

# PROTEIN (Program to Revitalize Overall health of Tribals by Ensuring Intake of Nutritious products): A comprehensive program to address malnourishment in the tribal and rural blocks

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PROTEIN (Program to Revitalize Overall health of Tribals by Ensuring Intake of Nutritious products): A comprehensive program to address malnourishment in the tribal and rural blocks

Navi Mumbai: The Energy and Resources Institute.

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The Energy and Resources Institute

# 1 Rationale

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Micronutrient deficiency, is a phenomenon that is observed in all sections of society, irrespective of the strata of the society or if he/ she is a rural or urban citizen. Almost 56% of the population in India is malnourished, according to the World Food Programme report<sup>1</sup>. However, it is more pronounced in rural areas where, unlike urban areas, nutrient deficiencies go undetected until there are serious repercussions on the patient's health. This un-detection, coupled with poverty and under-consumption of nutritious food is the root cause of several of the malnutrition related deaths that have plagued our country for the past few years. According to a World Bank Report, the prevalence of underweight children in India is one of the highest in the world; almost double than that of Sub-Saharan Africa.<sup>2</sup>

The problem is even worse in tribal areas, especially tribal villages in the interiors of India where Govt. initiatives to curb malnourishment have not had the desired results due to several reasons like accessibility issues, low awareness level, and so on. Most of the malnourishment related deaths in India have occurred in tribal areas with Maharashtra being one of the most affected state. Lack of resources as well as the lack of knowledge in utilizing available resources to grow nutritious food to include in the diet, are just a few of the reasons that lead to under nutrition, which if resolved, will have long term benefits in bringing about nutritional security. TERI (The Energy and Resources Institute) attempted to address this critical issue through this project in a sustainable manner.

The hidden form of malnutrition, micro-nutrient deficiency, does not produce dramatic images and goes largely unnoticed or undetected. The deficiency of vital micro-nutrients (Vitamins and Minerals) may cause mental and physical impairment to both children and adults. Moreover, the small quantity requirement of Vitamin A, iron and other trace elements, if not made available to the human body, may lead to serious problems such as risk of infection or visual impairment, anaemia further causing higher mortality rates. To prevent and combat vitamin and mineral deficiencies, a sustainable food based approach is needed to improve their diets and raise the nutrition levels.

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<sup>1</sup> <http://timesofindia.indiatimes.com/city/mysuru/cftri-chief-grow-spirulina-to-beat-malnourishment/articleshow/57454834.cms>

<sup>2</sup> <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/o,,contentMDK:20916955~pagePK:146736~piPK:146830~theSitePK:223547,00.html>



## 2 Background

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### 2.1 Malnourishment in Palghar district -Problem statement

Prevalence of malnutrition in Maharashtra is unacceptably high<sup>3</sup> with Palghar district being one of the worst performing districts when it comes to malnutrition. The deaths of malnourished children were reported to be 1274 between the months of June 2014 to March 2015.<sup>4</sup> As per a report published in the Economic and Political Weekly titled “*Progress in Reducing Child Under-Nutrition: Evidence from Maharashtra by Sunny Jose and KS Hari (2015)*”, nutritional interventions through the Rajmata Jijau Mother-Child Health and Nutrition Mission played a crucial role in dropping the number of stunting among children below 2 years in Maharashtra. It has also been observed in 6-year span, stunting among children below 2 years belonging to the Scheduled Tribe (ST) households declined to 25.3 percentage points: from 52.9 percent in 2005-06.<sup>5</sup>

The above data indicates that though there is a decline in the trend but the rate of malnourishment is still very high especially in the backward and tribal areas, which needs to be addressed with immediate interventions.

### 2.2 Project location

Wada is one of the fifteen blocks (taluka) of the Palghar district in the Indian state of Maharashtra. This area is the most industrialised *taluka* in Palghar district. It is located 13km from Wada village and is 78km away from Mumbai. The main rivers flowing through Wada are Vaitarna and Pinjal. There are three main lakes in Wada block. Many castes live in Wada taluka, namely, Kunbi, Agri, Koli, Vaishya Vani and Sonar.

