. Their ability to grow food or earn sufficient income is reflected in the health of their

children. It is felt that there will be an increasing number of children suffering from malnutrition or debilitating diseases such as diarrhoea, scabies, influenza, measles, that may precipitate overt malnutrition, as the pressure for available land and jobs increases (Parkinson, 1977).

This study has attempted to identify the main causes of malnutrition in an urban and a rural community and the possible remedies which could be applied in these particular cases. It was apparent from the study that the causes of the families not providing their children with the necessary foods for growth and health in the preschool age group were different for the urban and rural communities. However, ignorance of the children's nutritional needs at this age was an important factor in all communities. The remedial projects developed to help these particular communities could be expanded into other similar communities in Fiji, depending on their own needs.

The rural community studied is characteristic of isolated inland Fijian groups described in 1.3. Although these communities lived on the river banks where they could obtain water and, at some times of the year, transport, the rivers were too shallow or prone to flooding to support large quantities of river protein foods. Prawns, eels and some small fish were the only natural foods in the rivers. People moving from such rural areas to the towns would reside in communities similar to that at Tovata.

Children in the Fijian communities have traditionally been the last to receive their food at mealtimes. Consequently all the protein-rich foods may have been consumed, particularly in areas where these were in short supply, before the children were fed. Coastal communities with large supplies of fish were able to provide their children with sufficient of this despite their social customs. However, from the author's personal discussions with the people of inland Namosi it was assumed that children would have suffered from protein deficiency in the past. This is a possible explanation of the small physical stature of the Namosi people, which is most noticeable in comparison with the

majority of Fijians, who are tall, well built people. Other studies have shown a relationship between height and nutritional status (Peking Study, 1977). The genetic effect could also be considered as affecting their physical stature, as this community had been isolated for generations in such a way that inbreeding was another of their major problems.

The Namosi community was a much closer-knit group of people than the urban communities, therefore community projects were easier to initiate and complete. Matters affecting this community were always discussed among the village members prior to decision-making that affected their development.

There was very little cohesion in the urban communities. As a result any opportunity of changing the behavioural patterns of these people will be expressed in the rural, not the urban, communities, and includes the provision of adult education to bring about social change and a healthier environment. This was demonstrated by the physical change in all the villages following FSP intervention, when the villages became better drained, cleaner, tidier and more attractive with flowers, lawns and shrubs as well as food gardens, all accomplished by the villagers' own volition.

## 2. HOUSING

Of the two communities, only Tovata contained one or two houses constructed of timber, with iron roof, glass windows, and kitchens, bedrooms and lounge inside. The majority of homes were adequate for shelter and cleanliness, with only a few being quite substandard in that they had rotting walls and were unclean, providing a bad environment for maintaining the health of the occupants.

### 2.1 Urban Housing

Urban housing in many instances was barely adequate because of the insecurity of land tenure and the fear that if a good home was erected the householder would be evicted.

## 2.2 Rural Housing

Rural housing depends upon the materials available in the immediate vicinity. Although bamboo was the principal material used for walls in these, it was difficult to obtain and transport to the villages from the bamboo groves in the valleys. Consequently the walls became badly deteriorated before being replaced. Most homes in Namosi district had iron roofs purchased when this area had a good income from the sale of bananas, a venture which failed in the 1950s. Iron roofs were preferred to the traditional thatch because of the difficulty of obtaining thatching materials and the short life of the thatch. The raised earth floors covered with dry grass, then mats, were not the best type of floor, and given the opportunity the people would prefer their homes to have wooden floors raised off the ground.

The village compounds became extremely slushy in the rain, creating the need for facilities for cleaning feet before entering the buildings, and although rubber boots were the preferred footwear in the wet season, few people possessed these. Raised cement footpaths criss-crossing the villages would be the solution to this problem, particularly if the villagers were to improve the standard of their housing.

## 3. INCOME

### 3.1 Urban Income

Income in the urban communities varied from that of a senior government official, to people who earned nothing at all and lived on Family Assistance and Welfare.

In many cases of malnutrition the family income was very low or non-existent, and in one or two cases where there was an adequate income there was malnutrition because the children were not looked after by the mother, who was often one of the wage earners. Cases were found where a child was left at home all day with no one to look after it

and no food while the family were away working. In cases of parental neglect there was no system in Fiji by which the children could be cared for, for traditionally it was the grandparents who took this responsibility. However in many cases where the grandparents looked after the children there was still insufficient income to provide for these. In fact many cases of malnutrition were found where the child was in the care of the grandparents, the only foods being provided being cold boiled cassava or cabin cracker biscuits.

Some families in these communities who were struggling on a very low income could improve their financial situation if there were home cottage industries available for them, and it was with the hope of helping these people that the Nutrition Program encouraged the formation of Clubs at which these industries were taught. Another aim of forming Clubs was eventually to provide a cheap and nutritious mid-day meal, to which preschool children of poor or neglected families could come for their main meal of the day.

### 3.2 Rural Income

The rural communities of Fiji were based on subsistence economy. When cash was required for school fees, cigarettes or food such as flour and tinned fish, garden produce was taken to the market and sold. The Namosi community was fortunate in having agricultural sources of cash, including duruka, yagona, oranges and bananas. In the 1940s and 1950s there was a relatively thriving banana industry, which failed for a variety of reasons including floods, disease and mismanagement. However, at the time when it was operating there was a consistent and reasonable income for the people of the area.

Citrus and duruka came to the market on *bili bilis* (bamboo rafts) but although the area produced large quantities of oranges and mandarins, very little of these came to the market because of transport difficulties. It was hoped that the new road would provide the means of selling more citrus and increase the income from this, for two or three months of the year. The area was also very productive of duruka but it was left to grow wild and was vulnerable to flooding, bad seasons and destruction by livestock. Should these problems be solved, duruka would also provide the community with a good source of income in its season of one to two months of the year. The Agriculture Department was introducing new varieties of duruka which would produce at different times of the year and provide a better distribution of income from this source.

The traditional sources of income were being replaced by weekly wages from the employment of the men by the mining company and the Public Works Department. Although there was an increase of cash in the area, less food was being planted and agriculture neglected because the men were unable to work their land while employed outside the villages. This meant that cash earned was being spent on importing foods from outside the area. The cash income was between F\$30 and F\$80 per week.

In any subsistence economy the population has no experience of the management of cash, which is used to purchase material goods such as houses, furniture, clothes, alcohol and cigarettes in preference to food. People used to food gathering found it difficult to understand the relationship between food, work and money, and the change to a cash economy could have the effect of increasing the number of malnutrition cases in such communities because insufficient money may be spent on food items to ensure adequate nutrition for the family.

A sound education program plus the attraction of having meat, fish and poultry regularly in the daily diet would improve the health of the children if the family was taught budgeting and the nutritional needs of individuals in the family. It was observed that some families with a new cash income were buying more tinned fish.

Agricultural projects would continue to provide food for the population of the rural community as well as surplus production for increased cash income if farming was mechanised by the use of a tractor, plow and necessary ancillary equipment. Properly managed agricultural implements were being considered for the area together with a training program to educate those men remaining in the village to manage such a program. The project was being developed as a community program involving the approval of the Fijian mataqalis of the villages concerned. The Agriculture Department and a business advisory service to Fijians, together with support from Amax, were asked to help give this project a solid foundation.

It is emphasised that families also require education in the use of cash, budgeting for household requirements and the purchasing of foods to meet their nutritional requirements.

#### 4. TRANSPORT

##### 4.1 Urban Transport

The urban community in Tovata had good transport when compared with similar areas near Suva. Many such communities had only three buses per day - morning, lunch time and evening. In the early part of the Nutrition Program the Tovata area was serviced by two bus lines which made a total of five trips per day, but at the time of writing there are buses half-hourly on Friday and Saturday, and hourly during the rest of the week.

Bus fares were very high relative to the income of the population in this area. Nevertheless access to the main business areas of Fiji was relatively easy. Transport would not be considered a problem for these people, the only constraint being the financial situation of the individuals in the community.

#### 4.2 Rural Transport

The recent opening of a road to the rural community had a very profound impact on their economic, social and nutritional status. As more and more vehicles became available to this community they travelled more frequently to Suva and imported more varieties of goods and food items into their home communities. It was interesting that this community was studied sociologically prior to the opening of the road, and that the Nutrition Program began operating at the beginning of important changes effected by mining exploration and accelerated by the new facility of the road.

