

NATURAL RESOURCES SYSTEMS PROGRAMME
PROJECT REPORT¹

DFID Project Number

R8084

Report Title

Combating malnutrition – A participatory approach in PUI.
Annex R of the Final Technical Report of project R8084.

Report Authors

Patil, A., Hunshal, C.S. and Bhuvaneshwari, G.

Organisation

University of Agricultural Sciences, India

Date

2005

NRSP Production System

Peri-Urban Interface

¹ This document is an output from projects funded by the UK Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

Annex R

Combating Malnutrition-A Participatory Approach in PUI

Anasuya Patil, C.S Hunshal and Bhuvaneshwari. G

1. Introduction

Peri-Urban Interface is where urban and rural influences interact. This interface is constantly expanding around the cities due to population pressure especially in developing countries. In 1950, 30% of world population lived in urban areas, which is expected to be 60% by 2030. Two significant effects arise from this; rural areas are being engulfed by urban areas; secondly, people are moving to urban areas, leaving less number of youth to work on the land. The dominant process that takes place in the peri-urban interface is that the people's livelihoods are changed as a result of changes driven by urbanization. Rapidly changing land use patterns, new industry and new populations that prefer employment in industry to agricultural work are some of the notable changes. These changes have their own repercussions on health and nutrition of the poor people.

Over 526 million of the total 800 million undernourished people in the world live in Asia-Pacific region. It is all the more startling to know that India alone has 204 million undernourished people. Compared to 164 million in China which has a much larger population (Anon, 2002).

In India because of extensive maternal undernutrition, about 30% of the infants are born with low birth weights (<2.5kg). Both clinical and sub-clinical undernutrition are widely prevalent even during early childhood. About 1-2% of pre-school children (1-5yr) suffer from PEM (protein energy malnutrition). This is only the tip of the iceberg. Countrywide surveys indicate that more than half of the Indian pre-school children suffer from under nutrition as indicated by low birth weight for age of which 65% of them suffer from stunted growth. About a half of the adults have a Body Mass Index (BMI) below 18.5, which indicates chronic energy deficiency (Anon, 1998)

One should not be led to believe that this situation is due to a large scale shortage of food. It has been estimated that the food already available is enough to be equitably distributed in accordance with the physical needs of the people. India has witnessed green revolution, white revolution, yellow revolution, blue revolution etc. Our food stocks are overflowing but the problem of hunger has not been solved. Dr Amartya Sen has rightly pointed out that the poor do not have adequate means or

entitlements to secure food even when the food is locally or regionally available. It is interesting to note that mere increase in food production does not necessarily ensure improved nutritional status. Access to gainful employment, suitable technologies and other productive resources are important factors influencing under nutrition.

Knowledge about foods is necessary to improve the nutrition status of poor. When there is a shortage of food due to drought, household production of food drastically is reduced and also less purchasing power of the poor results in poor health conditions. Efforts are made to improve food habits, so as to utilize all available food to get maximum benefits, and to grow some food in every home which will contribute much to the welfare of the people. Cooking food to save the food value is not only one phase of nutrition, learning to use all edible foods of the area is another. Food prejudices, of the people such as never having tasted or eaten certain foods also affect their nutrition status. This can be overcome by nutrition education. The problem of balancing diets when there is a shortage of food (in case of drought) can often be overcome through learning how to use substitutes such as soybean and other available food grains. Including soya products in the daily diets will help to lessen the demand for cereals, pulses and oilseeds which may be in short supply during drought or low purchasing power of the poor.

1.1 Why Soybean Used as an Intervention:

Very poor women SHG members were engaged in agriculture as agricultural labourers or in factory workers as wage earners. Due to drought (for a period of 3 years) the agriculture and other natural resource based activities in the peri-urban area has been drastically reduced. Unskilled women were forced to take up as daily wage earners in factory for that they have to travel 10-14 km. per day. They get rupees 25/- per day as wages out of that Rs. 10/- spent on traveling and Rs. 5/- for drinking tea at work place. With the meager amount and vulnerable groups in the family they were unable to meet out their family food needs. The team members of the project were trying to find out appropriate ways of supporting poor groups of people out of poverty. Soybean is a legume contains 40% protein, 23% carbohydrates, 20% oil and reasonable amounts of minerals and vitamin. Soybean is grown in Kotur village and directly marketed without keeping for family consumption. This is mainly due to food prejudices, never having tested or eaten soybean. An attempt has been made on

a participatory method to understand nutritive value of soybean in the daily diet. The opportunity in the existing pattern of agriculture production also helps to promote soy based income generating activities for the poor women to increase their family income and household nutritional security at an affordable cost.

It is absolutely undeniable that putting an end to hunger necessarily starts with ensuring that enough food is produced and made available to everyone. However, simply growing enough food does not guarantee the elimination of hunger. What is to be assured is the access by all people at all times to nutritionally adequate and safe food. It is indeed a fundamental right of all human beings to be free from hunger. Initiatives like feeding minds and fighting hunger (FAO) is a step forward in reducing hunger. The present study was carried out in Kotur a periurban village in Dharwad district of Karnataka State of South India to understand the prevalence of hunger and malnutrition. It presumed that education and information on issues related to hunger and food as key factors in this direction.

The poor rainfall during the last three years has led to poor crop yields. Due to variation in the distribution of rainfall the agricultural production has become risky. The people are slowly shifting towards non-agricultural activities such as factory work, brick making, building construction work at cities etc. as wages are higher than agriculture.

Even the food need of these people is not adequately fulfilled, as they are underemployed throughout the year. Continuous drought for the last 3 years has worsened their condition. Especially the poor and landless. During the regular cropping period both in *kharif* and rabi the poor are employed in agriculture for nearly eight months. But the drought has left this vulnerable group in search since there has been hardly any cropping in rabi. Thus they have been able to get work for a maximum of three months during *kharif*. Apart from this a large number of dependents have made people vulnerable in general and women in particular. It is to be noted that malnutrition is both the cause as well as the effect of poverty. The vicious circle of poverty and malnutrition has to be broken some where. As long as food need is not satisfied, one cannot think of satisfying higher needs. Under these circumstances it is very difficult for these underprivileged and zero-asset based women to start income generating activity for their livelihoods. With this background the following objectives were set.