Wada is located at 19.65°N 73. 13° E, in Palghar district (Figure No. 1), the 36<sup>th</sup> district of Maharashtra and was earlier part of Thane district. It has an average elevation of 38 metres (124 ft) from the sea level<sup>6</sup>. Palghar, Nalasopara, Virar, Bhiwandi are the cities that are nearest to Wada city. Marathi is the local language of the region.

The *Taluka* has a varied mix of several social castes. According to 2011 Indian census, the total population of Wada suggests that almost 90% of the population live in rural areas.

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<sup>3</sup> Final Report & Recommendations, Malnutrition Monitoring Committee 2007- 2012

<sup>4</sup> <http://www.deccanherald.com/content/468754/1274-kids-died-malnutrition-10.html>

<sup>5</sup> <http://indiatgether.org/dlhs-data-on-wasting-stunting-underweight-children-throws-cloud-on-maharashtra-nutritional-progress-economy>

<sup>6</sup> <http://www.indianetzone.com/76/vada.htm>



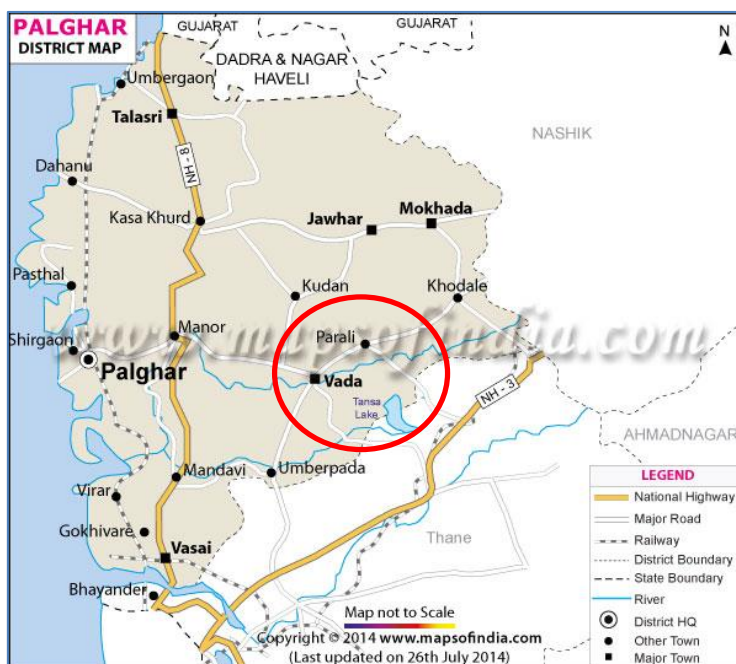


Figure No. 1: Palghar District Map, Source: Maps of India

The main source of livelihood is monsoon dependent agriculture, with approx 47% of the population working as farm labourers. Post monsoon, the members of the community migrate to the cities in search of livelihood opportunities and return to their villages in the month of June. Most of the tribal population lives below the poverty line and illiterate. Wada, like many areas in Palghar is infamous for malnourishment, with women and children being the most affected demographic groups. Thousands of children here fall into the category of SAM and MAM. Several factors contribute to the prevalence of malnutrition, mainly socio-economic. An improvement in the socioeconomic status of the targeted population would directly have an impact on their health and nutrition.

### 2.3 Status of malnourishment in the selected villages (*Nehroli, Jamghar, Savarkhand, Vijapur*)

With an objective to identify highly affected villages within the block, TERI approached Anganwadis functioning under the ICDS scheme in the year 2014 to acquire secondary data of the children falling in the category of SAM (*Severely Acute Malnourished*) and MAM (*Moderately Acute Malnourished*). It was observed that four villages namely Nehroli, Jamghar, Savarkhand and Vijapur needed special attention due to a high prevalence of malnutrition in the children. Table No. 1 shows the number of children under SUW (*Severely Underweight*) and MUW (*Moderately Underweight*) who have a high risk of falling under SAM and MAM category if not attended to with appropriate care at the earliest. Around 28% of children from the total population are (*moderately & severely*) underweight which indicates the improper or inadequate measures to tackle malnutrition at individual/ community level.