It is planned to extend the road from Waivaka to Wainiwaqa, which will then complete a circuit from Suva up the river, through the mountains and back to Suva. The original Namosi road is too difficult for bus transport but the second road now being built will provide a bus service which will increase the human traffic in this area. Another road is to be built from Namosi in through the hills to open villages which are still completely cut off except by horse or foot transport.

The new facilities at Namosi such as the co-operative store, the proposed Community Centre and motor vehicle transport generated by the opening of these roads have improved the way of life of the people. It is possible that the pattern established by the intervention projects of the Nutrition Program, the Church and Government projects through the village committees, will be repeated by those villages which will be accessed when the new roads reach them. It is expected that Namosi would then become a major centre

for the interior in the future, which emphasises the need to educate the people of Namosi.

#### 5. WATER SUPPLY

Piped water in the urban communities became a political issue on the grounds that the provision of piped water would increase the number of squatters and encourage overcrowding in the Suva periurban communities. It was considered that there was nothing to be gained by trying to force the issue in a rather unstable emotional situation. The high Suva rainfall and the normally adequate supply of rain and stream water flushed away surface pollution, reducing health hazards; however, there was no doubt that installing piped water would improve the general health of the communities, thereby reducing the number of cases of diarrhoea and malnutrition.

The rural communities where the Nutrition Program operated were very well supplied with water and the only improvement would be for taps to be provided to each individual home instead of having community taps and showers.

#### 6. HYGIENE

Recurrent infections are one of the major debilitating factors in children with malnutrition. They do not have resistance to disease and when they contract any infection are more critically ill and the disease more prolonged. Relatively common diseases such as measles and diarrhoea can be fatal. The level of hygiene in the community is considered to determine the frequency with which the population becomes ill, and children who are undernourished and living in unhygienic conditions are more at risk than those enjoying better living conditions.

The general level of hygiene throughout Fiji is very poor. Spitting in the streets is prevalent, throwing rubbish and litter about and a general complacency towards dirt leaves the population of Fiji vulnerable to many diseases. The Health Department has carried out comprehensive campaigns to immunise

all children against whooping cough, diphtheria and polio. Most tropical diseases, e.g. yaws, leprosy and filariasis, have been eradicated or controlled but there are continual problems with influenza, upper respiratory tract and skin infections, diarrhoea and scabies which could be reduced with more public health consciousness in the population. The Public Health nurses continually work with the people to treat these diseases.

#### 6.1 Rubbish Disposal

In both the areas where the Nutrition Program was operating, rubbish disposal had improved after explanation of the importance of burying rubbish. Regular burning was impracticable because of the wet climate.

#### 6.2 Flies

Flies carrying diseases are considered to be a major cause of infection in children who are at risk of malnutrition. Therefore it is of utmost importance that Public Health authorities take action to reduce the incidence of flies in all areas, particularly where agricultural waste such as fowl manure is breeding flies, and where living conditions are substandard and fly control and screening in homes is non-existent.

The flies were a problem throughout the year in Tovata because of the commercial poultry farm which was not taking sufficient precautions against fly breeding in the sheds. In some homes flies were seen covering the walls and furniture, particularly during the summer months. Numerous complaints to the Health Department and to the Agriculture Department produced no action. The owner of the farm was most aggressive towards any criticism or suggestions for improving the health hazard.

In the rural communities flies were a spasmodic problem which was more prevalent during the wet season, and were a contributing factor in spreading diarrhoea at this time of the year. Toilets were not properly cared

for and as children often did not use them, fly-borne diseases were a major problem. Health Committees, now established, have been asked to find solutions to this problem. Animal faeces in and around the villages also provided fly breeding situations and the long term solution to the fly problem may be in fly screening the homes as well as maintaining very clean village compounds.

### 6.3 Health

The urban washing facilities used in Tovata - a creek which was stagnant during the dry season - was a potent source of spreading skin disease and prevented the cure of scabies when proper treatments were applied.

The major health hazard was diarrhoea. Other problems included eye infections which were prevalent in children in both communities and for which treatment with ointments and drops was supplied. Scabies, ringworm, dhan and sores and boils were prevalent because the Fijian families shared one towel for all members of the family, and bedding, mats and clothing were not properly cleaned to prevent the spread of these contagious diseases. Health Committees established in the rural communities undertook village inspections and this was combined with an ongoing education program.

## 7. SIZE OF FAMILY AND BIRTH FREQUENCY

Birth frequency and the position of the child in the family are important factors in the nutritional status of the child (Omran, 1974). Omran postulated that the optimum age for child bearing was between 20 and 35 years for the mother, with conceptions at no less than two and no more than four years apart. The ideal family was two to three children, well spaced, and expressly wanted, because the health risks increased for the fourth, fifth and later children and for any unwanted child in any order.

The Medical Department in Fiji had a comprehensive

Family Planning Program, concentrating on using the pill, the loop, injections and sterilization. Public Health nurses kept detailed records for the Family Planning Program. The Namosi district had not accepted these methods of family planning. However, it can be seen from the results that the birth frequency and family size of the Fijians in Tovata, who were predominantly Methodist, were identical to the Namosi community, who were Catholic. A study by students of the School of Social and Economic Development of the University of the South Pacific (Yee and Narain, 1976) on preferred family size, age of marriage and attitudes to family planning in Nadi, Fiji, found that Indians were more in favour of family planning than Fijians. About two thirds of the Fijian community and one third of the Indian did not practice family planning in Nadi.

Although birth frequency and family size were important factors in their nutritional status, they were not the major causes of nutritional problems in the children of Namosi. These were deficiencies of protein- and fat-rich foods, which are now becoming more readily available with the establishment of a Co-Operative bulk store and agricultural projects for the development of livestock. The importance of family size as a factor in malnutrition will then be the same in Namosi as in the rest of the Dominion.

The Indian community, although having smaller families, tended to have shorter spacing between births than the Fijian. A high proportion of Indian women in Fiji are anaemic (Matthews, 1976) as the result of poor diet and frequent pregnancies. Babies born to these women will therefore have suffered intrauterine malnutrition which has resulted in the high proportion of small-for-date babies recorded at the maternity hospitals in Fiji. This would explain the large number of low weight-for-age children on the Road to Health Chart. It was also seen that most Indian children were smaller than their Fijian counterparts.



Malnourished, neglected Namosi child.



Skin disease in  
a Namosi child

80a

## 8. NUTRITION

### 8.1 Urban Community

Because fish, meat, chicken, eggs and milk could not be produced in the urban communities, the nutritional status of the families was income-related as discussed by Willmott (1970). In these communities the amount of land available for growing food varied. Many householders were self sufficient in leafy and starchy-root vegetables, some with a surplus for sale which enabled them to purchase protein- and fat-rich foods. Those without gardens or surplus produce depended on cash income for purchasing the nutritional requirements of the family. Most cases of malnutrition were present in homes where there was a combination of insufficient income and small garden plots.

It was of interest that vitamin C deficiency was not apparent in these communities and this was explained by the abundant fruit supply which was available nearly all the year around. The mango and pineapple season in November/December was followed by the guava season, after which there were oranges and other citrus followed by wi fruit, which was followed by the mango season. Bananas and pawpaw were available all the year round and as many of these fruits grew wild, even the poorest people had access to these foods. All the fruits mentioned were rich in vitamin C and many were also rich in vitamin A (carotene).

### 8.2 Rural Community

The rural community diet was deficient in protein- and fat-rich foods. The main source of fat in the Fijian diet was the coconut milk, made from squeezing the liquid from grated mature coconut meat. Other sources of fat were found in meat and fish and other animal foods. The Namosi district had coconut trees but they were poor yielding. There was very little fish in the rivers and the difficulties involved in catching eels and prawns or wild pigs prevented the communities from having these foods

regularly in their diet. These deficiencies had been present for as long as the community could remember.

This area is expected to be able to produce surplus agricultural produce such as dalo, duruka, cassava, green leafy vegetables and citrus fruits for sale. Cash from this course as well as from outside employment, together with better transport, should provide more protein foods to remedy the dietary deficiencies caused by isolation and unavailability in the past.

It is also expected that locally grown protein foods such as fish, pigs and poultry, can be produced in the future with proper agricultural guidance. The general terrain is ideal for fish ponds. There are many small streams coming from the high mountains and it is possible for fish ponds to be dug next to these streams and to divert the water through the ponds. This would prevent the fish being washed downstream in times of heavy rainfall because the small streams would be less prone to flooding and the diversion could be blocked off if necessary.

Pigs have never been farmed in this area because a limited amount of pork was available by hunting wild pigs with dogs, a long and difficult process. The people had not previously considered the feasibility of pig breeding.

