Implementation & assessment of a Community Nutrition Program

By

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DECLARATION

The work described in this thesis was carried out by me at the Faculty of Applied Sciences, under the supervision of Mrs. K.M. Somawathie and Miss. Roslyn Myers. A report on this has not been submitted to any other university for another degree.

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Affectionately

Dedicated

To

My parents

&

Teachers

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ABSTRACT

Childhood undernutrition is a major health problem in Sri Lanka. The mothers should be given a thorough knowledge regarding the factors that could lead to undernutrition of their children and the ways of preventing them, because mothers are mostly involved in caring and feeding of their children and nutrition education programs could play a major role, on providing knowledge.

The Community Nutrition Program was implemented, aimed at children 5 years and under, in the target village, Nawimana. The major objective was to reduce the risk of undernourishment of the children. The specific objectives were to develop leadership skills in volunteer leaders and to establish Discussion Groups among mothers. The nutritional levels of children, behavioral changes in family nutrition and household sanitary were also expected to be improved.

Heights and weights were taken from sample population (40 children), at the commencement and end of the program and the two data sets were compared with each other and also with NCHS reference standards. In addition a 7-day dietary survey was carried out. Volunteer leaders were selected from the target group and given 7 weeks training on nutrition and health education along with leadership skills. At the end, the training was evaluated. Mother's Discussion Groups were then established and finally, random home visits were carried out.

Results of the anthropometric measurements compared with NCHS standards revealed that, the percentages before implementing the program was stunting 7.5%, underweight 10% and wasting 0%. After implementing the program the percentages were stunting 7.5%, underweight 2.5% and wasting0%.A significant weight gain was observed during the 3 months period at 95% significant level but, there was no significant height gain. The food diary data disclosed that the following nutrients did not meet the Sri Lankan recommended nutrient intake. Energy 33.8%, Protein 0.01%, Calcium 40.2%, Iron 100%, Vitamin A 15% and Vitamin C 27%. Evaluation of the volunteer leaders training depicts that the training sessions were successful. Home visits indicated that behavioral changes were occurring in family nutrition and household sanitary along with the program.

This Community Nutrition Program gives evidence that the best method to transfer nutrition and health information to the community is by implementing participatory health and nutrition programs.

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CHAPTER 01

Introduction

Background of under nutrition/malnutrition problem

Childhood undernutrition and poor nutrition during pregnancy is a major health problem occurring in Sri Lanka. Though several strategies and nutrition programs were carried out to reduce the incidence of malnutrition, they haven't met their goals. The growth pattern of children is normal for the first 5-6 months of life and afterwards, if the complementary feeding is not adequate quantitatively and qualitatively, the growth started to become slower and at verse, stops completely. If no any further action taken, malnutrition will become more severe. The major causes of the malnutrition are poor practices of breast feeding and complementary feeding, discriminatory feeding and caring practices and repeated infections.

The underlying causes of malnutrition can be clustered in to 3 main areas; the unhealthy environment including inadequacies in the delivery of basic health services, problems related to household food security, and unmet needs in the care of children and mothers in the household. Although the first two causes of health care and household food security are connected with commodities and services which are essential for adequate dietary intake and control of diseases, the care of children and mothers at home is crucial to ensure that the food and services are properly used to benefit children and mothers. This is the component where families need to be empowered to improve nutrition (News bulletin, 1994). Health of an individual can be affected by general health condition of the society. Therefore, health of community needs higher attention while considering development of a region or country (Kamble, 1984).

The relationship between health and nutrition

The complex socio-cultural determinants of women's health and nutrition have cumulative effects over the lifetime (Ghosh, 2004). Less attention on childcare may lead to malnutrition and impairment of physical development. This becomes more severe when there is lack of nutritious food. Adequate nutritious food is the most important requisite for growth. While it is important throughout childhood, it is more crucial during first 5 years of a child's life, particularly in first 3 years, in which the rapid growth occurs and the child is entirely dependent on her mother and family for food. Malnutrition during pregnancy has its origins in childhood and adolescence. Not only does an underweight mother transfer her nutritional status to her child in the form of low birth weight, the baby is much more likely to die in the prenatal period. (Ghosh, 2004). Under nutrition could have lasting effect on family health and development. It can result in inefficiency and low labor productivity. Low productivity leads to low income and economically and socially deprived households or community (Information bulletin, 1995).

Nutritional assessment of vulnerable populations

The nutritional assessment of individuals is fundamental to the formulation of appropriate nutrition programs and policies. To assess the nutritional status , working knowledge of the various anthropometric techniques is essential. The information gathered from nutritional assessment can also be used to evaluate the efficacy of disease control programs, since there is an interaction between nutrition and infection (Nutrition guide, 1997).

Importance of health and nutrition education

In a developing country like Sri Lanka, there are many constraints to better living and adequate nutrition, such as low income, inadequate housing, poor environment sanitation and lack of safe drinking water. To achieve a good nutrition by dispelling those constraints , there must be a good understanding about the problems and try to make the community as self –reliant as possible.

Community participation and involvement is the key to successful health and nutrition program. A discussion with members of the community can help to identify constraints. People do not change their habits and behaviors just because they have been told to do so. With gentle persuasion, the community can be made to accept better health care practices. Face to face communication is an excellent medium to discuss health and nutrition (Ghosh, 2004)

Efforts should be made in nutrition programs to ensure adequate intakes of energy and micronutrients of pregnant women and adolescent girls and delay pregnancy so that their growth may be optimized before conception. This depends largely upon participatory action in not only implementing the activities, but also following up on recommended actions (Krishnaswamy, 2000)

Health and nutrition programs would help to improve the knowledge about nutrition and health and also, behavioral changes in family nutrition, food preparation, storage and household hygiene can be expected.

Introduction to the project implementing area and the target group

The Community Nutrition Program has been carried out in Nawimana South and Nawimana North villages in Matara district in Southern province. These two villages got the priority for implementing this project because, it was highlighted that amongst children aged 1-5 years, most of the pre-school children are underweight and there are also severely underweight children according to the monthly health records of public health midwives. Also, a research by the local medical officer of health has revealed that ,though the birth weights in Matara district are normal ($\geq$2500g), the complementary feeding practices is problematic because most of the babies becoming underweight by the age of 12months .

It is planned to carry out the project in both villages for a period of 6-9 months. The target group includes all the children 5 years and under and their mothers as well as pregnant mothers in Nawimana South and Nawimana North villages.

1.1 . Objectives of the Community Nutrition program

Major objective:

- To reduce the risk of undernourishment of the children (5 years and under)of the target villages.

Specific objectives:

- To achieve increased body weights and heights of children 5 years and under.
- To achieve behavioral changes in family nutrition, food preparation and household sanitation through improved knowledge.
- To increase the confidence of mothers through group participation and developing leadership skills in group leaders.
- To establish mother's discussion groups which can continue after the program, to enable the flow of health information

CHAPTER 02

Literature review

2.1. Energy requirements and recommendations during infancy and childhood

The human neonate requires food energy for numerous and varied biological functions. For almost half a century, international and national committees have made recommendations on the food energy needs of infants and children (Walker and Rolls, 1999).

Breast milk is tailor-made to meet the nutrient needs of the young infant. It offers its carbohydrate in the easy to assimilate form of lactose; its fat contains a generous proportion of the essential fatty acid Linoleic acid; and its protein, alphalactalbumin is one that the infant can easily digest. With the exception of vitamin D, its vitamin contents are ample. As for minerals, Calcium, Phosphorous and Magnesium are present in amounts appropriate for the rate of growth expected in a human infant, and breast milk is low in Sodium. Its Iron is highly absorbable and the presence of Zinc –binding protein favors the absorption of the Zinc it contains. It protects a newborn against allergy development during the vulnerable first few weeks of life. Breast milk or formula and the infant's own internal stores will meet most nutrient needs for the first four or six months. Thereafter, the introduction of properly chosen juices and foods will normally keep up with the infant's changing requirements. At four to six months, infants require additional iron, preferably in the form of iron- fortified cereal (Boyle, 2001).

The infant's rapid growth and metabolism demand an adequate supply of all essential nutrients. Because of their small size, infants need smaller total amounts of the nutrients than adults do, but when comparisons are made based on body weight, infants need over twice as much of many of the nutrients (Boyle, 2001). The energy requirements of children are determined by their individual basal metabolic rates, activity patterns and rate of growth. Toddlers (ages 1 to 3) need about 1300 calories per day. By the age of 10, children need about 2000 calories per day (Boyle, 2001). The Recommended Dietary Allowances (RDA) of some nutrients for infants, children, males, females, pregnant and lactating mothers is illustrated in table 2.1.

Table 2.1.The Recommended Dietary Allowances (RDA) of some nutrients for infants, children, males, females, pregnant and lactating mothers

Age (yr)	Energy (Kcal)	Protein (g)	Vit A (µg RE)*	Vit K (µg)	Iron (mg)	Zinc (mg)	Iodine (µg)
Infants							
0.0-0.5	650	13	375	5	6	5	40
0.5-1.0	850	14	375	10	10	5	50
Children							
1-3	1300	16	400	15	10	10	70
4-6	1800	24	500	20	10	10	90
7-10	2000	28	700	30	10	10	120
Males							
11-14	2500	45	1000	45	12	15	150
15-18	3000	59	1000	65	12	15	150
19-24	2900	58	1000	70	10	15	150
25-50	2900	63	1000	80	10	15	150
51+	2300	63	1000	80	10	15	150
Females							
11-14	2200	46	800	45	15	12	150
15-18	2200	44	800	55	15	12	150
19-24	2200	46	800	60	15	12	150
25-50	2200	50	800	65	15	12	150
51+	1900	50	800	65	10	12	150
Pregnancy	+300	60	800	65	30	15	175
Lactation							
1st 6 mts	+500	65	1300	65	15	19	200
2nd 6 mts	+500	62	1200	65	15	16	200

*RE- Retinol Eqivalents

(Source: Boyle, 2001)

Table 2.2. Shows the energy and protein requirement of children, (per 1 kg of body weight) from birth to 6 years.

Table 2.2. Energy and protein requirement for children- birth to 6 years (per kg)

Age group	Energy *(kcal per kg)*	Protein *(grams per kg)*
0 - 6 months	108	2.0*
6 – 12 months	98	1.65*
Daily requirements		
6 months to 1 year	800-1000	13-17**
1 to 3 years	1240	22**
4 to 6 years	1690	30**

* In terms of milk protein alone

** In terms of mixed vegetable protein of NPU (net protein utilization) 65 relative to egg (Source: Ghosh, 2004)

2.2. Nutrition related problems during infancy and childhood

Undernutrition, which occurs when children do not eat enough food or energy, is a problem for children in most developing countries, especially those from low-income and migrant families or certain ethnic and racial minority groups. Children in foster care, many of whom live in poverty, and young homeless children are also at risk for under nutrition (Boyle ,2001).

With exclusive breastfeeding and relative freedom from infections, the growth pattern is normal for the first 5 to 6 months of life, but if semisolids are not introduced at six months, the growth slows down and then may stop altogether. This is the beginning of malnutrition and unless timely action is taken, malnutrition will become more severe. The beginning of malnutrition, which starts around 5 to 6 months of age, reaches its peak around 2 years, and then more or less stays at that level (Ghosh, 2004). Good nutrition is vital for many aspects of children's growth and development. Children with poor growth

are not just small, poor growth is an indicator of inadequate nutrition and a warning of other damage that may be occurring even though it could not be seen.

Undernutrition in early childhood results in reduced mental development and physical growth because human brain grows to 75% of adult size within the first two years of life. Undernutrition lowers resistance to infection resulting in more severe episodes of illness, and that illness in turn reduces food intake. This is known as the vicious cycle of undernutrition and infection, which is illustrated in Figure 2.3. and results in deteriorating health and nutritional status (News bulletin, 1994).

It is important that the infant is exclusively breast-fed up to the 4-6 months. Early introduction of complementary foods is associated with the risk of diarrhea caused by diseases carried through food and water. Impaired digestion can be prolonged even after recovery from an infection. This is due to the destruction of the micro-villi found in the intestine, especially by the bacteria, *E-coli*. (Nutrition Guide, 2000)

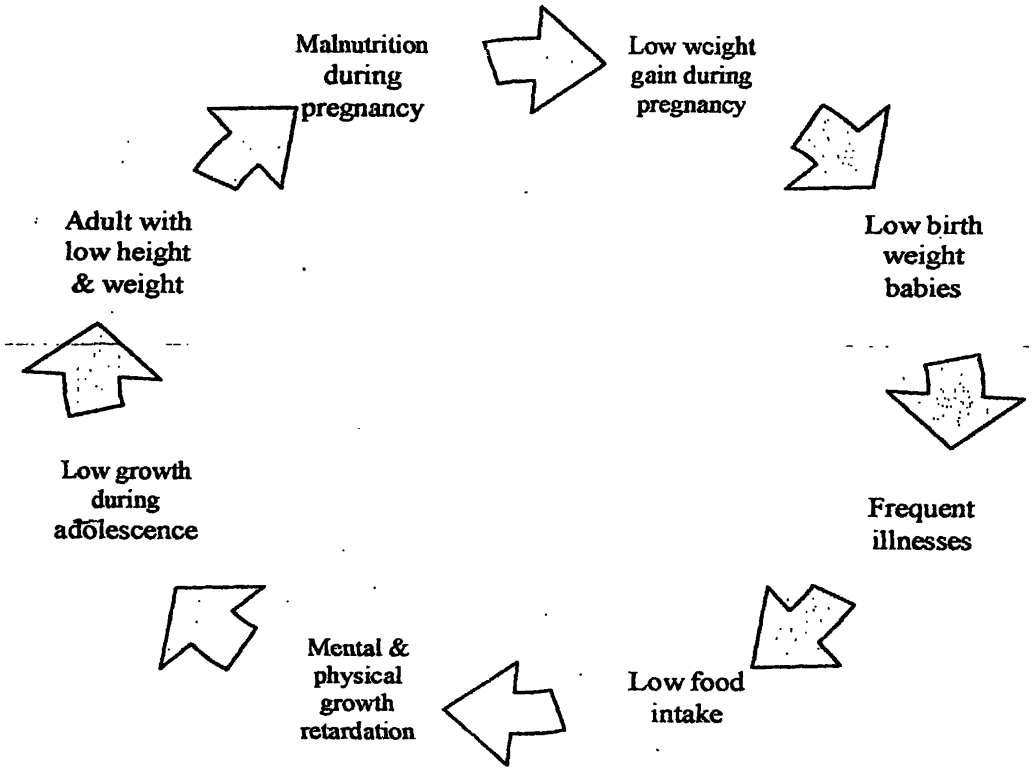

Fig. 2.3. The vicious cycle of undernutrition and infection

2.3. Malnutrition

Malnutrition may result due to improper or inadequate food intake or may result from inadequate absorption of nutrients. Deficient supply of food, poor dietary habits, food faddism and emotional factors may limit intake. Certain metabolic abnormalities may also cause malnutrition. Nutritionists believe that gender is one of the principle factors behind the high levels of malnutrition in Asian countries (Epsy, 2001). The Figure 2.4. shows the growth chart of a child who is suffering from prolong malnutrition in first two years of life.