Table No. 1: Population and status of malnourishment of selected villages near Khanivali Village (November 2014: during project initiation)

Sr. No	Name of the Village	Name of anganwaadi centre	Total population	Total population (ST)	No. of pregnant women	Total children age(0-6yrs)	Total malnourished children (0-6 age)				Percentage (%) of the malnourished children to the total population of children (0-6 age)			
							SUW	MUW	SAM	MAM	SUW	MUW	SAM	MAM
1.	Nehroli	Nehroli	1508	471	8	147	7	11	1	5	5	7	0.6	3
		Dongarpada	810	810	14	109	10	47	2	4	9	43	2	4
2.	Jamghar	Jamghar	821	436	16	114	6	16	-	6	5	14	-	5
		Papadepada	194	181	-	26	3	7	-	-	11	26	-	-
		Vavarepada	416	312	4	57	4	11	1	2	7	19	2	4
3.	Savarkhand	Savarkhand	936	936	8	116	9	39	-	2	8	33	-	2
4.	Vijapur	Vijapur	818	270	4	78	7	12	-	6	9	15	-	8
		Jambhulpada	274	156	2	44	8	7	-	3	18	16	-	7
<b>Total</b>			<b>5777</b>	<b>3572</b>	<b>56</b>	<b>691</b>	<b>54</b>	<b>150</b>	<b>4</b>	<b>28</b>				

Source: Census of India, 2011 and Anganwadi centres, ICDS, Palghar



### 3 TERI's Collaboration with IOCL

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As mentioned above, tribal areas of Palghar district in Maharashtra are grappling with the issue of malnutrition resulting in higher mortality rates amongst women and children. To address this critical issue, TERI (The Energy and Resources Institute) signed the MoU (Memorandum of Understanding) with IOCL (Indian Oil Corporation Ltd.) on May 11, 2015 to implement the project entitled "PROTEIN (Program to Revitalise the Overall health of Tribal communities by Ensuring the Intake of Nutritious food products): Food Processing Clusters"

TERI had earlier collaborated with IOCL and TZP for a pilot project, titled "Introducing the concept of nutri-gardens to address rural malnutrition by involving KSK<sup>7</sup>" in the year 2014 to address malnourishment. The pilot project was implemented at Khanivali village in Wada block for a period of eight months. In Phase I, TERI developed the concept of "nutri-gardens" to promote consumption of nutritious crops by cultivating them locally. Moreover, to create larger impact "Nutri kits" were designed, developed and distributed amongst the tribal women, especially mothers of malnourished children and anganwadi sevikas of Khanivali village.

In Phase I, the main objective was to ensure a sustainable source of nutritious food through the development of nutri gardens and ways and means to increase the nutritional intake. Phase II was aimed at strengthening the nutritional status of the target villages while developing ways to do so while also providing additional livelihood opportunities to the women in the village.

In Phase II, the project focuses on addressing malnourishment with the integration of additional livelihood options strictly in the context of developing healthy food products and food fortification with an aim to make the project more sustainable.

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<sup>7</sup> KSK- Kisan Seva Kendra



## 4 About the Project

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TERI aims to bring about an improvement in the health status in the region, focusing on the children and the women. The program focuses on supplying locally produced nutritional food, generating a livelihood option, empowering women to make healthy and processed food products, establishing a food processing business and so on. Hence, TERI in collaboration with IOCL, adopted a three-pronged approach:

- 1) Nutrient supplementation as an immediate intervention;
- 2) Capacity building, focusing on capability to provide sufficient nutrition through food fortification and processing;
- 3) Dietary diversification by establishing nutri gardens, aimed at creating long term impacts to promote intake of balanced nutrition<sup>8</sup>.

It is essential to reduce this hidden hunger by complementing these approaches with one another while giving prime importance to multi-sectors such as health, food security and agriculture.