The Nutrition Program attempted to raise poultry for egg production with the aim that the hens would adapt to the village situation and lay eggs in boxes outside the bures. However, this project failed because of the general climatic conditions, predators and endemic poultry diseases present in the area. It appears that a project in which hens are to be reared for egg production would need to be done on a semi-commercial scale with hen houses being built

to protect the birds from natural hazards. This would in addition require local production of fowl food. It appears that the exploitation and development of the rivers is also in keeping with the environment and economically feasible.

### 8.3 Dietary Survey

It was decided that the best method of recording dietary information was to ask the mother what the child had eaten in the 24 hours prior to the administration of the questionnaire. As customs in Fiji had a strong influence on the dietary intake, it was also felt necessary to record three days' intake, making Sunday obligatory. This was done because in the Fijian family the best available food was prepared and eaten on Sunday, when all the family were at home together. If no fish, meat or chicken was consumed at any other time of the week it would probably appear at a Sunday meal.

Festivals and feasts associated with marriage, deaths and births were also times at which meat would be available for consumption because cattle were killed and distributed amongst the participants as part of the customs. This custom of killing cattle for festivities was very strong in Namosi, where a number of animals were reared.

The records obtained from this study confirmed the generally held belief that the rural community consumed a more simple diet with fewer items and larger quantities of starchy root vegetables, green leafy vegetables and fruits, than the urban community. However the protein and fat deficiencies were higher than those in the urban community, the urban child being much more likely to receive tinned fish or milk, eggs or cheese than his rural counterpart (Tables 7, 8, 18). This led to the conclusion that urban

malnutrition was a function of the socioeconomic status of any particular family, while rural malnutrition resulted from a combination of socioeconomic status and the general unavailability of protein- and fat-rich foods.

#### 8.4 Traditional Food Tabus

There are a number of traditional tabus regarding food in the Fijian community. Although some of these are complicated, for example a person from one area may not eat a particular food in the presence of a person from another particular area, it was considered that there were none of these foods that did not have alternatives of equal nutritional value. The most urgent problem was that of mothers refusing to breast feed their newborn for the first day or so while they expressed the colostrum, their reason being the association of the yellow colour of the colostrum with the often observed jaundice of the newborn. This is particularly unfortunate as the two major issues of importance to the health of the newborn are that the infant should be put to the breast immediately after birth if possible when the sucking reflex is strongest, and that colostrum, rich in antibodies and nutrients which give the infant an important advantage, should not be discarded. Although education of young girls would be a move to combat this practice of not feeding the colostrum, it is a social custom and would require some status to be given to the alternative healthier methods, before much change would be observed.

### 9. MALNUTRITION

#### 9.1 Definition

*"Malnutrition has recently been defined as a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients, this state being clinically manifested or detected only by biochemical, anthropometric or physiological tests. Four forms should be distinguished:*

- (a) *Undernutrition - the pathological state resulting from the consumption of an inadequate quantity of food over an extended period of time. Marasmus and inanition are synonymous with severe undernutrition; starvation implies the almost total elimination of food, and hence the rapid development of severe undernutrition, marasmus or inanition.*
- (b) *Specific deficiency - the pathological state resulting from a relative or absolute lack of an individual nutrient.*
- (c) *Overnutrition - the pathological state resulting from the consumption of an excessive quantity of food, and hence a caloric excess, over an extended period of time.*
- (d) *Imbalance - the pathological state resulting from a disproportion among essential nutrients, with or without the absolute deficiency of any nutrient as determined by the requirements of a balanced diet".*
- (Scrimshaw *et al.* in Jelliffe (1966), page 8).

By the above definition, the malnutrition seen in the survey was of undernutrition.

## 9.2 Past History

The initial survey showed that the number and severity of cases of malnutrition was greater in the rural than in the urban community. Records of addresses of patients admitted to the Colonial War Memorial Hospital (CWMH) prior to this study had shown that the majority of malnutrition cases were from urban communities. This contradiction occurred for two reasons - many admissions were from rural communities but the address given was the urban residence the family used while the child was in hospital, and secondly, many rural children ill with diarrhoea and influenza complicated by malnutrition were not taken to the health services for treatment. This was observed by the survey team when eight rural children

were found to be sufficiently ill to have been admitted to hospital had they lived in an urban community. These children were treated by the survey team nurses at home rather than expose them to the added trauma of a long journey to hospital. One child, admitted to hospital when internal haemorrhaging occurred, died after rehydration and recovery from the emergency, when she contracted measles in the hospital and collapsed from the stress of the added disease. High transport costs for the rural people to the nearest health centre prevented many parents from taking their sick children for attention until the child was critically ill. A number of children in the past died when the crisis occurred during floods, making any kind of movement absolutely impossible.

### 9.3 Current Situation

Children in both communities suffered from malnutrition because they were not provided with protein- and fat-rich foods - in the rural community because of environmental unavailability and in the urban children because of poverty. The principal component of the diet was starchy root vegetables with fruit and other varieties of vegetables when available.

The malnourished child was particularly susceptible to disease, especially respiratory tract infection, skin infections and diarrhoea. The most common treatment for the latter was to give plain boiled water for one or two days, thereby aggravating a critical nutritional situation. This treatment was advised by the public health nurses. World Health Organisation (WHO) had developed an electrolyte oral rehydration formula (Cameron and Hofvander, 1976) to be added to boiled cooled water for use in diarrhoea cases. In the absence of this mixture the juice from a seven month green coconut was an excellent sterile, readily available substitute. It was found to work very well in the rural

community, where the Nutrition Program advised its use. Supplies of the ingredients for the electrolyte mixture (glucose, NaCl,  $\text{Na}(\text{HCO}_3)_2$  and KCl) were given to the village health committees with instructions for its use.

### 9.3.1 School Children

Although school children were not included in this study, a brief examination of children at Kalabu school in Tovata and the Namosi Junior Secondary School was made to obtain information for production of the Height-for-age Charts (Figs. 4, 5, 6, 7, 13, 14) and the general state of health of the children.

School children take their lunches in billy cans, and on one day the contents of the billy cans of a sample of the Namosi school children were examined. About 30 containers were examined, of which only four contained fish of some variety. All other lunches were dalo or cassava and green leaves, and many were insufficient in quantity to meet the child's needs. Drinks brought to school were lemon leaf flavoured water. Teachers at the school mentioned that children were often too tired to work properly. This school was already receiving World Food Program skim milk powder but as yet there has been no report on the effect of this on the children.

### 9.3.2 Parental Attitude

A number of cases of children at risk in both communities were clearly problems of parental neglect. Mothers were indifferent to any offers of help for the child, or after receiving some assistance did not persist with treatment and the child was slower to show the expected improvement in health. The field workers in the Nutrition

Program referred to some of these mothers as 'lazy'. It was considered that the unresponsive or 'lazy' mothers were most likely to be malnourished themselves and had neither the physical nor mental energy required to care for a child, whether sick or healthy (Pfeiffer, 1975). It was observed in the rural community that many of the elders looked to be ten to twenty years older than their given age, and there was no doubt that malnutrition in this community was an historical problem.

#### 9.4 Weight for Age

The Ministry of Health was informed of the extent of the malnutrition problem. Health committees were formed in the villages. The progress of all children plotted on Road to Health Charts was being watched closely by the Nutrition Program and it was planned for this work to become part of the work of the health committees. The district nurse was assisting with observing the children and educating the health committees.

The most important index for early malnutrition was failure to gain weight. Health committee members and medical staff should be reminded to pay particular attention to this matter in a community such as Namosi where children were more at risk than in other areas. The Road to Health Charts and a set of simple scales could be provided to each health committee in such communities and monthly weight checks carried out on every preschool child by the committees.

As the district nurses travelling by foot already carry a substantial weight of equipment and medical supplies, carrying the additional weight of scales and records is not to be recommended for them. It would be valuable if every village had one set of scales, rather than have the scales sited in the clinic of the district nurse.

The Morley Road to Health Chart and monthly or three-monthly weighing of all preschool children was considered to be the most useful method of measuring malnutrition for the people of Fiji. The population was sufficiently educated to comprehend the meaning of the weight for age chart and to use it correctly.

#### 9.5 Mid Upper Arm Circumference

MUAC, another simple method of measuring nutritional status, was found to be unreliable. All birth dates were known in Fiji and although a pair of scales as used in this survey was more cumbersome than a tape measure, it was considered to be more accurate for a nutritional assessment.

