SMALL CHANGES, BETTER CHANCES

THE DEVELOPMENT AND IMPLEMENTATION OF A NUTRITION AWARENESS PROGRAM FOR MOTHERS IN SELF-HELP GROUPS IN PUDUCHERRY TO PREVENT CHILD UNDERNUTRITION.

ROSANNE SMILDE

OCTOBER 2009 – FEBRUARY 2010

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AUTHOR'S PREFACE

This thesis is the product of three months of research in India. I wrote this thesis for people with a (professional) interest in undernutrition in children and/or the development of an education program. Some knowledge about nutrition and health is useful, but not necessary.

The fact that I did the research abroad turned 'writing a thesis' into a rich experience. First of all I had to get used to the Indian way of running an office. This means: a lot of meetings and a lot of 'chai' (Indian tea), often combined.
I had the opportunity to work together with Indian staff as well as international volunteers, which was very instructive. I got acquainted with 'Indian Time', which means that everything goes a lot slower than I was used to in hurried Western countries, and I celebrated different holidays from all directions of the world.

Of course there was a large language barrier; most of the lower class people did not speak English. All materials had to be translated from English to Tamil, what took some time. Also, the rainy season caused some delay: appointments were cancelled because of the rain and the streets and office became flooded.

During my research I had the opportunity to get to know the culture and eating habits on a deeper level then tourists usually do. I visited the houses of women in the Self-Help Groups and ate a lot of things of which I had never heard before. This caused illnesses every now and then, but it was definitely worth it.

I could not have done this research alone, so I would like to thank Prime Trust's staff for making arrangements and giving assistance. In special I would like to thank Arasu, for giving me the opportunity to volunteer at his organization, Prabu, for doing all the translations and helping with the fieldwork and Inge Rozendal for bringing me in contact with Prime Trust and her involvement with the volunteers.
I was lucky to have two Englishmen in the organization, Brett Ackroyd and Dan Hope, who helped me with my English writing.
Furthermore I would like to thank Helene van Dulmen, Raoul Buiter and Sander Rijksbaron for guiding my process and giving feedback.
Last but not least, I wish to express my appreciation to my boyfriend, family and friends for their support during my stay abroad.

Rosanne Smilde

ABSTRACT

A new awareness program is needed to learn the women of Prime Trust's Self-Help Groups more about healthy nutrition for children. The following main question is formulated: *What is an effective nutrition awareness program for mothers in Self-Help Groups in Puducherry to prevent undernutrition in young children (aged 0-3)?* Literature search is done to learn more about undernutrition in children. Worldwide, 52.5% of all deaths in young children are, directly or indirectly, attributable to undernutrition. The hunger situation in India is considered 'alarming'. 43.5% of the Indian children aged <5 is underweight and 47.9% is stunted. Micronutrient deficiencies are widespread and can even be present when energy needs are met. 46.4 % of the infants is exclusively breastfed for the first six months of life, which is a high percentage compared to other countries. A questionnaire in 77 women of Prime Trust's Self-Help Groups is used to discover the main problems in knowledge, feeding practices and hygiene. Also, the dietary pattern (N=49) and anthropometric measurements (N=62) of children aged <3 are investigated. 21% of the children were Low Birth Weight babies (<2500 g). Fever and diarrhea are common health problems; 34% of the children suffers from fever every month. A large majority of the children eat enough grains (90%, N=44) and vegetables (84%, N=41), but none of them consumes fruit. The oil consumption is moderate; 61% (N= 30) consumes enough. 82% of the children (N=40) eat too less meat and beans and 57% (N=28) have a larger milk intake than recommended. 80% of the children eat biscuits on daily basis. The percentage of breastfed children is high: 96%. More than half (57%, N=44) of the women start too early with giving complementary feeding. 9% do not use safe drinking water for the preparation of formula feeding. There are some misconceptions about breast feeding; 43% assumes that colostrum is unhealthy for infants. The most important subjects that should be discussed in the education program are: recommended daily amounts (especially fruits, milk and beans and meat), timing of starting with complementary feeding, adequate products for complementary feeding and misconceptions about breastfeeding. The education will be aimed at mothers of children up to and including three years of age so that all stages of nutrition for the young child (breastfeeding, complementary feeding and family foods) are covered. The 45-minute program is very interactive and contains spoken information, a demonstration to learn how to make fruit more attractive for children, a puzzle to figure out which food belongs to what age and all the women receive a handout with the recommended daily amounts for children aged 1-3. The set goals for this program are: the children eat fruit in between meals instead of biscuits, the mothers start with complementary food after the first six months of life, newborns receive colostrum, the mothers have knowledge about the daily recommended amounts for young children and the mothers know how to give a hygienic bottle feed. An effect evaluation is needed to see if the set goals are achieved.

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1. Introduction

Many developing countries are struggling with the problem of undernutrition in children. This is a major issue, since the basis for the rest of a child's life is set in their early years. When an undernourished child survives the vulnerable first years, he or she can experience a variety of disadvantages during the rest of it's life, from disturbed growth and increased risk of infections to lower school performance. This way, malnutrition can not only affect health, but also income in adulthood.

In India, nutritional problems among mothers and children belong to the most important health problems, according to the World Health Organization. More than a third of the world's malnourished children under 5 years live in India. That is why Prime Trust felt the need for an education program about healthy nutrition for young children. The current nutrition program is about healthy nutrition for adult women. This is not sufficient to fulfill the need for prevention of undernutrition in children.

In this thesis the need and required content of this new nutrition program is investigated. The following main question is formulated:

What is an effective nutrition awareness program for mothers in Self-Help Groups in Puducherry to prevent undernutrition in young children (aged 0-3)?

The answer to this question leads to a new education program, which can be given to the more than hundred Self-Help Groups of Prime Trust. This way the women become aware of the importance of healthy nutrition for their children. Also, they learn how to give their young children the right nutrition, even with their limited resources.

The research that is done to answer the main question consists of three parts. First, there is a literature search done about undernutrition in children. Undernutrition in developing countries in general, and more specific in India, are discussed in chapter 3, according as the causes and consequences.

Second, there is a questionnaire used to learn more about the specific socioeconomic status, knowledge, feeding practices, etcetera, of the women in Prime Trust's Self-Help Groups. One can find the method, results and conclusions of this questionnaire in chapter 4.

Finally, research is done to find out what is the most effective way to give the education. Which determinants play a role in the feeding practices of the mothers? What should be taken into account with developing the program? Answers on these questions are given in chapter 5.

The education program itself is attached in appendix III.

2. Prime Trust

Prime Trust is a Non-Governmental Organization (NGO) in Puducherry, India. The organization consists, besides three trustees, of eight staff members. On a regular base, the organization is supported by international volunteers.
Their mission is to bring about social transformation through empowering the rural and urban poor and enabling them to become self-reliant.
The main focus is on women empowerment. To achieve this, Prime Trust helps with financial support as well as education and raising awareness. Women are stimulated to from groups with 10-20 members, the so called 'Self-Help Groups' (SHG's).

Prime Trust is an intermediary between the SHG's and banks, so that they have access to microfinance. The women can use the loan to start a small business and become financially independent.

Prime Trust also conducts awareness programs for the women of the SHG's on a variety of topics, such as HIV/Aids, domestic violence, nutrition, women's rights, and hygiene and sanitation.

The existing nutrition program is about healthy nutrition for women. The program consists of two sessions of 45 minutes.
The first session provides information about a balanced diet for adult women, and which foods provide power, body growth, and health protection. Also self-hygiene and anemia are discussed.
In the second session the women are taught how to use the food pyramid and they get 10 tips to healthy eating. Furthermore the importance of drinking enough water is explained.

Because of the high prevalence of undernutrition in children in India, Prime Trust wants to expand the existing program with a new program. This 45 minute program should focus on healthy nutrition for young children. In this thesis the need and required content of this new nutrition program is investigated.

3. Undernutrition in children

3.1 Nutritional problems in children in developing countries

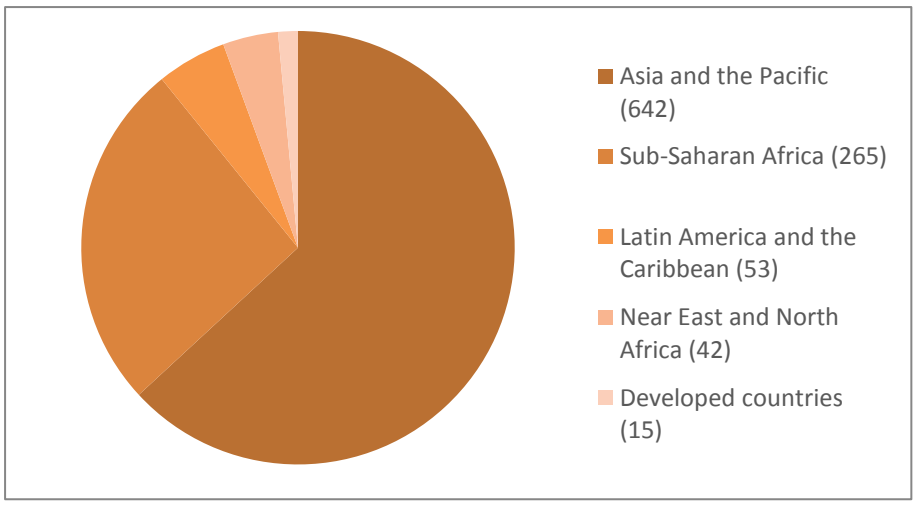
Worldwide more than 10 million children under 5 years of age die each year. Almost 4 million of them do not survive the first four weeks of life. There is a large difference in child survival between the developing world and the industrialized world. In the developing world 7.2 million die under the age of one year, while there are 54,000 infant deaths in the industrialized world. (*Christian, 2004)*

Malnutrition plays a major role in the large number of child deaths in developing countries. An analysis of ten cohort studies shows that the simultaneous presence of malnutrition and infection together greatly increase the child's risk of death. Overall, 52.5% of all deaths in young children were, directly or indirectly, attributable to undernutrition. *(Caulfield, 2004)*

Many children who survive malnutrition, suffer from delayed mental and physical development and have an increased risk of infections. More than a third of all children under five in developing countries experience malnutrition to a significant enough degree to become permanently growth retarded. *(Schroeder, 2004)*

There are large regional differences in malnutrition, as shown in figure 1. Although these numbers are absolute, and thus dependent on population size, it makes clear that a large majority of undernourished people live in Asia and the Pacific.