### 4.1 Objectives

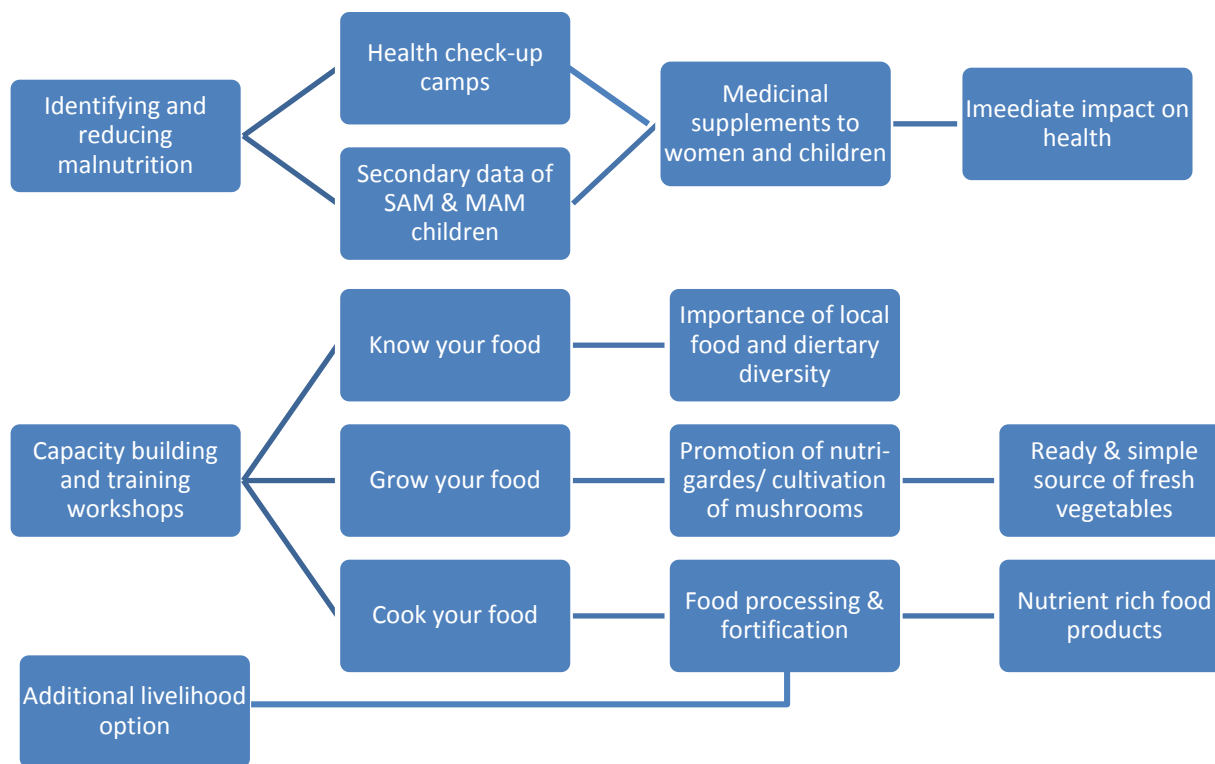
The main objective of the project was to address the issue of malnourishment mainly in tribal and rural communities and to provide additional livelihood options to the women.

- i. To regularly monitor and improve the health status of the SAM, MAM, SUW (Severely Underweight) and MUW (Moderately underweight) children throughout the project activity and provide them the required supplements.
- ii. To create awareness and build capacity of the stakeholders
- iii. To develop stake-holder consortia and collaborate with various partner agencies which include government and other institutes
- iv. To establish a cluster based, processing and packaging unit at the village, and to standardize the recipes from the selected crops and its processing and packaging methods.
- v. Infrastructural development and establishment of a resource center.
- vi. To create different livelihood options dependent on the processing clusters strictly in the context of developing healthy food products and food preservation for the communities/ stakeholders.
- vii. To assist the stakeholders, establish forward linkages for the products.

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<sup>8</sup>[https://www.bmz.de/en/zentrales\\_downloadarchiv/themen\\_und\\_schwerpunkte/ernaehrung/food\\_fortification.pdf](https://www.bmz.de/en/zentrales_downloadarchiv/themen_und_schwerpunkte/ernaehrung/food_fortification.pdf)

## 4.2 Approach and Methodology



**Figure No. 2: Multi-pronged approach to tackle malnutrition in selected area.**

Focusing on the target vulnerable groups, the children and women, the project objectives were carefully aligned to improve the micro-nutrient deficiency through a sustainable food-based approach focusing on immediate supplementation, food fortification and livelihoods to sustainably combat hidden hunger.