#### 9.6 Height for Age

The height for age measurements taken in the survey showed that the urban Fijian children had average heights similar to the Harvard Scale (Figs. 13, 14). The Indian children (Figs. 11, 12) were much shorter than this average, but there was not a sufficiently large sample in the survey to make further comments on this, and there has not been a detailed study on height for age in preschool children made in Fiji with which to compare the results of this survey. The heights of the Namosi children were significantly below the Harvard Scale (Figs. 18, 19) when compared with the urban Fijian heights for age. This result confirmed the general observation that had been made by other people working in the district. When asked for their ages, children replied one or two years older than the questioner expected. The shorter stature of these people may be attributed to a genetic strain because they have been isolated, and inbreeding had become a problem as evidenced by the family relationships revealed in discussions with the villagers. However the nutritional disadvantages for the children of this community at the critical growing phases in the first five years of

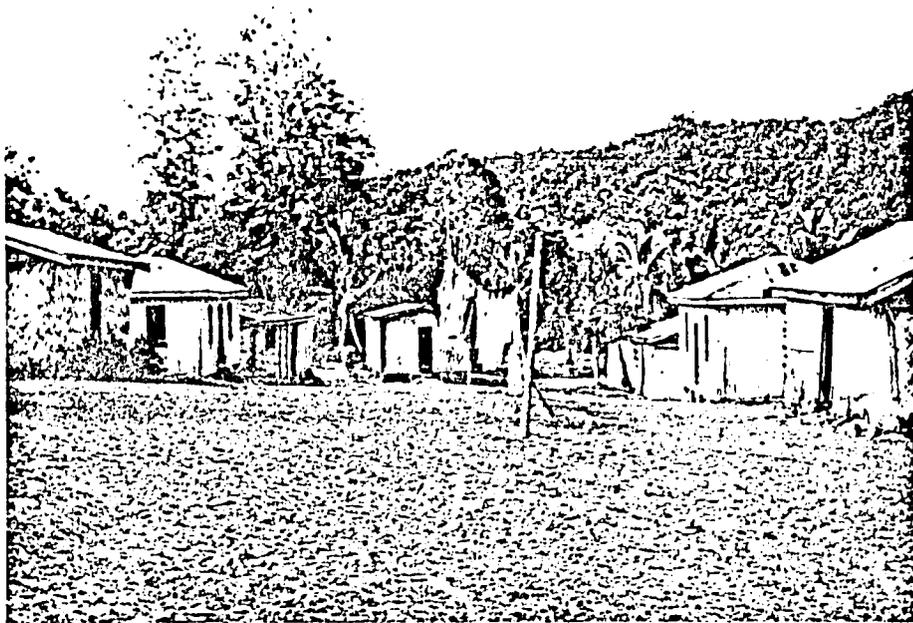
life were considered to be the major factors according to other studies (Rao and Rao, 1975; Peking Study, 197?) and these would need to be removed before any assessment of the genetic effect could be made.

## 10. INTERVENTION PROGRAMS

### 10.1 Past Projects

Intervention projects in the rural community had been implemented by other agents in the past, and current projects were already established prior to the survey by the Nutrition Program. Therefore there was no baseline with which to compare the original nutritional status of the children in this community before the current projects began. The contributions of the Catholic Mission and the priests working there have been as follows:

- 10.1.1. In the 1940s a Nurse/Sister was brought to the Mission by the priest and dramatically reduced the infant mortality rate.
- 10.1.2. The priest acted as a doctor/nurse to the community and since the opening of the road has transported the sick to the Health Centre at Waivaka or the hospitals at Navua or Suva as needed.
- 10.1.3. The Mission has provided protein biscuits for the children since 1974 to help fight malnutrition.
- 10.1.4. The priest found a sponsor to build a co-operative store and purchase a truck which would provide a wider range of foodstuffs at reasonable prices.
- 10.1.5. The Mission developed schools in the district for the education of the children and permitted the use of the Namosi school for an adult education program.
- 10.1.6. The priest worked to have piped water brought to the village and to have rural electrification in the future.



Waivaka Village



Namosi Village - Western Approach

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10.1.7. The priest has endeavoured to make people aware of the sociological changes taking place in the area, brought about by the presence of Amax and the new road.

The contribution of the Government was as follows:

10.1.8. Established a rural nurse at Waivaka to serve the Namosi people in the 1940s or 1950s.

10.1.9. Assisted the people with the banana venture which failed.

10.1.10. Built a road from Nabukavesi to Namosi.

The contribution of Amax has been:

10.1.11. To hasten the building of the Public Works Department road from Nabukavesi to Namosi and to themselves build a road from the Government road to the Waisoi River junction and mining camp.

10.1.12. To employ a nurse from 1974 at their camp and to make her services and medical supplies available to the villagers, and provide a doctor to visit the Namosi area once a month.

10.1.13. To provide emergency transport for the critically ill by helicopter evacuation.

10.1.14. Since the Nutrition Program began working in the area Amax has provided funds through the Project to help with educating girls in cooking, sewing and craft at the YWCA and to help develop agricultural projects in the area.

The change in the health of the children has been a response to all of these activities as well as to current projects.

## 10.2 Intervention Activities of the Nutrition Program

The Nutrition Program survey established a baseline of general health, weight- and height-for-age from which the

intervention programs of the Nutrition Program and other agents could be evaluated.

#### 10.2.1. Milk Powder

Malnourished children were supplied with milk powder, which was well received. They were also treated for diarrhoea and respiratory tract infections, treatment to which they responded rapidly. These were most important factors in the acceptance of the Nutrition Program by the population. The World Food Program skim milk powder distributed through the Fiji Government replaced the milk supplied by FSP and it was considered that this type of supplement was essential and will continue to be until a permanent supply of alternative protein-rich foods is locally available.

#### 10.2.2. Agriculture

Agricultural products are required to be established to eventually replace the milk powder supplements. Poultry could be raised for egg production with sufficient local food for the hens and the type of housing required to prevent endemic diseases and predators.

Although cows were an important animal in the Namosi district, the Agriculture Department Dairy Advisor pointed out that the grasses were of a poor variety and these animals lost a lot of condition in the winter months.

The geography of the area is excellent for fish ponds and cultivated fish when funds and personnel are available to set up the project.

Pigs and goats could be reared in this district. They would require proper housing, fencing and care because cows are already a nuisance to vegetable gardens from lack of fences. The Nutrition Program aimed to run a pig farm in the future as an educational project for the villagers to demonstrate what was involved before setting up their own piggeries.

As many of the young men in the villages who formerly worked in the gardens are now working for Amax and the Public Works Department, the old system of agriculture based on labour-intensive subsistence farming is no longer viable. Some men who have decided to remain in the villages have shown interest in mechanised farming. The Agriculture Department has approved the principle of using tractors and mechanical equipment to provide the staple foods for home consumption plus a surplus for sale. The steps required to obtain a tractor had not been completed by July 1978 but it was hoped that mechanised cultivation would begin before the wet season opened in October.

Pulses are an excellent source of cheap protein food. Dried, they are transportable and store well. The people of this area were introduced to the use of pulses and found them acceptable when the Nutrition Program held an Adult Education Workshop at the Namosi Junior Secondary School. Local production of pulse in the form of wing beans (*Psophocarpus tetragonolobus*) which are ideally suited to tropical conditions, can replace imported dried pulses. If wing bean production is successful it will provide both humans and animals with a valuable source of protein, as the entire plant - leaves, flowers, seeds and root - is edible and protein-rich.

Fencing is an urgent requirement for the development of agricultural crops because cows eat any unprotected vegetable crops. Cows ate the growing tips of the duruka and reduced the harvest, which is a valuable source of cash. Cows also damaged cassava and dalo plantations by walking through them. For wing beans and other vegetables to grow to provide additional items in the diet it is recommended that the villagers grow these around the kitchens and bures instead of growing decorative plants, until adequate fencing is available for large-scale vegetable production.

### 10.2.3. Clubs

Women's Clubs and Youth Clubs are a concept with which the people are familiar. Gathering the villagers in Clubs provides a vehicle by which the Nutrition Program can work collectively with the communities, reducing the amount of work required for the teaching programs. Both the rural and urban communities responded to the idea of having Clubs.

Urban Clubs: Mothers' Clubs were formed in the Tovata area, gathering weekly with teachers from the FSP Program, YWCA and Women's Interest giving them lessons in cooking, nutrition and infant feeding, craft and sewing. However, eventually these Clubs did not meet regularly and teachers were unable to continue attending them. It was felt that some of the women in the district should be trained at the YWCA to act as resident teachers and community workers to assist members to develop these urban Clubs.