Figure 1: Undernourishment in 2009, by region (millions). Total = 1.02 billion



From: FAO, 2009

PROTEIN-ENERGY MALNUTRITION

Protein-energy malnutrition (PEM) occurs when intake of protein and/or energy are below minimal requirements. This is common in places where food is scarce; particularly in the developing world. PEM can also be caused by great losses of nutrients, for example through vomiting, diarrhea or malabsorbtion syndromes. It characteristically starts in children between 6 months and five years old. Adults can also suffer from PEM, but their protein and energy needs per kilogram mass are smaller then in childhood. This means PEM manifests less frequently and less obviously in adults.

PEM is a term that covers many different clinical syndromes. The Wellcome classification helps to interpret the anthropometric measurements, as shown in Table 1.

TABLE 1: WELLCOME CLASSIFICATION OF MALNUTRITION IN CHILDREN

Weight (% of standard)*	**Oedema**	
	Present	**Absent**
80-60	Kwashiorkor	Underweight
<60	Marasmic kwashiorkor	Marasmus

** Standard = 50th percentile of NCHS standards*

From: Coovadia & Wittenberg, 2003

UNDERWEIGHT

Underweight is the most common presentation of PEM, and it often stays unknown. The first effects of lack of energy and protein are retarded linear growth, failure to gain weight, or weight loss. The undernutrition is often not severe enough to develop clinical symptoms; these children are underweight and undersize. The underweight will only be diagnosed if the weight for age and height is charted.

KWASHIORKOR

Kwashiorkor has a peak prevalence between nine months and two years. It is a severe form of PEM that commonly occurs when the diet only exists of refined carbohydrate, cereal and/or vegetable food, without high protein food.

The most important clinical features include: oedema (in lower arms, hands, lower legs, feet, face and belly), abdominal distension (pot belly), muscle wasting, immune suppression, infections, diarrhea, anemia, dermatoses, mental and neurological changes (apathy and irritability), enlarged liver and growth failure.

Marasmus

Marasmus is the childhood equivalent of starvation and is most commonly seen during the first year of life. It often occurs due to early start of complementary feeding, such as energy dense cereal porridge or bottle feeds. In older children, marasmus is seen in situations without any food available, such as war, extreme poverty or lack of care.
The presenting symptoms are extreme underweight, irritable crying, apathy, diarrhea and sometimes vomiting. The children are often extremely hungry, but some are anorexic.

Marasmic kwashiorkor

In many cases the symptoms are not easy to classify. Children can show signs of starvation as well as oedema. In these cases the term Marasmic Kwashiorkor is used. *(Coovadia & Wittenberg, 2003)*

Micronutrient deficiencies

In developing countries, animal products and fruits are often more expensive then high carbohydrate staple foods. In settings with poor strata spending a large percentage of their income on staple food, it can be expected that multiple-micronutrient deficiencies rather then singular deficiencies will be common. The most common deficiencies are deficiencies of vitamin A, B complex, C, iron, iodine, and zinc. Conditions of suboptimal micronutrients are widespread and may be present even when energy needs are met. *(Ramakrishnan & Huffman, 2004)*

3.2 Nutritional problems in children in India

Nutritional problems among mothers and children is marked by the WHO as one of the major health problems in India. The prevalence of underweight among children in India is among the highest in the world, and nearly double that of Sub-Saharan Africa. The high prevalence combined with India's large population makes that more than a third of the world's malnourished children under 5 years live in India. In absolute numbers are these 150 million malnourished children. *(Gragnolati, Shekar, Das Gupta, Bredenkamp & Lee, 2005)*

Table 2 shows the most recent percentage of stunted and underweight children in India.

TABLE 2: STUNTING AND UNDERWEIGHT IN CHILDREN AGED <5

Children aged <5 (%), 2000-2007	
Stunted for age[1]:	47.9
Underweight for age[2]:	43.5

From: World Health Organization Statistical Information System (WHOSIS)

As shown in table 3, the number of exclusively breastfed infants during the first six months of life in India is relatively high, compared to other regions.
The most recent percentage of low birth weight newborns is 28% *(Unicef 2007)*

TABLE 3: EXCLUSIVE BREASTFEEDING COMPARED TO OTHER REGIONS

Infants exclusively breastfed for the first 6 months of life (%) (2000-2008)	
India	46.4
South-East Asia	43.2
Global	34.8
Europe	17.7

From: World Health Organization Statistical Information System (WHOSIS)

Micronutrient deficiencies are also widespread in India. 87% of pregnant women and 75% of preschool children suffer from Iron Defeciency Anemia (IDA).
Vitamin A deficiency (VAD) is present in 57% of the preschool children, and 25% have goiter, a sign of iodine deficiency. *(Gragnolati e.a., 2005)* Half of the households (51%) use iodized salt *(Unicef, 2000-2007)*. The consequences of these micronutrient deficiencies are discussed in paragraph 3.4.

3.3 UNDERNUTRITION IN TAMIL NADU

Prime Trust is active in and around Puducherry, in the state Tamil Nadu. Table 4 provides information about the weight, height and BMI of children in Tamil Nadu.

TABLE 4: PERCENTAGE OF CHILDREN AGED 0-5 YEARS BELOW MEDIAN (2005-2006):

Weight/age		Height/age		Weight/height		BMI/age	
-3SD	-2SD	-3SD	-2SD	-3SD	-2SD	-3SD	-2SD
7.7	31.1	11.2	31.0	9.5	22.7	9.3	19.6

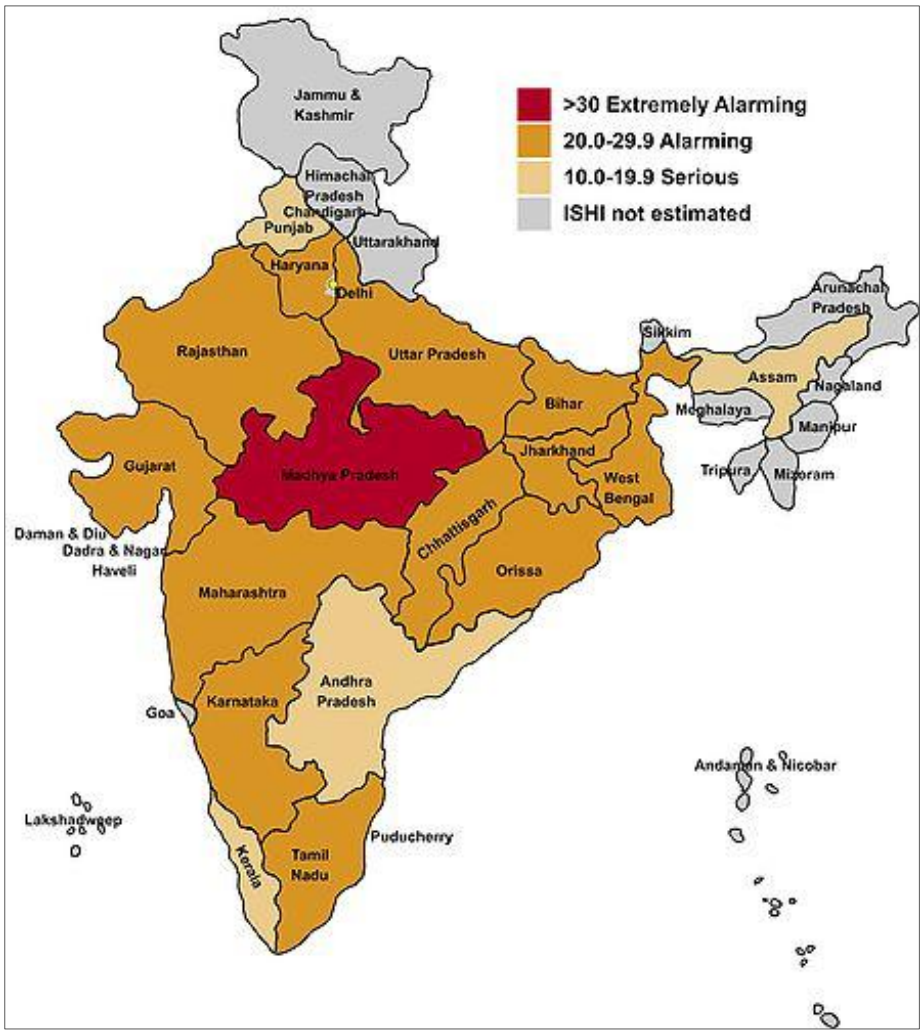
Source: WHOSIS

[1] Height (or length)-for-age of more than 2 standard deviation below the median of the WHO international reference

[2] Weight-for-age of more than 2 standard deviation below the median of the WHO international reference

The India State Hunger Index is developed to enable comparisons within India and globally, see figure 2. This index is based on calorie undernourishment, child underweight and under five mortality rate. Tamil Nadu is ranked 6th out of 17 states, which seems a good score, but the situation is considered 'alarming' (on a scale of low, moderate, serious, alarming and extremely alarming).

FIGURE 2: MAP OF THE INDIA STATE HUNGER INDEX, BY SEVERITY.



From: Menon, Deolalikar & Bhaskar (2009)

The government of Tamil Nadu has formulated several objectives in order to achieve the goal to make Tamil Nadu a malnutrition-free state. Some of these objectives are shown in table 5.