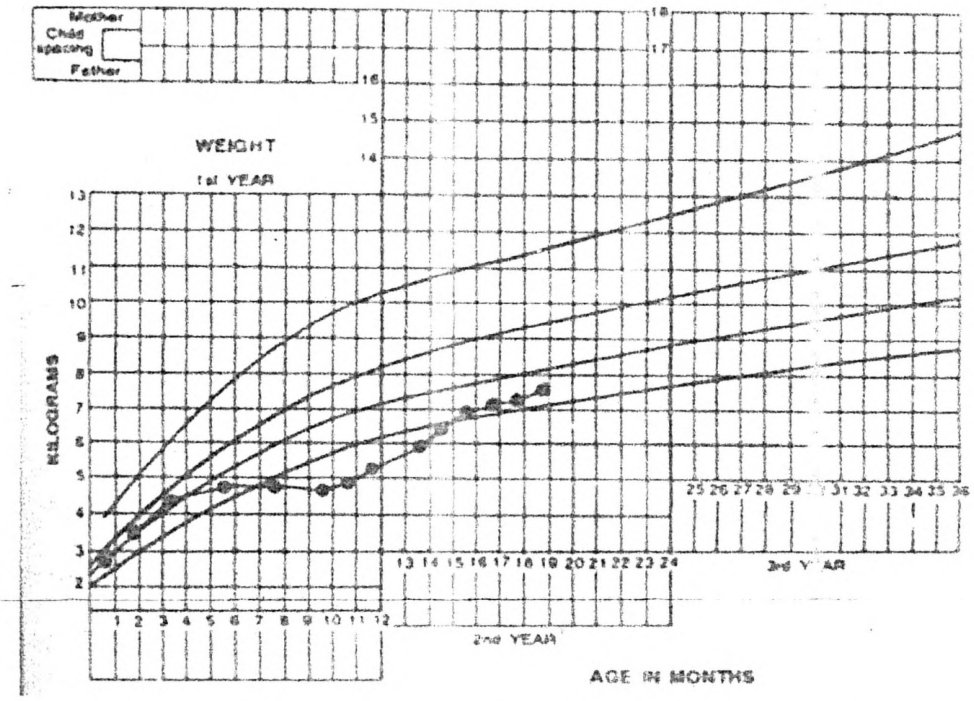

Fig. 2.4. Prolonged malnutrition in first two years of life

2.3.1.Protein-Energy malnutrition

Protein energy malnutrition (PEM) or protein calories malnutrition (PCM) can arise from primary, secondary or a combination of both types of malnutrition. PEM results from under-consumption of protein or calories required for normal growth and health. Advanced and extreme forms of PEM , such as Marasmus and Kwashiorkor carry a high mortality rate , even with adequate treatment.

PEM can also be expressed in terms of stunting, wasting, and underweight which are currently the preferred indices used to measure and describe malnutrition.

2.3.1.1. Stunting

Stunting refers to shortness in height and usually indicates past under nutrition .The child's height is measured and compared to the standard height of children of that age in a reference population. It is considered to be present when child's height-for –age is less than two standard deviations of the median value of NCHS / WHO standards.

2.3.1.2. Wasting

Wasting refers to a significant weight loss due to an acute shortage of food and/ or severe disease and indicates current under nutrition, although chronic processes can also lead to wasting. It is considered to be present when child's weight for height measurement is less than two standard deviations of the median value of NCHS / WHO standards.

2.3.1.3. Underweight

Underweight is a composite of stunting and wasting , and is present if the child's weight-for-age is less than two standard deviations of the of NCHS / WHO median values. Underweight is useful as an indicator of the overall magnitude of malnutrition(Nutrition guide, 1997).

2.3.1.4. Marasmus

The clinical picture of Marasmus is due to general starvation. It arises from an inadequate calorie intake may be due to insufficiency of the diet to improper feeding habits or to metabolic abnormalities. There is a failure to gain weight followed by loss of weight until emaciation results. Skin becomes wrinkled due to loss of subcutaneous fat. Face become shrunken and wizened like a monkey. The abdomen may be distended or become thin. Appetite may be extreme or reduced with occasional diarrhea(Gupta et al ., 1992) .

Figure 2.5. shows a child suffering from Marasmus .

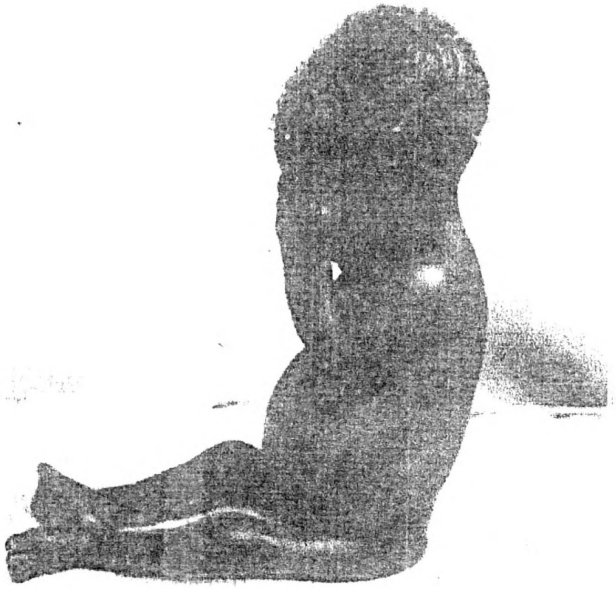

Fig. 2.5. A child suffering from Marasmus

Figure 2.6. illustrates a growth chart of a Marasmic child

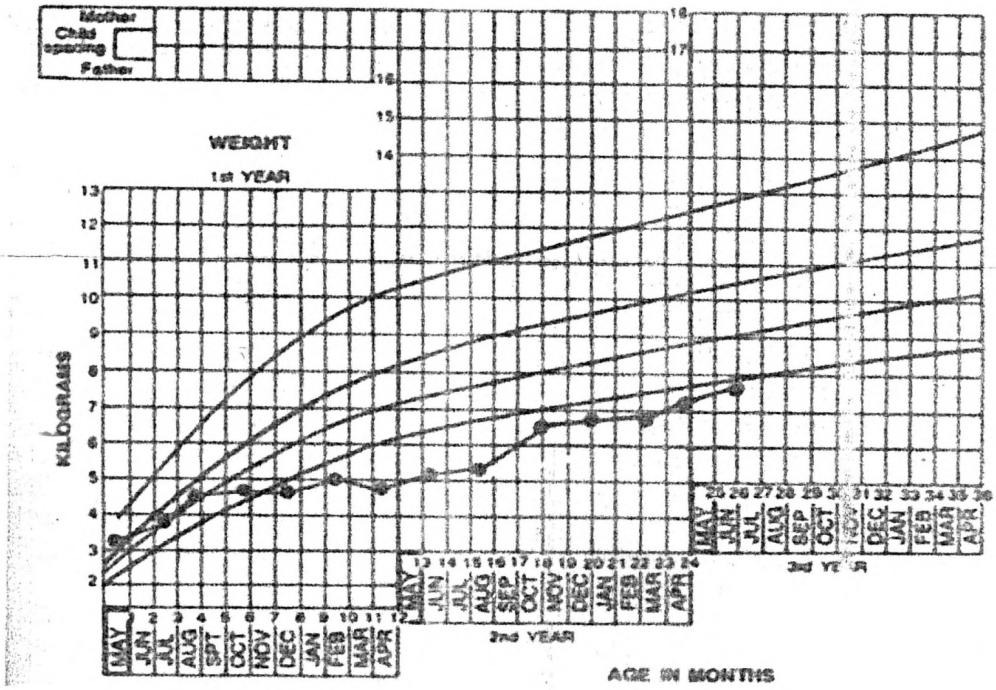

Fig. 2.6. Growth curve of a marasmic child

2.3.1.5.Kwashiorkor

The term Kwashiorkor, means the sickness of the older child when the next baby born. During the period of growth enough nitrogenous food must be consumed to maintain a positive nitrogen balance. Adequate calorie intake as carbohydrate or fat helps to minimize protein requirement. The child becomes apathetic, anemic, anorexic and oedematous. He develops diarrhea. There is severe growth retardation. Child looses weight but due to oedema he does not look like so. Darkening of the skin appears in areas of irritation, but not in those exposed to sunlight. Cracks appear at folds and ulcer may develop (Gupta *et al*., 1992). Figure 2.7. shows a child suffering from Kwashiorkor.

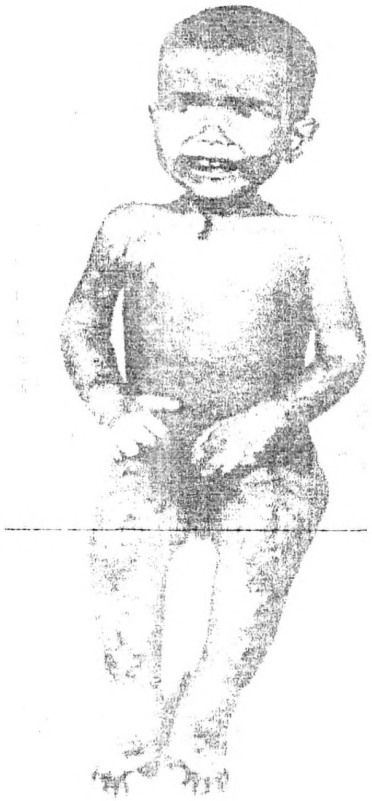

Fig. 2.7. A child suffering from Kwashiorkor

The table 2.8. depicts the main differences between Marasmus and Kwashiorkor

Table 2.8.Main differences between Marasmus and Kwashiorkor

Feature	Marasmus	Kwashiorkor
Cause	Due to deficiency of calories	Protein deficiency
Wasting	Thin, lean and skinny	Less obvious, child looks flabby, moon face
Muscle wasting	Severe	Sometimes less
Loss of weight	Severe	Masked by oedema
Mental changes	Usually absent	Usually present
Appetite	Usually good	Poor
Skin changes	None	Depigmentation
Hair changes	Slight change in texture	Often sparse depigmentation , grayish or reddish
Hepatic enlargement	None	Frequent

(Source: Gupta et al., 1992)

2.3.1.6. Marasmic Kwashiorkor

This is a combination of varying degrees of the super imposition of both conditions. It is the superimposition of Kwashiorkor on any degree of Marasmus and it is the most common presentation(Gupta et al., 1992).

2.4. Nutritional assessment of vulnerable populations

The nutritional assessment of individuals is fundamental to the formulation of appropriate nutrition programs and policies. The nutritional status of individuals and population groups is valuable indicator of their health and well-being . And their assessment can be very useful in designing, modifying and guiding cost-effective nutrition interventions and policies. Due to the interaction between nutrition and

infection, information from nutritional assessment can also be used to evaluate the efficacy of disease control programs (Nutrition guide, 1997).

2.4.1 Nutritional assessment systems

Nutritional assessment can be defined as the interpretation of information obtained from anthropometric ,dietary ,biochemical, and clinical studies. The information obtained is used to determine the health status of individual or population groups as influenced by their intake and utilization of nutrients. Nutritional assessment is done by survey, surveillance, screening and monitoring (Joshi, 2003)

2.4.1.1.Nutritional surveys

The nutritional status of a selected population may be assessed in cross sectional surveys. The cross sectional data can be used for baseline nutritional data or can ascertain the overall nutritional status of a population. It can also identify the population at risk (Joshi, 2003).

2.4.1.2. Nutritional surveillance

Surveillance means continuous monitoring of nutritional status of a selected population group. Here the data is collected, analyzed, and utilized for an extended period of time. Surveillance studies identify the possible cause of malnutrition and hence can be used to formulate and initiate intervention measures at population or subpopulation level. (Joshi, 2003).

2.4.1.3. Nutritional screening

The identification of malnourished individuals requiring intervention can be accomplished by nutrition screening. This involves a comparison of an individual's measurement with predetermined risk levels or cut off points (Joshi, 2003).

2.4.2. Methods used in nutritional assessment

Nutritional assessment systems utilize basically four types of methods, which are used either alone or in combination. The methods used are;

1. Anthropometric assessment
2. Biochemical assessment
3. Clinical assessment
4. Dietary assessment

They are popularly known as ABCD. For the assessment of nutritional status in a community, basically dietary and anthropometric measurements are used, since they are not invasive techniques, quite simple, less time consuming and do not require sophisticated instruments (Joshi, 2003).

2.4.2.1. Anthropometric assessment

Anthropometry is the science of using human body measurements to assess the nutritional status of individuals or population groups. The most common human body measurements used in anthropometry are,

- weight
- height (adults or children) or length (infants or toddlers)
- arm circumference
- head circumference
- skin fold thickness

The instruments required for the above measurements are simple and include weighing scales, stadiometer or height measuring board, tape measure and calipers. (Nutrition guide, 1997)

a. Weight

All measurement techniques should be standardized and instruments must be checked frequently. In a clinic, a beam type weighing scale should be used because it is more accurate. For field conditions, a Salter spring machine is quite satisfactory.

Figure 2.9. shows different Salter scales.

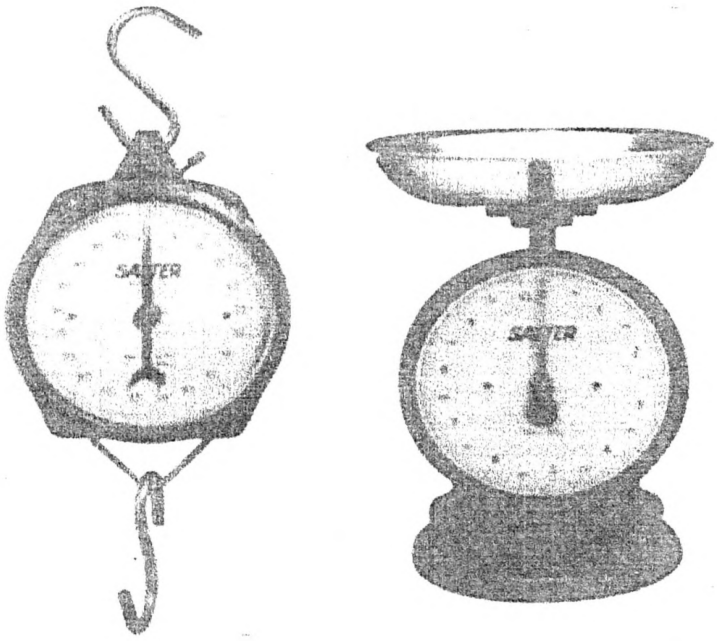

Fig. 2.9. Different Salter scales

These kinds of scales used for children between 0 to 6 years. The baby is slung in strong pants and the straps are fixed on the hook of the machine or a hammock-like seat can be made. The machine can be hung from a hook or a nail on the door, or an attendant can hold it up(Fig.2.10.). The machine will weigh up to 25 kg and is accurate for up to 100g. Its accuracy should be tested frequently (Ghosh, 2004).

Fig. 2.10. A child being weighed by Salter spring balance

b. Height/ length

In children up to 2 years of age, height or rather length is best measured by the infantometer, with the child lying supine. The head touches the headboard and the knees are held extended. The second board touches the feet (the whole foot and not just the toes). The length is read from the measurement marked on the infantometer(Figure 2.11.).

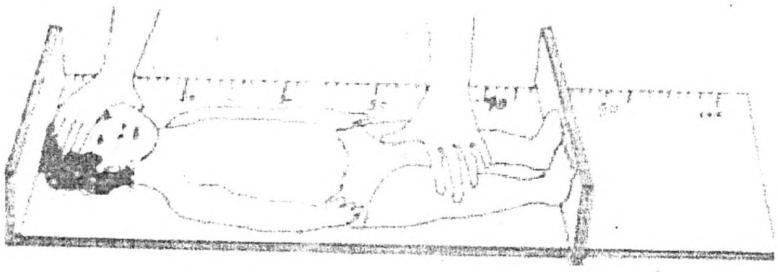

Fig. 2.11. Measuring the length of an infant with an infantometer

In older children who can stand , height can be measured by the rod attached to the lever type machine or by an anthropometer, or even more simply without expensive tools as explained below.

The child should stand barefoot on a flat floor against a wall, with her feet parallel and with heels, buttocks, shoulders and back of the head touching the wall. The head should be comfortably erect and a mark made on the wall with the help of a right-angled object. Height is then measured by using a steel measuring tape (Figure 2.12.) (Ghosh, 2004).

Fig. 2.12. Measuring the height of a child against the wall

c. Mid Arm Circumference (MAC)

MAC has been one of the most widely used indicators for the assessment of nutritional status especially during childhood because the tape used is inexpensive and portable. (Joshi, 2003). It is especially useful in situations where one needs to measure the nutritional status of large numbers of people in a short time (Nutrition guide, 1997).

d. Head Circumference

This is sometimes used as an index of chronic protein-energy malnutrition, during the first two years of life when brain growth is most rapid. It is less useful after the age of 2 years. It is especially useful as a screening tool to identify preterm , low birth weight neonates in situations where it may be difficult to obtain birth weight or gestational age (Nutrition guide, 1997).

e. Skin Fold Thickness

Measured with the help of calipers, is a good indicator of total body fat and is usually done at triceps (back of arms), biceps (front of arm) , or sub scapular (just below the shoulder blade) levels (Nutrition guide, 1997).

2.4.2.2. Anthropometric indices

Height-for-age, Weight-for-height and Weight-for-age are considered as the main anthropometric indices. The term that is needed to know about in order to compute the above indices is the Z score. The Z score is another way of expressing the standard deviation obtained from reference population charts. It is calculated, for example in the case of weight-for-age, by subtracting from the child's observed weight, the median weight of the reference population at the child's age, and dividing the difference by the standard deviation of the weight of the reference population at that age.