1. To understand the prevalence of hunger and malnutrition
2. To devise strategies to combat hunger and malnutrition.
3. Impact assessment of the strategies evolved.

2. Methodology

Criteria for selection of study area: Kotur village is located in peri-urban areas of Dharwad district of Karnataka state in south India. It is situated 14 km North West of Dharwad, which is 1.5 km away from National High way No 4 (NH4). An industrial growth center Belur is located across the NH4 near Kotur. The main crop grown during monsoon (*kharif*) are paddy, sorghum, cotton, maize, pulses (*Greengram, Blackgram, pigeon, broad beans, soybean*) timing post monsoon (*Rabi*) wheat, sorghum, chickpea. Majority of unskilled women of Kotur village work in factories as wage earners and in agriculture as agriculture labours. The staple food crops of people are sorghum, wheat and rice. Common vegetables consumed are brinjal, cluster beans, potato, pumpkin, tomato, cucumber, variety of gourds and leafy vegetables. Groundnut oil or palm oil is the common cooking medium for a number of households. Chewing betel leaves and nuts is the most common habit of the people of this area. Due to continuous drought for a period of 3 years, the purchasing power of people on food has been drastically reduced and worsened their condition. Apart from this, large number of dependents have made people vulnerable in general and women in particular. Women expressed that they were unable to work long hours in factories due to inadequate consumption of food and illhealth. Recently farmers have started growing soybean as a commercial crop. Due to lack of knowledge on food people are not consuming soybean. They have considered it as a livestock feed. Based on the participatory methodologies soybean intervention was introduced to combat malnutrition.

The study was conducted in three phases. In the first instance, socioeconomic information on self help groups operating in the village was obtained from Community Organizer, India Development Service (IDS), Dharwad an NGO working one of the as partners in the peri-urban projects funded by DFID, UK (R 8084) (Appendix 1). Out of seven SHGs two women very poor SHGs named Akkamahadevi and Tajmahal were selected based on the participatory wealth characterization made during 2002. During the second stage participatory methods such as historical time line on food habits, health mapping, hunger analysis, seasonality calendars on food, food matrices, preferential ranking were carried out. Based on the information

generated participatory training on nutrition and participatory exhibition on soybean products was conducted. An attempt was also made to assess the nutritional status of the family by anthropometric measurements and Body Mass Index (BMI). Nutritional knowledge was assessed as a result of participatory training and exhibition. Impact indicators on intervention was studied by participatory monitoring and evaluation.

2.1 Methods Used

Base line data: It was collected with the help of prestructured schedule during the months of 2002.

Participatory methods: Historical time line on food habits, health mapping, hunger analysis, seasonality calendars, matrices, preferential rankings, training on nutrition knowledge on soybean receipiess, exhibition of soybean receipies were carried out. Participatory indicators on nutrition was also collected.

Body Mass Index (BMI): Nutritional status of adults was determined by using body mass index as the criteria before and after the intervention and were classified according to categories given by Brahmin (1999). Body Mass Index was calculated before and after the intervention of soybean using the formula

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height}^2(\text{m})}$$

Table 1 Classification of nutritional status of adults based on BMI

BMI	Nutritional guide
Below 16	III degree chronic energy deficiency
16.0- 17.0	II degree chronic energy deficiency
17.0- 18.5	I degree chronic energy deficiency
18.5- 20.0	Low normal

Nutritional status of children was calculated according to Gomez classification using NCHS standard weights for age of Indian boys and girls (Anon., 1994)

Table 2 Classification of nutritional status of children based on Gomez classification

Normal	90 % of standard weight for age
Grade I	75 - 90% ”
Grade II	60 – 75% ”
Grade III	Below 60% ”

Organoleptic Evaluation

The Panelists: The acceptability of the soybean based recipes was carried out by all the SHG members and also some of their family members present during the meeting.

Development of Score Card: A score card was prepared keeping in mind the quality characteristics of the products. Overall acceptability was tested on a 5 point hedonic rating scale (adopted from Amerine *et al.*, 1965). Highest score was assigned to the most preferred characteristic (5) and the least (1) to the undesired characteristic.

Testing: The acceptability test was made in the usual meeting place of SHGs. All the food items to be tested were labeled and arranged. The judges were given necessary instructions about the method of scoring. Since most of the members were illiterate, cartoons were used to make them understand the concept of degrees of acceptability. For each recipe the members were asked to keep stones (for scores ranging from 1-5) in a box and when all the members evaluated a food item the total number of stones in the box was counted (ballot box method). Acceptability for each item was calculated as follows:

$$\text{Per cent Acceptability} = \frac{\text{Total score obtained}}{\text{No of judges} \times 5} \times 100$$

Then the subjects were briefed about the experimental protocol in detail and were informed about the risks and benefits of the experiment and their oral consent was obtained.

Calculation of the quantity of soybean to be supplemented:

The main aim was to supplement 1/3 of the pulse requirement. Pulse requirement for each individual of each family was calculated, keeping in mind the age, sex, type of activity, physiological status of each person (Dietary Guidelines for Indians-A Manual 1998 NIN publication).

Experimental Procedure:

Each SHG member was given a calculated quantity of soybean once in a month, for a period of 3 consecutive months. Then after giving the necessary instructions about the preprocessing they were asked to prepare soy dhal (split bean). All of them were asked to bring the soy dhal so prepared after 3 days. Then they were asked to bring the dhal so prepared with wheat/ Sorghum in the ratio of 1:5 for milling. Usually the flour mill owners do not grind any other grains except cereals more so sorghum and

wheat. Hence they were contacted and told about the experiment. After the SHG members started using the flour mix, for a period of three months, their opinion was collected.