TABLE 5: INDICATORS FOR MALNUTRITION FREE STATE (%)

Indicator	2000	2007	2012	2020
Low birth weight	23	20	15	10
Underweight among 0-3 years	36.7	30	20	15
Stunting among 0-3 years	29.4	25	20	15
Anaemia in 0-3 year old children	69	50	40	20
Anaemia in pregnant women	60	50	40	30

From: Government of Tamil Nadu, 2008. Malnutrition Free State.

3.4 WHAT ARE THE CONSEQUENCES OF MALNUTRITION?

Undernutrition directly affects many aspects of children's development. In this paragraph the most important consequences of malnutrition are discussed.

PHYSICAL DEVELOPMENT

The physical development already starts *in utero*; the fetus is dependent of the nutritional intake of the mother. If the mother is malnourished, the child will not be able to become completely developed. Low prepregnancy BMI, especially with a maternal weight of less then 40 kg, is a determinant of preterm birth and intrauterine growth restriction. These two processes cause low birth weight (defined by WHO as a birth weight less then 2.500 kilogram). *(Richard, Semba & Cesar, 2004) (Coovadia & Wittenberg, 2003)*

Physical growth is recognized as the best indicator of physical wellbeing in children. Fetuses suffering from growth retardation are at higher risk of several diseases, such as sudden infant death syndrome, and also higher perinatal morbidity and mortality and higher infant mortality and childhood morbidity. The increased risk of diseases is life-long; in adulthood they are at increased risk of cardiovascular disease, hypertension, obstructive lung disease, type II diabetes, hypercholesterolemia and renal damage. *(Onis, 2004)*

MALNUTRITION AND INFECTION

Malnutrition increases the susceptibility for infection and disease. Malnutrition and infection often becomes a downward spiral, because infection also aggravates the malnutrition. A malnourished child will recover slowly and the infection will be more severe. Also, the malnutrition gets worse because of diarrhea, vomiting and lack of appetite. This way, malnutrition can lead to death. Overall, 52.5% of child deaths are associated with undernutrition. *(Caulfield, 2004)*

Mental development

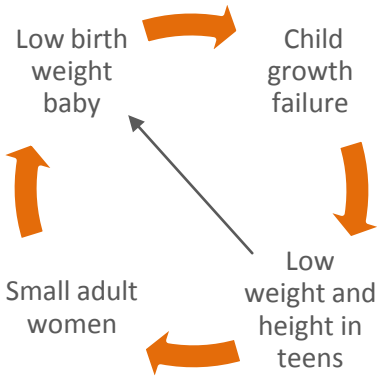
Malnutrition in early childhood is associated with poor motor and cognitive development, but the precise mechanisms are not clear. The period between the last trimester of pregnancy and 2 to 3 years of age is most important for mental development. Poor mental development undermines school performance and labor productivity and this way it affects income and economic growth. Several studies have investigated the total financial costs of malnutrition. Micronutrient deficiencies alone may cost India US$ 2.5 billion annually. The productivity losses from stunting, iodine deficiency and iron deficiency together are responsible for a total productivity loss of almost 3% of Gross Domestic Product (GDP). *(Gragnolati e.a., 2005)*

Intergenerational cycle of growth failure

An undernourished low birth weight baby will develop child growth failure. A girl becomes a small adult woman. As described before, low maternal weight is an indicator for low birth weight, so malnutrition and low birth weight are a vicious circle, as visible in figure 3. *(Coovadia & Wittenberg, 2003)*

Teenage motherhood is another determinant for low birth weight, especially when it concerns a teenage mother with low weight and height. To decrease childhood malnutrition it is important to break this vicious circle.

Figure 3: Intergenerational cycle of growth failure

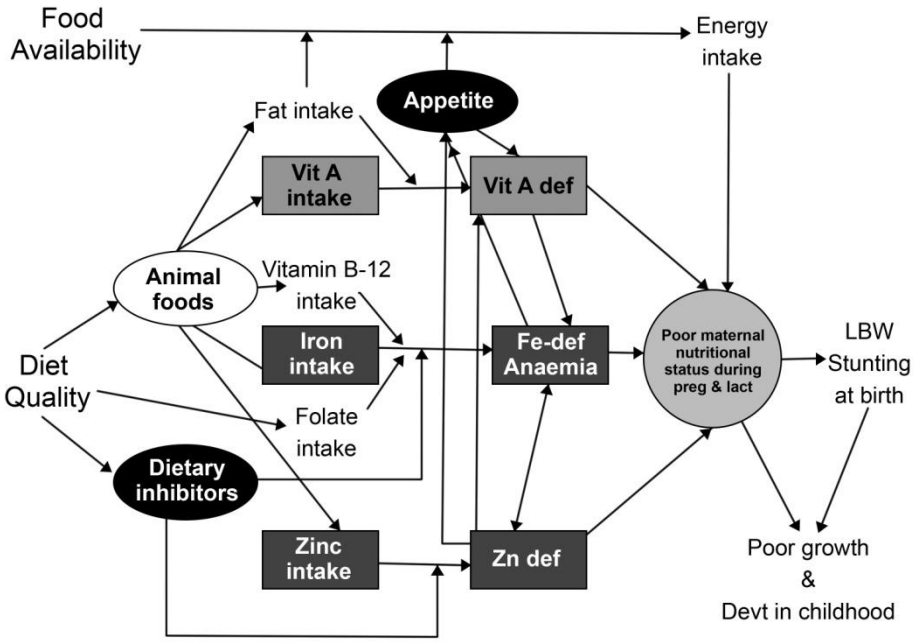


From: Coovadia & Wittenberg, 2003

CONSEQUENCES MICRONUTRIENT DEFICIENCIES

However every micronutrient deficiency has its own symptoms; multiple micronutrient deficiencies are complex. The nutrient deficiencies are strongly related and interfere with each other. Some of the complex relations are shown in figure 4.

FIGURE 4: CAUSES AND CONSEQUENCES MULTIPLE MICRONUTRIENT DEFICIENCIES



From: Ramakrishnan & Huffman, 2004

Diets low in animal foods are often low in several nutrients simultaneously. For many nutrients the bio-availability is affected by the mix of foods eaten, presence of inhibitors and mode of preparation. Diarrhea and parasitic infections can influence absorption, utilization and excretion. Some micronutrient interactions can affect nutrient absorption. For example: Vitamin C is an enhancer of iron absorption, whereas zinc and calcium can interfere with the absorption and availability of iron. All these factors can lead to a poor nutritional status during pregnancy and lactation. This leads to low birth weight and stunting at birth and poor growth and development in childhood. *(Ramakrishnan & Huffman, 2004)*

MOST IMPORTANT DEFICIENCIES SEEN IN CHILDREN

Vitamin A (retinol)

When animal foods are seldom eaten, all vitamin A intake is provided by its provitamin, β-carotene. β-carotene is found in green leafy vegetables and orange and red fruits and vegetables. These foods may be too expensive during dry seasons and in urban area's. Vitamin A deficiency causes xerophthalmia, especially in infants and younger children, and can lead to blindness. Night blindness is a common symptom in older children and adults. Furthermore it limits growth and leads to increased morbidity and mortality from infections. In addition, infections decrease serum levels of vitamin A, so this can become another vicious circle. *(Coovadia & Wittenberg, 2003) (Gragnolati e.a., 2005)*

Iron

Iron deficiency is highest among children and pregnant and lactating women. In pregnant women it includes increased risk of low birth weight, premature delivery, perinatal and neonatal mortality, inadequate iron stores for the newborn, lowered physical activity, fatigue and increased risk of maternal morbidity. Inadequate iron stores in newborns, simultaneously with insufficient iron intake during the weaning period, impairs intellectual development. *(Gragnolati e.a., 2005)*

Iodine

Iodine deficiency during pregnancy is associated with low birth weight, increased likelihood of stillbirth, miscarriage, and congenital disorders. In children, it impairs physical growth, causes hypothyroidism and goiter and decreases the chances of child survival. It is also the most common cause of preventable mental retardation and brain damage in the world. *(Gragnolati e.a., 2005)*

3.5 WHAT ARE THE CAUSES OF MALNUTRITION?

The causes of malnutrition are complex and diverse. The common thought is that lack of money is the cause of the problems, but recently inadequacies in infant care and feeding practices are being targeted as an important cause of malnutrition *(Johri, 2005).*

The immediate causes of undernutrition are insufficient intake of protein, energy and micronutrients, or nutrient losses through infection and disease. These immediate causes are influenced by underlying factors, including inadequacies in food security and caring practices; and insufficient income, knowledge, and access to clean water and sanitation, unhealthy hygiene behavior, inadequate supplies of vaccines, dehydration and inadequate medical care.

The roots of these problems are found in basic causes, such as economic structure, political and ideological superstructure, formal and non-formal institutions and inadequate education. *(Johri, 2005) (Schroeder, 2004)(FAO, 2005)*

In India, poverty and gender inequality are major causes for the high prevalence of undernourishment. Because of the low status of women and children in Indian society the girls and women receive less than their fair share of food and medical care.

However, a one-year follow up study showed that there is no difference in malnutrition rates between socio-economic classes. Also, a survey of the National Nutrition Monitoring Bureau (NNMB) indicated poor dietary intake in under three-year olds, even in families with adequate dietary requirements. These outcomes suggest that feeding practices and household behavior are important causes for malnutrition.

The main factors that cause the high number of undernourished children are:

- Low status of women and girls in Indian society
- Poor nutritional status of women before and during pregnancy
- Delayed initiation of breastfeeding
- Insufficient exclusive breastfeeding
- Delayed introduction of nutritionally adequate complementary feeds *(Johri, 2005)*

3.6 Conclusion

Malnutrition in children is a large problem in India. The percentage of stunted and underweight children is respectively 47.9% and 43.5%. Micronutrient deficiencies are also widespread.

The nutritional situation in Tamil Nadu is alarming, and the government has set several goals in order to achieve a malnutrition free state.