It should be noted that the values of the above indices below 3 standard deviations indicate severe stunting, wasting or under weight. Thus while values below 2 standard deviations are used to estimate the prevalence of undernutrition in populations, values below 3 standard deviations would obviously quantify as nutritional emergencies.

Height / age is less than ≤ -2 SD indicates Stunting (measure of past undernutrition)

Weight/ height is less than < -2 SD indicates Wasting (measure of current undernutrition)

Weight / age is less than < -2 SD indicates Underweight (composite measure of stunting and wasting)

Weight / height and Height / age are less than < -2 SD indicates Concurrent malnutrition.

In adults, the Body Mass Index (BMI) is the preferred measure for under nutrition. The BMI is the weight of the individual in kilograms divided by the square of the height in meters. Table 2.13 shows the varying degrees of nutrition levels.

Table 2.13. Varying degrees of nutrition levels

BMI	Nutritional Status
Below 16	Third degree of malnutrition
16 -17	Second degree of malnutrition
17 – 18.5	First degree of malnutrition
18.5 - 25	Normal
> 25	Obese

(Source: Gupta et al., 1992)

The Gomez system (table 2.14.) is the most widely used method for monitoring pre-school children in developing countries, because it is easy to use and calculate, sensitive to small changes in weight and requires only a weighing scales and estimate of the child's age.

Table 2.14. The Gomez classification

% expected weight for age	Classification	Category of nutritional status
> 90 %	Normal	Normal
76 -90 %	Mild malnutrition	First degree of malnutrition
61 -75 %	Moderate malnutrition	Second degree of malnutrition
< 60 %	Severe malnutrition	Third degree of malnutrition

(Source: Gupta et al., 1992)

The Waterlow classification system (Table 2.15.), on which the WHO system is based , combines height –for- age (to identify past undernutrition) and weight- for-height (to identify current undernutrition) . The great advantage of the Waterlow system is that it correctly categorizes individuals on current undernutrition, past undernutrition and both past and current undernutrition.

Table 2.15. The Waterlow Classification System

Height for age	Weight for height	Nutritional grade
> 95	> 90	Normal
90 - 95	80 – 90	Mild malnutrition
85 - 90	70 - 80	Moderate malnutrition
< 85	< 70	Severe malnutrition

(Source: Nutrition guide, 1997)

The Welcome classification (Table 2.16.) , like the Gomez system, uses weight-for-age as the index but also includes the occurrence of oedema to assist in distinguishing Marasmus and Kwashiorkor (Nutrition guide, 1997).

Table 2.16. The Welcome classification

Weight (Haward standards)	Oedema present	Oedema absent
60 - 80 %	Kwashiorkor	Under weight
60 %	Marasmic Kwashiorkor (very closer to death)	Marasmus

(Source: Nutrition guide, 1997)

period of time prior to survey can be recalled as accurately as possible. The respondent recalls what and how much food was consumed and when it was consumed. This diet recall is most commonly done for a period of 24 hours. The ingredients recalled are recorded in household standardized volumetric measurements. For the raw weight of foodstuffs, their nutritive value is calculated.

$$\frac{\text{Individual intake (in volume)}}{\text{Total cooked quantity (in volume)}} \times \text{raw amounts} = Y \text{ (nutritive value)}$$

Diet history- provides a more comprehensive assessment of diet and it permits investigation of less-known or unidentified dietary factors that can be retrieved for future examination. The normal daily dietaries are first recorded along with the timings of each meal, their composition, snacking, etc. Quality and quantity of foodstuffs are calculated from the number of servings and their portion size (Joshi, 2003).

(II) Food frequency method: Usual intake in terms of frequency with which various food items are consumed is recorded. When estimation of calories and other nutrients are to be made, it is essential to record the amounts of foods that are eaten (Joshi, 2003).

(III) Questionnaire method :In principle, this method is identical to diet history. The difference is that no interviewer is needed. Questionnaires are sent to the respondents who fill in and return them. The respondents record their usual food intake for a period of time (Joshi, 2003) .

2.5. Growth Monitoring and Promotion (GMP)

Growth monitoring refers to the process of weighing a child periodically and charting the growth curve on a graph. Growth monitoring has been advocated as an effective , simple and inexpensive way of preventing child malnutrition.

Moreover, in many communities, its use and promotion results in the participation of community members , especially mothers; in tracking the growth of their

Childs, and evokes their active interest in analyzing the reasons for growth failure and modifying dietary practices towards better outcomes. (Nutrition guide, 1997)

It is important to familiarized oneself with the weight gain pattern as shown in table 2.17. In the first year after infancy, the child is still gaining height and weight rapidly but at ever- diminishing rates. From 2 to 5 years, rapid physical and mental development continues, the child's rate of height gain continues to fall but move slowly than previously and the child's rate of weight gain remains fairly steady, at around 2kg per year (Ghosh, 2004).

Table 2.17. Average weight and height increments during the first five years

Age	Weight increments per week
0 -3 months	200g
4 -6 months	150g
7- 9 months	100g
9 -12 months	50 - 75g
Weight increments per day	
1 -2 years	2.5g
3 -5 years	2.0g
Length increments per year	
1st year	25 cm
2nd year	12 cm
3rd year	9 cm
5th year	6 cm

(Source: Ghosh, 2004)

The average birth weight of a baby is about 2700 to 2900g. Babies born in homes with higher socioeconomic status and better maternal nutrition, weigh more than those belonging to poor socioeconomic groups. Almost all babies loose weight during the first 3 to four days of birth, and regain it by 7 to 10 days. After that , the weight increases by 25 to 30g a day for the first three months, and there after less rapidly. The widely

accepted formula, that a baby double her birth weight at 5 months and trebles it at 1 year is by and large true. The length of a baby at birth is 48 to 50 cm and at one year of age it increases one and a half time. Thereafter, it increases as shown in the table2.20.

Several studies have shown that the weight curves of many children are excellent for the first 4 to 5 months of life, with the birth weight doubling by this age. However, the curves tend to flatten after this. The reason for this is exposure to infections because mother is no longer exclusively breastfeeding thinking that she does not have enough milk and instead gives a little bit of diluted animal milk, tea or some other liquid which results in infection and the growth slows down further and a downward trend begins.

A healthy child is happy, full of energy, runs around and has a good appetite. Normal development is another sign that a child is well nourished. The first indication that the child is not well nourished is poor appetite, listlessness , decreased activity and peevishness. Usually there is an associated illness as well.A child's weight is made up of both height and fatness and can show growth more clearly. All healthy children do not weigh the same and do not have similar heights. There is a range within which weights and heights of children are considered normal. It has to be remembered that a series of readings is more important than a single reading (Joshi, 2003).

2.5.1. NCHS Standards

Any weight taken has to be compared with some reference standard, and that of the National Center of Health Statistics (NCHS), USA is considered most suitable. The concept of centiles should be understood before growth can be evaluated and compared with a reference standard. It is easier to understand it in relation to height. If 100 children of the same age are lined up from the shortest to the tallest, the fifteenth will be in the middle and will represent the median or fiftieth percentile. The tenth from the left will represent the tenth percentile (ninety children will be taller than the child). The lower the percentile , the more growth retardation there is likely to be.

The percentile curves are frequency distribution curves. Percentile indicates the positions that measurement would hold if 100 children are arranged in ascending order. The median line is 50^{th} percentile on either side of which lie half the observations. In 25^{th} percentile curve, 75% observations are expected to be above and 25% below it. The

NCHS growth charts shows curves at 3^{rd} , 5^{th} , 10^{th} , 50^{th} , 75^{th} ,90^{th} , 95^{th} , and 97^{th} percentiles. A child who stays on or near one percentile line or between the same lines on subsequent monitoring is growing normally(Joshi, 2003).

2.5.2. Growth charts

The child's weights could be compared with the reference standards by plotting the weights on growth charts, which have a weight-for-age graph printed on one side. The graph is divided into five years, for the first five years of the child's life because this is the most crucial period of growth. Inadequate growth, as shown by a straight line on the chart or dip in it, is one of the first sign of insufficient nutrition and should be on alert to take necessary steps in improving food intake and treating any illness that may be present. In a healthy child, the child's weight should be increase at about the same rate as the reference curve (Figure 2.18.). However, healthy children of the same age vary in size, and different children's growth lines vary in their position on the chart. Some children's growth lines are above the reference curve, some are below the reference curve (Figure 2.19.). Most healthy children have growth lines above the third centile (Figure 2.20.). As long as the direction of the curve is maintained, child is growing well (Ghosh, 2004).

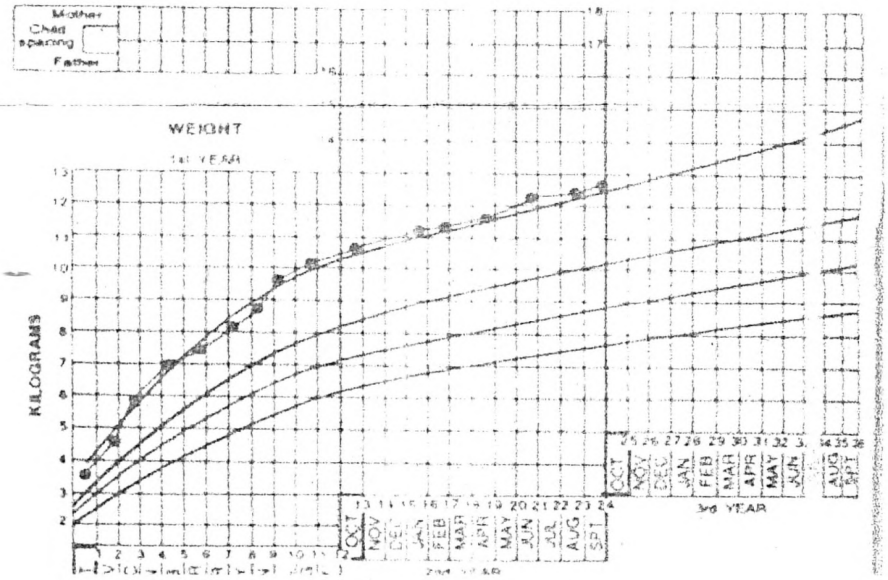

Fig. 2.18. Growth chart of a child at reference line

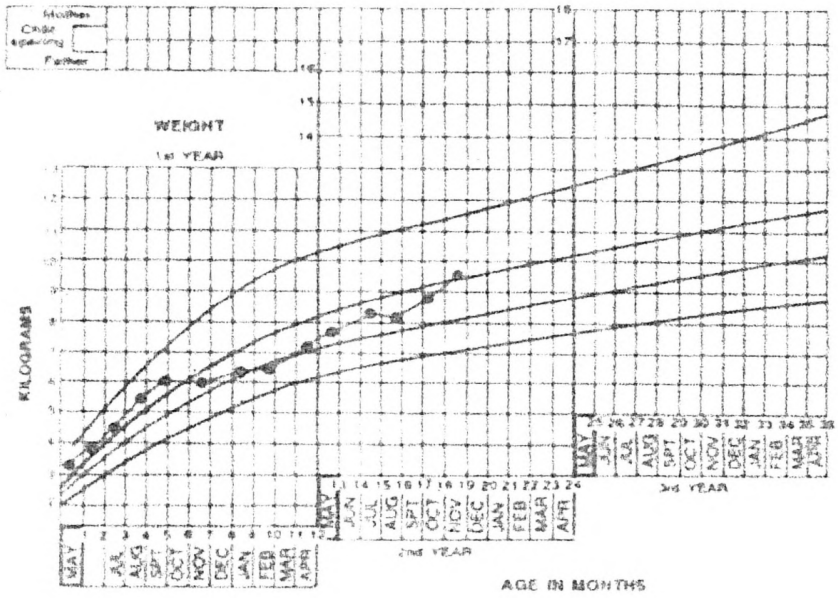

Fig. 2.19. Growth faltering between 6 and 11 months

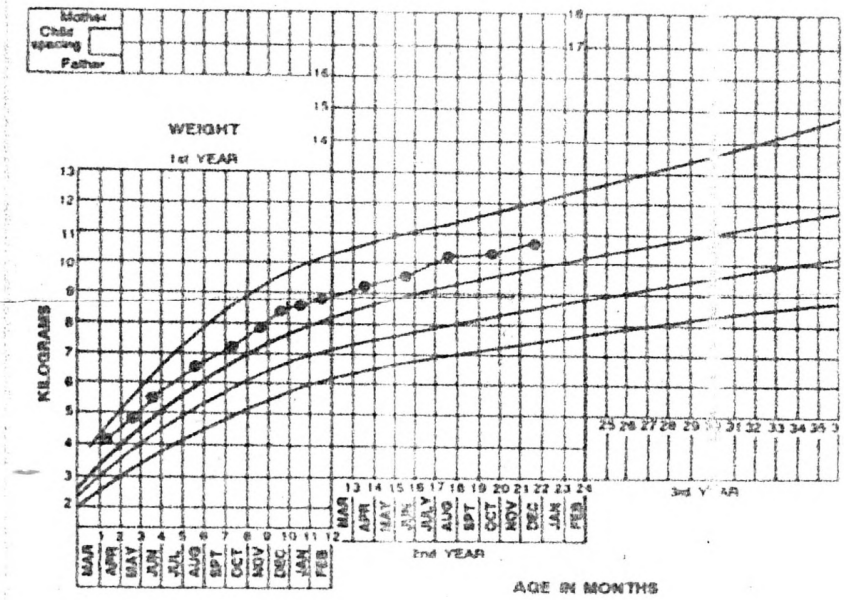

Fig. 2.20. Normal growth pattern

2.6. The current situation of malnutrition in Sri Lanka

Despite improvements in many public health indicators, problems of under nutrition persist in Sri Lanka , particularly among women and young children. These problems include poor growth of children, high rates of low birth weights, poor maternal nutritional status and deficiencies of micronutrients (vitamins and minerals).

Among the approximately 1 million children aged 0-3 years in Sri Lanka, more than one in three are under weight for their age when compared to the reference growth patterns.

- Every fourth child has a low height for age. These very short or stunted children are likely to have experience long-term under nutrition and repeated illnesses.
- Every eighth child has a low weight for height. These very thin or wasted children currently suffer from inadequate food intake.
- Even more seriously, about 5% of these children are both stunted and wasted, indicating severe nutritional problems.
- every fourth child born in Sri Lanka has a low birth weight of less than 2.5 kg , putting them at a disadvantage for future growth and development.
- Studies have shown that nearly 30% of Sri Lankan mothers are stunted (shorter than 148cm) and it is estimated that 2 out of 3 have iron deficiency anemia. In addition, many women have low food intakes and do not gain an adequate amount of weight during pregnancy (News bulletin, 1994). The table 2.21 shows the current status of malnutrition in Sri Lanka.

Table 2.21. Current status of malnutrition in Sri Lanka (Z Score < -2SD)

Background variables	Height for age		Weight for height		Weight for age	
	1993	2000	1993	2000	1993	2000
Sex						
Male	22.7	11.9	15.6	15.1	34.8	20.0
female	25.1	15.3	15.4	12.6	40.9	29.8
Age in months						

03-05	4.9	3.9	3.1	1.3	5.8	0.7
06-11	11.8	5.7	6.8	10.3	1.9	20.2
12-23	25.7	16.2	18.2	18.2	36.3	28.8
24-35	23.8	12.4	15.1	13.3	42.4	34.0
36-47	27.5	13.4	18.2	13.9	46.7	30.7
48-50	28.7	19.1	17.6	15.9	43.0	37.9
Sector						
Colombo	19.7	7.4	12.2	10.1	31.2	18.2
Other urban	16.8	8.6	16.8	6.3	29.9	21.3
Rural	22.9	12.8	16.4	15.9	38.3	30.8
estate	53.7	33.8	9.5	11.8	52.1	44.1

(Source: Sri Lanka Demographic and Health Survey-2000)

2.7. Health and nutrition education

Community participation and involvement is the key to successful health and nutrition programs. A discussion with members of the community can help to identify the constraints. The community must be involved in planning , in identifying priorities, and in various stages of implementation and monitoring. No programs, however , good, can be imposed in the community. People do not change their habits and behaviors just because they have been told to do so. With gentle persuasion, the community can be made to accept better health care practices. Periodic meetings with women's groups, village elders, school teachers can be very rewarding.