Knowledge Test on Nutrition: To know the knowledge level of SHG members, a simple questionnaire in local language (kannada) containing 20 knowledge items was constructed with Yes/No response. Each of the selected knowledge item with respect to incorporation of soybean in daily diet was credited with one score. The maximum score one could obtain was 20. The knowledge score was measured by using teacher made test as advocated by Anastasi (1961) before as well as after training. The knowledge index was calculated with the help of following formula and the respondents were categorized into low medium and high by using mean and standard deviation (SD) as a measure of check.

$$\text{Knowledge Index} = \frac{\text{No. of correct responses}}{\text{Total No. of Knowledge items (N)}} \times 100$$

Statistical methods used: The data was processed by using frequencies and percentage, and analyzed by using suitable statistical methods such as student 't' test and Pearson correlation coefficient.

2.1.1 Participatory Methods to Understand Prevalence of Hunger and Malnutrition

Historical Time line on Food Habits:

Process: When the PRA team went around the village the women were doing their usual household chores. Initial rapport was established and we requested them to draw some illustrations on ground about their food habits through participatory method. An old lady Mallavva Yellappa Sogalad told that, when she was young they used to eat lots of millets like little millet, bajra. They were more healthy and energetic than the subsequent generations. She observed a slow and steady change in food habits. Now everyone prefers eating rice as it has become a social prestige. Moreover, millets are to be processed before cooking and that time utilized for processing could be for some other work. The food habits were illustrated on the ground by the village women with the help of locally available resources like food grains.

Inflows and Outflows of Food

The agricultural laborers get wages in kind during harvesting of *Little millet* and in other periods in the form of cash. Women expressed that *Little millet* takes lot of time for processing hence they did not consume it. Instead they preferred to sell *Little millet* and buy rice from Dharwad market. When they get wages in the form of kind such as sorghum, ground nut, chilies etc., they purchase rice (28 kg), wheat (7 kg), and sugar (7 kg) from fair price shop at Kotur village. For petty things as well as during emergency (when their friends/relatives visit them), they buy from provision stores in Kotur. They go to Dharwad market, once in a week (on Tuesday) and buy sorghum, other cereals (if needed), pulses, oil, vegetables, fruits. Some members do have kitchen garden, where they grow brinjal, tomato and fruits like papaya, etc. In case of food shortage, they borrow food grain either from landlords or their neighbours and return the same when they get their wages.

Mobility Map on Health

Process: During SHG weekly meetings, the research team found that some members were irregular in attending the meeting. On enquiring, we came to know that they had gone to Dharwad Civil Hospital for the treatment of one of their family members, who was suffering from ailments like fever, stomach ache, dysentery, weakness, headache, infections of eye & throat etc. The members present also said that they visit temples as superstition, local homeopathy doctor as well. They go to Bhadrapur a village which is 40 km away for treatment of simple & compound fractures and they also sometimes approach the Govt. health worker for treatment.

Expenditure Pattern on Health

Poor SHG women of Kotur expressed that, they spend lot of money on medicine and health checkup. During drought due to irregular work their earnings were badly affected. Due to less earnings 75% of the amount was used to fulfill their food needs. During illness 50 % of money was spent on medical expenses and 50 % on purchase of foods. They expressed that on an average 25 % of the food or cash is borrowed as a loan from the landlords to meet out their immediate food needs. To express this,

women used coins of different denominations viz Rs. 1 0.50 ps. 0.25 ps as depicted below (Fig 1).