The consequences of malnutrition include growth retardation, higher susceptibility to infection and disease, poor motor and cognitive development and even higher mortality. These facts emphasize the need for prevention of malnutrition.
Not all undernutrition is the result of lack of money. Inadequacies in infant care and feeding practices are important factors, according as insufficient knowledge and unhealthy hygiene behavior. This implies that an education program can play an important role in the prevention of undernutrition in children.

A questionnaire is needed to learn more about the details of feeding practices, knowledge and hygiene within the target group. This includes information about exclusive breastfeeding, early initiation of breastfeeding and the time of introducing complementary foods.

To learn more about the nutritional status of the children in the target group, their dietary pattern, morbidity pattern and anthropometric measurements will be analyzed.

Multiple micronutrient deficiencies rather than single micronutrient deficiencies are common, so it is important to focus on a healthy dietary pattern as a whole. The education program should not be focusing on specific foods, but (micro)nutrient rich, healthy foods in general. To ensure that the daily requirement of vitamins and minerals is met, the children should be stimulated to consume a rich variety of foods, especially fruit and vegetables.

4. Questionnaire

4.1 Formulation of the questionnaire

The purpose of this questionnaire is to elicit the feeding practices and nutrition related knowledge and attitudes of mothers of young children.
This information is needed to know what could be improved in order to reduce childhood malnutrition. Based on this information the education program will be developed. One can find the complete questionnaire in appendix I.

Method

All respondents are women belonging to Prime Trust's Self-Help Groups.

There is a large language barrier. Therefore, this is a written questionnaire. The questions were translated from English to Tamil by a staff member. Afterwards they were translated back to English by another staff member, to check if the translation is done correctly. When the women are filling in the questionnaire there will be an interpreter available to help with oral explanation, if necessary. Also, someone is available to help the illiterate women with reading and writing.

Most of the questions are multiple choice questions. In this way the answers are standardized and it is possible to analyze them. It is also easier for the women to fill in the form, and it needs less translation from Tamil to English, so the answers will be more secure.

It is important to find out what the bottlenecks are in child nutrition, so there are also some open questions. In this way it is possible to receive information about the problems they experience, for example: *why don't you give your children breastfeeding?*

Some questions only have to be filled in by mother of children age 0-3. Other questions can be filled in by all mothers, for example: *did you use any supplements during pregnancy?* Women who do not have any children do not have to fill in the questionnaire, but the education program could be useful for them, if they will have any children in the future.

Prime Trust's staff members arranged data collection meetings. The Self-Help Groups that lived nearest to Prime Trust were invited to gather, in their own villages. These meetings (8 to 12 persons) could find place in one of the women's homes, or in a nearby temple for example. They were asked to bring their children as well, for anthropometric measurements.

The women were asked to have no discussion with each other while they were filling in the questionnaire.

Socio-economic background

These questions were formulated to learn more about the socio-economic background of the mothers and children. These factors have influence on the access to food. The number of family members shows with how many people the food has to be shared. The education level of the mother and the knowledge test together provide information about the level of knowledge, which is useful in developing the education program.

Dietary and morbidity pattern

The 24-hour recall method will provide a lot of information about the types, amounts and timing of food the children consume. If there are any ambiguities about the used products or preparation methods, this can become clear with the help of the interpreter.

The outcomes of the dietary pattern are compared with the recommended daily amounts. Per food group the number and percentage of children that eat too less, enough or more than recommended are established.

The mothers are also asked about the health problems that their children suffer. The most important determinants and symptoms of undernutrition are listed.

Breastfeeding and complementary feeding

These questions were formulated to learn more about the breastfeeding and complementary feeding practices of the mothers. It also makes clear what problems the mothers experience in giving breastfeeding.

Supplements

This is information of interest, because there could be some deficiencies in mothers during pregnancy, which affects the development of the fetus (for example folic acid or iron). Using supplements is also a sign of paying attention to staying well nourished.

Anthropometry

Anthropometric measurements were done to establish the child's weight for age and length, and length for age. Also the Mid-Upper Arm Circumference (MUAC) has been measured, as an indicator of undernutrition. All measurements were done by the same person, with the same instruments.

Hygiene and cooking practices

Poor hygiene can lead to infections and diarrhea, which affects the nutritional status of the child. Also, if food is prepared in the wrong way, large micronutrient losses can occur. Hygiene and cooking practices have an important role in the prevention of childhood malnutrition.

Knowledge

These multiple choice questions were formulated in order to estimate the current knowledge of the women about child nutrition.

4.2 Results

The total number of respondents was 77 women, with a total of 62 children under 3 years old. The dietary pattern of 49 children of age 1-3 years was analyzed.

All tables are shown in appendix II.

Socio economic background

Age distribution

All respondents are between 20 and 60 years old. A large majority (62%) of the women are of age 21-30. *(Appendix II, table 1)*

Educational qualifications

13% of the women are uneducated and 8% only completed primary school. The majority of respondents (68%) completed secondary school and 11% followed higher education.

Occupational status

22% of the women are employed, next to 78% unemployed respondents.

Family income

Most families (52%) live off >1500-≤3000 Indian Rupees per month. *(Appendix 1, table 5)* This is comparable to € 22-44 per month, not taking purchasing power into account.

16% live off 1500 rupees or less per month and 30% has more than 3000 rupees to spend. The remaining 3% did not answer the question.

Anthropometry

The measurements were done in 62 children of whom 55% are male and 42% are female. The sex of the remaining 3% was not stated on the form.

All children are 0-3 years old, with a majority aged two years old. The age distribution is shown in appendix II, table 7.

Birth weight

As shown in table 6, 21% of the children were born with a birth weight of less then 2500 g; these are Low Birth Weight baby's.

Table 6: Birth weight

Birth weight	Total number	Percentage
<2500 g	13	21%
≥2500 g	46	73%
No answer	3	5%

Anthropometry

The outcomes of the anthropometric measurements are shown in standard deviations from the mean. The percentage of children with an outcome of two or more standard deviations under the mean is shown in table 7.

Table 7: anthropometry

	Weight/age			Height/age			Weight/height		
	-2SD	**-3SD**	**<-3SD**	**-2SD**	**-3SD**	**<-3SD**	**-2SD**	**-3SD**	**<-3SD**
No.	7	3	3	6	7	1	11	2	2
%	11%	5%	5%	10%	11%	2%	18%	3%	3%

	BMI/age			MUAC/age			No data
	-2SD	**-3SD**	**<-3SD**	**-2SD**	**-3SD**	**<-3SD**	
No.	6	3	3	2	1	0	4
%	10%	5%	5%	3%	2%	0%	6%

Morbidity pattern

The most often stated health problem in children is fever. A large majority (81%) has suffered fever, of whom 45% often (more than once in 6 months). 34% of the children suffers from fever every month.
Diarrhea is stated as a health problem from which 19% of the children suffer. The complete overview is shown in table 8.

TABLE 8: MORBIDITY PATTERN

Health problem	Total number	Percentage
Fever	50	81%
Diarrhoea	12	19%
Dizziness, headache	0	0%
Disturbed growth	3	5%
Common ear, nose and throat problems	1	2%
Common eye problems	2	3%
Common disorders of skin	3	5%
Respiratory diseases	4	6%
Heart diseases	1	2%
Genito-urinary problems	0	0%
Others	0	0%

DIETARY PATTERN

10% of the children follow a vegetarian diet, as one can see in appendix II, table 11. This means that they do not eat meat, fish or eggs.

As can be concluded from table 9, most children eat enough grains and vegetables, respectively 90% and 84%. The fruit intake is of bigger concern, because none of the children consumes fruit. Only 61% of the children consume enough oils, the rest has too low an intake of oils. The milk consumption is large; 57% of the children consume more than the recommended 3-5 servings a day, but there is also 12% that use too few milk products. 82% of the children consume too less beans and meat. Regarding the extras, biscuits are very popular. 80% of the children eat biscuits on a regular basis. The amount per day varies from 1 to 8, with an average of 3.

TABLE 9: INTAKE PER FOOD GROUP IN CHILDREN OF 1-3 YEARS OLD

Food group	Recommended servings a day	Too less		Enough		More than recommended	
		No.	%	No.	%	No.	%
Grains	4-8	5	10%	44	90%	0	0%
Vegetables	2-3	8	16%	41	84%	0	0%
Fruits	2-3	49	100%	0	0%	0	0%
Oils	3-4	19	39%	30	61%	0	0%
Milk	3-5	6	12%	15	31%	28	57%
Beans and meat	2-3	40	82%	9	18%	9	18%

Breastfeeding and complementary feeding

Almost all women (96%) gave their children breastfeeding. The other 4% stated that they had no milk production. A large majority continued the breastfeeding longer than the by the World Health Organization recommended minimum of 6 months, as one can see in table 10.

Table 10: Duration of breastfeeding

Time in months	Total number	Percentage
0-6	3	4%
7-12	20	27%
13-18	22	30%
18-24	22	30%
>24	3	4%
No answer	4	5%

The women also start early with the breastfeeding, most of them (84%) within the first hour of birth. *(Appendix II, table 14)*
Most women give breastfeeding because it is good for their child's health. Some stated that breast milk contains more vitamins and few gave as a reason for giving breastfeeding that it contains antibiotics.

Not all women gave their children exclusive breastfeeding during the first 6 months of life. *(Appendix II, table 16)* About half of the women (49%) gave their children other foods and drinks, such as water, cow's milk, fruit juice or biscuits.
The age of starting complementary foods varies, some start too early (younger than 6 months) and other start quite late. The details are shown in table 11.

Table 11: Age of starting complementary foods

Age in months	Total number	Percentage
0-6	44	57%
7-12	19	25%
>12	8	10%
No answer	6	8%

Supplements

Appendix II, table 17 shows the supplement use of the women. 22% of them used supplements before they got pregnant and 65% during pregnancy. Also, 13% used supplements during lactation. Most women (69%) did not fill in the details about the supplements. Of the women who used supplements, 16% stated that they used vitamins, 13% used iron and 2% calcium. *(Appendix II, table 18)* None of the women mentioned folic acid.