Participatory methods in which the people who are learning to play an active part are much more successful for health and nutrition education. If people just sit,watch and listen ,they become bored, but if they participate, then it becomes a sharing experience, because they also tell what their problems and why they cannot do better. Role play is a good strategy.

It is better to sit with the people and not stand and talk or sit in a chair. The group should not be too large, otherwise people sitting at distance lose interest. There should be

enough time to informal chat and questions and answering. The mothers may see apathetic and unresponsive, but given time they will relax and participate actively. They should be encouraged to give their opinions. It is the communication skill of the person that is important, and a good communicator can put across the message even without any visual aids. Those who can read should be given pamphlets, which would be suitably illustrated. Radio and television can also be used effectively. Role plays, dramas and short films can add interest to health education.

Most health and education is aimed at women, but men too should participate as much as possible. They are often the decision makers, and one should try and get them involved in better health and nutrition of the family (Ghosh, 2004).

There are many food secure households where children may still remain undernourished. This is because of inadequate or inappropriate child care practices, especially those relating to feeding and cares during illnesses. This is an area where attention should be included to such aspects as the establishment of education of care givers.

The field of nutritional intervention is exciting and challenging, and offers much reward and satisfaction to nutritional practitioners who can observe the effects of these programs on vulnerable groups(Nutrition guide, 1997).

CHAPTER 03

Methodology

3.1. Determination of the nutritional status of children

3.1.1. Sampling

Children between 3-5 years were selected as the population for the evaluation of nutritional status. Statistics were taken from the Public Health Midwife. 40 children were selected randomly out of 156 children who were between 3-5 years in Nawimana South and Nawimana North villages.

3.1.2.Collection of data (Height and weight measurements) before and after implementing the program

Height measurement: The child kept stand barefoot on a flat floor against a wall. Her feet was kept parallel and her heels, buttocks, shoulders and back of the head was kept in such a way, that it was touching the wall. The head was held comfortably erect and a mark was made on the wall with the help of a right –angled object. Then the height was measured using a tape and recorded.

Weight measurement: The child was undressed as much as possible before weighing. Then child was kept stand on the Salter digital balance which measures up to maximum 25 kg (increment 100g). The reading on the screen was read directly and recorded.

Age and sex: The date of birth and sex of the child was recorded directly. Then the age was calculated for the nearest month.

These measurements were taken before implementing the program and after 3 months of the previous height and weight measuring, the same sample population was used and again the height and weight measurements were taken.

3.1.3. Analysis of data

The recorded heights and weights of the child were compared with the NCHS (National Center for Health Statistics) reference standards (Appendix I). The children's weight for age, weight for height was compared in a similar manner. When the indicator is below – 2 SD of the reference standards. the child was considered as malnourished and when it lies between - 2 SD and + 2 SD the child was considered to be normal.

3.1.4. Comparison of the nutritional status before and after implementation of the nutrition program

The collected data (weights and heights measurements) before and after implementing the nutrition program were compared and analyzed using paired t- test at 95 % significant level. (Appendix VII)

3.2. Determination of the nutrient intake of the children

3.2.1. Dietary survey

In order to gather data for calculation of average dietary intake levels of major nutrients in children, a dietary survey was carried out. 40 food diaries were distributed randomly among the mothers who have children between 3-5 years in Nawimana South and Nawimana North villages. An introductory meeting was held for the mothers to introduce the concepts and to explain the purpose of the food diary. Also, instructions were given to the mothers to fill the food diary (Appendix II). The mothers were requested to record food and drink intake of their child over a 7-day period. The food diaries were collected after 7 days.

The nutrient content of each meal was calculated by utilizing the tables of food composition (Appendix III) in Sri Lanka. Then amount of Energy, Protein, vitamin A. Vitamin C, Calcium and Iron received by the child per day was calculated. Finally, average amount of the above nutrients received by the child per day was calculated by taking the average from the nutrient amounts they have received through 7 days.

3.3. Implementation of the Community Nutrition Program

3.3.1 Volunteer Leaders' Training Seminars

To implement the participatory health education program, building the capacity of local women is essential. At first, those women who wish to become volunteer leaders were selected under the consultancy of the village midwife. A group of 18 volunteer leaders were selected in this manner.

The volunteer leaders were trained in leadership skills, nutrition and health education. The training was held once a week for seven consecutive weeks.

At the end of the training, "Volunteer leaders training evaluation sheets" were given to them to fill in, in order to evaluate the progress of the training seminars (Appendix V).

3.3.2. Mothers' Discussion Groups

The establishment of mothers groups was done after completion of training for volunteer leaders. All the mothers who have babies of 5 years and under and, pregnant mothers of Nawimana South and Nawimana North were invited to attain these groups.

These groups were lead by trained volunteer leaders and were consist of 10-15 mothers. The discussion group meetings were held fortnightly and the venue changed in a roster manner. There was time for informal chat and personnel discussion in the tea breaks. This enabled health and nutrition education and discussion to take place in a friendly environment. Meetings were arranged with volunteer leaders to disperse information, to get feed back and also to provide encouragement.

3.4. Assessment of the Program

3.4.1.Home Visits

Home visits gave the opportunity to the nutrition trainer, to meet mothers personally in their own houses and to discuss their personal problems regarding health and nutrition. The mothers were asked series of questions, covering all the aspects required to assess and it was recorded on home visit survey sheets (Appendix VI).

The home visits were also helpful to assess family food security situations, food preparation conditions, water and sanitation, and most importantly to evaluate whether the mothers are implementing changes as the program progresses.

CHAPTER 04

Results and Discussion

The aim of this project was to reduce the incidence of undernourishment amongst the children between 0 –5 years. It is important to have a better idea about the nutritional status of the children before implementing the program, in order for the assessment of the "Community Nutrition Program" . The 3-5 year age group is a vulnerable age group for nutrition deficiency. Since most of them become fussy eaters, and due to their activeness in day to day life, the children in this age group easily get undernourished. Also this age group has fast growth rates that are obvious. Thus , children in this age group were selected as the population that was used to assess the nutritional status.

40 children were selected randomly out of 156 children who were between 3-5 years in Nawimana South and Nawimana North villages. These include almost equal numbers of boys and girls and this sample population has covered all socio-economical groups.

4.1. Nutritional status of the children

4.1.1. Nutritional status of children before implementing the program

The table 4.1. depicts the height for age of the children compared with the reference standards before implementing the program.

Table 4.1. Nutritional status of children (Height for age)

child ref: no:	sex	Age of child (months)	Height of child (cm)	(Ref. Std) - 2 SD	nutritional status
1	B	58	102.0	99.7	N
2	B	59	99.7	100.2	L
3	B	59	102.0	100.2	N
4	B	60	122.3	100.7	N
5	B	55	108.7	98.2	N
6	B	58	105.5	99.7	N
7	B	56	98.5	98.7	L
8	B	60	104.5	100.7	N
9	B	51	105.4	96.1	N

10	B	41	94.0	90.4	N
11	B	53	102.5	97.1	N
12	B	50	98.8	95.5	N
13	B	54	106.0	97.7	N
14	B	46	97.0	93.3	N
15	B	53	101.5	97.1	N
16	B	50	94.8	95.5	L
17	B	55	105.6	98.2	N
18	B	38	94.3	88.6	N
19	G	60	103.0	99.5	N
20	G	56	105.0	97.6	N
21	G	56	106.0	97.6	N
22	G	60	110.3	99.5	N
23	G	62	114.9	100.5	N
24	G	61	109.6	100.0	N
25	G	61	108.5	100.0	N
26	G	61	104.0	100.0	N
27	G	59	101.3	99.1	N
28	G	52	98.5	95.6	N
29	G	51	102.2	95.1	N
30	G	45	100.0	91.9	N
31	G	50	99.1	94.6	N
32	G	51	107.7	95.1	N
33	G	60	106.2	99.5	N
34	G	58	100.1	98.6	N
35	G	43	101.0	90.7	N
36	G	60	103.4	99.5	N
37	G	48	101.0	93.5	N
38	G	42	104.0	90.2	N
39	G	51	100.0	95.1	N
40	G	42	96.0	90.2	N

N- Normal L- Low

- The percentage of stunting within the population is 7.5 %

$$\frac{3}{40} \times 100$$

Stunting indicates that, a child's height for age is less than (– 2) standard deviations (Reference standard). It is a measure of past undernutrition or growth failure. In this sample population the percentage of stunting was 7.5%. This gives evidence that 7.5% of the population were experienced undernutrition or failure in growth during their early days of life. This also confirms the requirement of health and nutrition education, in those two villages, that could help to reduce the risks of undernourishment.

The table 4.2. shows the height for age of the children compared with the reference standards before implementing the program.

Table 4.2. Nutritional status of children (Weight for age)

child ref: no:	sex	Age of child (months)	Weight of child (kg)	- 2 SD	nutritional status
1	B	58	13.8	14.2	L
2	B	59	16.0	14.3	N
3	B	59	16.0	14.3	N
4	B	60	23.2	14.4	N
5	B	55	18.0	13.8	N
6	B	58	15.6	14.2	N
7	B	56	16.0	13.9	N
8	B	60	15.0	14.4	N
9	B	51	15.6	13.3	N
10	B	41	12.6	12.0	N
11	B	53	14.4	13.5	N
12	B	50	14.0	13.1	N
13	B	54	15.8	13.7	N
14	B	46	12.4	12.6	L
15	B	53	16.8	13.5	N
16	B	50	12.8	13.1	L
17	B	55	16.0	13.8	N
18	B	38	13.8	11.7	N
19	G	60	14.2	13.8	N
20	G	56	15.2	13.4	N
21	G	56	15.2	13.4	N
22	G	60	15.2	13.8	N
23	G	62	19.4	14.0	N
24	G	61	16.4	13.9	N
25	G	61	18.8	13.9	N
26	G	61	16.6	13.9	N
27	G	59	13.6	13.7	L
28	G	52	14.8	13.0	N

29	G	51	13.6	12.9	N
30	G	45	15.0	12.2	N
31	G	50	13.0	12.8	N
32	G	51	16.2	12.9	N
33	G	60	14.2	13.8	N
34	G	58	14.7	13.6	N
35	G	43	15.8	12.0	N
36	G	60	15.8	13.8	N
37	G	48	13.7	12.6	N
38	G	42	21.0	11.9	N
39	G	51	13.8	12.9	N
40	G	42	14.0	11.9	N

N- Normal L-Low

- The percentage of underweight within the population is 10 %

$$\frac{4}{40} \times 100$$

The weight for age which is less than (-2) SD indicates that, the child is underweight. This is a result of the combination of Stunting and Wasting and it is useful to identify the overall magnitude of the extent of undernutrition. The percentage of underweight was 10% and it's an important statistic. This means, the sample populations' nutritional level was quite low, and the others in the target group in a risk of undernourishment.

The table 4.3. illustrates the Weight for Height of the children compared with the reference standards before implementing the program.

Table 4.3 .Nutritional status of children (Weight for Height)

child ref: no:	sex	Weight of child (kg)	Height of child (cm)	- 2 SD	nutritional status
1	B	13.8	102.0	13.4	N
2	B	16.0	99.7	12.9	N
3	B	16.0	102.0	13.4	N
4	B	23.2	122.3	21.2	N
5	B	18.0	108.7	15.0	N
6	B	15.6	105.5	14.3	N
7	B	16.0	98.5	12.7	N
8	B	15.0	104.5	14.0	N
9	B	15.6	105.4	14.3	N
10	B	12.6	94.0	11.8	N
11	B	14.4	102.5	13.6	N
12	B	14.0	98.8	12.8	N
13	B	15.8	106.0	14.4	N
14	B	12.4	97.0	12.4	N
15	B	16.8	101.5	13.3	N
16	B	12.8	94.8	11.9	N
17	B	16.0	105.6	14.3	N
18	B	13.8	94.3	11.8	N
19	G	14.2	103.0	13.3	N
20	G	15.2	105.0	13.8	N
21	G	15.2	106.0	14.3	N
22	G	15.2	110.3	15.2	N
23	G	19.4	114.9	16.9	N
24	G	16.4	109.6	14.9	N
25	G	18.8	108.5	15.0	N
26	G	16.6	104.0	13.5	N
27	G	13.6	101.3	13.0	N
28	G	14.8	98.5	12.3	N
29	G	13.6	102.2	13.1	N
30	G	15.0	100.0	12.7	N
31	G	13.0	99.1	12.4	N
32	G	16.2	107.7	14.4	N
33	G	14.2	106.2	14.0	N
34	G	14.7	100.1	13.0	N
35	G	15.8	101.0	12.9	N
36	G	15.8	103.4	13.4	N
37	G	13.7	101.0	13.2	N
38	G	21.0	104.0	13.5	N
39	G	13.8 -	100.0	12.7	N
40	G	14.0	96.0	11.8	N

- The percentage of wasting within the population is 0 %

$$\frac{0}{40} \times 100$$

The Weight for Height which is less than (-2) SD indicates that, the child is wasted. This is useful in identifying the current undernutrition of a child. Since the percentage of wasting was 0 %, there are no children who are currently undernourished.

4.1.2.Nutritional status of children after implementing the program

The table 4.4. shows the height for age of the children compared with the reference standards after implementing the Community Nutrition Program.

Table 4.4. Nutritional status of children (Height for age)

child ref: no:	sex	Age of child (months)	Height of child (cm)	- 2 SD	nutritional status
1	B	61	102.0	101.2	N
2	B	62	99.7	101.7	L
3	B	62	102.0	101.7	N
4	B	63	122.3	102.2	N
5	B	58	108.9	99.7	N
6	B	61	105.5	102.2	N
7	B	59	98.5	100.2	L
8	B	63	104.5	102.2	N
9	B	54	105.4	97.7	N
10	B	44	94.0	92.1	N
11	B	56	102.5	98.7	N
12	B	53	98.8	97.1	N
13	B	57	106.0	99.2	N
14	B	49	97.0	95.0	N
15	B	56	101.5	98.7	N
16	B	53	94.8	97.1	L
17	B	58	105.6	99.7	N
18	B	41	94.3	90.4	N
19	G	63	103.0	100.9	N
20	G	59	105.0	99.1	N
21	G	59	106.1	99.1	N
22	G	63	110.3	100.9	N
23	G	65	114.9	101.8	N
24	G	64	109.6	101.4	N

25	G	64	108.5	101.4	N
26	G	64	104.0	101.4	N
27	G	62	101.3	100.5	N
28	G	55	98.5	97.1	N
29	G	54	102.2	96.7	N
30	G	48	100.0	93.5	N
31	G	53	99.1	96.1	N
32	G	54	107.7	96.7	N
33	G	63	106.2	100.9	N
34	G	61	100.1	100.0	N
35	G	46	101.0	92.4	N
36	G	63	103.4	100.9	N
37	G	51	101.0	95.1	N
38	G	45	104.0	91.9	N
39	G	54	100.1	96.7	N
40	G	45	96.0	91.9	N

N- Normal L-Low

- The percentage of stunting within the population was 7.5 %

The percentage of stunting was remained same before and after implementing the program This result can be accepted because stunting indicates past undernourishment, which cannot be over come within a short period of time. Stunting results from insufficient protein energy intake, frequent infection and incorrect feeding practices. If the mothers pay more attention on giving their children with more energy and protein rich foods and on correct feeding practices, the incidence of stunting can be reduced gradually from the population.

Table 4.5. shows the weight for age of the children compared with the reference standards after implementing the program.