Rural Clubs: These were more viable. Girls resident in the villages were trained at the YWCA and South Pacific Commission Community Training Centre as community workers. A boy was also trained as a rural worker by the YMCA. An Adult Education Workshop held during May 1978 was attended by 60

people from eight villages. In all of these activities the villages have shown considerable enthusiasm, particularly for the plan for a Community Centre to be built at Namosi for the establishment of ongoing education projects. This Centre and the Youth Clubs in other villages will be encouraged to conduct preschool education programs and provide a well balanced mid-day meal for all the preschool children in the village.

#### 10.2.4. Committees

Committees formed in the villages are to be instructed in the management of various projects. FSP began this activity with the formation of a health committee in each village. In Namosi village, a co-operative committee has achieved the building of the co-operative store with the aid of a grant to FSP from The Australian Freedom From Hunger Campaign, and is now developing this and the associated trucking business. This project was initiated and assisted by the resident priest. The store was planned to enable small subsistence farmers to sell their produce for immediate cash, as well as to import foodstuffs into the district at bulk rates, thus enabling the purchase of food at prices similar to those in Suva, instead of high prices paid to the small family stores in the villages. From the nutritional aspect, the increased availability of cash and the introduction of a wider variety of food should give the Namosi children a diet similar to their urban counterparts. This, combined with an education program of budgeting, infant feeding and good nutrition, should greatly improve the health of the children in this area.

A committee will be formed to manage the establishment of Namosi Community Education Centre

and the associated agricultural program, while other project-specific committees will be formed as the Department of Agriculture introduces its own projects in the area. These committees will enable the villagers to manage the development of their own communities in accordance with their own ideas.

## 11 FUTURE PROSPECTS

### 11.1 Urban

The improvement in the nutritional status of the urban community was a direct result of regular supplies of skim milk powder. The greatest contribution of the Nutrition Program would be to continue to assist the Medical Department with the distribution program.

The grounds of the FSP Club House will be used to grow wing beans for seed production and distribution throughout the urban communities. Club activities are spasmodic, therefore it has been decided that unless they become viable entities of their own volition, they will be allowed to lapse.

### 11.2 Rural

In the rural community the increase flow of cash has been accompanied by a much greater consumption of alcohol, particularly at the mining camp. A pioneer movement in which the individuals pledge not to drink alcohol for a given period of time, has been established by the priest. As money spent on alcohol is a sociological factor involved in malnutrition elsewhere in the world it is hoped that the education program and the priest's influence will minimise this threat to the Namosi children.

Men working for Amax are not replanting their gardens. By about mid-1979 this could cause a severe shortage of locally grown foods and it is planned that

mechanisation of farming will be established before this problem arises.

Village committees established to direct projects either as temporary or permanent activities should have the capacity to guide their communities to the healthier and more prosperous way of life which they themselves envisage as resulting from the present process of changing from a subsistence to a cash economy. It is therefore imperative that suitable education programs are initiated and guided by appropriate authorities to avoid possible sociological and economic problems (for example, alcoholism, malnutrition, extremes of poverty and wealth).

The rural children's diet will change from the traditional meals of dalo and cassava with green leafy vegetables and between-meal snacks of fruit, to meals with flour, rice and biscuits replacing the root vegetables, while more meat, fish, milk and eggs will appear at the mid-day and evening meals. Consumption of commercial snacks of no nutritional value will increase and replace some of the fruit. More fat will be used for frying and in the preparation of stews, and additional imported coconuts will also increase the fat consumption.

Root vegetables, particularly dalo, are of higher nutritional value than refined cereals, but are more laborious to produce for the table and will be replaced by the more conveniently prepared dishes using refined flour and rice, a nutritional disadvantage. However, the overall changes expected in the diet, which will provide more protein and fat, can be predicted to combat much of the malnutrition which was observed in this study.

The greatest improvements can only be made, however, if the population combines the use of a wider variety of foodstuffs with the knowledge of the nutritional requirements of the different members of the family, especially the rapidly growing preschool child. To this

end, the next phase of the Nutrition Program is to establish an ongoing adult education program using members of local communities, after training, to act as leaders and educators. Education programs to be conducted by the team of already-trained girls at the Namosi Centre and extended to other villages on a roster basis would be aimed at teaching budgeting, sewing, cooking, craft and other subjects in which the villagers may be interested.

### 11.3 Replicability.

Ongoing work in the rural and urban aspects of the current program is aimed both at eradicating the causes of protein energy malnutrition in the areas of the pilot study and at crystallizing the experience gained there into a program that is easily replicable throughout Fiji and is valid for the Pacific region generally.

Rural: The goal in Namosi is to establish a nutrition education/assistance program as a permanent resource agency for the Namosi valley. While this resource agency will be initiated by the FSP Nutrition Program it will evolve as an integrated activity of the normal rural extension services of the Fiji Government.

#### Steps.

- a. Establish at Namosi village a Resource Centre to coordinate the education/assistance activities of

the Fiji Government Department of Health Namosi Health Committee and the extension services of the Department of Agriculture, Fisheries, etc., and the support activities of the FSP Nutrition Program. (December, 1978).

b. Staff the Centre with the four community workers already trained in earlier phases of the program at the South Pacific Commission Community Education Training Centre and the YWCA Suva Resource Centre. (January, 1978).

c. Recruit a husband-wife team of volunteers (PCV's) to assist the Centre staff in extension work in Agriculture and Health (February, 1979).

d. Develop curricula for activities areas: nutrition, health, agriculture - to be used by staff and volunteer-advisors. (December, 1978).

e. Study feasibility of adding demonstration pig, goat and poultry projects at the Resource Centre. If agreed to be feasible establish demonstration projects during first half of 1979.

f. Set up village committees in each village of the Namosi valley as nucleus for replication of Namosi model when the village is ready.

g. Training through 1979 will include weekly club and committee meetings in each village of the valley, with an emphasis on cash-earning activities towards goal of local resource-centre support replacing FSP support, weekend classes and two major one-week workshops tentatively scheduled for May and August, 1979.

Note: This program grew out of requests of the Namosi villagers themselves and their experiences during the first phases of the Nutrition Program.

B. Urban: The method in the urban program will be the same - a nutrition education and assistance program based in a permanent resource centre. The steps will be adapted to the differing urban environment.

Steps.

- a. The physical structure and land for the urban resource centre in Tovata already exists as part of the current FSP Nutrition program.
- b. This structure is identical with the housing standard for this urban area and a husband-wife team of community workers will be recruited to occupy the house and operate the resource centre (December, 1978).
- c. There is land for demonstration gardens and the cultivation of wing-beans and other high protein foods.

- d. Begin gardens. (January, 1979).
- e. Begin education activities with women's clubs: cooking, balanced meals, sewing, water supplies, sanitation, housing, gardens, crafts, marketing of crafts through weekly club meetings and extension activities into homes. (January, 1979).
- f. Collaborate with similar programs of HART, YWCA, YMCA, the churches and the Government in other needy urban areas. (December, 1978).
- g. Select suitable local Tovata woman for training at SPC/Community Education Training Centre, Fiji, February-December, 1979, with the aim of adding this trained community worker to the program in 1980.
- h. During first phases of program four women's clubs have been established in Tovata area with an average membership of 20 women. An average of ten members meet regularly for discussion of problems in health, nutrition and infant feeding and for craft and sewing activities. It is planned to continue and expand this activity.

Conclusion.

Both the rural and the urban interventions of the FSP Nutrition Program are phases of the comprehensive Fiji Government Department of Health's fight against malnutrition in Fiji. Despite the success of the FSP program overall figures remain grave. Twenty five per cent of all pregnant women in Fiji, especially the Indian women, are anemic. Malnutrition is a widespread problem among Fijian children at weaning time. Considerable nutrition-education work is required to combat these problems and to promote breast-feeding.

FSP, a founding member of the Fiji National Nutrition Committee, is working with that Committee and the Fiji Department of Health and international organizations like UNDP/WHO so that available resources will be used to best advantage to reduce malnutrition in Fiji to a minimum.

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## APPENDIX I.

## THE FOUNDATION FOR THE PEOPLES OF THE SOUTH PACIFIC, INC.

The Foundation for the Peoples of the South Pacific, Inc. (FSP) is a non-sectarian, non-profit voluntary agency, founded in the U.S.A. in 1965, with branches in Australia and Canada, and offices in Port Moresby (Papua-New Guinea) and Suva (Fiji). The FSP is not an endowed organisation, but is a fund-raising agency which makes grants from its own income. It will support grass-roots development projects, preferably at the village level, with preference for agriculture, fisheries, community development, small business, credit unions and co-operatives. It will also support some research, change-agencies and training where related to consciousness-raising or job creation for self help, operating only through non-profit entities. When it approves a project proposal it includes it in its fund objectives for that particular year and seeks funds for it through its international organisation, then provides finance and/or material aid or technical assistance to the program in graduated steps.