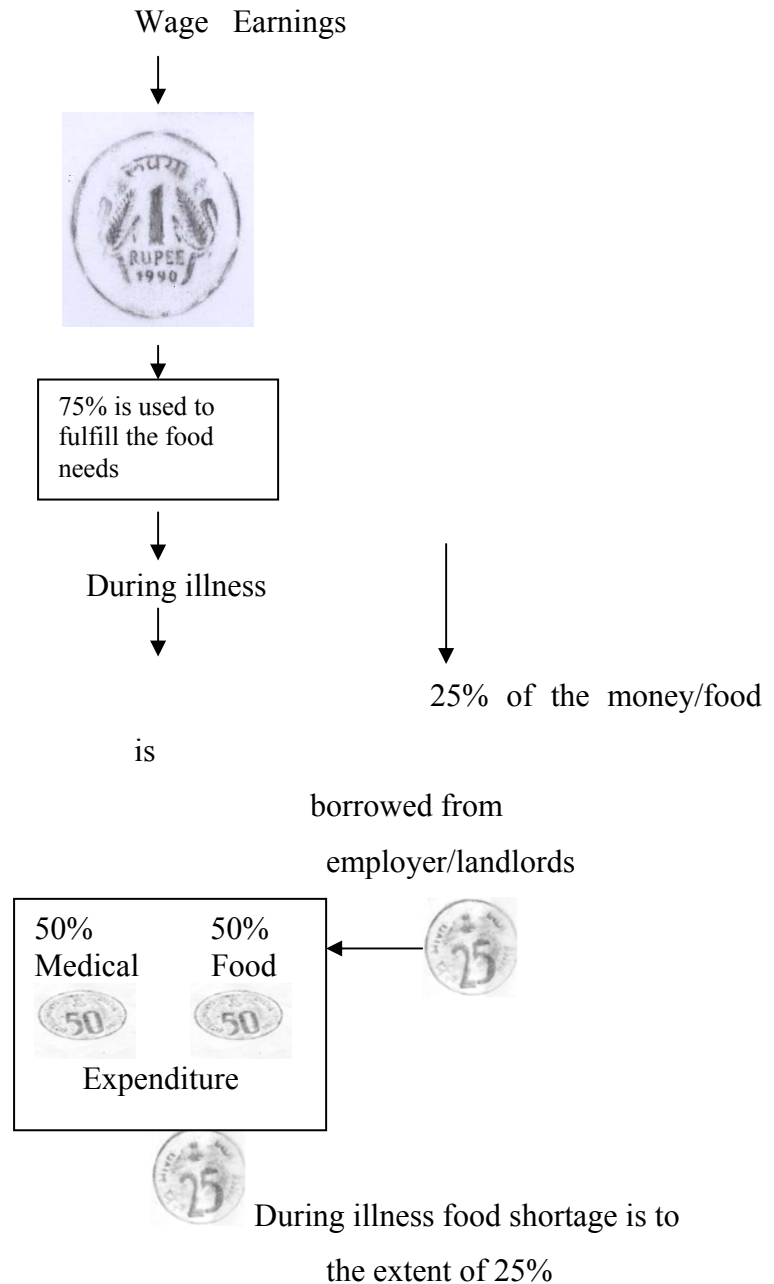


Fig.1 Expenditure pattern on health

Hunger Analysis

The focused group discussion on hunger indicated that hunger and food shortages are common experience for SHG members. The team asked the members to classify the degrees of hunger experienced by them. They expressed that drinking gruel/ganji for one or two days made them least satisfied with food; eating dhal (split beans of pigeon pea) and one roti made them (unleavened sorghum bread) poorly

satisfied; eating 2 roties, dhal, vegetable made them moderately satisfied and eating 3 to 4 roties curds dhal, curry, fruits, vegetables made them fully satisfied.

- *Mahaboobi Jardikar old woman aged 60, expressed a periodic craving for food and she is unable to get it as a result she cannot work for a longer hours in the field and cannot lift water from well. The first sign of hunger may be slight restlessness then irritability or a feeling of tension and finally feeling pain in the stomach. Other women SHG members expressed that hunger is affected by work in the agriculture field and quantity of food intake increases during rainy season. The purchasing power for food is less during summer as they do not get work and are unable to have the required quantity of food.*

To clarify this, the research team conducted a PRA exercise on hunger. During this meeting ten members were present. The team asked the members to classify the degrees of hunger experienced by them. After mutual discussion among themselves, they finally arrived at 4 categories viz day with least satisfied meal, poorly satisfied meal, moderately satisfied meal and fully satisfied meal. Then what they meant by these was illustrated with cartoons-- human face with different expressions along with meal plate with different food components. (Fig 2)) in order to make very clear to illiterate SHG members.

They expressed that on shandy day (Tuesday), they get their weekly wages and they go to market and buy the essential food commodities and cook balance meal and eat adequate quantity of food on that day only and they are fully satisfied with food. As days pass on, not only the food items, all other items that they had purchased on shandy day (Tuesday) get exhausted, which resulted in cutting down their expenses on food. So Sunday and Monday are real nightmares for them as far as food is concerned. They expressed that it is difficult to predict for longer duration of hunger and so the values on a monthly & seasonal basis would be appropriate. They discussed among themselves and depicted meal satisfaction in month during drought and normal mansoon. (Fig 3)

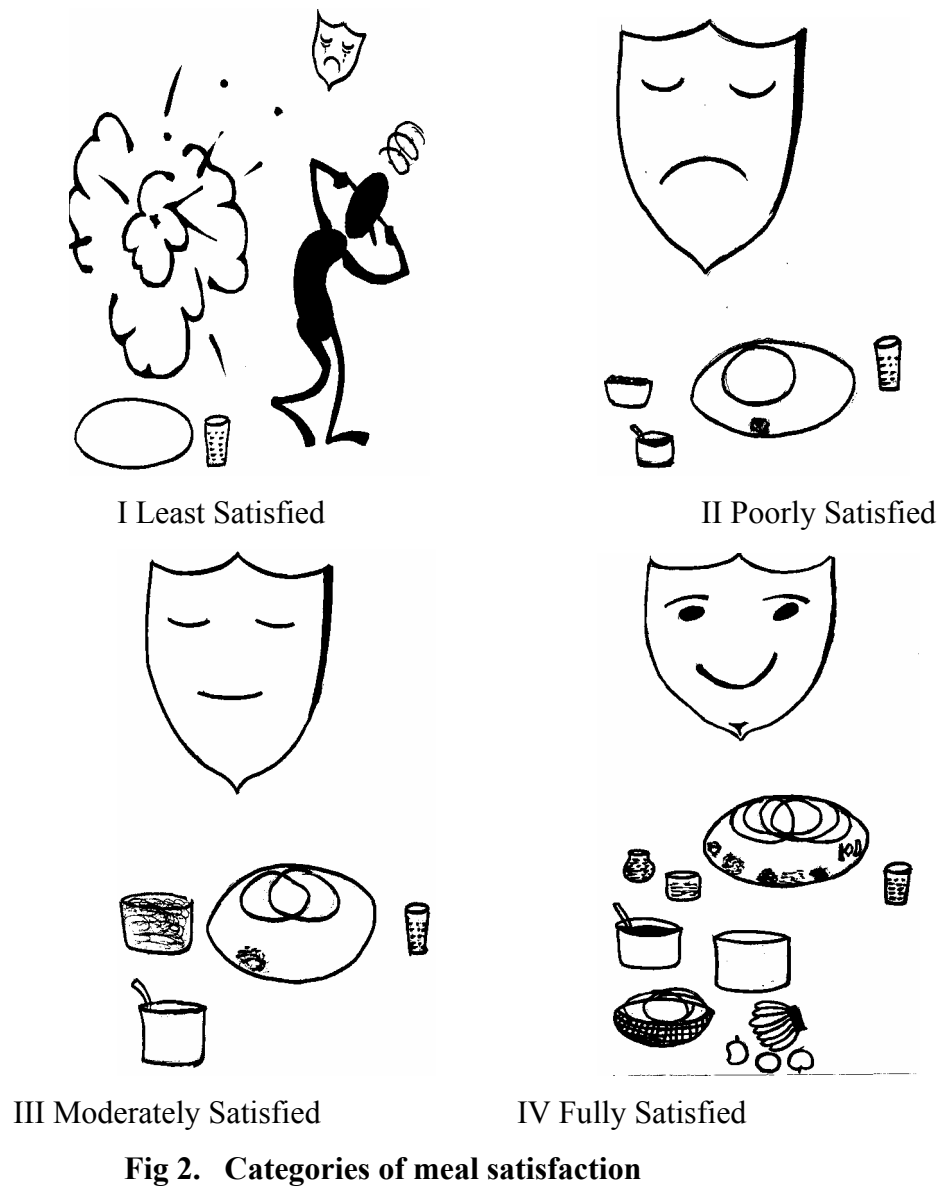
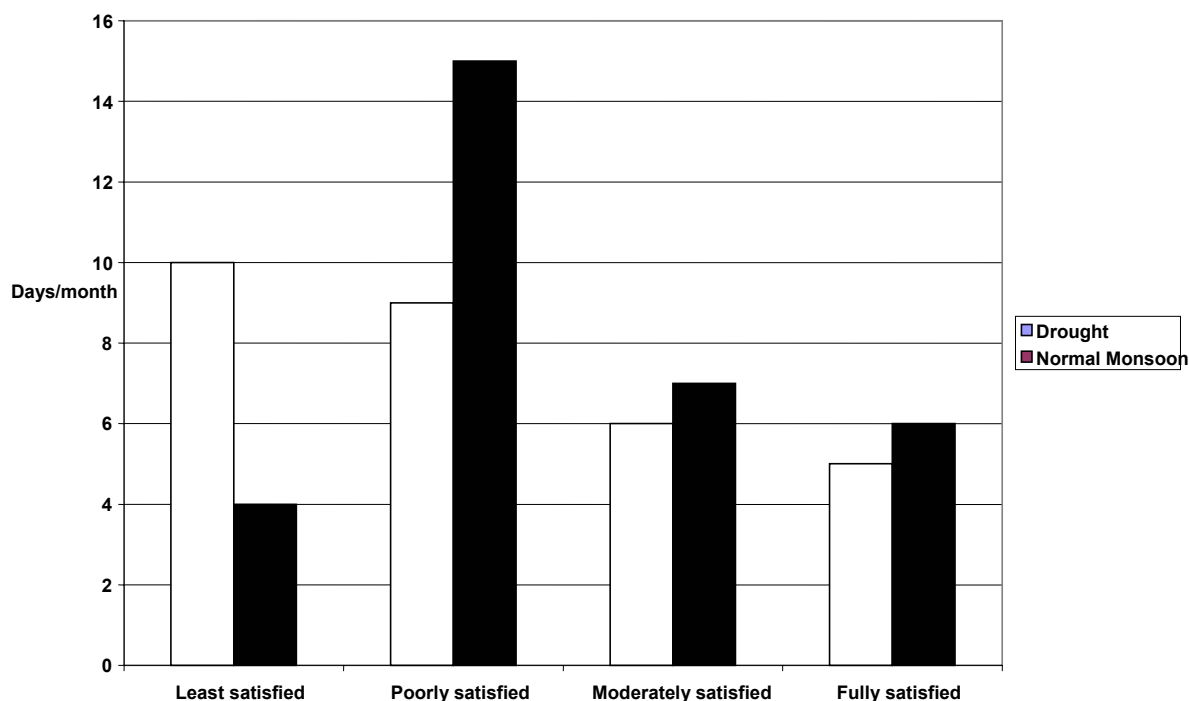