Hygiene and cooking practices

Table 12 provides information about the hygiene and cooking practices of the respondents. Most families (90%) get their drinking water from the pump. 56% boil the water before drinking, and 16% both boils and filters the water before use. 17% of the respondents use the water direct, without filtering or boiling. For the preparation of formula feeding, most women boil or filter the water, or a combination. There are 9% that do not use safe drinking water for the preparation of formula feeding. Only 5% of the respondents do not sterilize the bottle and teat by cooking them before preparing formula feeding. Most of the women (60%) do not preserve leftovers of bottle feeds.

A majority of respondents (83%) washes their hands with soap before food preparation. More than half of the women (56%) wash the vegetables after cutting. The rice is washed thoroughly, 95% wash the rice twice or more. Also, most respondents (88%) store their food closed after cooking and not too long; 99% preserve it no longer than 1-2 days.

TABLE 12: HYGIENE AND COOKING PRACTICES

	Total number	Percentage
Source of drinking water		
- Pump	69	90%
- Well	5	6%
- Stored water	3	4%
Supply of safe drinking water		
- Boil	43	56%
- Filter	6	8%
- Boil+filter	12	16%
- Do not boil/filter	13	17%
Water to prepare formula feeding		
- Boil	40	52%
- Filter	11	14%
- Boil+filter	8	10%
- Do not boil/filter	7	9%
- Do not use formula feeding	7	9%
Hand wash with soap before food preparation	64	83%
Vegetable washing after cutting	43	56%
Cook bottle and teat before preparing formula feeding		
- Yes	53	69%
- No	4	5%
- Do not use formula feeding	19	25%
Wash rice before cooking:		
- Once	2	3%
- Twice	16	21%
- More than twice	57	74%
- Do not wash	1	1%
Food stored closed after cooking	68	88%
Preservation cooked foods		
- 1-2 days	17	22%
- 3-4 days	1	1%
- More than 4 days	0	0%
- Eat it immediately after cooking	59	77%
Preserve leftovers from prepared bottle-feeds		
- Yes	12	16%
- No	46	60%
- Do not use formula feeding	17	22%

KNOWLEDGE

Table 13 shows how many women gave the right answer to a variety of questions about child nutrition. As one can see, all women know that breastfeeding is the best way to feed an infant. Also, most of them do know that infants do not need other foods or drinks besides breast milk during the first six months of life. 43% of the women think that colostrums is unhealthy for babies, and 36% stated that a mother should not give breastfeeding when she or her baby is ill.

23% has the assumption that food restriction during pregnancy leads to easier delivery.

Only 26% of the women know that a prepared bottle of formula feeding can not be stored outside the refrigerator. Almost all women (99%) know that nutrition plays an important role in the child's development. They are also motivated to learn more about nutrition so that they can give their children more healthy food.

Only 1% of the women gave the right answer on the question what infants need besides breast milk during the first six months. Most of them stated 'water' or 'cow's milk', instead of 'nothing' or 'vitamins'.

TABLE 13: WOMEN GIVING THE RIGHT ANSWER TO QUESTIONS ABOUT CHILD NUTRITION

	Right answer	Women giving the right answer	
		Total number	Percentage
Breastfeeding is the best way to feed an infant	True	77	100%
Bottle feeding makes a baby healthier	False	62	81%
Breastfeeding is the only food/drink an infant needs for the first six months	True	74	96%
A woman who gives breastfeeding becomes unattractive to men	False	68	88%
Colostrum is unhealthy for babies	False	44	57%
A mother should not give breastfeeding when she is ill or when the baby is ill	False	49	64%
You should stop giving breastfeeding after 1 year	False	59	77%
Fruits and vegetables are good foods for children older than 6 months old	True	71	92%
A pregnant woman doesn't need to use any vitamin supplements	False	56	73%
Eating less during pregnancy will lead to easier delivery	False	59	77%
It won't damage the child's health if he/she isn't growing well; he or she will just be small	False	69	90%
A prepared bottle of infant formula can be stored outside the refrigerator	False	20	26%
Nutrition has an important role in the child's physical and mental development	True	76	99%
I would like to get more knowledge about food and nutrition, so I can give my children more healthy food	-	76	99%
What does an infant (younger than 6 months) need besides breast milk?	Vitamins	1	1%

4.3 Conclusion

As can be concluded from the results of the questionnaire, the following subjects are most important to be discussed in the education program:

- Recommended daily amounts of food for children between 1-3 years old, with a specific focus on fruits, milk and beans and meat.
- Exclusive breastfeeding and the time of introduction of complementary feeding. Also adequate kinds of complementary foods should be discussed.
- Misconceptions about breastfeeding (e.g. colostrum)

5. THE EDUCATION PROGRAM

The outcomes of the literature search and the questionnaire together form a good base to develop the education program. However, there is also knowledge needed about how the information should be provided. In this chapter, the most effective target age, factors of behavioral change and practical constraints are discussed.

5.1 WHAT IS THE MOST EFFECTIVE TARGET AGE FOR THE NUTRITION AWARENESS PROGRAM?

It is widely recognized that improving dietary intakes of pregnant women and children under 5 years old is essential to reduce childhood malnutrition. *(Schroeder, 2004)*. However, most of the damage from malnutrition is already done by the second year of a child's life. *(Johri, 2005)*

Improved childhood nutrition, particularly in the first two to three years, will reduce the prevalence of childhood stunting and of consequent maternal short stature. *(Richard, Semba & Cesar, 2004)*

Retarded growth begins early and is rarely reversible. This means that most of the absolute height deficits seen in adults in developing countries are already present by about 3 years of age. *(Schroeder, 2004)*

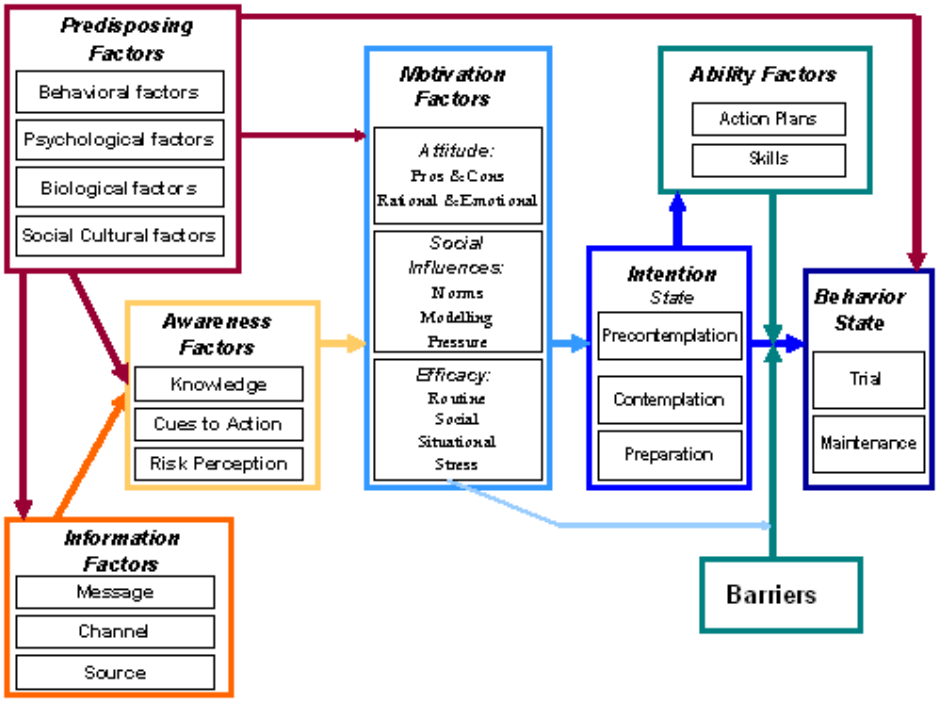
According to the nutrition campaign, this means that nutrition for children under three years of age is the most effective subject. At a higher age the damage is possibly already present, and the education will be too late. Also, most information needed for a healthy food pattern for older children is already provided by the existing nutrition program, since it is not much different from the recommendations for adult nutrition.

Children can receive breastfeeding during the first two years of life or beyond *(WHO, 2009),* so if the education will be aimed at children up to and including three years of age, all the stages of nutrition for the young child are covered; breastfeeding, complementary feeding and family foods. The transition from exclusive breastfeeding to full use of family foods is a very vulnerable period. It is the time when many infants become malnourished. *(WHO, 2008)*

5.2 Motivational and behavioral change

The I-change model

Figure 5: the I-change model



By: De Vries, 2008

Behavioral change is a complex process, which is influenced by a lot of factors. Figure 5, the I-change model, shows the interaction between the different groups of factors.

This model can be of great use in the development of an education program. Some factors can not be influenced by the education program, for example the predisposing factors. The factors that will be influenced by the education program are mainly awareness factors.

Knowledge

As concluded from the results of the questionnaire, more knowledge about several subjects is needed. This knowledge can be given during the 45 minute interactive education session. To support the spoken word, a handout will be provided.
Also, the knowledge will be tested at the end of the program with a small game.

Cues to action

It is important to learn the women skills to do something with the given information. Therefore, ideas for healthy complementary feeding are included. Children often prefer biscuits or chocolates above fruits, so during the program the women will be inspired how they can make fruit more attractive for their kids.

Risk perception

There should be explained why certain behavior is important, without scaring the women. During the program will, for example, be explained that too early initiation of complementary feeding can cause diarrhea and too late initiation can cause deficiencies. This way the mothers are better able to understand why they should start complementary feeding when their child is 6 months old.

The purpose of this education program is to change risk behavior into goal behavior. The most important goals of the program are shown in table 14.