Table 4.5. Nutritional status of children (Weight for age)

child ref: no:	sex	Age of child (months)	Weight of child (kg)	- 2 SD	nutritional status
1	B	61	14.0	14.6	L
2	B	62	16.2	14.7	N
3	B	62	16.3	14.7	N
4	B	63	23.3	14.8	N

5	B	58	19.2	14.2	N
6	B	61	15.4	14.6	N
7	B	59	17.1	14.3	N
8	B	63	15.2	14.8	N
9	B	54	15.4	13.7	N
10	B	44	13.0	12.4	N
11	B	56	14.8	13.9	N
12	B	53	14.4	13.5	N
13	B	57	16.2	14.0	N
14	B	49	13.1	13.0	N
15	B	56	16.9	13.9	N
16	B	53	13.7	13.5	N
17	B	58	16.5	14.2	N
18	B	41	13.9	12.0	N
19	G	63	14.4	14.1	N
20	G	59	15.4	13.7	N
21	G	59	15.4	13.7	N
22	G	63	15.1	14.1	N
23	G	65	19.6	14.3	N
24	G	64	17.0	14.2	N
25	G	64	18.4	14.2	N
26	G	64	16.8	14.2	N
27	G	62	14.0	14.0	N
28	G	55	15.0	13.3	N
29	G	54	14.3	13.2	N
30	G	48	14.8	12.6	N
31	G	53	13.3	13.1	N
32	G	54	16.4	13.2	N
33	G	63	14.8	14.1	N
34	G	61	15.6	13.9	N
35	G	46	15.8	12.3	N
36	G	63	15.8	14.1	N
37	G	51	13.9	12.9	N
38	G	45	21.8	12.2	N
39	G	54	13.4	13.2	N
40	G	45	14.2	12.2	N

N-Normal L-Low

- The percentage of underweight within the population was 2.5 %

$$\frac{1}{40} X100$$

The percentage of underweight was reduced from 10 % to 2.5 %. Underweight is a composite measure of stunting and wasting and is useful for defining the overall magnitude of the extent of undernutrition in a population. Since, the percentage of underweight has been reduced obviously , the overall magnitude of the undernutrition has also been reduced. This result can be considered as an outcome of the Community Nutrition Program .

Table 4.6. shows the weight for height compared with the reference standards after implementing the Nutrition Program.

Table 4.6. Nutritional status of children (Weight for Height)

child ref: no:	sex	Weight of child (kg)	Height of child (cm)	- 2 SD	nutritional status
1	B	14.0	102.0	13.4	N
2	B	16.2	99.7	12.9	N
3	B	16.3	102.0	13.4	N
4	B	23.3	122.3	21.2	N
5	B	19.2	108.9	15.0	N
6	B	15.4	105.5	14.3	N
7	B	17.1	98.5	12.7	N
8	B	15.2	104.5	14.0	N
9	B	15.4	105.4	14.3	N
10	B	13.0	94.0	11.8	N
11	B	14.8	102.5	13.6	N
12	B	14.4	98.8	12.8	N
13	B	16.2	106.0	14.4	N
14	B	13.1	97.0	12.4	N
15	B	16.9	101.5	13.3	N
16	B	13.7	94.8	11.9	N
17	B	16.5	105.6	14.3	N
18	B	13.9	94.3	11.8	N
19	G	14.4	103.0	13.3	N
20	G	15.4	105.0	13.8	N
21	G	15.4	106.1	14.3	N
22	G	15.1	110.3	15.2	N
23	G	19.6	114.9	16.9	N
24	G	17.0	109.6	14.9	N
25	G	18.4	108.5	15.0	N
26	G	16.8	104.0	13.5	N

27	G	14.0	101.3	13.0	N
28	G	15.0	98.5	12.3	N
29	G	14.3	102.2	13.1	N
30	G	14.8	100.0	12.7	N
31	G	13.3	99.1	12.4	N
32	G	16.4	107.7	14.4	N
33	G	14.8	106.2	14.0	N
34	G	15.6	100.1	12.7	N
35	G	15.8	101.0	12.9	N
36	G	15.8	103.4	13.4	N
37	G	13.9	101.0	13.2	N
38	G	21.8	104.0	13.5	N
39	G	13.4	100.1	12.7	N
40	G	14.2	96.0	11.8	N

N-Normal L-Low

- The percentage of wasting within the population was 0 %

$$\frac{0}{40} X100$$

The percentage of wasting within population was also didn't change after implementing the Community Nutrition Program. Wasting is a sensitive measure of current undernutrition. Since no body in the sample population is experiencing current undernutriton , it can be stated that there is a positive effect of the Community Nutrition Program on the nutritional status of the target population.

4.1.3. Comparison of nutritional status before and after the program

To assess the impact of the Community Nutrition Program, it is required to compare the differences of heights and weights of the sample population before and after implementing the program. The table 4.7.1.shows the height comparison of the sample population before and after implementing the program.

Table 4.7.1. Height comparison

child ref: no:	sex	Height of child (cm) BEFORE	Height of child (cm) AFTER
1	B	102.0	102.0
2	B	99.7	99.7
3	B	102.0	102.0
4	B	122.3	122.3
5	B	108.7	108.9
6	B	105.5	105.5
7	B	98.5	98.5
8	B	104.5	104.5
9	B	105.4	105.4
10	B	94.0	94.0
11	B	102.5	102.5
12	B	98.8	98.8
13	B	106.0	106.0
14	B	97.0	97.0
15	B	101.5	101.5
16	B	94.8	94.8
17	B	105.6	105.6
18	B	94.3	94.3
19	G	103.0	103.0
20	G	105.0	105.0
21	G	106.0	106.1
22	G	110.3	110.3
23	G	114.9	114.9
24	G	109.6	109.6
25	G	108.5	108.5
26	G	104.0	104.0
27	G	101.3	101.3
28	G	98.5	98.5
29	G	102.2	102.2
30	G	100.0	100.0

31	G	99.1	99.1
32	G	107.7	107.7
33	G	106.2	106.2
34	G	100.1	100.1
35	G	101.0	101.0
36	G	103.4	103.4
37	G	101.0	101.0
38	G	104.0	104.0
39	G	100.0	100.1
40	G	96.0	96.0

Ho: There is no difference in heights before and after implementing the program

H1: There is a difference in heights before and after implementing the program

P =0.103

P' = 0.05

Since P > P', Ho is not rejected at 95% significant level. So there is no difference in heights before and after implementing the program.

In general, a child has an annual increment in height of 2-3 cm. This increment is not so obvious and is a gradual increment through out the year. This nutrition program was carried out within a short period of time (3 months) and this time period is not sufficient to a child to gain a considerable height increment. So there may not be a significant height change before and after implementing the program.

But there was one exception. One child out of 40 children gained 2 cm within the 3 months time period (ref. 5). This result might be an outcome of a genetic behavior or a practical error.

The table 4.7.2.shows the weight comparison of the sample population before and after implementing the program.

Table 4.7.2 Weight comparison

child ref: no:	sex	Weight of child (kg) BEFORE	Weight of child (kg) AFTER
1	B	13.8	14.0
2	B	16.0	16.2
3	B	16.0	16.3
4	B	23.2	23.3
5	B	18.0	19.2
6	B	15.6	15.4
7	B	16.0	17.1
8	B	15.0	15.2
9	B	15.6	15.4
10	B	12.6	13.0
11	B	14.4	14.8
12	B	14.0	14.4
13	B	15.8	16.2
14	B	12.4	13.1
15	B	16.8	16.9
16	B	12.8	13.7
17	B	16.0	16.5
18	B	13.8	13.9
19	G	14.2	14.4
20	G	15.2	15.4
21	G	15.2	15.4
22	G	15.2	15.1
23	G	19.4	19.6
24	G	16.4	17.0
25	G	18.8	18.4
26	G	16.6	16.8
27	G	13.6	14.0
28	G	14.8	15.0
29	G	13.6	14.3
30	G	15.0	14.8
31	G	13.0	13.3
32	G	16.2	16.4
33	G	14.2	14.8
34	G	14.7	15.6
35	G	15.8	15.8
36	G	15.8	15.8

37	G	13.7	13.9
38	G	21.0	21.8
39	G	13.8	13.4
40	G	14.0	14.2

Ho: There is no difference in weights before and after implementing the program

H1: There is a difference in weights before and after implementing the program

P =0.000

P' = 0.05

Since P < P', Ho is rejected at 95% significant level. So there is a difference in weights before and after implementing the program

A significant weight gain can be achieved within 3 months of time period. Weight increment can be used to assess the impact of the Community Nutrition Program, because it is a very significant parameter. Since, there is a significant difference in weights before and after implementing the program ,it can be stated that there is a positive effect of the Community Nutrition Program on the weight gain of the population. This weight gain might be a result of the improvement of the mother's knowledge on health and nutrition through the Community Nutrition Program.

4.2 . Results of the dietary survey

32 out of 40 food diaries were returned.

The percentages of children, which do not receive , daily dietary nutrients that meet the Sri Lankan recommended nutrient intake are as follows. (Appendix VII)

Energy	33.8 %
Protein	0.01 %
Calcium	40.2 %
Iron	100 %
Vitamin A	15 %
Vitamin C	27 %

There were 33.8% ,of children under the recommended daily intake of energy. which can adversely affect to their growth. An adequate intake of protein can be found in all households, according to the food diary. All diets indicated that the iron intake is not sufficient at all. So Iron intake should be increased by 100%. Calcium intake is also should be increased in children's diets by 40.2%. Vitamin intake was generally good but it is necessary to be increasing it by 15%. Inadequate vitamin C intake (27%) was observed in children, especially on days when few vegetables or no fruit were consumed.

58% of mothers reported that their children often don't like to eat, making it difficult for mothers to ensure they are receiving all the nutrients they require. A large number of mothers don't grow any vegetables in their homes. But most households have one or more fruit trees such as banana, papaw, jack fruit and other useful trees such as coconut. The most common places that they purchase their foods were the market and local boutiques. 81% of the mothers have introduced complementary foods to their child at 4-5 months of age. The children were breastfed for an average of 2 years. Most families have 1- 3 children. The amount that they spend on food varied from Rs. 500 - 2000 per week.

This dietary survey helped to identify the constraints that prevent children receiving sufficient daily dietary nutrients. The gathered results also helped to confirm that there is a need of education programs on Health and Nutrition.

4.3. Implementation of the Community Nutrition Program

4.3.1. Summary obtained from Volunteer Leaders Training Evaluation Sheets

All (100%) of the volunteer leaders were completely satisfied with the Community Nutrition program. They have suggested adding following new areas into the program.

- Relevant videos or films into sessions
- More information on immunization, communicable diseases
- More active participation of the leaders in sessions

The training seminars were interesting to almost every volunteer leader. 93.75% of the volunteer leaders easily understood, the information supplied to them. Almost every

leader stated that the handouts were useful for them. To improve the handouts, they have suggested to include page numbers, introduce graphs from national reports and to add more pictures. 100% of the volunteer leaders didn't find any difficulty regarding flipcharts & drawings, which were used in the seminars.

The most interesting sessions for the volunteer leaders were malnutrition cycle, nutrition of the girl child, worm infections, malnutrition during pregnancy, immunization, home gardening, deficiency disorders and complementary feeding. 25 % of the leaders have pointed out that they had acquired a very good knowledge on all of the topics and others stated that they have learnt more on the following topics than the others.

- Immunization
- Worm infections
- Vicious cycle of malnutrition
- Home gardening
- Deficiency disorders
- Cleanliness and household sanitation

The leaders have suggested the below topics to be added as new topics for the training.

- Family planning
- Easily spreading diseases
- Dental health

Most of the volunteer leaders (81.25 %) were satisfied with teaching methods and the way of presentation. Also 81.25 % people stated that they are satisfied with the lecturers. The same percentage of the leaders has reported that they have gathered a lot of new information from this training. 56.2 % of the leaders think that they can transfer the information they received to others successfully, but 37.5 % has a less confident than the others, on this. The leaders overall confident regarding, taking up leadership on mother's discussion groups before the training was quite low. But after the training their confident has been increased considerably.

Almost all of the leaders stated that there should not be any changes in training seminars. 81.2 % were satisfied about the venue of the training, while 75 % were satisfied

about the study environment. Their responses regarding tea which was supplied to them was very good, but they weren't satisfied with the food.

Almost every volunteer leader thinks that, the training given to them had helped them to find out new methods of care giving for their families. The training also helped them to improve their family's health, home gardening, to take food on time, to take nutritious food, , methods of preparing food without destroying vitamins, cleanliness in households, to get good quality food, to keep away worm infections and infant feeding.

They have reported that, below reasons lead to health problems in their community.

- Lack of knowledge of mothers
- Not taking midwife's instructions in to consideration
- Unhygienic practices
- Not utilizing nutritious food
- Poverty
- Following myths and believes on food consumption
- Bad health habits

The summery obtained from the Volunteer leaders' Training Evaluation Sheets gives evidence of the successfulness of Volunteer leaders' training seminars. The main target of conducting training seminars for the Volunteer leaders was , to improve their knowledge in health and nutrition as well as to develop leadership skills in them . It was expected to transfer the knowledge that they acquired, to the other mothers in the target village through them. They were given the responsibility to conduct the Mothers' Discussion Groups and they were given the required knowledge, guidance and the confidence to lead the mothers' Discussion Groups. But they were inspected informally on this task in order to assess the objectives are being met. During the seminars the volunteer leaders were actively participated in most of the sessions. They had the enthusiasm in attending the seminars. At the end of the seminars they appreciated the service that were given to them by the Health Educator and the Nutrition Trainer.

The main aim in establishing Mothers' Discussion Group was to educate the mothers on certain aspects in Health and Nutrition. . The mother of the house has the responsibility in preparation of food for the family and taking care of the children . If

mothers' were given more education and knowledge on Health and Nutrition it can indirectly affect on improving the nutritional level, health and well being of their families. Thus. the risk of under nourishment and malnourishment can also be reduced in target group.

The pregnant mothers were also invited to participate in Mothers' Discussion Groups. If they received a good knowledge on Health and Nutrition and if they could do behavioral changes regarding Health and Nutrition it would be a great benefit for the fetus also and it would prevent low birth weight babies. This could stop the vicious cycle of malnutrition and consequently it would reduce the risk of under nourishment and malnourishment of the children, 5 years and under.

4.4. Assessment of the program

4.4.1. Results gathered from home visits

The results gathered from the home visits indicated that the growth charts of all the children were kept updated. 100% of the mothers have the ability to read and interpret the growth chart. 44.45 % of the children's growth curves are normal, 38. 89% of the curves are moving up and down, and 16.67 % of the children having growth curves which can be categorized as low growth curves.

Most of the families have 5 – 6 members and there were 3 children in most of the families. 50 % of the families live with their old parents. Husband is the main source of income generator for 83.33 % houses, mother for 11.11 % houses and the rest have different other sources of income . The average monthly income for the houses is Rs. 6000 and they spend Rs. 4000 from it for food. Almost all the people think that a good nutrition means a balanced diet which includes all the essential nutrients as well as prepared in sanitary and clean conditions.100% of the mothers think that their families eat a balanced diet. They think that the major problems that prevent their families having a good diet are; economic problems, lack of availability of food, illnesses and different food habits of the family members.

Most of the children have experienced fever 5 times in last 3 months and they were suffered from respiratory infections frequently. But only 16.66% of them experienced diarrhea only once within the last 3 months. The other illnesses, which they

have experienced. were fit, wheezing, and urinary tract problems. The mothers themselves have experienced fever and respiratory infections once or twice, within the past 3 months. During the study period 5.56 % mothers as well as the family members(other than children) suffered from diarrhea within the above mentioned duration. The other family members in the family also have caught fever once or twice and they also experienced respiratory infections frequently. No body has experienced worm infections because they were taking pills once in every 6 months .

They are interested in having nutrition programs, small business development programs, family health programs, youth education programs, children's education programs, and sewing training programs in their village. Almost every mother would like to attend in nutritious cooking, home gardening, fussy eaters / parenting skills workshops.Only few mothers (5.56%) were not interested in attending the home gardening workshop.

Most of the mothers had almost every food when they were pregnant, but some mothers didn't. One mother didn't eat sour foods because it made her vomit, another mother didn't ate fish and meat just because she doesn't feel like eating it and the other one didn't ate pineapple, papaw and manioc because she was not allowed to eat them during pregnancy . The foods that are not been eaten by other family members in certain times were jack, bitter guard, meat , capsicum, beef, beans, green leaves, spinach, ladies finger and sweet meats.

There were 55.55% households which have their own water source as pipelines and 33. 33% used their own wells while 11.11% of them are not covered. The rest of the households use public pipelines and shared wells. The habit of drinking boiled water was practiced by 27.77% of the parents but, they give boiled water to their children. Only 11.11% of the families do not boil their drinking water at all.

Nearly 100% of the people use iodized salt, wash hands before eating using soap, wash their hands after toilet with soap and wash dishes with soap. But16.66% of the people do not always wash hands before preparing food. There were 2 houses that didn't have a sanitary toilet on their own. Over 55.55% of the people do not use slippers when they go out. More than 38.88% of the houses don't have chimneys. Almost every house

kept food covered, surfaces and floor was kept clean and food was kept in pots covered with lids when not consuming. Almost all the houses eat the food within 2 hours after preparation and if they eat it after 2 hours they reheat it.