Fig 3. Days of meal satisfaction in a month during drought and monsoon



They said that even during periods of normal monsoon, they are fully satisfied only for few days. According to them, the major difference between hunger experienced during drought and that during periods of normal monsoon is that, the number of days with least satisfied food drastically gets reduced during periods of normal monsoon. They said hunger according to the seasons is more appropriate.

Rainy season	Summer	Winter
Moderately Satisfied	Poorly Satisfied	Fully Satisfied

They said that they are poorly satisfied during summer. Once agricultural operations start, they do get some wages. During “growing period of crops” they get employment on farm. During harvesting time they get full employment as well as competitive wages as there is good demand for agricultural labour during this period.

SHG members were discussing about the prices of staple food. They were discussing where to get food at cheaper rates in neighbouring villages. So food occupies a prime place in their discussions.

Participatory Training on Soybean

At the time of initial visit of the research team, it was found that soybean crop which is grown in Kotur was being harvested (October). At this time, a group of women who were involved in post harvest operations of soybean, were contacted and enquired about the uses of soybean. Akkamahadevi SHG members said that they occasionally mixed handful of soybean with 8-10 kg sorghum/ wheat and that too without preprocessing, whereas Tajmahal SHG members thought that it was suitable only as animals feed. Next day the subjects were asked to assemble at their usual SHG meeting place. Then the nutritive value, importance and use of soybean in regular diet was explained to them. One of the SHG members Mallavva Yellappa Sogalad came forward to prepare soymilk. Then she was given 100 g soybean and she was asked to soak it overnight. Next under the guidance of the researcher, in the presence and assistance of all SHG members she prepared soy milk. After preparation of soy milk a part of it was kept aside for the preparation of curds and a part of it was used for the preparation of tea and a part of it was kept as it is. All the people present there were asked to taste. Four members said that they were ready to try the recipes. These 4 members viz Shanta Mavinkatti, Basavva Mahadevi Ganiger, Anasuya Ishwar Ganiger and Mahadevi Rudreppa Saudatti were given 1 bowl of soybean and were asked to prepare 1 recipes which they found them to be acceptable.

Then, they were informed about preprocessing of soybean for preparation of soy flour, and incorporation in *chapatti*(Unleavened wheat bread) *roti*(Unleavened sorghum bread) *idli* (rice and blackgram at fermented overnight) *dosa* (rice and blackgram at fermented overnight) and how soy dhal can be used in each and asked them to exhibit it after two days.

Participatory Exhibition of Soybean Incorporated Recipes

All the SHG members organized exhibition. Each of them had prepared one dish after mutual consultation among themselves. The soy incorporated recipes that were exhibited on that day included *chapati*, *roti*, *idli*, *dosa*, *pakoda*, *vada*, *soy dhal bhaji*, *soy milk* & *soy tea*. All these were neatly labeled and arranged. Then each member was asked to explain the preparation of their respective recipes to other

members. At the end they all tasted recipes and found them to be highly acceptable. The training on use of soybean in diet and its importance was imparted to all the women and men who gathered there.