Womens Group - Sewing Class



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## F.S.P. NUTRITION PROGRAM

No. 1.

Plan submitted to the National Nutrition Committee for consideration.  
 Problem to be considered is: Malnutrition in under 6 year olds.

Step 1

Problem: undernutrition.

1. Babies 6 months to 6 years, peak incidence around 18 months.
2. Located in urban situation, e.g. around Suva, Nausori and Navua (New Development Area).
3. Incidence of this problem has been increasing over past 5 years.
4. ? Kwashiokor ? Marasmus or both.
5. 100 cases 1st degree malnutrition per annum. ? other degrees.
6. If nothing is done there will be an increase in the numbers of 1st degree malnutrition.

Step 2

Major determinants (causes)

1. Low birth weight.
2. Congenital abnormalities.
3. Maternal deprivation.
4. Associated disease - chronic or acute.
5. Maternal malnutrition.
6. Twin pregnancies.
7. Separation of parents.
8. Unemployment of father and employment of mother.
9. Lack of breast feeding.
10. Food taboos and feeding habits.
11. Bottle feeding.
12. Multiparity.
13. Illiteracy and ignorance.
14. Poor income.
15. Neglect of family.
16. Polygamy of father.
17. Attitudes in child rearing.
18. Extended family in poor urban families.
- 19 ? Land.

Establish the relationship between least cost diet and land or income.

What is the established dietary pattern?

How much sugar is consumed?

Require survey to establish:

1. Proportion of population who can afford to meet their nutritional requirements.
2. Proportion of population that could achieve nutritional adequacy.
3. Proportion of population which is the welfare group.

### Step 3

1. Health Service - for obtaining information and treating affected children.  
Constraint - too busy providing other health services to spend time on malnutrition.
2. Community Health Committees - have been used successfully in the past but no longer function. The re-establishment of these committees in rural areas and introduction in urban areas to be considered.
3. Agricultural field workers - cover wide area of Fiji and are in close contact with farmers. Do not promote nutrition.
4. Land usage and its political position is a constraint.
5. Affected population do not recognise that they have malnutrition.

### Step 4.

#### Priorities and tentative goals

1. We will eliminate clinical malnutrition by 1980.
2. Children under 6 will be the target group.
3. Children must be given sufficient protein and energy to prevent clinical malnutrition.
4. The people who are going to change will be in the Suva urban area.
5. We can only eliminate clinical malnutrition, Preclinical malnutrition will not be removable in this period.
6. In the 3 years left we will reduce the incidence of hospital admissions from 100/year to below 10/year.

Step 5.Collection of information about promising points of intervention.

1. Health records
2. F.S.P. Survey in urban areas.

Step 6.Identify alternatives for points of intervention.

Possible points to be verified or rejected by survey:

1. Educate mothers what and when to feed their babies.
2. Provide low cost Fiji weaning food.
3. Improve standards of hygiene and sanitation.
4. Educate nurses to detect malnutrition early - using height/weight charts and MUAC tapes.
5. Improve potential for home gardens - use urban agricultural extension officers.
6. Increase public awareness of malnutrition through radio, press and poster campaign.

Step 7.Strategy and related hypothesis

1. Establish Health Committees in three communities -
  - 2 Urban - Navua and Tovata area
  - 1 Rural - Namosi
2. Promote urban gardens in these communities with appropriate agriculture programs.
3. Publish and distribute more literature on malnutrition and related problems with the aim of increasing public awareness of the problem, in conjunction with the Health Committees.
4. During the survey investigate the feasibility of having a low cost weaning food for Fiji - that is, would it be an appropriate intervention?
5. Encourage Nursing Mothers' Association, Fiji (NMF) to promote breast feeding and good weaning practices. As contact is well established with NMF, this is just an ongoing project.
6. Nurses to use height/weight charts (about to be distributed through the health system) to detect failure to grow and alert the mother

and the Community Health Committee that the child is at risk. Action to be taken to depend on that community's or family's resources. Determine how this can be incorporated into Health Services.

Step 8.

Evaluation

1. Survey for basic data carried out by FSP Nutrition Program as a random sample in the Suva urban community.
2. Survey a total community in which is pilot intervention project.
3. Changes in the community to be monitored by FSP personnel in the field and by suitable data collection in Health Department (e.g. notification of children who fail to gain weight when visited by MCH nurse).
4. Changes to be looked for include decrease in number of hospital admissions with malnutrition from particular areas.
5. FSP Nutrition Program to use home visits in areas where project is in operation.

## APPENDIX III.

## F.S.P. NUTRITION PROGRAM

No. 2.

Plan submitted to the National Nutrition Committee for consideration.  
 Problem to be considered is: Anaemia.

Step 1Problem: anaemia

1. WHO - mainly Indian women in the child bearing age.  
     Adolescent females of both races also have a high incidence of anaemia.
2. WHERE - throughout the Dominion of Fiji, predominantly in areas with large Indian communities.
3. HOW LONG HAS THE PROBLEM EXISTED - for as long as there have been medical records kept in Fiji.
4. TYPE OF PROBLEM - large proportion is iron deficiency with some folic acid and B12 deficiency.
5. DEGREE OF PROBLEM - many cases are of severe anaemia.
6. TRENDS - if nothing is done it will not necessarily become worse but there will definitely be no improvement and the health of many women will continue to be severely impaired.

Step 2Major determinants (causes)

1. Imbalanced diet -
  - (a) Deficiency of sufficient fresh greens
  - (b) Deficiency of fresh fruit and vegetables
  - (c) Insufficient dhal or meat in the diet
  - (d) Many one-day fasts
  - (e) Women eat last and are too tired to eat
2. Too many pregnancies.
3. Hookworm.
4. Lack of education as to what to eat and general hygiene.

Step 3Resources/constraints

1. Health service - for obtaining information and treating anaemic patients.
2. Community Health Committees to be re-established.
3. Agricultural field workers - cover wide area of Fiji and in close contact with farmers. Do not promote nutrition.
4. Iron and folic acid tablets are given to anaemic pregnant women. Provides only a short term solution and patient relapses after pregnancy.
5. Land usage and its political position is a constraint.
6. Affected population do not recognise that they have anaemia.

Step 4Priorities and tentative goals

1. Reduce the incidence of low birth weight babies by 1980 through effective treatment of anaemia.
2. Reduce the incidence of anaemia in women by 1980 on a continuous basis.
3. Adolescent girls and Indian women of childbearing age will be the target groups.

Step 5Collection of information about promising points of intervention

1. Health records.
2. Follow up information obtained by John Matthews and find where the cases of anaemia were located in their survey.
3. Extend the survey to rural areas.

Step 6Identify alternatives for points of intervention

1. Education programs directed toward adolescent girls and women of childbearing age.
2. Check high school girls for anaemia and concentrate on treating those cases.
3. Promote the use of iron, B12 and folate rich foods.
4. Establish home gardens.

5. Treat population under study for hookworm.
6. Make standard of hygiene and sanitation to prevent reinfestation of hookworm.
7. Increase public awareness of anaemia through radio, press and poster campaign.

### Step 7

#### Strategy related hypothesis

Set of related interventions to achieve the goal.

1. Establish Health Committees - 2 urban and 1 rural.
2. Promote home gardens in those communities.
3. Publish and distribute more literature on anaemia with the aim of increasing public awareness of the problem.
4. Treat all cases of anaemia with iron and folic acid plus treat for hookworm in the pilot communities and aim to prevent recurrence of anaemia in those communities.
5. Run education programs to get the women to change the dietary pattern which leads to anaemia.

### Step 8

#### Evaluation

1. FSP survey the pilot villages (or communities) for anaemia and relate these results to the survey done 12 months ago.
2. Use suitable records to establish how effective treatment is for anaemia using tablets and hookworm treatment, and whether there is relapse.
3. Note the change in hygiene and latrines in the community and what effect this has on hookworm and anaemia.
4. FSP Nutrition Program to use home visits in areas where project is in operation.

## NATIONAL NUTRITION COMMITTEE

Discussion  
Paper 1(77)

1977

## NUTRITION STRATEGY FOR FIJI

From the Nutrition Planning Workshop, November 21 to December 4, in  
Port Moresby, P.N.G.

To be presented to the National Nutrition Committee for approval and  
adoption and promotion through affected Ministries.