Most of the houses have a garden space and most of them have a home garden which consists mainly with lemon, wood apple, coconut, king coconut and mango. Most of the mothers have the willingness to grow brinjals, ladies fingers, manioc, papaw, tomato, pumpkin in their home gardens.

The results gathered from home visits depicts that, there are behavioral changes in family nutrition, food preparation and household sanitation through improved knowledge. Almost all the mothers keep aware of their child's growth and they know how to read and interpret the growth charts of their children before and after implementing the program. They also keep more attention on providing good nutritious food as well as balanced diets to their children and to other family members. They now have a sufficient knowledge on making, their children grow healthier and normally. The Mothers' Discussion Groups were expected to continue even after finishing the project in order to disperse more knowledge on Health and Nutrition amongst mothers.

CHAPTER 05

Conclusions and Recommendations

5.1. Conclusions

There was a positive increase in the nutritional status of the children. The children have achieved a considerable weight gain during the 3-month period ,but there was no significant increase in heights.

There were behavioral changes in family nutrition, food preparation and household sanitation through improved knowledge.

The volunteer leaders have developed leadership skills and confidence through the training seminars.

The Mothers' Discussion Groups have been established and they were continuing successfully.

The Community Nutrition Program was in success and it lead to reduce the risk of undernourishment amongst children in the target villages.

5.2. Recommendations for further studies

The height of the child increases very slowly. So that, it would take more than six months to achieve a measurable height difference. In order to assess the changes in height, the study period must be extended.

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Appendix I

NCHS Reference Standards

Table 1.1. Weight for age of boys and girls

Boys						Girls				
Age		- 1 SD	- 2 SD	- 3 SD		Age		-1 SD	- 2 SD	-3 SD
Years	Mths					Years	Mths			
3	0	13.0	11.4	9.8		3	0	12.6	11.2	9.7
3	1	13.2	11.5	9.9		3	1	12.8	11.3	9.8
3	2	13.3	11.7	10.0		3	2	12.9	11.4	9.9
3	3	13.5	11.8	10.1		3	3	13.1	11.5	10.0
3	4	13.6	11.9	10.2		3	4	13.2	11.6	10.1
3	5	13.8	12.0	10.3		3	5	13.3	11.8	10.2
3	6	13.9	12.1	10.4		3	6	13.5	11.9	10.3
3	7	14.1	12.3	10.5		3	7	13.6	12.0	10.4
3	8	14.2	12.4	10.6		3	8	13.7	12.1	10.5
3	9	14.4	12.5	10.7		3	9	13.9	12.2	10.6
3	10	14.5	12.6	10.8		3	10	14.0	12.3	10.7
3	11	14.6	12.8	10.9		3	11	14.1	12.4	10.8
4	0	14.8	12.9	11.0		4	0	14.3	12.6	10.9
4	1	14.9	13.0	11.1		4	1	14.4	12.7	10.9
4	2	15.1	13.1	11.2		4	2	14.5	12.8	11.0
4	3	15.2	13.3	11.3		4	3	14.6	12.9	11.1
4	4	15.4	13.4	11.4		4	4	14.8	13.0	11.2
4	5	15.5	13.5	11.5		4	5	14.9	13.1	11.3
4	6	15.7	13.7	11.6		4	6	15.0	13.2	11.4
4	7	15.8	13.8	11.8		4	7	15.1	13.3	11.5
4	8	16.0	13.9	11.9		4	8	15.2	13.4	11.5
4	9	16.1	14.0	12.0		4	9	15.4	13.5	11.6
4	10	16.3	14.2	12.1		4	10	15.5	13.6	11.7
4	11	16.4	14.3	12.2		4	11	15.6	13.7	11.8
5	0	16.6	14.4	12.3		5	0	15.7	13.8	11.9
5	1	16.7	14.6	12.4		5	1	15.9	13.9	11.9
5	2	16.8	14.7	12.6		5	2	16.0	14.0	12.0
5	3	17.0	14.8	12.7		5	3	16.1	14.1	12.1

5	4	17.1	15.0	12.8		5	4	16.2	14.2	12.2
5	5	17.3	15.1	12.9		5	5	16.4	14.3	12.2
5	6	17.4	15.2	13.0		5	6	16.5	14.4	12.3
5	7	17.6	15.4	13.1		5	7	16.6	14.5	12.4
5	8	17.7	15.5	13.2		5	8	16.7	14.6	12.5
5	9	17.9	15.6	13.4		5	9	16.9	14.7	12.5
5	10	18.0	15.8	13.5		5	10	17.0	14.8	12.6
5	11	18.2	15.9	13.6		5	11	17.1	14.9	12.7

Table 1.2. Stature for age of boys and girls

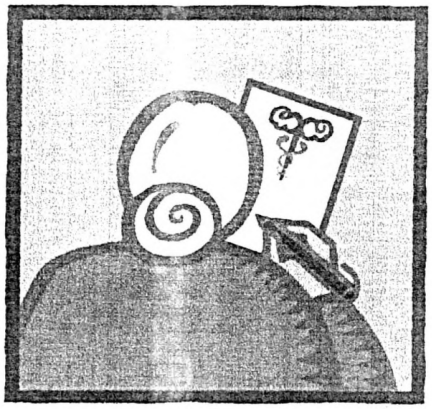
Boys					Girls				
Age		- 1 SD	- 2 SD	- 3 SD	Age		- 1 SD	- 2 SD	- 3 SD
Years	Mths				Years	Mths			
3	0	91.1	87.3	83.5	3	0	90.2	86.5	82.8
3	1	91.8	87.9	84.1	3	1	90.9	87.1	83.4
3	2	92.4	88.6	84.7	3	2	91.5	87.7	84.0
3	3	93.1	89.2	85.2	3	3	92.2	88.4	84.5
3	4	93.8	89.8	85.8	3	4	92.8	89.0	85.1
3	5	94.4	90.4	86.4	3	5	93.4	89.6	85.7
3	6	95.0	91.0	86.9	3	6	94.0	90.2	86.3
3	7	95.7	91.6	87.5	3	7	94.7	90.7	86.8
3	8	96.3	92.1	88.0	3	8	95.3	91.3	87.4
3	9	96.9	92.7	88.6	3	9	95.8	91.9	87.9
3	10	97.5	93.3	89.1	3	10	96.4	92.4	88.4
3	11	98.1	93.9	89.6	3	11	97.0	93.0	89.0
4	0	98.7	94.4	90.2	4	0	97.6	93.5	89.5
4	1	99.3	95.0	90.7	4	1	98.1	94.1	90.0
4	2	99.9	95.5	91.2	4	2	98.7	94.6	90.5
4	3	100.4	96.1	91.7	4	3	99.3	95.1	91.0
4	4	101.0	96.6	92.2	4	4	99.8	95.6	91.5
4	5	101.6	97.1	92.7	4	5	100.3	96.1	92.0
4	6	102.1	97.7	93.2	4	6	100.9	96.7	92.4
4	7	102.7	98.2	93.7	4	7	101.4	97.1	92.9
4	8	103.2	98.7	94.2	4	8	101.9	97.6	93.4

96.5	13.5	12.2	11.0	96.5	13.2	11.9	10.7
97.0	13.7	12.4	11.0	97.0	13.3	12.0	10.7
97.5	13.8	12.5	11.1	97.5	13.4	12.1	10.8
98.0	13.9	12.6	11.2	98.0	13.5	12.2	10.9
98.5	14.0	12.7	11.3	98.5	13.7	12.3	11.0
99.0	14.1	12.8	11.4	99.0	13.8	12.4	11.1
99.5	14.3	12.9	11.5	99.5	13.9	12.5	11.2
100.0	14.4	13.0	11.6	100.0	14.0	12.7	11.3
100.5	14.5	13.1	11.7	100.5	14.1	12.8	11.4
101.0	14.6	13.2	11.8	101.0	14.3	12.9	11.5
101.5	14.7	13.3	11.9	101.5	14.4	13.0	11.6
102.0	14.9	13.4	12.0	102.0	14.5	13.1	11.7
102.5	15.0	13.6	12.1	102.5	14.6	13.2	11.8
103.0	15.1	13.7	12.2	103.0	14.7	13.3	11.9
103.5	15.3	13.8	12.3	103.5	14.9	13.4	12.0
104.0	15.4	13.9	12.4	104.0	15.0	13.5	12.1
104.5	15.6	14.0	12.6	104.5	15.1	13.7	12.2
105.0	15.8	14.2	12.7	105.0	15.3	13.8	12.3
105.5	15.9	14.3	12.8	105.5	15.4	13.9	12.4
106.0	16.1	14.4	12.9	106.0	15.5	14.0	12.5
106.5	16.2	14.5	13.0	106.5	15.7	14.1	12.6
107.0	16.3	14.7	13.1	107.0	15.8	14.3	12.7
107.5	16.5	14.8	13.2	107.5	15.9	14.4	12.8
108.0	16.6	14.9	13.4	108.0	16.1	14.5	13.0
108.5	16.8	15.0	13.5	108.5	16.2	14.6	13.1
109.0	16.9	15.2	13.6	109.0	16.4	14.8	13.2
109.5	17.1	15.3	13.7	109.5	16.5	14.9	13.3
110.0	17.2	15.4	13.8	110.0	16.6	15.0	13.4
110.5	17.4	15.6	14.0	110.5	16.8	15.2	13.6
111.0	17.5	15.7	14.1	111.0	16.9	15.3	13.7
111.5	17.7	15.9	14.2	111.5	17.1	15.5	13.8
112.0	17.8	16.0	14.4	112.0	17.2	15.6	14.0
112.5	18.0	16.1	14.5	112.5	17.4	15.7	14.1
113.0	18.1	16.3	14.6	113.0	17.5	15.9	14.2
113.5	18.3	16.4	14.8	113.5	17.7	16.0	14.4

Appendix II

Food Diary

මාර්තු 2005



ඔබගේ ප්‍රධාන ආහාර වේල වෙනස් කරන්න එපා. නිතරම සාමාන්‍ය ආහාර වේලක් ගන්න.

මවගේ නම : _____

ළමයාගේ නම : _____

ළමයාගේ වයස : _____ උස :) බර :)

පළමු දවස

කරුණාකර ඔබ අනුහව කළ සියලුම ආහාර වරග සහ ප්‍රමාණය සඳහන් කරන්න.

මවගේ	ළමයාගේ
උදේ ආහාරය පානය	උදේ ආහාරය පානය
දිවා ආහාරය පානය	දිවා ආහාරය පානය
රාත්‍රී ආහාරය	රාත්‍රී ආහාරය
පානය	පානය
ප්‍රධාන ආහාර වේලට අමතර කෑම පානය	ප්‍රධාන ආහාර වේලට අමතර කෑම පානය

ඔබ මව් කිරිදීම නවත්වන විට ඔබාගේ වයස කියද ?

ඔබගේ ඔබාට මව් කිරිදෙන විට වෙනත් ආහාර දුන්නේ වයස කියේදීද ?

දෙවන දවස

කරුණාකර ඔබ අනුභවකළ සියලුම ආහාර වරග සහ ප්‍රමාණය සඳහන් කරන්න.

මවගේ	ළමයාගේ
උදේ ආහාරය පානය	උදේ ආහාරය පානය
දිවා ආහාරය පානය	දිවා ආහාරය පානය
රාත්‍රී ආහාරය පානය	රාත්‍රී ආහාරය පානය
ප්‍රධාන ආහාර වේලට අමතර කෑම පානය	ප්‍රධාන ආහාර වේලට අමතර කෑම පානය

ඔබගේ පවුලේ කිදෙනෙක් දැන් සිට ද ?_____ වැඩහිටියන් ළමයින්

දැනට ඔබට ඔබෙක් ලැබෙන්න සිටිද ? *ඔව් / නැහැ*

නැතිනම් ඔබ බබාට කිරිදෙනවාද ? *ඔව් / නැහැ*

තුන්වන දවස

කරුණාකර ඔබ අනගව කළ සියලුම ආහාර වරග සහ ප්‍රමාණය සඳහන් කරන්න.

මවගේ	ළමයාගේ
උදේ ආහාරය පානය	උදේ ආහාරය පානය
දිවා ආහාරය පානය	දිවා ආහාරය පානය
රාත්‍රී ආහාරය පානය	රාත්‍රී ආහාරය පානය
ප්‍රධාන ආහාර වේලට අමතර කෑම පානය	ප්‍රධාන ආහාර වේලට අමතර කෑම පානය

ඔබගේ බබා කෑම කන්න ආසද?

නැත සමහර විට ඔව්ව

ඔබගේ බබා කෑම කන්නේ නැති විට ඔබ මොනවද කරන්නේ?

හතරවන දවස

කරුණාකර ඔබ අනුභව කළ සියලුම ආහාර වරග සහ ප්‍රමාණය සඳහන් කරන්න.

මවගේ	ළමයාගේ
උදේ ආහාරය පානය	උදේ ආහාරය පානය
දිවා ආහාරය පානය	දිවා ආහාරය පානය
රාත්‍රී ආහාරය පානය	රාත්‍රී ආහාරය පානය
ප්‍රධාන ආහාර වේලට අමතර කෑම පානය	ප්‍රධාන ආහාර වේලට අමතර කෑම පානය

ඔබ පවුලේ කෑම ගැන ඔයා හිතන්නෙ මොනවාද? නරකයි හොඳයි ඉතා හොඳයි

ඔබ පවුලේ පෝෂණය දියුනු කරන්න කළයුතු දේ මොනවාද?

පස්වන දවස

කරුණාකර ඔබ අනුභව කළ සියලුම ආහාර වරග සහ ප්‍රමාණය සඳහන් කරන්න.

මවගේ	ළමයාගේ
උදේ ආහාරය පානය	උදේ ආහාරය පානය
දිවා ආහාරය පානය	දිවා ආහාරය පානය
රාත්‍රී ආහාරය පානය	රාත්‍රී ආහාරය පානය
ප්‍රධාන ආහාර වේලට අමතර කෑම	ප්‍රධාන ආහාර වේලට අමතර කෑම
පානය	පානය

කරුණාකර ඔබ කෑම මලඳී ගන්න ස්ථාන වල නම (ඉරිදා පොළ. ගෙවත්තෙන්. සිල්ලර කඩයෙන්)
සහ කෑම වරග (සහල් එලවලු රසකාරක) යනාදි ය ලියන්න .

සතියකට ඔබ ආහාර වලට කොපෙමණ ප්‍රමාණයක් වියදම කරනවද?

0 250 500 750 1000 1250 1500 1750 2000 වැඩි රුපියල්

හය වන දවස

කරුණාකර ඔබ අනුභව කළ සියලුම ආහාර වරග සහ ප්‍රමාණය සඳහන් කරන්න.

මවගේ	ළමයාගේ
උදේ ආහාරය *පානය*	*උදේ ආහාරය* *පානය*
දිවා ආහාරය *පානය*	*දිවා ආහාරය* *පානය*
රාත්‍රී ආහාරය *පානය*	*රාත්‍රී ආහාරය* *පානය*
ප්‍රධාන ආහාර වේලට අමතර කෑම *පානය*	*ප්‍රධාන ආහාර වේලට අමතර කෑම* *පානය*

ඔබ එළවළු වවනවද? **ඔව් / නැහැ / සමහරවිට** මොනවද වවන්නේ?

ඔබේ ආහාරය සඳහා ප්‍රයෝජනයට ගත හැකි ගස් වරග ලියන්න :උදා (පොල් ගස, කෙසෙල් ගස)

හත් වන දවස

කරුණාකර ඔබ අනුභව කළ සියලුම ආහාර වරග සහ ප්‍රමාණය සඳහන් කරන්න.

මවගේ	ළමයාගේ
උදේ ආහාරය පානය	උදේ ආහාරය පානය
දිවා ආහාරය පානය	දිවා ආහාරය පානය
රාත්‍රී ආහාරය පානය	රාත්‍රී ආහාරය පානය
ප්‍රධාන ආහාර වේලට අමතර කෑම	ප්‍රධාන ආහාර වේලට අමතර කෑම
පානය	පානය

සාමාන්‍යයෙන් ඔබගේ බබා ගිය සතියේ කොපමණ ප්‍රමාණයක් කැම කැවාද?