Feedback / opinions obtained from the SHG members:

- i) Foaming was high during grinding for the preparation of milk
- ii) Peeling of the soaked grains was time consuming.
- iii) The recipes prepared using soybean were accepted organoleptically and liked by family members.
- iv) Chapati, idli, roti, dosa were softer in texture compared to their usual preparation. But they said that there was no much difference in taste.
- v) Soya dhal bhaji, was just like the usual this is usually made from chickpea bhaji.

Educational Material

Educational material: Pamphlets containing method of preparation of recipes were distributed among the members as some of the members suggested to give the write up so that their children can read the material and help them to put soybean into practice.

Preferential Ranking

To incorporate soybean in the daily diets of poor families preferential ranking was made to select recipes of their choice. Maximum number of recipes preferred were by using soybean. Therefore soybean was selected to be incorporated in daily diets of the poor families.

Matrix Ranking

Matrix Scoring on soybean incorporation in diets

After participatory demonstration and acceptability test, the selection of soybean recipes for daily consumption was made with the help of matrix scoring. When the team explained the method of scoring, 2 members viz Anasuya Ishwar Ganiger and Rudravva Boodannavar came forward and expressed the criteria for regularity of consumption as Daily, once in week, once in 15 days, once in a month, rarely, not at all.

Since majority of participants were illiterate, the criteria were represented with the help of symbols. The weightage for each criteria was expressed with the help of stones (one stone representing the preference of one member). The matrix scoring clearly favoured the incorporation of soybean daily in roti and chapatti. Therefore acceptability test was carried out for soy incorporated recipes. Roti and Chapati are

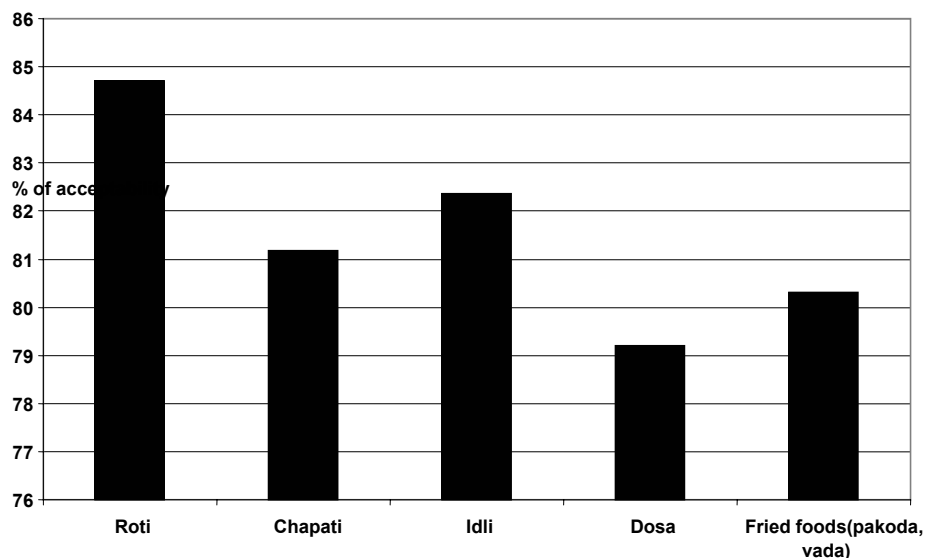
the staple bread whereas Idli and Dosa are usually prepared once a week for breakfast as change in food. Dhal is prepared in form of curry which goes with bread daily.

Organoleptic Evaluation

Acceptability test:

Results of the acceptability test is depicted in Fig 4 and it was observed that the incorporation of soyabean (20% level) in roti was accepted by more (84.70%) members, followed by idli (82.35%) and chapati (81.17%). The results of the present study are similar to the study conducted by Beatrice *et. al.* (1998), who incorporated soybean flour to bread, bun, sago, rice and vermicelli at 20 and 30 per cent levels in place of the main ingredients found that the difference between the standard products (100) and samples (90.10) for all the five attributes viz., appearance, colour, texture, odour and taste was not statistically significant.