AIMS

1. To reduce the incidence of low birth weight babies by 1980.  
This has a subgoal to reduce anaemia in women by 1980 on a  
continuous basis.
2. Eliminate clinical malnutrition by 1980 and reduce the  
incidence of subclinical malnutrition.

ANAEMIA

Programs already in operation:

1. Iron and folic acid are given to anaemic pregnant women.
2. Haemoglobin levels are checked at Health Centres.
3. Medical Department does provide education about anaemia with  
demonstrations and teaching aids.

Possible intervention: Evaluate these programs.

Under the guidance of Mr. Jim Pines, the following points were made:

1. Need to collect data on anaemia
2. Increase outreach to identify new cases
3. Encourage women to eat greens, fruit and dhal
4. Encourage people to grow more greens, fruit and dhal
5. Treat or prevent worms

Specific actions that could take place include:

1. Encourage footwear
2. Build latrines
3. Encourage use of dark green leaves

4. Reduce the amount of fasting in Indian women
5. Treat hookworms
6. Education on hygiene
7. Try to get better child spacing

Study one rural and one urban area.

#### Education goal

1. School education -  
Concentrate on teenage girls  
Define target group
2. Recuperation -  
Use clinics and centres for educational classes and demonstration.
3. Village groups need community co-operation to reinforce education.
4. Mass media - radio and paper. Use radio dramas and farmer tips.

Treatment of anaemia will have to come first and this belongs to the Ministry of Health. The Health Department must decide what haemoglobin levels are important and these need to be standardised.

#### Production strategy

1. School gardens
2. Agriculture Department - provide seeds, promotion and research
3. Use village co-operatives to increase dhal production
4. Use Young Farmers' Clubs
5. Use National Marketing Authority for marketing

#### Reduction of parasites

1. Health education - use nurses
2. Village health committees to be used
3. School teachers
4. Mass media

We must detail a strategy to eliminate anaemia. Get the National Nutrition Committee to force multisectorial co-ordination and get project money through N.N.C. (e.g. apply to Foundation for Peoples of South Pacific with detailed requirements).

MALNUTRITION - 1 to 3 year olds

Causes - as per Apenisa's paper.

Interventions - Sanitation and housing, e.g. environment.

There is no control in the level of environmental health on mataqali land where it is not leased.

Specific intervention - approach Fijian Affairs

Health Services

1. Nurses know about malnutrition but do not act on it.
2. Introduce a standardised method into the present health system to define malnutrition using anthropometric measurements.
3. Increase awareness among the nurses.
4. Give more information on the amount of malnutrition.
5. Detect preclinical malnutrition.
6. Use the present health system to get information.
7. Education requires communication.
8. Re-initiate Community Health Committees in village and urban areas. Use existing committees and clubs where possible.
9. Request Housing Authority to police policy on overcrowding.
10. Encourage urban vegetable gardens.

Malnutrition

1. Work out and introduce the standard method for detecting malnutrition - use Verona's time and Lily and Apenisa's knowledge.
2. Statistics can be gathered through Public Health Nursing using the established standard
3. Consider suitable food supplement for weaning.
4. Improve sanitation and income of affected families.
5. Aim to establish Health Committees in areas where malnutrition occurs and remove all clinical malnutrition in 2 urban and 1 rural community within 2 years.

Characteristics of the problem

1. Children are malnourished
2. Find whether income (include land) is a constraint
3. Intra-family distribution
4. Community does not see that it has malnutrition

5. Drunkenness and other social problems
6. Mismanagement of money

#### Conditions

1. Land problem
2. Environmental sanitation

#### Chain of causation

1. Motivation by setting up a Club around a common need.
2. Use preschool and playschool to bring mothers together.
3. Prevent squatter problem from getting worse.
4. Environment in squatter areas, provide minimal sanitation (e.g. rubbish to be buried, and pit latrines) to discourage further squatting.

If we monitor an increase in squatters related to an increase in malnutrition the N.N.C. would have a political voice.

APPENDIX V.

FOR OFFICE USE	LOC	HOUSEHOLD NUMBER			DATE	ADULTS		6-14		2-5	
						M	F	M	F	M	F
		2-5	0-1	1-2	T	CASH	EMPLOY	CHILD	CASH	LOOKING	
		M/F	M/F	M/F							

HOUSE HOLD DATA

1. How many people in household?

		<u>Permanent</u>	<u>Temporary</u>
Adults 15 and over	Male		
	Female		
Childrens of school age (6 - 14 years)	Male		
	Female		
Toddlers (2 - 5 years)	Male		
	Female		
Infants 0 - 1 year	Male		
	Female		
1 - 2 year	Male		
	Female		

2. In the past month, how many people were actively working at all for a cash income of some kind?

WRITE IN NUMBER \_\_\_\_\_

3. (a) For each person who worked last month, were they engaged:-

	<u>PERSON 1</u>	<u>PERSON 2</u>	<u>PERSON 3</u>
For an hourly or daily wage on <u>casual</u> basis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For <u>regular</u> weekly wage, but paid on basis of an hourly rate, piece rate, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For <u>salary</u> (paid monthly, fortnightly or less often)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
As employer of other workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Self - employed, own account workers, no employee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

HOUSEHOLD DATA p. 2

(b) Approximately how much cash did  
this person earn last week? \_\_\_\_\_

4. Did any of the children in the household earn or receive  
any income from outside the household in the past week?

YES 1

NO 2

If "YES" How much, in total \_\_\_\_\_

5. Was there anyone in the household who was not working  
on a regular basis last month, who would have liked to  
work in a regular basis if there had been a job available?

YES 1

NO 2

6. Approximately how much money was spent in total by the  
family for food last week?

\$ \_\_\_\_\_ cents

7. Did the family receive any gifts of food last week?

YES 1

NO 2

IF YES: WHAT \_\_\_\_\_

HOUSING DATA

Name of Head of Household \_\_\_\_\_

Address of Household \_\_\_\_\_

Circle appropriate  
Number1. Type of living quarters

- Single unattached house - concrete, cement,  
bricks, etc.....1  
- wooden construction .....2  
- other .....3
- House in attached row of housing .....4  
Flat in a block of flats .....5  
Bure .....6  
Improved, sub-standard, make shift housing, such as shack..7  
A building not intended for living in in .....8  
Other (specify: \_\_\_\_\_) .....9

2. SIZEHow many rooms does dwelling have in total (excluding  
passage ways, lobbies, toilet rooms, bathrooms and kitchens)?

- One .....1  
Two .....2  
Three .....3  
Four or more .....4

## 3. Is there a separate kitchen or kitchenette?

- Yes, inside dwelling .....1  
Yes, Outside dwelling .....2  
No, .....3

4. What is source of drinking water?

- Piped water inside dwelling .....1  
Piped water outside, exclusive use .....2  
Piped water outside, shared with others.....3  
Well .....4  
Rainwater .....5  
River, lake, stream, etc. : .....6  
Other (specify: \_\_\_\_\_) .....7

5. What kind of toilet facilities does household have?

- None .....1  
Flushed or water sealed, exclusive use.....2  
Flush or water sealed, shared with others .....3  
Pit latrine, exclusive use.....4  
Pit latrine, shared with others .....5  
Other (specify: \_\_\_\_\_) .....6

Circle Appropriate  
Number

6. What cooking facilities usually used?
- |                      |   |
|----------------------|---|
| Electricity .....    | 1 |
| Gas .....            | 2 |
| Kerosene Stove ..... | 3 |
| Wood .....           | 4 |
| Primus .....         | 5 |
| Lovo .....           | 6 |
7. (a) Which of following best describes tenure of dwelling lived in by this household?
- |  |   |
|--|---|
| Rented from Housing Authority .....          | 1 |
| Rented from Government of similar body ..... | 2 |
| Rented from private landlord .....           | 3 |
| Owned outright .....                         | 4 |
| Owned and being paid for by instalment ..... | 5 |
| Occupied rent free (Matagali) .....          | 6 |
| Occupied rent free (other) .....             | 7 |
| Other (specify: _____) .....                 | 8 |
- (b) IF PAYS RENT OR MORTGAGE: About how much per week? \_\_\_\_\_
- (c) (IF MATAGALI LAND): Do you make an annual payments to Matagali for land?
- YES 1
- NO 2
- If "YES": What payment do you make each year?  
DESCRIBE: \_\_\_\_\_
8. Does household own, part-own (e.g. Matagali land) Lease or occupy any land on which household grows / could grow own vegetables, etc.?
- |  |   |
|--|---|
| Yes, currently growing fruit, vegetables ..... | 1 |
| Yes, but not currently used .....              | 2 |
| No .....                                       | 3 |
9. Which fruit, vegetables grown on land?  
(CIRCLE ITEMS)
- Rice, Dalo, Tavioka, Cassava, Funula, Other root crops,  
Chinese cabbages, European cabbage, Rou rou, Tomatoes,  
Beans, Egg plant, Advocados, carrots, Ora, Pumpkin,  
Guava, Citrus Fruits, Pineapples, Pawpaw, Water Melon  
Bananas, Passion Fruit,  
Others (specify) \_\_\_\_\_

**Best Available Document**

10. (IF GROWS DALO, CASSAVA, TAVIOKA, KUMALA OR OTHER ROOT CROPS)  
 Does enough dalo, cassave or other root vegetables grow on  
 your land to enable you to have it everyday if you want?