කුඩා යාමාන්‍ය වැඩිපුර

Appendix III

Food composition table

Food	Quantity (gms)	Energy	Protein	Calcium	Iron	Vit A	Vit C
Rice	100	346	7.5	9	3.2	2	
	250	865	18.75	22.5	8	5	0
	300	1038	22.5	27	9.6	6	0
Noodles	100	363	10.4	30	1		
	85	308.55	8.84	25.5	0.85	0	0
Bread	100	245	7.8	11	1.1		
1slice	20	49	1.56	2.2	0.22		
2 slice	40	98	3.12	4.4	0.44		
3 slice	60	147	4.68	6.6	0.66	0	0
4 slice	80	196	6.24	8.8	0.88	0	0
Margarine	100	705		4.		900	
	5	35.25	0	0.2	0	45	
Dhal	100	343	25.1	69	4.8	270	
	50	171.5	12.55	34.5	2.4	135	
Chickpeas	100	360	17.1	202	10.2	189	3
	200	720	34.2	404	20.4	378	6
	300	1080	51.3	606	30.6	567	9
Cow pea	100	323	24	77	5.9	12	
	200	646	48	154	11.8	24	0
Hoppers	100	334	8.6	5	0.6		
String Hoppers	100	324	9.3	13	1.3		
Pittu	100	369	6.2	12	1		
Roti	100	343	6.9	18	1.4		
Papadam	100	288	18.8	80	17.2		
Chicken	100	120	22	25	1		
	75	90	16.5	18.75	0.75		
Fish (tuna)	100	113	23.8	429	6.8		
	75	84.75	17.85	321.75	5.1		
Sprats	100	408	48.1	356	3.7		
	25	102	12.025	89	0.925		

Egg	100	173	13.3	60	2.1	700	
Cheese	100	348	24.1	790	2.1	82	
Milk (powered)	10	49	25	95	0.2	52	0.4
Curd	100	60	3.1	149	0.2	30.6	1
Yogurt	100	90	3.6	140	10		
Pala	30	13.8	1	84.4	8.94	585.6	16.9
Pala Sambol	30	29	1.16	85	9	586	17
Kankun	100	28	2.9	110	3.9	1980	137
							41.1
	30	8.4	0.87	33	1.17	594	
Food	**Quantity (gms)**	**Energy**	**Protein**	**Calcium**	**Iron**	**Vit A**	**Vit C**
Gotukola	100	37	2.1	224	68.8	1950	15
	30	11.1	0.63	67.2	20.64	585	4.5
Mukunvenna	100	73	5	510	16.7	1926	17
	30	21.9	1.5	153	5.01	577.8	5.1
Capsicum (chilly)	100	24	1.3	10	1.2	427	137
	30	7.2	0.39	3	0.36	128.1	41.1
Carrots	100	48	0.9	80	2.2	1890	3
	50	24	0.45	40	1.1	945	1.5
Beans	100	26	1.7	50	1.7	132	24
	50	13	0.85	25	0.85	66	12
Potato	100	97	1.6	10	0.7	24	17
	75	72.75	1.2	7.5	0.525	18	12.75
Sweet Potato	100	120	1.2	46	0.8	6	24
	75	90	0.9	34.5	0.6	4.5	18
Leeks	100	35	2.3	58	2.7	2453	32
	25	8.75	0.575	14.5	0.675	613.25	8
Beetroot	100	43	1.7	18	1	0	10
	50	21.5	0.85	9	0.5	0	5
Pumpkin	100	25	1.4	10	0.7	50	2
	50	12.5	0.7	5	0.35	25	1
Snake Gourd	100	18	0.5	26	0.3	96	
	50	9	0.25	13	0.15	48	0

Onion	100	50	1.2	47	0.7		11
	20	10	0.24	9.4	0.14	0	2.2
Spinach	100	26	2	73	10.9	5580	28
	30	7.8	0.6	21.9	3.27	1674	8.4
Winged							
Beans	100	404	33				
(Dambala)	50	202	16.5	0	0	0	0
Knolkhol	100	21	1.1	20	0.4	21	85
	50	10.5	0.55	10	0.2	10.5	42.5
Ash Banana	100	64	1.4	10	0.6	30	24
	50	32	0.7	5	0.3	15	12
Banana							
Flower	100	34	1.7	32	1.6	27	16
	40	13.6	0.68	12.8	0.64	10.8	6.4
Tomato	100	20	0.9	48	0.4	351	27
	50	10	0.45	24	0.2	175.5	13.5
Bringal	100	24	1.4	18	0.9	74	12
	50	12	0.7	9	0.45	37	6
Ela Batu	100	39	3.1	100	1.2		
	50	19.5	1.55	50	0.6	0	0
Lady's							
Fingers	100	35	1.9	66	1.5	52	13
	50	17.5	0.95	33	0.75	26	6.5
Bitter Gourd	100	60	2.1	23	2	126	96
	50	30	1.05	11.5	1	63	48
Jack Fruit	100	51	2.6	30	1.7	0	14
	40	20.4	1.04	12	0.68	0	5.6
Bread Fruit	100	113	1.5	25	1	0	20
	50	56.5	0.75	12.5	0.5	0	10
Drumstick	50	13	1.25	15	2.65	55	60
Cabbage	50	14	0.9	20	0.4	600	62
Lettuce	20	4	0.4	10	0.5	198	2
Banana	100	116	1.2	17	0.9	78	7
	60	69.6	0.72	10.2	0.54	46.8	4.2
Papaw	100	32	0.6	17	0.5	666	57
Pineapple	100	46	0.4	20	1.2	18	39
Mango	100	74	0.6	14	1.3	2743	16

Grapes	30	17.4	0.18	6	0.15	0.9	0.3
Passion fruit juice	25	9.25	0.3	2.5	0.5	492	3.25
Orange	100	48	0.7	26	0.3	1104	30
Apple	50	29	0.1	5	0.5	0	0.5
Dates	30	43.2	0.36	6.6	1.5	4.8	0.3
Coconut Sambol	10	36.2	0.44	7	0.47		1.4
Coconut - kernel	50	156	1.6	11.5	2		1.5
Coconut milk	25	107.5	0.85	3.75	0.4		0.75
Fried Cashews	50	171	9	16	2		
Peanuts (groundnuts)	50	285	13	38	1.5	0	
Biscuits	100	435	7.4				
	50	217.5	3.7	0	0	0	0
Triposha	100	360	8	15	2		
Bun	100	311	7	23	0.9		
Jam	5	13	0.02	0.6	0.015		0.5
Kola Congee		100.3	2.88	86.65	9.74	586	16.9

Appendix IV

Average Daily Dietary Nutrient Consumption

Ref: no		Energy	Protein	Calcium	Iron	Vit A	Vit C
1	Day 1	1784.5	87.03	801.55	4.0515	1033.6	82.7
	Day 2	1878.5	78.61	410.25	1.255	2390.65	43.5
	Day 3	1581	51.51	331	3.647	4260.8	72.2
	Day 4	1760.75	60.52	635.9	3.3855	3196.6	77.4
	Day 5	1429.75	51.705	466.75	2.192	2554.02	36.45
	Day 6	1623.625	57.06	593.875	3.7375	2623	133.75
	Day 7	1604.8	64.04	604.35	1.782	715.8	26.7
	Average	**1666.132**	**64.35357**	**549.0964**	**2.864357**	**2396.353**	**67.52857**
2	Day 1	1419.16	65	440.3	3.159	456.8	21.6
	Day 2	1435.1	73.325	450.15	2.692	2097.8	41.85
	Day 3	1663	107.59	770.7	2.74	833.4	60.025
	Day 4	1880.15	89.885	468.7	3.2185	2474.5	46.05
	Day 5	1814.5	82.195	285.15	0.8975	183.8	10.95
	Day 6	1731	69.19	394.25	2.627	1533.7	72.6
	Day 7	1765.65	90.1575	310.045	1.835	399.1	53.5
	Average	**1672.651**	**82.4775**	**445.6136**	**2.452714**	**1139.871**	**43.79643**
3	Day 1	1411.7	101.17	368.85	1.41625	2979.1	60
	Day 2	1521.6	82.215	422.8	1.136	1688.4	60.05
	Day 3	1711.05	98.95	755	3.176	2583.4	99.6
	Day 4	1248.15	72.66	649.2	1.087	226.8	11.6
	Day 5	1511.6	82.36	588.5	3.4025	1779.5	137.8
	Day 6	1471.05	90.46	646.9	1.6425	228	18.4
	Day 7	2002.9	105.1	448.7	1.992	2027.2	85.4
	Average	**1554.007**	**90.41643**	**554.2786**	**1.978893**	**1644.629**	**67.55**
4	Day 1	1499.6	92.51	760.25	3.4295	777.8	45.95
	Day 2	1171.7	72.1	787.4	3.2605	1935.2	53.4
	Day 3	1266	72.64	443.9	1.5125	362.2	21.9
	Day 4	1186.4	72.24	540	2.5525	701.8	45.4
	Day 5	1526.5	63.15	341.1	2.265	1629.6	40
	Day 6	1573.35	95.765	804.5	3.552	857.8	58.2
	Day 7	1550.85	94.2	808.7	3.39075	915.1	58.95
	Average	**1396.343**	**80.37214**	**640.8357**	**2.851821**	**1025.643**	**46.25714**
5	Day 1	1776.7	56.95	338.5	2.6005	443.8	59.55
	Day 2	1255.1	64.68	454.55	2.1035	470.2	139.45

	Day 3	1594.15	69.62	587.65	2.875	478.8	38.8
	Day 4	1742.85	97.7	828.8	2.8435	594.2	21.1
	Day 5	1558.95	42.49	364.05	2.4395	350.8	36.1
	Day 6	1760.25	62.2	590.25	1.585	994	16.5
	Day 7	1478.6	52.49	232.7	1.967	1229.8	38.2
	Average	**1595.229**	**63.73286**	**485.2143**	**2.344857**	**651.6571**	**49.95714**
6	Day 1	1372.75	44.005	107.5	1.015	172	36
	Day 2	1593.35	56.63	347.3	3.01625	1042.8	34.8
	Day 3	1531	62.6	532.25	1.49	278	27.2
	Day 4	1297	63.07	288	1.1395	1419.2	27.2
	Day 5	1268.5	51.985	225.1	1.0495	254.3	22.3
	Day 6	984.1	45.04	649.25	3.136	674.6	48.8
	Day 7	1556.05	43.69	163.75	1.0825	1681	13.15
	Average	**1371.821**	**52.43143**	**330.45**	**1.704107**	**788.8429**	**29.92143**
7	Day 1	1945.9	140.245	1142.35	2.2155	1444.4	24.55
	Day 2	1724.3	87.615	790.15	2.08875	465.6	30.8
	Day 3	1591.45	82.95	623.5	3.65575	1020.6	50.4
	Day 4	1561.7	96.99	360.95	3.065	620.8	22.25
	Day 5	1765.6	120.675	1008.5	2.8375	766.8	34.6
	Day 6	1554	104.85	571.1	1.5275	493.2	31.1
	Day 7	1851.1	102.08	514.15	1.638	319.8	36.75
	Average	**1713.436**	**105.0579**	**715.8143**	**2.432571**	**733.0286**	**32.92143**
8	Day 1	1025	40.705	281.65	3.4765	916.3	34.4
	Day 2	1274.45	39.64	404.35	4.0305	915	26.65
	Day 3	1795.9	79.32	403.45	1.33775	287.55	2.7
	Day 4	1571.1	31.1	252.8	2.031	2653.8	35.9
	Day 5	2036	84.22	350.45	1.87725	1198	19.95
	Day 6	1381.95	52.535	415.1	2.44275	1033.8	27.3
	~~Day 7~~	~~1522.65~~	~~29.93~~	~~152.1~~	~~3.0635~~	~~1248~~	~~23.25~~
	Average	**1515.293**	**51.06429**	**322.8429**	**2.608464**	**1178.921**	**24.30714**
9	Day 1	1820.1	84.44	644.6	4.4294	915.6	35.2
	Day 2	1342.7	57.08	687.9	2.5995	3182.7	49.1
	Day 3	1268.2	54.33	705.45	3.3775	669.7	41.15
	Day 4	1898.25	95.07	430.75	2.719	3788.5	71.9
	Day 5	1518.3	49.12	438.5	1.548	1945.62	92.4
	Day 6	2112.75	75.61	240.25	2.48	3359	46.86
	Average	**1660.05**	**69.275**	**524.575**	**2.8589**	**2310.187**	**56.10167**
10	Day 1	1034.9	57.505	543	2.3255	2593.22	44.5
	Day 2	1152.6	37.95	532.3	2.7315	3279.24	52.8
	Day 3	1108.15	24.745	177.6	1.098	1488.22	30.95
	Day 4	1003	22	39.5	0.345	4	0
	Day 5	963	22.84	43.2	0.3565	4	2.4

	Day 6	963	22.84	43.2	0.3565	4	2.4
	Day 7	1003	22	39.5	0.345	4	0
	Average	**1032.521**	**29.98286**	**202.6143**	**1.079714**	**1053.811**	**19.00714**
11	Day 1	1348.4	46.075	316.35	1.657	2335.3	29.4
	Day 2	1432.4	57.94	294.85	1.206	1014.3	22.4
	Day 3	1594.8	68.75	580.15	1.7095	244.5	9.7
	Day 4	1999.9	56.685	282.6	2.2975	1185.4	102.1
	Day 5	2258.75	50.025	335.5	2.27	176	40.75
	Day 6	1633.4	92.88	696.1	2.08575	530.9	57
	Day 7	1699.9	81.55	544.55	2.355	606.4	28.25
	Average	**1709.65**	**64.84357**	**435.7286**	**1.940107**	**870.4**	**41.37143**
12	Day 1	1533.25	71.295	647.85	3.8635	693	37.35
	Day 2	1572.2	56.24	487	1.5385	50	5.6
	Day 3	1877	74.75	639.75	1.8075	983.5	4.875
	Day 4	1475	94.84	460.85	2.20225	434.5	22.2
	Day 5	1496.2	43.78	314.8	5.256	2000	29
	Day 6	1284.25	47.62	472.6	1.292	147	8
	Day 7	1948.5	98.07	808.45	2.36	349.5	4.875
	Average	**1598.057**	**69.51357**	**547.3286**	**2.617107**	**665.3571**	**15.98571**
13	Day 1	1736	77.07	592.85	2.5495	758	34.7
	Day 2	1489.65	58.525	598.6	3.046	1363.4	90.1
	Day 3	1431.55	53.61	315.7	1.315	1298.25	70
	Day 4	1352	29.59	134.4	0.812	2780.5	108.7
	Day 5	1524.35	58.095	448.3	4.587	1341.4	37.9
	Day 6	1809.2	73.9	350.2	1.212	785	1.4
	Day 7	1851.4	80.0725	168.245	1.1625	221	13.15
	Average	**1599.164**	**61.55179**	**372.6136**	**2.097714**	**1221.079**	**50.85**
14	Day 1	1761.85	88.47	761.85	5.104	5798.8	72.35
	Day 2	1614.75	52.725	355.3	5.4304	2374.6	105.9
	Day 3	1617.6	65.08	430.2	3.654	4287	48.7
	Day 4	1505.65	66.23	606.6	3.815	1185	25.45
	Day 5	1596.35	81.92	541.45	3.554	1481.5	44.06
	Day 6	1369.1	77.98	802.2	5.2785	3503	49.7
	Day 7	1697.35	72.63	353.95	4.38025	4516	48.7
	Average	**1594.664**	**72.14786**	**550.2214**	**4.45945**	**3306.557**	**56.40857**
15	Day 1	1179.5	48.98	132.1	0.483	2799	16.4
	Day 2	1313.6	54.565	275.9	1.0735	1473.42	26.8
	Day 3	1260.1	65.02	192.7	0.502	112.8	4.96
	Day 4	1239.85	50.54	156.7	0.3175	766.8	61.6
	Day 5	1262.55	29.225	324.4	2.251	4184.42	42.4
	Day 6	710.5	15.88	15.6	0.183	2	0
	Day 7	1022.55	22.305	180.5	0.934	2543.42	56.4