Table 14: goals of the nutrition program

Risk behaviour	Goal behavior
Giving children biscuits in between meals	Giving children fruit in between meals
Too early or too late initiation of complementary feeding	Starting complementary feeding after the first six months of life.
Throwing colostrum away	Giving the child colostrum
Having too less knowledge about recommended daily amounts	Knowing how much milk, fruit, meat and beans a young child needs per day
Having too less knowledge about hygiene	Knowing how to give save bottle feeding

Constraints

Since the program will be given in a developing country, there are some limitations in the possibilities. The most important things to take into account are listed below:

- Cheap; there is no specific budget for awareness programs, so the cost should be as low as possible.
- Not too complicated; the program is given by staff members without education in nutrition and is given to low educated women.
- Without any equipment; there are no computers and beamers available.
- Suitable for small groups (8-15 persons) and small spaces. The place where the program is given varies from a small room to a temple, so there can only be count on a floor.
- All materials must be translated to Tamil.
- The materials must be reproducible in case of damage or lost.
- The materials must be easily transportable on a scooter or moped.
- Suitable for illiterate persons, so mainly spoken word and images.

Practical information

The program will be given by one of Prime Trust's staff members. This person has been taught how to make the program interactive and what are the most important things to pay attention to. The program will be given to all Prime Trust Self-Help Groups in the upcoming year. It consists of one 45-minute meeting, at the home of one of the women or in a nearby public place. One can find the script of the program in appendix III.

6. Conclusion and discussion

Conclusion

An effective education program for women of Prime Trust's Self-Help Groups focuses on a healthy dietary pattern as a whole, since multiple micronutrient deficiencies rather than single micronutrient deficiencies are common. As can be concluded from the results of the questionnaire, the following information is important to discuss: recommended daily amounts for children between 1-3 years old (especially fruits, milk and beans and meat), timing of introduction of complementary feeding, adequate products for complementary feeding and misconceptions about breastfeeding.
The most effective target age is children aged <3 . The program will mainly aim on awareness factors (knowledge, cues to action and risk perception), so that the women know what to change, how they can change it and why there should be something changed. It should be interactive, to get the women involved and suitable for illiterate and low educated persons.

Reliability

All anthropometric measurements were done by the same person, with the same instruments, but the used weighing machine was not calibrated. During every session the same staff members were available for translation and writing.

The sample size represents approximately 8% of the women of Prime Trust's Self-Help Groups.

Validity

Some information could have been changed or lost in translation. To diminish this, the questions of the questionnaire were translated back to English, after translating to Tamil. The answers to the open questions had to be translated from Tamil to English. Therefore, the number of open questions were reduced to a minimum.

The taken sample was not random. Only the nearby groups were invited, and only women who were willing to attend the data collection were included. Therefore, the results cannot be scientifically generalised to the whole population. Nevertheless, this research gives a good impression of the most important bottlenecks in child nutrition in Prime Trust´s Self-Help Groups.

Although women were asked not to discuss while they were filling in the questionnaire, there was still some discussion. Also, the illiterate women are more likely to give social desirable answers, because they had to tell their answers to the person that helped with writing.

All data was collected within a month, so time was not a confounding factor.

Limitations

It is not possible to do draw reliable conclusions about the nutritional status of the children. Missing information, for example, includes a blood test to find out which nutritional deficiencies are present.

The education program

A certain risk was taken by making the program interactive, since this is not the usual way of teaching in India. In practice this turned out to work very well. The hand-out with recommended daily amounts might be too difficult, but the staff gives a clear explanation.

Recommendations

In this education program is only attention paid to nutrition after birth. Further research can be done to expand the program with healthy nutrition and supplements for the mother during pregnancy.

There is no effect evaluation done, so future researchers can investigate if the set goals for this program are achieved. This way they can find out if the education program is effective, and if not, what can be improved.

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APPENDICES

I. Questionnaire

II. Tables results

III. Script education program

APPENDIX I: QUESTIONNAIRE

DATE:

NAME OF THE SHG:

PLACE OF THE SHG:

I. SOCIO ECONOMIC BACKGROUND

1. Name of the investigator : Rosanne Smilde

2. Name of the respondent :

3. Age of respondent :

5. Number of family members :

6. Number of children :

7. Respondent's Highest Education Qualification :

8. Respondent's occupation :

9. Respondent's monthly income :

10. Total monthly income of the family :

II. DIETARY AND MORBIDITY PATTERN <u>(only fill in this section for children younger than 3 years. If you don't have any children younger than three: please go to section III)</u>

Child 1
Sex: Male / Female

Age: .....

Birth Weight: .....

Is he/she:
a) Vegetarian b) Non-vegetarian

For each mealtime please describe what, and how much (in cups, spoons, etc), your child eats and drinks.

Mealtime:	**What?**	**How much?**
Early morning		
Breakfast		
Mid morning		
Lunch		
Mid afternoon		
Tea		
Dinner		
Bed time		

Please state the health problems your child suffers from:

O Fever How often?.....

O Diarrhoea How often?.....

O Dizziness, headache How often?.....
O Disturbed growth
O Common ear, nose and throat problems
O Common eye problems
O Common disorders of skin
O Respiratory diseases
O Heart diseases
O Genito – urinary problems
O Others, please state: .....

Child 2
Sex: Male / Female

Age: .....

Birth Weight: .....

Is he/she:
a) Vegetarian b) Non-vegetarian

For each mealtime please describe what, and how much (in cups, spoons, etc), your child eats and drinks.

Mealtime:	**What?**	**How much?**
Early morning		
Breakfast		
Mid morning		
Lunch		
Mid afternoon		
Tea		
Dinner		
Bed time		

Please state the health problems your child suffers from:

O Fever How often?.....

O Diarrhoea How often?.....

O Dizziness, headache How often?.....
O Disturbed growth
O Common ear, nose and throat problems
O Common eye problems
O Common disorders of skin
O Respiratory diseases
O Heart diseases
O Genito – urinary problems
O Others, please state: .....

<u>If you have more than two children under three years old, please ask for more paper.</u>

III. BREASTFEEDING AND COMPLEMENTARY FEEDING

1) Do /did you breastfeed your children?
a) Yes b) No

If 'Yes': Why? .....

Duration of breastfeeding:.....

Time of starting breastfeeding: O Within the first hour of birth
O Within de first day of birth
O Other, ...

If 'No': Why not? .....

.....

2) At what age did you start giving complementary (weaning) foods?
.....

3) Do/did you give your child any foods or drinks other then breast milk/formula feeding during the first 6 months?:
a) Yes b) No

If 'Yes': What kind of foods or drinks?

.....

.....

IV. DETAILS OF SUPPLEMENTS

1. Did you use any supplements (vitamin/mineral pills) before getting pregnant?
   a) Yes b) No

2. Did you use any supplements during pregnancy?
   a) Yes b) No

3. Did you use any supplements during lactation?
   a) Yes b) No

4. If you used any supplements, fill in next table. If not, go to chapter V.

Supplements	Time of introduction	Duration	Dosage	Reason

V. HYGIENE AND COOKING PRACTICES FOLLOWED

1. What is the source of drinking water?
   a) Pump b) Well c) Stored water

2. How do you supply safe drinking water?
   a) Boil b) Filter c) Boil + filter d) Do not boil/filter

3. What kind of water is used to prepare formula feeding?
   a) Boil b) Filter c) Boil + filter d) Do not boil/filter
   e) Do not use formula feeding

4. Do you wash your hands with soap before food preparation?
   a) Yes b) No

5. Do you wash vegetables after cutting them?
   a) Yes b) No

6. Do you cook the bottle and teat before preparing formula feeding?
   a) Yes b) No c) Do not use formula feeding

7. How many times do you wash rice before cooking it?
   a) Once b) Twice c) More than twice d) Do not wash

8. How do you store the food after cooking? *(please fill in two answers)*
   a) Open b) Closed
   a) Refrigerated b) Unrefrigerated

9. How long do you preserve cooked foods?
   a) 1-2 days b) 3-4 days c) more than 4 days d) eat it immediately after cooking

10. Do you preserve any leftovers from a prepared bottle-feed?
    a) Yes b) No c) Do not use formula feeding

VI. KNOWLEDGE HEALTH AND NUTRITION

For each question mark the one answer that suits your opinion most

1. Breastfeeding is the best way to feed an infant
   a) True b) False
2. Bottle feeding makes a baby healthier
   a) True b) False
3. Breastfeeding is the only food/drink an infant needs for the first six months
   a) True b) False
4. A woman who gives breastfeeding becomes unattractive to men
   a) True b) False
5. Colostrum ('first milk', yellow transparent fluid during the first days after delivery) is unhealthy for babies
   a) True b) False
6. A mother should not give breastfeeding when she is ill or when the baby is ill
   a) True b) False
7. You should stop giving breastfeeding after 1 year
   a) True b) False
8. Fruits and vegetables are good foods for children older than 6 months old
   a) True b) False
9. A pregnant woman doesn't need to use any vitamin supplements.
   a) True b) False
10. Eating less during pregnancy will lead to easier delivery
    a) True b) False
11. It won't damage the child's health if he/she isn't growing well; he or she will just be small.
    a) True b) False
12. A prepared bottle of infant formula can be stored outside the refrigerator
    a) True b) False
13. Nutrition has an important role in the child's physical and mental development
    a) True b) False
14. I would like to get more knowledge about food and nutrition, so I can give my children more healthy food.
    a) True b) False
15. What does an infant (younger than 6 months) need besides breast milk?
    a) water b) cow's milk c) nothing d) vitamins

VII. CLINICAL ASSESSMENT SCHEDULE *(to be filled in by investigator)*

Anthropometric measurements

Child 1

Age	
Height (cm)	
Weight (kg)	
MUAC (cm)	

Child 2

Age	
Height (cm)	
Weight (kg)	
MUAC (cm)	

Child 3

Age	
Height (cm)	
Weight (kg)	
MUAC (cm)	

APPENDIX II: TABLES RESULTS

Total number of respondents: N=77

Total number of children: N=62

Number of dietary patterns analyzed: N=49

SOCIO-ECONOMIC BACKGROUND

TABLE 1: AGE DISTRIBUTION RESPONDENTS

Age	Total number	Percentage
11 - 20	1	1%
21 - 30	48	62%
31 - 40	19	25%
41 - 50	7	9%
51 - 60	2	3%
≥ 61	0	0%

Note: not all respondents are mothers, some grandmothers participated in the research.