Furthermore, TERI encouraged the practice of fortification at the local level. Figure No. 3 delineates the methodology on generating food products which would have higher nutrition value to tackle micro-nutrient deficiency and create an additional livelihood opportunity for women.



Figure No. 3: Methodology of generating additional livelihood option for women to tackle malnutrition





## 5 Activities

The activities were focussed on creating awareness about the nutrition and health, infrastructure development, forming a Self-help Group (SHG) to take accountability of the provided services and further training the SHG on food fortification and processing. Training workshops were aimed at empowering women on preparing nutritious food products and generating an additional livelihood option. Certain major drawbacks were needed to be dealt with, such as, absence of infrastructure lack of facilities like electric supply and absence of adequate storage, inadequate information, and lack of market linkages<sup>9</sup>. These obstacles are a lot more pronounced in the case of tribal areas where these problems are magnified manifold. Thus, facility-level interventions were undertaken to promote food fortification and processing.

### 5.1 Health assessment and resource analysis

#### 5.1.1 Secondary data analysis

TERI regularly collected the data of the children from the four shortlisted villages with the help of ICDS supervisors. Normally, anganwadi workers are responsible to maintain records for children below 6 years by checking the weight of the children, record the head and arm circumference on the growth card. It was observed from the data acquired from the anganwadis of the selected villages that the number of children falling under MUW has increased higher over the years. The children in the SAM and MAM category recover depending upon the immediate care and necessary attention provided to them.

#### 5.1.2 Conducting health check-up camps and micro-deficiency analysis

Several factors could play a part in assessing the nutritional status of underweight children, weight being one of them. An increase in weight though does not necessarily mean an improvement in the nutritional status of an individual, as it does not account for any change in the quantity of micro-nutrients available to the body. The reduction in micro-nutrient deficiencies is a major requirement in the fight against malnutrition. Micro-nutrient deficiency is a major component of malnutrition in the selected areas. Based on the reports from the anganwadi supervisors, it was reported that there is high prevalence of malnutrition in the selected villages and hence, to establish a baseline of their nutritional status, TERI carried out a health Check-up camp. The main focus of the camp was to assess the level of micro-nutrient deficiency within the target population.

Thus, a primary data of the micro-nutrient deficiencies was collected through blood test analysis. A representative sample size of 35 children between ages 0 to 6 falling in the category of MUW, SUW, MAM and SAM along with their mothers (above age 19) were considered for the analysis. Only two villages namely Vijapur and Savarkhand were selected for health camp due to high occurrence in the number of malnourished children in these two villages. The results of the assessment are as follows:

As shown in Figure No 4 below, more than 50% of the of the sample size suffered from Iron deficiency anaemia which is the most common type of anaemia. The women and children with less than 60 -180 µg/dl (reference range) of iron in the body fall under iron deficient category. Its causes could be mainly because of the insufficient mineral iron content in the body due to poor diet.

<sup>9</sup><http://ficci.in/sedocument/20073/Food-Processing-bottlenecks-study.pdf>