	Average	**1141.236**	**40.93071**	**182.5571**	**0.820571**	**1697.409**	**29.79429**
16	Day 1	1418.55	54.62	369.2	2.652	453.8	22.6
	Day 2	1313.6	44.83	424.2	3.074	688.5	13.2
	Day 3	1547.9	89.58	178.75	0.787	117	5.4
	Day 4	1424.3	67.67	296.5	2.675	1229	29.2
	Day 5	1479.1	54.76	213.4	1.2135	1144	22.9
	Day 6	1330.4	61.7	180.9	2.1195	1838.5	17.8
	Day 7	1527.9	67.67	416.7	4.4195	725	19.4
	Average	**1434.536**	**62.97571**	**297.0929**	**2.420071**	**885.1143**	**18.64286**
17	Day 1	1220.9	63.42	497.45	3.194	1153.4	33.8
	Day 2	1500.45	83.065	680.75	2.8945	827.2	25.35
	Day 3	1718.45	50.965	213.85	1.4325	625	25.35
	Day 4	1579	75.86	444.4	2.53	608.7	38.5
	Day 5	1469.9	60.25	203.4	1.356	1376.7	14.4
	Day 6	1415.8	67.96	415.8	2.026	567.4	16.9
	Day 7	1343.15	47.445	340.65	1.973	354.2	17.6
	Average	**1463.95**	**64.13786**	**399.4714**	**2.200857**	**787.5143**	**24.55714**
18	Day 1	1737.25	72.135	366.45	2.5655	1399.8	34.15
	Day 2	1150.4	46.54	474.75	1.972	42	11.95
	Day 3	920.2	19.05	57.2	0.711	2769	28.4
	Day 4	1216.1	64.92	357.6	0.787	135	8.9
	Day 5	1262.8	52.9	415.4	2.2125	353.6	29.25
	Day 6	1127	45.05	466.75	1.505	53	0.35
	Day 7	1433.3	50.97	345.8	1.9795	3331.2	71.45
	Average	**1263.864**	**50.22357**	**354.85**	**1.676071**	**1154.8**	**26.35**
19	Day 1	1261.95	61.93	616.9	2.7455	3423.04	57.4
	Day 2	1496.3	79.49	721.5	3.329	2930.84	55.6
	Day 3	1206.1	86.21	701.5	2.7285	3383.24	53.6
	Day 4	1681.6	54.89	393	2.0575	3979.24	55.2
	Day 5	1570.15	78.645	641.6	2.7105	2548.22	44.85
	Day 6	1437.65	67.365	508	2.2575	1554.22	58
	Day 7	1160.3	62.555	550.7	1.9555	1527.62	29.2
	Average	**1402.007**	**70.155**	**590.4571**	**2.540571**	**2763.774**	**50.55**
20	Day 1	1912.3	88.35	600.15	2.684	2203.1	101.175
	Day 2	1501.15	81.895	734.6	3.3715	1248	58.5
	Day 3	1821.4	91.32	680.4	1.8855	2149.5	23.15
	Day 4	1999.95	107.09	578.15	2.261	1132.6	53.7
	Day 5	1739.9	126.27	817.45	2.25425	628	74.8
	Day 6	1322.375	64.02	427.05	2.04375	2044.42	67.85
	Day 7	2049.8	87.525	609.4	2.976	7378.6	104.6
	Average	**1763.839**	**92.35286**	**635.3143**	**2.496571**	**2397.746**	**69.11071**

21	Day 1	1496.55	84.87	498.05	2.068	1164.2	18.05
	Day 2	1536	63.415	472.6	4.8535	615.2	5.5
	Day 3	1102.15	40.655	522.45	1.1685	331.8	21.45
	Day 4	1340.5	64.52	458.4	2.855	1315.2	18
	Day 5	1566.15	75.56	441.35	3.559	913.8	18.1
	Day 6	1168.7	37.81	359	1.9835	415	26.6
	Day 7	1512.45	42.55	562.85	2.26475	398.5	35.95
	Average	**1388.929**	**58.48286**	**473.5286**	**2.678893**	**736.2429**	**20.52143**
22	Day 1	1221.3	61.68	560.15	2.6715	3280	101.3
	Day 2	1292.4	42.95	340.65	2.183	2564.22	44.1
	Day 3	1214	36.95	435.8	1.7735	4755.5	44
	Day 4	1528.4	50.97	477.15	2.58325	2595.42	47.6
	Day 5	1441.45	36.515	320.4	2.257	3540.92	54.3
	Day 6	1185.5	36.45	295.8	1.273	2012.5	28
	Average	**1313.842**	**44.2525**	**405.025**	**2.123542**	**3124.76**	**53.21667**
23	Day 1	1710.175	55.24	362.35	2.17175	3558.62	21.65
	Day 2	1666.2	84.35	385.3	2.437	1532.9	43.85
	Day 3	1209.875	41.955	222.45	1.57925	1872.62	18.25
	Day 4	1874.65	67.7	448.2	2.216	1364.5	57.65
	Day 5	2241.9	73.65	528.75	3.685	1688.5	74.475
	Day 6	1136.6	69.28	564.2	1.48925	1043	2.4
	Day 7	1922.35	62.54	274.8	1.899	2187.2	33.05
	Average	**1680.25**	**64.95929**	**398.0071**	**2.211036**	**1892.477**	**35.90357**
24	Day 1	1377.55	65.265	532.6	2.6365	2309.42	40.25
	Day 2	1366.85	57.9	428.1	2.406	3209.2	70
	Day 3	1520.7	89.32	768.65	3.39495	801.8	43.35
	Day 4	1436.35	89.295	571.3	5.5485	1335.8	73.1
	Day 5	1393.25	70.53	409.15	1.1275	1039.8	7
	~~Day 6~~	~~1372.45~~	~~64.96~~	~~533.3~~	~~2.17525~~	~~2445.2~~	~~28.25~~
	Day 7	1428.95	90.29	685.3	3.3155	796.6	58.36
	Average	**1413.729**	**75.36571**	**561.2**	**2.943457**	**1705.403**	**45.75857**
25	Day 1	1786.85	71.99	708.55	4.38	1071.2	55.05
	~~Day~~ 2	1831.9	67.005	634.7	3.2905	1310.4	126.5
	Day 3	1989.8	108.31	614.65	1.679	1189.2	31.2
	Day 4	953.3	55.01	241.4	1.149	3162.2	38.3
	Day 5	1822	140.21	707.15	1.1125	1137.3	17.875
	Day 6	1674.1	112.125	693.05	2.877	1789.6	37.7
	Day 7	1195.7	100.47	376.8	0.3685	221.6	18.6
	Average	**1607.664**	**93.58857**	**568.0429**	**2.122357**	**1411.643**	**46.46071**
26	Day 1	1730.8	119.62	516.4	1.955	775.2	38.9
	Day 2	1279.65	106.43	740.4	2.49825	431.7	32.15
	Day 3	1640.85	145.18	320.8	1.149	361.8	5

	Day 4	1609.5	90.4	711.5	1.6075	1988	16.9
	Day 5	1950.25	87.69	550.4	1.4825	706.6	101.3
	Day 6	1473.25	79.83	643.25	1.465	183.5	2.6
	Day 7	1734.3	1326.32	779.6	1.964	552.2	17.7
	Average	**1631.229**	**279.3529**	**508.9071**	**1.731607**	**714.1429**	**30.65**
27	Day 1	1418.8	77.19	550.4	2.2585	3284.32	42.25
	Day 2	1684.35	92.31	629.4	1.8055	205.8	18
	Day 3	1515.75	61.4	299.85	1.3505	2033.6	14.15
	Day 4	1420.95	64.865	563.25	1.3835	1115	27.4
	Day 5	1430.75	62.46	496.2	1.80375	181	19.75
	Day 6	1353.25	101.685	533.6	1.212	234	0.8
	Day 7	1535.7	77.63	409.15	1.1645	353.72	18.2
	Average	**1479.936**	**76.79143**	**497.4071**	**1.568321**	**1058.206**	**20.07857**
28	Day 1	1423.2	63.29	582.65	2.808	542.1	62.35
	Day 2	1501.2	78.35	310.2	3.915	701	21.9
	Day 3	1615.1	55.38	309.2	1.2245	831.8	74.2
	Day 4	1587.7	55.475	324.4	5.13875	1419	25.95
	Day 5	1324.2	91.58	318.55	2.3125	1212.6	25.8
	Day 6	1980.6	95.21	601.9	3.642	1583.3	43.075
	Day 7	1636.5	100.88	362.2	1.91	1153	18.76
	Average	**1581.214**	**77.16643**	**401.3**	**2.992964**	**1063.257**	**38.86214**
29	Day 1	1128	27.92	41.4	0.337	2	0
	Day 2	1157.5	31.33	127.6	0.582	1138.3	18.6
	Average	**1142.75**	**29.625**	**84.5**	**0.4595**	**570.15**	**9.3**
30	Day 1	1684.6	97.805	608.25	2.1355	2966	29.85
	Day 2	1338.9	84.14	663.5	2.354	478	33.5
	Day 3	1364.25	67.5	197.9	0.6275	274.2	13.15
	Day 4	1942.5	93.1	286.1	2.648	387.8	33.8
	Day 5	1806.55	85.565	452.3	1.74975	387.2	20.9
	Day 6	1217	71.34	638.4	2.391	339.7	19.05
	Day 7	1311.5	74.36	416.6	1.1645	1117.2	18.7
	Average	**1523.614**	**81.97286**	**466.15**	**1.867179**	**850.0143**	**24.13571**
31	Day 1	808.65	38.78	344.15	1.734	757.8	21.1
	Day 2	1732.05	53.7	232.1	1.3985	1331.6	31.8
	Day 3	1067.88	25.69	367.75	3.402	4250.66	66
	Day 4	784.15	18.64	179.85	1.4635	1640.8	34.6
	Day 5	1648.35	66.24	295.9	1.337	230.8	16.95
	Day 6	1299.75	64.025	293.95	1.18	234	0
	Day 7	976.18	23.125	240.55	2.576	2499.64	43.8
	Average	**1188.144**	**41.45714**	**279.1786**	**1.870143**	**1563.614**	**30.60714**
32	Day 1	1769.9	59.575	439.2	2.16925	3410.7	112.45

Day 2	1703.65	64.635	342.55	2.089	3274	63.4
Day 3	1619.05	59.03	624.63	2.956	605.5	42.85
Day 4	1377.8	72.84	373.2	1.142	2983.5	64.75
Day 5	1783.3	71.57	487.4	2.16	438.2	39.9
Day 6	991.25	80.32	144.85	0.631	97.5	0.75
Day 7	1238.25	67.91	289.575	0.46	217.5	0.775
Average	**1497.6**	**67.98286**	**385.915**	**1.658179**	**1575.271**	**46.41071**

Appendix V

Volunteer Leaders Training Evaluation Sheet

NSRDF ප්‍රජා පෝෂණ වැඩසටහන

ස්වේච්ඡා නායකයින් සඳහා පුහුණු ඇගයීමේ පත්‍රිකාව

නම දිනය

ගම

1. මෙම පෝෂණ වැඩසටහන ගැන ඔබ කොපමණ දුරට තෘප්තිමත්ද?

2. මෙම වැඩසටහනට ඇතුලත් කල යුතු අලුත් කොටස් මොනවාද?.....

3. ස්වේචඡා නායකයන්ගේ පුහුණු සැසි කොතරම් දුරට ප්‍රියජනකද?

4. අප සපයන තොරතුරු, කරුණු තේරුම් ගැනීමට පහසුද?

5. ඔබට සපයන අත්පත්‍රිකා ඔබට ප්‍රයෝජනවත්ද?
   එවා කෙසේ වැඩි දියුණු කල යුතුද?.....

6. ඔබට පෙන්වන රූප සටහන්, වාක්‍ය සටහන් තේරුම් ගැනීමට පහසුද?

7. ඔබට වඩාත්ම සිත්ගත් පාඩම කොටස කුමක්ද? එයට හේතුව?.....

8. ඔබ හොඳින් කරුණු ඉගෙනගත් මාතෘකා සඳහන් කරන්න?.....

9. ඉගැන්වීමේ ශිල්ප ක්‍රම / ඉදිරිපත් කිරීම ගැන ඔබේ අදහස කුමක්ද?

10. ඔබ උපදේශකවරුන් ගැන කුමක් සිතන්නේද?

11. ඔබ කොපමණ අලුත් දේවල් මෙහිදී ඉගෙන ගත්තාද?

12. ඔබ ඉගෙනගත් කරුණු අනෙක් මව්වරුන් වෙත යොදු කිරීමට ඔබට හැකියයි ඔබ සිතන්නේද?

13. මව්වරුන්ගේ සාකච්ඡා කණ්ඩායම් සඳහා නායකත්වය ගැනීමට ඔබට ඇති ආත්මවිශ්වාසය

– පුහුණුවට පෙර – පුහුණුවට පසු

14. පුහුණු වැඩසටහන් වල වෙනස් කල යුතු කොටස් මොනවාද? .....

15. පුහුණු වැඩසටහන් පවත්වන ස්ථානය පිළිබඳ ඔබේ අදහස?

– ඉගෙනුම් පරිසරය – ස්ථානය

16. ඔබට සපයන ආහාරය හා තේ පිළිබඳව ඔබ කුමක් සිතන්නේද?

17. පුහුණු වැඩසටහන් වලට පත් කලයුතු ඔබට ප්‍රයෝජනවත් වෙයැයි සිතන වෙනත් මාතෘකා මොනවාද?.....

18. මෙම පුහුණුව මගින් ඔබට ඔබේ පවුල වෙත අලුත් ක්‍රම වලින් අවධානයක් ලබා දීමට උදව්වක් වුවායයි ඔබ සිතනවාද?

ඔව් / නැත

ඒ මොනවාද?.....

19. ඔබේ ප්‍රජාවේ සෞඛ්‍ය ප්‍රශ්න ඇතිවීමට ප්‍රධාන හේතු සාධක මොනවාදැයි ඔබ සිතන්නේද? .....

Appendix VI

Home Visit Survey

Mother's Name..... Child's Name .....

Date of visit.....

Growth charts

O Kept updated O Can Read O Can Interpret

Child's Growth O Normal O Low O Up and Down

General

Family members age & sex: Wife Husband

(living in your house) Children

Parents

Main source of income in your family? Monthly income

How much money do you spend on food each month?

What do you think good nutrition is?

Do you think your family eats a balanced diet (variety of food types)?

What do you think are the main problems preventing your family from having a good diet?

How often did your family members experience the following health problems in last 12 months?

	Fever	*Diarrhoea*	*Respirat Infect*	*Worm inf*	*Other*
Child					
Mother					
Others					

What kind of programs would you like to see in your village?

If we ran the following workshops would you attend?

Nutritious cooking Y/N

Home Garden Y/N

Fussy eaters / Parenting skills Y/N

Food Taboos ☙✕

What foods don't you eat when you are pregnant? Why?

What other foods don't you or your family eat at certain times? Eg "Hot" or "Cold" foods, Why?

House Check List ☐✔

Water supply O household tap O community tap

O household well O shared well O covered

O Drinking Water Boiled O Cook with Iodized salt

O Hands washed before cooking O with soap

O Hands washed before eating O with soap

O Hands washed after toilet O with soap

O Have sanitary toilet O Wear slippers outside

O Dishes washed with soap O Adequate waste disposal

Kitchen Cleanliness

O flies/ants O food covers O surfaces clean O garbage bin

O chimney O cloths clean O Spider webs O floors

How long is food prepared for prior to eating?

O Food reheated after 2 hours if not eaten or refrigerated

How is food stored?

Home Garden

O have garden space O can recycle water

O have a home garden O don't have a home garden

Vegetables and fruits that you like to grow

Appendix VII

Comparison of data before and after implementing the program

Paired t-Test and CI: Height of child (cm) AFTER, Height of child (cm) BEFORE

Paired T for Height of child (cm) AFTER - Height of child (cm) BEFORE

	N	Mean	StDev	SE Mean
Height of ch	40	103.132	5.520	0.873
Height of ch	40	103.122	5.515	0.872
Difference	40	0.01000	0.03789	0.00599

95% CI for mean difference: (-0.00212, 0.02212)
T-Test of mean difference = 0 (vs not = 0): T-Value = 1.67 P-Value = 0.103

Paired t-Test and CI: Weight of child (kg) AFTER, Weight of child (kg) BEFORE

Paired T for Weight of child (kg) AFTER - Weight of child (kg) BEFORE

	N	Mean	StDev	SE Mean
Weight of ch	40	15.745	2.212	0.350
Weight of ch	40	15.450	2.201	0.348
Difference	40	0.2950	0.3693	0.0584

95% CI for mean difference: (0.1769, 0.4131)
T-Test of mean difference = 0 (vs not = 0): T-Value = 5.05 P-Value = 0.000

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