Fig 4. Acceptability of soybean incorporated recipes

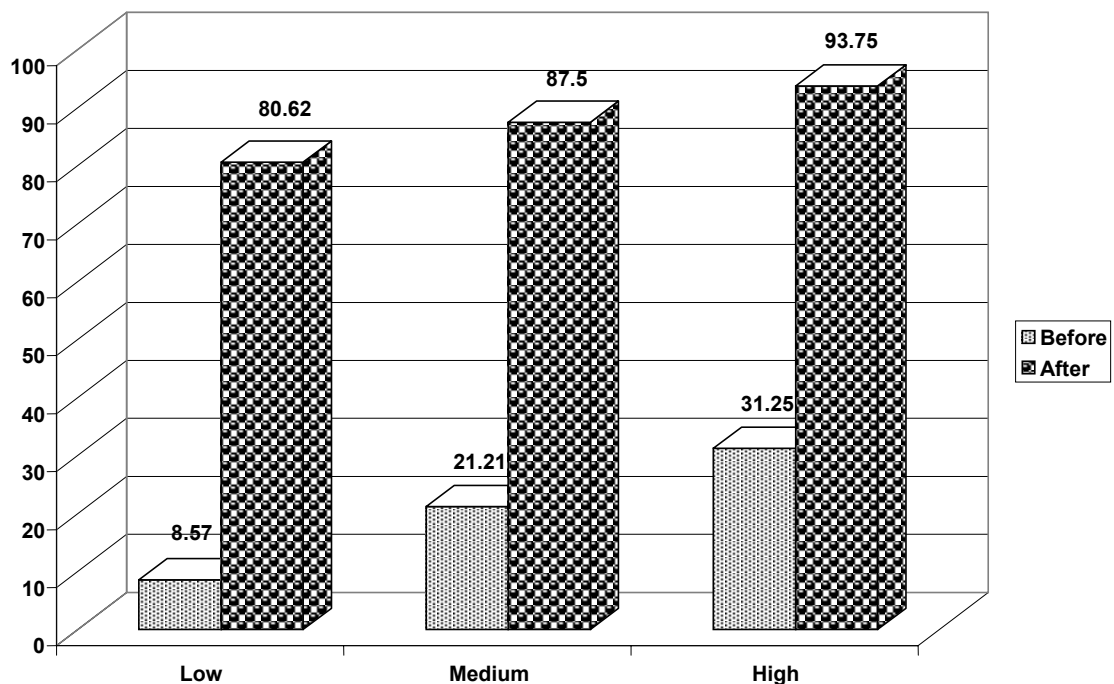


Impact of nutrition education on SHG members with reference to nutritious soybean recipes

The fig 5 shows an impact of nutrition education on the gain in knowledge over the bench mark level with reference to nutritious soybean recipes. It was interesting to note that in all categories of women viz., low, medium, high groups indicated a positive and significant relationship between the category with reference to gain/ in knowledge. There was a significant improvement ($p < 0.01$) in the nutritional knowledge of the SHG members after the training.

The multifactor reasons could be attributed to the imparting of nutrition education of women. Probably the basic reason might be the immediate need of the women to know more about the improved practices of nutrition in order to meet the nutrition requirement of the family. The second possible reason might be the participatory methodologies used in training, exhibition and planning of soybean products and adequate practical knowledge to make use of local recipes might have acted as the reinforcement of the information gained in the training situation.

Fig 5. Knowledge test before and after training



Hence, the hypothesis set for the study that there will be no difference in knowledge level of the participants before and after training with reference to improved practices of nutrition as the result of training was rejected.

Impact of soybean intervention on nutritional status

BMI before and after the intervention of soybean

The table 1, clearly depicts the significant ($P < 0.01$) increase in mean body mass index (BMI) after the intervention of soybean in diets of Kotur sangha members.

Nutritional status of adults before and after the intervention was determined based on body mass index (BMI). It is clearly observed from the table 2 that the number of people in chronic energy deficiencies in all the degrees reduced after the intervention except in II degree. This may be due to the fact that the member was suffering from diarrhoea, and fever for the last 15 days and this reduced drastically

their weights and in turn reduced BMI. It was also observed that the number of people in low normal category was drastically increased after the intervention than III and I degree chronic energy deficiencies.

Table 1. Over all mean values of adults BMI before and after the intervention of soybean (N = 64)

	Before intervention	After intervention
Mean	18.48	18.95
SD	2.47	2.54
SE	0.30918	0.31806
t value	3.177**	

** P< 0.01

Table 2. Percentage of adults in different degree of chronic energy deficiency before and after the intervention (Based on BMI)*

Nutrition Intervention	Before intervention	After intervention
III degree chronic (<16)	11	8
II Degree (16-17)	5	6
I degree (17-18.5)	15	8
Low normal (18.5-20.0)	13	22
Total	44	44

* Those who came under other categories (normal, over weight and obesity) have not been included in this table.

Table 3. Nutritional status of children* before and after intervention of soyabean

	Children (n=27)	
	Before	After
Grade III (Below 60%)	1	0
Grade II (60-75%)	18	8
Grade I (75-90%)	12	14
Normal (90% and above)	6	15

*Based on Gomez classification

Standard weights for age are taken according to NCHS standards (Anon, 1994)

In the case of children the nutritional status was determined based on Gomez classification. Table 3 indicates that the one child fell in grade III, 18 in grade II, 12 in grade I and 6 in normal before the intervention of soybean. Due to intervention there was no children in grade III, decrease in grade II where as drastic increase in number of children in grade I and normal. This is due to impact of nutrition education and training about the soybean utilization given to mothers and also utilization of soybean regularly in the daily diets which might have contributed to some amount of protein requirement for the growth and development of body.

The results of the study is in accordance with the studies conducted by Obatolu and Ashaye (1999) who assessed the contribution of soybean utilization on the nutritional status of children from low income families in Nigeria and found that the weight and height of children from Idimu, Imota (soyabean utilized) were higher than for the children from Badagry (not using soybean). About 26,32 and 71% of children studied in Idimu, Imota and Badagry, respectively, fell below the WHO 5th centile bracket of weight for age.

Owolabi *et.al.* (1996) conducted a comparison study of the nutritional status of children in villages in Northern Nigeria using and not using soybeans. Kurmin Masaria, a community producing and using soybeans, had a higher percentage ($P < 0.05$) of nutritionally normal and lower percentage of severely malnourished children than the other two villages Kaya and Makera, respectively. Soybean accounted for 34.4, 28.5 and 1.3 % of the protein intake of children between 2-15 years of age in Kurmin Masara, Kaya and Makera, respectively.

Participatory Indicators on Nutrition

Taste, Texture & Appearance: All the women who involved in nutrition intervention programme receipies enhances the quality in terms of taste, texture (puffiness) & appearance.

Acceptability of Soybean receipies: Ashimbi Inamdar expressed that different varieties of soybean receipies can be prepared by incorporating soybean which were liked by all the family members.

Increased Appetite and working efficiency: Sangavva Sogalad & Kamalavva Ganiger expressed that consumption of food increased from 2-3 roties/chapathi instead of one.

- Ashimbi Inamdar expressed that it is good for health, it gives energy & increases the weight of the body.

- Working efficiency increased after the consumption of soybean. An old woman, Mahaboobi Jardikar (62 yrs) & three members of Tajmahal Sangha who were unable to cope up with the field work due to weakness started working more efficiently as agril. labourers.
- Two of the members of Akkamahadevi Sangha expressed that, who were incapable of lifting one pot full of water from borehole to their houses were able to lift two pots now.

No Health disorders on common ailments were observed during intervention:

They could not notice any symptoms of dysentery, diarrhea and constipation.