TABLE 2: NUMBER OF CHILDREN IN THE FAMILY

Number of children	Frequency	Percentage
0	1	1%
1	22	29%
2	34	44%
3	18	23%
4	1	1%
≥5	1	1%

TABLE 3: LEVEL OF EDUCATION

Highest education qualification	Total number	Percentage
Uneducated	10	13%
Primary school	6	8%
Secondary school	52	68%
Higher secondary school	4	5%
Graduation	4	5%
Post-graduation	0	0%
Diploma course	1	1%

TABLE 4: OCCUPATIONAL STATUS

	Total number	Percentage
Employed	17	22%
Unemployed	60	78%

TABLE 5: FAMILY INCOME

Income in rupees/month	Frequency	Percentage
>0 - ≤1500	12	16%
>1500 - ≤3000	40	52%
>3000 - ≤4500	13	17%
>4500 - ≤6000	8	10%
>6000	2	3%
No answer	2	3%

ANTHROPOMETRY

Total number of children: 62

TABLE 6: SEX CHILDREN

	Total number	Percentage
Male	34	55%
Female	26	42%
No answer	2	3%

TABLE 7: AGE CHILDREN

Age (months)	Total number	Percentage
0-12	11	18%
13-24	17	27%
24-36	34	55%

TABLE 8: BIRTH WEIGHT

Birth weight	Total number	Percentage
<2500 g	13	21%
≥2500 g	46	73%
No answer	3	5%

TABLE 9: ANTHROPOMETRY

	Weight/age			Height/age			Weight/height		
	-2SD	-3SD	<-3SD	-2SD	-3SD	<-3SD	-2SD	-3SD	<-3SD
No.	7	3	3	6	7	1	11	2	2
%	11%	5%	5%	10%	11%	2%	18%	3%	3%

	BMI/age			MUAC/age			No data
	-2SD	-3SD	<-3SD	-2SD	-3SD	<-3SD	
No.	6	3	3	2	1	0	4
%	10%	5%	5%	3%	2%	0%	6%

MORBIDITY PATTERN

TABLE 10: MORBIDITY PATTERN

Health problem	Total number	Percentage
Fever	50	81%
Diarrhoea	12	19%
Dizziness, headache	0	0%
Disturbed growth	3	5%
Common ear, nose and throat problems	1	2%
Common eye problems	2	3%
Common disorders of skin	3	5%
Respiratory diseases	4	6%
Heart diseases	1	2%
Genito-urinary problems	0	0%
Others	0	0%

45% of the children suffers often from fever (more than once in 6 months)

34% of the children suffers from fever once in a month

DIETARY PATTERN

TABLE 11: VEGETARIAN AND NON-VEGETARIAN

	Total number	Percentage
Vegetarian	6	10%
Non-vegetarian	54	87%
No answer	2	3%

TABLE 12: INTAKE PER FOOD GROUP IN CHILDREN OF 1-3 YEARS OLD

N=49

Food group	Recommended servings a day	Too less		Enough		Too much	
		No.	%	No.	%	No.	%
Grains	4-8	5	10%	44	90%	0	0%
Vegetables	2-3	8	16%	41	84%	0	0%
Fruits	2-3	49	100%	0	0%	0	0%
Oils	3-4	19	39%	30	61%	0	0%
Milk	3-5	6	12%	15	31%	28	57%
Beans and meat	2-3	40	82%	9	18%	9	18%

Extra's

39 children (80%) eats biscuits on regular basis. The amount per day varies from 1 to 8, with an average of 3.

96% of the women gave their young children breast milk. The other 4% had no milk production.

TABLE 13: DURATION OF BREASTFEEDING

Time in months	Total number	Percentage
0-6	3	4%
7-12	20	27%
13-18	22	30%
18-24	22	30%
>24	3	4%
No answer	4	5%

TABLE 14: TIME OF STARTING BREASTFEEDING

	Total number	Percentage
Within the first hour of birth	62	84%
Within the first day of birth	9	12%
Other	0	0%
No answer	3	4%

TABLE 15: AGE OF STARTING COMPLEMENTARY FOODS

Age in months	Total number	Percentage
0-6	44	57%
7-12	19	25%
>12	8	10%
No answer	6	8%

TABLE 16: EXCLUSIVE BREASTFEEDING DURING THE FIRST 6 MONTHS OF LIFE

	Total number	Percentage
Exclusive breastfeeding	38	49,4%
No exclusive breastfeeding	38	49,4%
No answer	1	1,3%

SUPPLEMENTS

TABLE 17: TIME OF USE SUPPLEMENTS

	Total number	Percentage
Before pregnancy	17	22%
During pregnancy	50	65%
During lactation	10	13%

TABLE 18: KIND OF SUPPLEMENTS

	Total number	Percentage (of women who used supplements)
Vitamins	10	16%
Iron	8	13%
Calcium	1	2%
No answer	42	69%

TABLE 19: HYGIENE AND COOKING PRACTICES

	Total number	Percentage
Source of drinking water		
- Pump	69	90%
- Well	5	6%
- Stored water	3	4%
Supply of safe drinking water		
- Boil	43	56%
- Filter	6	8%
- Boil+filter	12	16%
- Do not boil/filter	13	17%
Water to prepare formula feeding		
- Boil	40	52%
- Filter	11	14%
- Boil+filter	8	10%
- Do not boil/filter	7	9%
- Do not use formula feeding	7	9%
Hand wash with soap before food preparation	64	83%
Vegetable washing after cutting	43	56%
Cook bottle and teat before preparing formula feeding		
- Yes	53	69%
- No	4	5%
- Do not use formula feeding	19	25%
Wash rice before cooking:		
- Once	2	3%
- Twice	16	21%
- More than twice	57	74%
- Do not wash	1	1%
Food stored closed after cooking	68	88%
Preservation cooked foods		
- 1-2 days	17	22%
- 3-4 days	1	1%
- More than 4 days	0	0%
- Eat it immediately after cooking	59	77%
Preserve leftovers from prepared bottle-feeds		
- Yes	12	16%
- No	46	60%
- Do not use formula feeding	17	22%

KNOWLEDGE

TABLE 20: WOMEN GIVING THE RIGHT ANSWER TO QUESTIONS ABOUT CHILD NUTRITION

	Right answer	Women giving the right answer	
		Total no.	Percentage
Breastfeeding is the best way to feed an infant	True	77	100%
Bottle feeding makes a baby healthier	False	62	81%
Breastfeeding is the only food/drink an infant needs for the first six months	True	74	96%
A woman who gives breastfeeding becomes unattractive to men	False	68	88%
Colostrum is unhealthy for babies	False	44	57%
A mother should not give breastfeeding when she is ill or when the baby is ill	False	49	64%
You should stop giving breastfeeding after 1 year	False	59	77%
Fruits and vegetables are good foods for children older than 6 months old	True	71	92%
A pregnant woman doesn't need to use any vitamin supplements	False	56	73%
Eating less during pregnancy will lead to easier delivery	False	59	77%
It won't damage the child's health if he/she isn't growing well; he or she will just be small	False	69	90%
A prepared bottle of infant formula can be stored outside the refrigerator	False	20	26%
Nutrition has an important role in the child's physical and mental development	True	76	99%
I would like to get more knowledge about food and nutrition, so I can give my children more healthy food	-	76	99%
What does an infant (younger than 6 months) need besides breast milk?	Vitamins	1	1%

APPENDIX III: SCRIPT EDUCATION PROGRAM

Script 'Nutrition for young children (0-3 years old)'

This education program is meant to be given <u>after</u> the regular nutrition program, so the women are expected to have a certain basic knowledge about nutrition.

Materials

1 poster timeline
Handouts with daily recommended amounts (for each group member one)
Various fruits

Introduction

Welcome to you all, I am glad that you could all came here.
As you all know, it is very important to give children the right nutrition. Otherwise they don't have the optimal possibility to grow and learn. That is why I would like to learn you more about healthy nutrition for young children. This will take approximately 45 minutes. If you have any questions, please ask them immediately. I would like to make this meeting interactive, so don't be shy to say or ask something.

Healthy child nutrition

<u>First 6 months:</u>

Let's start at the beginning, right after the delivery. Who knows what kind of nutrition a newborn needs?

breastfeeding

Yes, very good, breastfeeding. It is important to start as soon as possible after delivery, within the first hour of birth. The first milk, colostrum, is thicker than other breast milk. That is because there are a lot of important nutrients in it. It is very healthy for your baby.
During the first six months, breastfeeding is the only food that your child needs. It is rich in energy and nutrients, so there is no need to give other foods. It can even be bad for your child, because their body is not yet ready to digest biscuits or idli. This way, the baby can get diarrhea.
Also drinks are not necessary, breastfeeding provides enough fluid. When the baby drinks other fluids, such as hot water, juices or cow's milk, he or she will be less hungry for breast milk and won't get enough nutrients.

Are there any questions so far?

After 6 months

The baby is growing, and becomes more active. After six months, breast milk is not sufficient anymore. There is more energy and iron needed in the nutrition of the half year old. Do you have any idea how that can be done?

Answer of the group

Exactly, there can be started with small portions of other foods besides the breastfeeding. This is called 'complementary feeding'.

It is best to start with mashed fruits or vegetables.
Can you think of some fruits or vegetables that are easy to mash? *(for example: banana, mango, melon, carrot, cauliflower, pumpkin, tomato (without skin), cucumber)*
How can you make hard fruits and vegetables easier to mash? *(by cooking it)*
When the mashed food goes well, you can try to give it with small pieces in it. Also, after a few months other foods can be added, such as potatoes and small amounts of beans, meat, fish or egg.