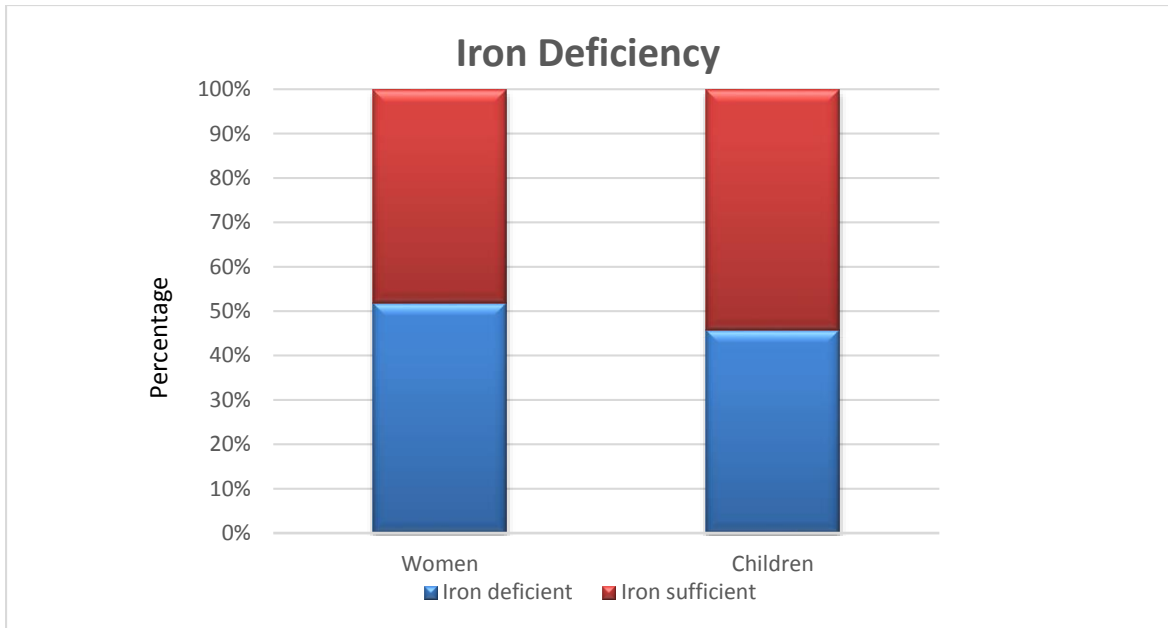


Figure No. 4: Status of Iron deficiency in different age-groups

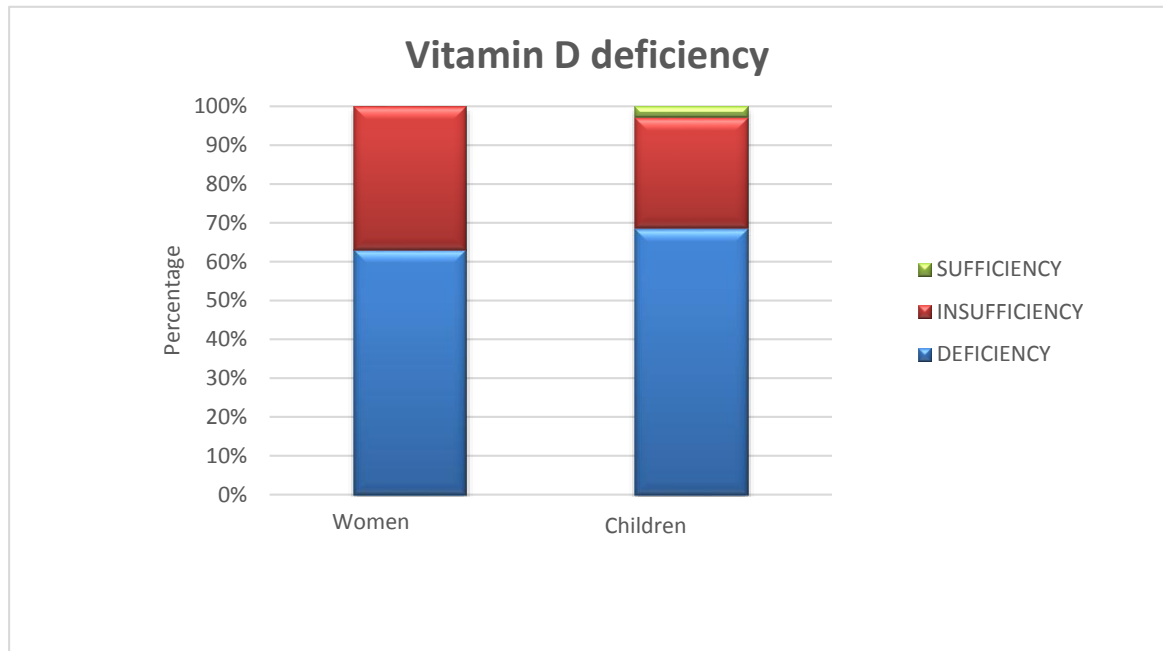


Figure No. 5: Status of Vitamin D deficiency in different age-groups

From Figure No. 5, almost 99% of sample size was reported to be vitamin D deficient. A level of 20 nanograms/millilitre to 30 ng/mL is considered insufficient for a healthy person and a level less than 20 ng/mL indicates vitamin D deficiency; whereas a level above 30 ng/mL to 100 ng/mL is considered to be sufficient. Despite exposure to sunlight and intake of meat and fish at least twice a week, it was observed that the diet lacks in fats and oil. Thus, insufficient fatty food intake in the diet could be a major

reason of Vitamin D deficiency as it has been proven that the integration of fats and oils in the meal increases the percentage of absorption of vitamins as compared to a fat-free diet<sup>10</sup>.