Influence on some the specific disorders

- Fathima Ganji, who was diabetic noticed that body pain and leg pain was reduced.
- Shakeena Aminaghad has been using soybean even after the intervention since her menstrual cycles became regular. Earlier she was suffering from irregular menstrual cycles for which she was using medicines by spending nearly Rs 250 per month.

Opinions of the respondents:

- Participatory training on soybean intervention was found to be useful and effective as they could learn by themselves by incorporating soybean in local available receipies.. Before the intervention they did not know how to utilize the soybean in their daily diets since its taste was not palatable (slightly bitter) therefore was not acceptable.
- Did not know that soybean was used by human beings even though they grew in their field and thought that it was only suitable for livestock as feed
- Soybean incorporated recipes were good in terms of taste and health
- Some of the members planned to grow soybean in their field.
- Incorporation increases the quality of the product in terms of puffiness and softness
- Some of the members continuously used soybean and adopted in their daily diet.
- They knew the nutrition aspects of soybean
- Soybean incorporated recipies were slightly oily in nature
- For milling, soybean should be mixed with other cereals otherwise soybean alone can not be milled due to high content of oil and it can not easily flow from the miller.

- Soybean can be processed into dhal and packed to take up as an IGA. If it is in the form of flour it is difficult to process and consumer also thinks that it may be adulterated with some other flour. Soybean dhal was remarkable to every one and accepted by the buyer.

Conclusion:

The results of the findings indicate that the incorporation of soybean in daily diet has had a beneficial effect to reduce the malnutrition. It also validates the importance of soybeans in the diet, especially in this period of economic recession when animal protein sources are very expensive and for the poor it is difficult to meet the daily protein needs for the body. The high protein content of soybean, the ease with which it blends in different regular recipes and its acceptability to the members make soybean flour more popular to enhance the dietary protein intake and in bringing about the reduction in the malnutrition of the mass of population.

References:

- Anastasi, A., 1961 Psychological Testing Macmillan and Co., New York, P. 428-36 (1961).....
- Fisher, Thomas and M.S Sriram (2002) *Beyond Micro-credit: Putting Development Back in to Micro Finance*, Oxfam, Vistaar Publications, New Delhi.
- Obatolu, V. A., and Ashaye, O.A.(1999) Assessing the contribution of soybean utilization on the nutritional status of children from low-income families Lagos State, Nigeria as a case study. *International Journal of Food Sciences and Nutrition*, 50:6, 375- 381.
- Owolabi A,O., Mac-Inegite-JO., Olowoniyani, F.O., and Chindo, H. O (1996) A comparative study of the nutritional status of children in villages in Northern Nigeria using and not using soya beans. *Food and Nutrition Bulletin* ,17:1, 42-48.
- Anonymous (1994) Reference body weights of Indians. *Nutrient Requirements and Recommended Dietary Allowances for Indians*. A report of the expert group of the ICMR, NIN, Hyderabad, 10
- Beatrice A D., Parvathi Easwaran , P and Kalpana, N (1998). Development of selected built in calinary foods using defatted soy flour. *The Indian Journal of Nutrition and Dietetics*, 35, 255-261.

Appendix 1 Socio-economic characteristics of SHG members:

Wealth class: The participatory wealth class showed that, majority of the households (73.07%) were classified under very poor category. One would notice negligible variations under wealth class of poor, rich, medium and higher medium households.

Age : age was measured as the number of calendar years reported to have been completed by the respondents at the time of interview. Based on their age the respondents were categorized as Infants (0-12 month), Children (2-12 yrs) Adolescents (13-18 yrs), Adults (19-60 yrs) and Oldage (> 60 yrs). It is clear from the table A that majority of the respondents belonged to adults (64) category followed by children (30) adolescents (17) Old age (7) and infants (4)

Sex composition: 55.28% of the subjects were females and 44.7% are males. The slightly higher percentage of females is probably due to the fact that the families of women SHGs were selected for the study. And some of the members are widows or are divorcees and therefore they do not have any male member in their families.

Educational status: Education was operational defined as the member of years of formal education acquired by a respondent. Based on their education level the respondents were classified into following categories. Primary School (I-IV) std, Middle School (V-VII) std, High school (VIII-X) std and Above S.S.L.C. The result of table ____ depict that majority (20 no.) were illiterate followed by primary school (20 no.) Middle School (17 no.) High School (10 no.) and adolescents (4 no.). The children between 6 years were not taken for education.

Family Size: Size of the family was operationalised as total number of members residing together in the families were categoried of as small family and big family. The results revealed that the 10 families were from large family size and 16 were from small families.

Fimaly type: The families were classified into two types

- 1.**Nuclear Family:** The family consisting of a single married couple living with heir unmarried children.
- 2.**Joint Family:** The family consisting of more than married couple of either same generation or of two generations living together with or without their children was considered as Joint family.

The results of table revealed that the 4 families were from nuclear families and 12 were from joint families.

Appendix 1 Socio-Economic Characteristics of SHG Members

I. Wealth class	Category	No.of House holds		
	Rich	1		
	Higher Medium	3		
	Lower Medium	2		
	Poor	1		
	Very poor	19		
	Total	26		
II. Age	Category	Male	Female	Total
	Infants (0-12 month)	1	3	4
	Children (2-12 yrs)	17	13	30
	Adolescents (13-18 yrs)	7	10	17
	Adults (19-60 yrs)	27	37	64
	Oldage (> 60 yrs)	2	05	07
	Total	54	68	122
III. Education	Category	Male	Female	Total
	Illiterate	17	36	53
	Primary School (I-IV) std	12	8	20
	Middle School (V-VII) std	7	10	17
	High school (VIII-X) std	5	5	10
	Above S.S.L.C	4	0	05
	Total	55	59	114
IV. Family size	Category	Frequencies		
	Below 5	10		
	5 & above	16		
	Total	26		
V. Family Type	Category	Frequencies		
	Nuclear family	14		
	Joint family	12		
	Total	26		