When starting complementary foods, breastfeeding can be continued as before.
You can start the complementary feeding with three times daily for babies of 6-7 months old, increasing to five times daily by 12 months. Start with a few teaspoons en gradually increase the amount and variety.
It is normal that the child doesn't like all the tastes immediately. He or she has to get used to the new tastes and structures of the foods, but don't give up! When you offer the food several times the baby gets the chance to get used to it.
You can continue the breastfeeding as long as wanted, even up to two years.

Bottle feeding

If the mother is not able to produce breast milk, formula feeding is a good second choice. Cow's milk doesn't contain the right amount of nutrients that your child needs, so make sure that you use the special formula feeding that you can buy in the stores.
Breast milk goes straight from the body to the baby, and is very safe. When you give bottle feeds, you have to pay a lot of attention to hygiene. Do you know which measures you can take to keep the bottle feeding safe? *(let the women answer)*

- *Cooking the bottle and teat before using*
- *Use filtered and boiled water*
- *Keep a prepared bottle of formula feeding in the fridge, for maximum 24 hours*
- *Don't preserve any leftovers*

After one year

After one year, the breastfeeding can stop gradually, depending on your child's needs. When the child's diet consists completely of family foods, it is important to know the right serving sizes an daily recommended amounts.

Hand the women the copy of the daily recommended amounts

This paper provides you information about the recommended amounts for children in the age of 1-3 years old.

Interact with the women!
Ask questions, for example:

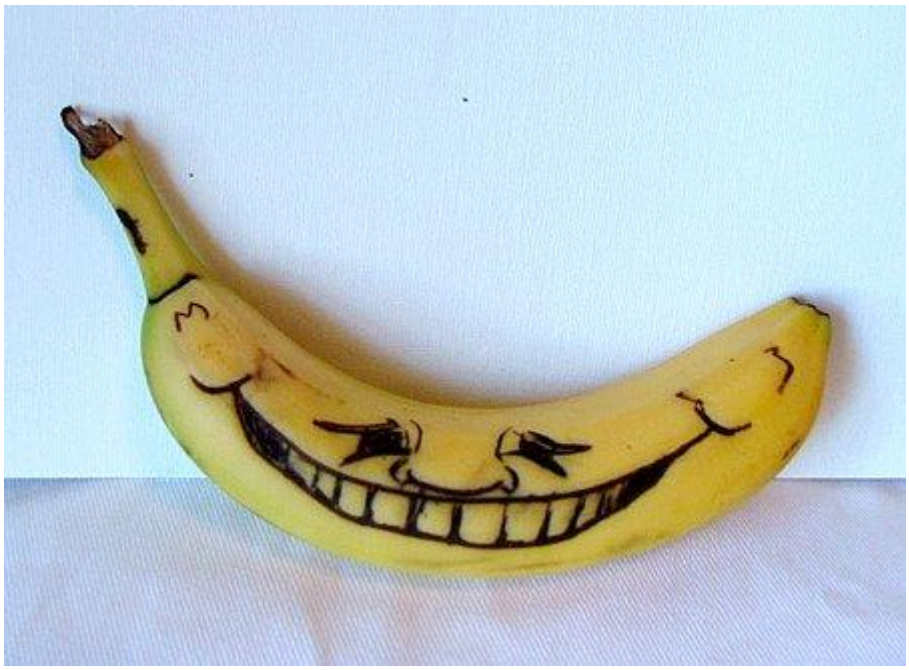
- Think of the foods you give to your child. In which food groups are the recommendations met?
- Which foods do they eat too infrequently?
  Pay extra attention to fruit.
  Ask if they know why fruit is important (lot of important nutrients, such as vitamins, minerals. When your child eats enough vitamins he or she will be less sensitive to becoming ill, and is able to develop well).
  Ask them how much fruit their young children eat, and let them compare that to the recommended amounts.
  Then ask why they eat too less fruit (if that is the case).
  Try to come with them to a solution, for example: give fruit as a snack instead of biscuits.
  Also try to discuss with the women what fruits they can afford. For example: a small banana costs only Rs.2, and most kids like them.

  Also mention the beans and meat group. Beans and meat contain a lot of proteins and iron, these are needed to grow well.

- Which foods do they eat too much? Why? How can that be changed?
  Pay extra attention to milk.

Funny fruit snack

You can make fruit more attractive to your child by making it a funny snack. For example: draw a funny face on a banana. Can you think of more funny fruit snacks?
Let one of the women draw a funny face on a piece of fruit



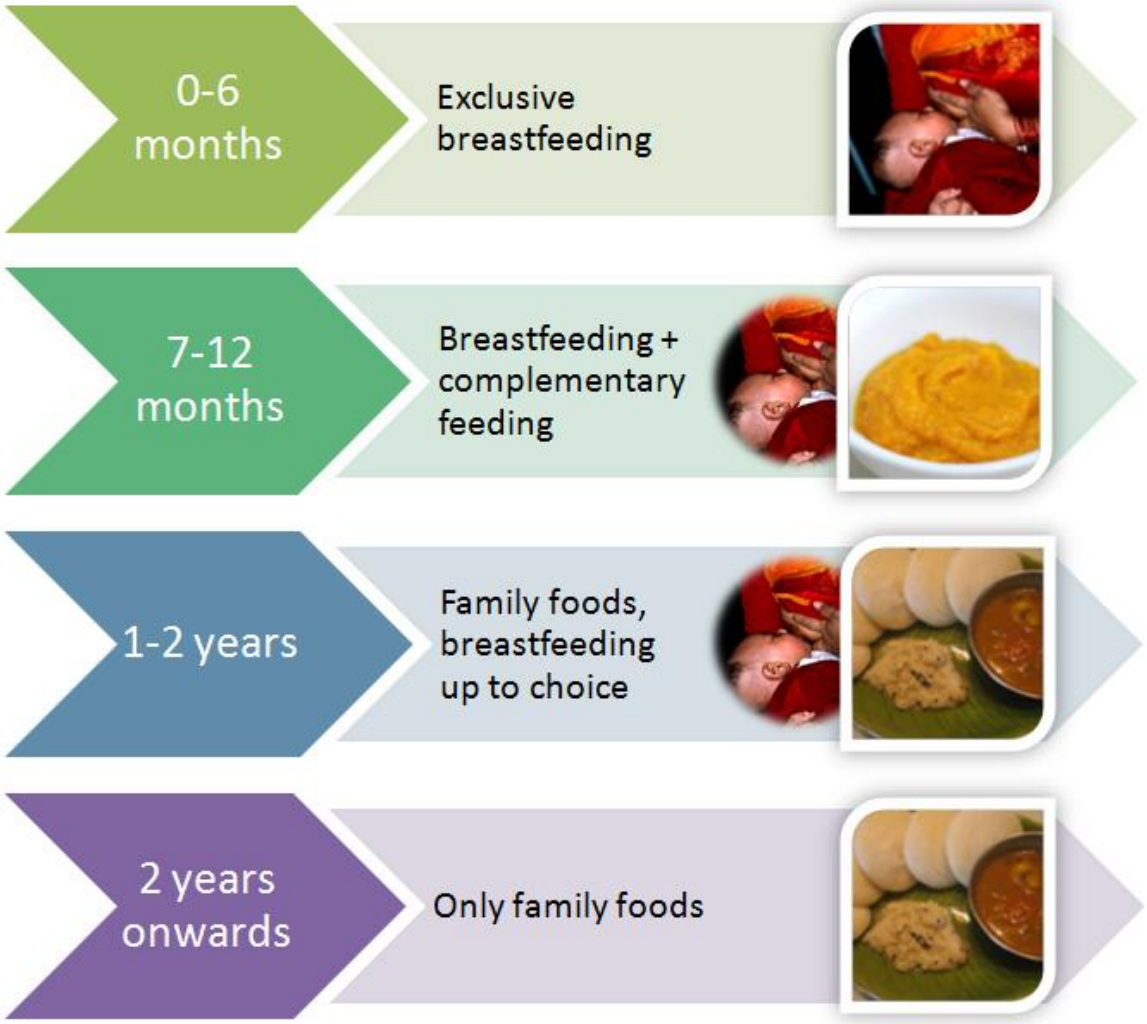
Summary

We have discussed all the stages of nutrition for young children. Now we can do a small game to see what you have learned today.
On this poster you see 4 arrows. 0-6 months, 7-12 months, 1-2 years and two years onwards. Now I 4 4 other arrows to you. Can you match the arrows? (let the group make the puzzle. Finally you can give the right answers).

Questions

Ask if they have any questions and answer them. Thank the women for coming and say goodbye.

Timeline


0-6 months
Exclusive breastfeeding
7-12 months
Breastfeeding + complementary feeding
1-2 years
Family foods, breastfeeding up to choice
2 years onwards
Only family foods

Recommended daily amounts for young children (1-3 years old)

This scheme is a rough guideline to help you understand which foods to offer and how much is a serving size. Every day a choice should be made from every food group.

Grains 	**4-8 daily servings**	**1 serving =**
	Whole grain or enriched bread, buns, bagels, muffins	¼ - ½ slice
	Chapati (roti)	½
	Naan	¼ - ½
	Rice or upma	¼ - 1/3 cup
	Dalia, oats, cereal	¼ - 1/3 cup

Vegetables 	**2-3 daily servings**	**1 serving =**
	Cooked	¼ cup
	Raw	¼ - ½ cup

Fruits 	**2-3 daily servings**	**1 serving =**
	Raw (fresh)	½ small piece
	Canned	¼ cup
	Juice	2-4 oz total/day
	Frozen	¼ cup

Oils 	**3-4 daily servings**	**1 serving =**
	Margarine, butter, oils or ghee	1 teaspoon

Milk 	**3-5 daily servings**	**1 serving =**
	Milk, yoghurt or lassi	¼ - ½ cup
	Cheese/paneer	½ oz
	Custard or pudding	¼ - ½ cup

Beans & meat 	**2-3 daily servings**	**1 serving =**
	Meat, fish, poultry	1-3 tablespoons
	Lentils, beans and peas	¼ cup
	Egg	½ - 1