It was observed that the villagers follow a fixed diet pattern which lacks dietary diversity and thus leads to deficiencies of certain important micro-nutrients in all the age-groups. Other reasons for micronutrient deficiencies could be impaired absorption and use of nutrients, increased nutrient requirement depending on the body type and physical activity or increased excretion.

#### 5.1.2.1 Workshop 2: Distribution of health supplements as short-term solution to improve health.

The supplements were distributed to the women as well as to the children with the help of ICDS officers. The medicinal supplements were selected (Table No. 2) as per the prescription provided by the PHC Doctors. An Iron tablet for women and multi-vitamin syrups for children were distributed in all the four selected villages.

**Table No. 2: Composition of the medicinal supplements distributed to women and children.**

Beneficiary	Prescribed medicines	Composition
Women	Orofer Xt Tablets	Iron in combination with folic acid and Antianemics
Children	Lysupra	Multi-vitamins and Multi-minerals
	Ostocalcium	Calcium/Vitamin B12/Vitamin D3)

Source: <https://www.medidart.com/customer/about>

## 5.2 Capacity building and training workshops

TERI and PZP (Palghar Zilla Parishad) conducted meetings with the existing Self-help groups of the four selected villages on July 3<sup>rd</sup>, 2015. The meeting took place in Nehroli and was attended by the anganwadi supervisor and anganwadi sevikas, along with the existing SHG members. The requirement and main objective of establishing a 'Food Processing Cluster' under the project was explained to the stakeholders in detail. The project objectives were emphasized; having a sustainable supply of nutritional food products, generating a livelihood option along with developing skills in making healthy, processed food products.

The main objective behind the assembly was also to bring together a group of like-minded women Self-help group to actively participate in the program and carry out the activities at the community level. A SHG group with 10 dedicated, members was formed and registered as 'Jagrut Mahila Gruh Udyog'. These women belong to families that practice farming as their sole source of livelihood, which is constantly reliant on unpredictable and often sparse rainfall.

The members were trained on maintaining records, documents, scheduling regular meetings, maintaining receipts, records and balance amounts and so on,. An SHG President and Secretary were appointed and duties and responsibilities distributed among the members to ensure the smooth

<sup>10</sup><http://www.andjrn.org/article/S2212-2672%2814%2901468-3/abstract>

functioning of the group. A savings bank account was opened to enable the members to obtain loans from the bank.



Picture No. 1: Meeting with SHG groups in the presence of Anganwadi supervisors in Savarkhand village

### 5.2.1 KNOW YOUR FOOD- Awareness workshop on Food and Nutrition security

A workshop was organized to sensitize the villagers about the importance of including simple, locally available food items in the daily diet. Although open for all, the workshop was mainly aimed at women participants as they were mostly responsible for the food intake and nutrition of the household. The participants, 25 of them, showed keen interest in understanding how available food could be used to improve nutrition intake by just incorporating a few simple methods and techniques. The impacts of a healthy diet on development of mental health and wellbeing were highlighted. Bringing diversity in the diet through addition of leafy vegetables, fruits and healthy fat such as milk, ghee, curd and buttermilk, was emphasized. The concept of fortification was introduced by encouraging women to learn to create tasty and varied healthy food through addition of nutritious ingredients. These fortified foods can be dependable sources of vitamins and minerals for the population, thereby helping to improve the overall health indicators of the target population.