YES 1

NO 2

IF "NO" Approximately how often can you have it?

CIRCLE AS  
APPROPRIATE

- More than once a week.....1
- About once a week.....2
- About once every two weeks.....3
- About once a month .....4
- About once every two months.....5
- About once every three months .....6
- Less often .....7

11. What kind of furniture available (Circle all that are applicable).

- Beds .....1
- Tables .....2
- Cupboard for food/crockery .....3
- Sewing machine .....4

DATA ABOUT EACH CHILD

FOR OFFICE  
USE ONLY

CHILD NO.

Name of child	_____	<input type="text"/>	<input type="text"/>
A. <u>Age</u>	Years _____ Months _____	<input type="text"/>	<input type="text"/>
B. <u>Sex</u>	Male _____ Female _____	1	2
C. <u>Height:</u>	_____	<input type="text"/>	
D. <u>Weight:</u>	_____	<input type="text"/>	
E. <u>MUAC:</u>	_____	<input type="text"/>	
F. <u>Skinfold:</u>	_____	<input type="text"/>	
G. <u>CURRENT GENERAL HEALTH</u>			
	Fever	Yes _____ No _____	1 2
	Cough	Yes _____ No _____	1 2
	Diarrhoea	Yes _____ No _____	1 2
	Scabies	Yes _____ No _____	1 2
	Measles	Yes _____ No _____	1 2
	Influenza	Yes _____ No _____	1 2
	Others specify _____		

FOR OFFICE USE ONLY

H. Is child attending C. W. Clinic?	Yes _____ No _____	1 2
I. Was child breast fed when small?	Yes _____ No _____	1 2
J. Until what age? _____ Months		
STILL BREAST FEEDING	<input type="checkbox"/>	<input type="text"/>

K. Is child currently being bottle fed?	Yes	1
	No	2

L. If "YES" how many times a day?  
 WRITE IN NUMBER \_\_\_\_\_

M. How many oz per bottle?	WRITE IN OZ.
Powdered baby milk	_____
Powdered cows milk	_____
Rowa sterilized milk	_____
Other (_____)	_____

(FOR OFFICE USE ONLY: Daily \_\_\_\_\_)



## APPENDIX VIII.

REPORT BY AID ADVISOR POULTRYNAMOSI POULTRY PROJECTProgress Report - AAP/6 October, 1977(Genetic Injection Objective Using Unsexed A.O./W.L. Cross)

Chickens as Delailasakau - were 11.5 weeks age at APP last visit 27th September 1977. Losses of 11/50 (22%) had occurred due to rats, in the first 3 weeks.

Chickens at Waivaka - under the Youth Group led by Anselamo had not done well. The 270 chicks were reduced to 104 by 20th September due to rats, suffocation (mismanagement) and coccidiosis 61% loss. The remaining 104 survivors then 4.5 weeks age were transferred: 25 to Rosi of Namosi Village and 70 to Romeo of Lakeba Village. Further losses occurred in the mismanaged birds raising loss to 64%.

Chickens at Namosi - under Rosi. The 50 originals now 5½ weeks age. Zero losses. Extra 25 ex-Waivaka had 2 losses, giving a remainder of 73 chicks. Roofing iron, about 10 sheets, bought by Rosi. Indicates she intends the poultry for semi-intensive housing - not the objective of the project. Communications a problem.

Chickens at Lakeba - under Romeo. The 30 originals now 5½ weeks age. Zero losses. Extra 79 ex-Waivaka had 4 further losses in the week after delivery. Signs of coxy still present. Toltro (1 lb) purchased by Verona Lucas given half to Romeo for medication.

SUMMARY

Delailasakau	50 -	11	=	39	22% loss
Waivaka	270 -	166	=	(104)	51% loss
Namosi	50 +	25-2	=	73	
Lakeba	30 +	79-4	=	105	
	<u>400</u>	<u>-183</u>	=	<u>217</u>	<u>48% loss</u>

Housing was not emphasised as it is proposed that the survivors should fend for themselves.

If it is intended that some people run commercial poultry farms then this must be considered quite separately and obviously reliable transport of commercial feed is the most significant factor.

(Stephen E. J. Swan)

AID ADVISOR POULTRY.

REPORT BY AID ADVISOR POULTRYNAMOSI VILLAGE GAPE WORM OUTBREAKAAP/7 November, 1977NAMED: *Syngamus trachea.*

The worm lives in the wind pipe of young chickens, turkeys and pheasants. Ducks and pigeons are not known to be affected. The worm is usually about 20mm (3/4") long and is made up of a red female part and a short white 4mm (1/10") male worm permanently joined to the female - this makes a Y shape. The male hangs on while the female hunts for new places to suck blood.

Infection can spread by birds eating each other's droppings or eating earthworms, slugs and snails which can be secondary hosts containing gape worm larvae.

It only takes 7 days between a chicken eating infected food before the worms are seen in the wind pipe. It takes over 4 years before an area becomes naturally free of this disease.

Young chickens aged 2-10 weeks are most seriously affected. The worms seen block up the wind pipe and the chick dies of suffocation.

Symptoms: birds show weakness and get thin. They spend time with eyes closed and head tucked into their body. From time to time they may throw their heads forward and upward and open the mouth wide to draw in air. The head may be shaken to try and loosen the blockage in the windpipe. The bird does not want to eat.

Treatment: Thiabendazole appears to be the only effective treatment. This is usually given in the diet at 0.05-0.5% level for 4-14 days.

Namosi case.

Rosi has 57 chickens remaining from the original 73. This is a 28% mortality in the 5 weeks since birds were seen by MAF advisors. Losses due to mongoose. Total enclosure of wire netting now restricts birds to vale and small grass area. Ideal for infection cycle of gape worm and many other internal worm parasites.

Birds are SPB Queen mixed sex laying strain aged 10 weeks with body weight about 500g (should be 900g at this age). This simply reflects lower protein diet normally expected for free range poultry. About 5 chicks were seen to be severely affected by gape worm at visit 4th November. Medicine to be delivered 8th November by FSP.

Instructions: "Equisole" Horse Drench thiabendazole 33½% 60g packet for \$1.40. Poultry text advises daily doses in serious cases of 2-10mg per chick of thiabendazole for 4-14 days.

¼ of one level teaspoon per day mixed in as much water as 50 chicks will drink in one hour, to be given every morning for 7 days.

Make sure each chicken gets about the same amount of medicine.

Cost of medication is about half a cent/chicken for a 7 day course of treatment. One packet is enough to treat 300 chicks for one week.

All other water must be removed and only medicated water given after a period of water "starvation" for a night. The reason is that the drug is not easily soluble and the suspension made by shaking  $\frac{1}{4}$  teaspoon in one pint bottle settles out quickly.

(Stephen E. J. Swan)

AID ADVISOR POULTRY



The Foundation for the Peoples of the South Pacific was incorporated in 1965 to work with the peoples of the Pacific Basin in programs that assist human development. FSP provides technical assistance in the areas of assessment, planning, implementation and evaluation of projects and orchestrates local and international resource agencies towards achievement of the goals Pacific Islanders are setting for themselves day to day in their evolution to self-sufficiency.

FSP is not a private (endowed) foundation but a not-for-profit, tax-exempt membership corporation which raises funds from the contributions of the general public, fundraising functions, grants from charities and foundations and grants and contracts from governments.

FSP is registered with the U.S. State Department Advisory Committee on Voluntary Foreign Aid and with the United Nations Economic and Social Council as a Non-Government-Organization. It is a member of the International Council of Voluntary Agencies, the American Council of Voluntary Agencies for Foreign Service, the Australian Council for Overseas Aid and the Société des Océanistes (Paris). It has Observer status with the South Pacific Commission (Noumea, New Caledonia).

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**THE  
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