With this focus, a recipe book was developed and distributed to the participants and a poster of simple recipes was put up in the center to increase the knowledge and practices regarding food fortification. It was designed to focus on the importance of consumption of nutritious local crops and the need for a balanced diet. The recipe book contained several highly nutritious recipes using locally available ingredients and crops, along with information on importance of the selected crops, cultivation and consumption methods. The recipe book was widely appreciated by the participants. A poster of simple recipes was put up in the community hall to increase the awareness of food fortification which has been attached as an (Annexure 8.1)

## 5.2.2 GROW YOUR FOOD: Promotion and Creation of nutri-gardens

### 5.2.2.1 Workshop 3: Intervention to create nutri-gardens: distribution of seeds and reuse of grey water

Although the concept of farming and cultivation is not new to the tribal/rural communities, it has however remained limited to cereal cultivation and the excess is mostly used for revenue generation. The main objective of introducing the concept of nutri-gardens was to encourage women to cultivate healthy food crops in their backyards. A nutri-garden ensures an inexpensive, regular and handy supply of fresh vegetables, which are basic to nutrition. Thus, TERI provided guidance to grow a variety of micronutrient-rich crops such as green vegetables rich in vitamins and minerals, and making use of available space, soil, water, keeping in mind the microclimate was effectively emphasized.

The lack of knowledge about nutritional value of food, a wholesome diet and utilization of available and easily-cultivable nutritious food is one of the major reasons of prevailing malnourished conditions. Hence, nutri-gardens may be regarded as a simple but innovative option to:

- Bridging the gap between the available resources and its utilization may lead to increased consumption of micronutrient-rich foods
- Create additional revenue-generating opportunities for farmer communities, especially women
- Ability to sell their product and save part of the money earned to cover future expenses.

With this objective, TERI decided to distribute seeds of Okra, spinach, fenugreek, and French beans to the interested members of SHG groups. In the below Picture No 2 seeds were distributed to encourage participants to bring diversity in their diet and create awareness and impart knowledge about nutrition. The vegetables were identified and seeds were selected based on the assessment of the local dietary habits and local micro-nutrient deficiencies.



Picture No. 2: Distribution of seeds to the participants of the program

While the main purpose of a nutri-garden is to increase nutrient and micronutrient intake in the diet of nutritionally vulnerable groups, it is also aimed at preserving local varieties and local food habits. Hence, factors such as local indigenous varieties, local and traditional eating habits, climate, soil type were

predominantly considered in the selection of crops while promoting nutri-gardens. In particular, nutri-gardens act as a complementary activity that contributes to the diversification of household diets and in turn prevents malnutrition.

Another major constraint during implementation of the nutri-garden in the summer months is shortage of water. Thus, simple techniques such as bottle drip irrigation, mud-pot irrigation and mulching has been displayed to encourage implementation of nutri-gardens as it can be an effective source of yearlong vegetable supply. Thus, informative charts (Annexure 8.2) were put up in the community hall which addressed simple solutions such as recycling of grey-water and reusing recycled water for cultivating vegetables. Along with this, harvesting rainwater for secondary purposes mainly for growing a variety of vegetables has been suggested through display of posters (Annexure 8.3).

#### 5.2.2.2 Workshop 4. Demonstration and training on Mushroom cultivation

Mushroom cultivation workshops with hands on training were conducted in May 2016. This was done to encourage the women to incorporate mushrooms into their diets and demonstrate the ease of cultivating mushrooms in their homes. Mushrooms are an extremely important source of vegetarian Vitamin D and protein. Along with these, mushrooms also provide several of the vital micro-nutrients required for the human body such as, selenium, potassium (8%), riboflavin, niacin, vitamin D and more<sup>11</sup>. Mushrooms also boost the immune system and help the body combat many diseases by providing numerous important vitamins, minerals and enzymes. They are highly antioxidant rich, which help fight free radical damage in the body, further improving health<sup>12</sup>.

The mushroom cultivation workshops were conducted with an objective to encourage them to start growing and consuming them to combat a range of nutritional deficiencies. Picture No 3 shows TERI representatives explaining the techniques and methodology involved in mushroom cultivation. The women were astonished at the ease of cultivating mushrooms and were eager to try it by themselves.



Picture No. 3: Mushroom cultivation workshops conducted at the community hall in Vijapur village

<sup>11</sup><http://m.mushroominfo.com/benefits/>

<sup>12</sup><https://draxe.com/mushroom-nutrition-benefits/>

### 5.2.3 COOK YOUR FOOD: Capacity building and training of food fortification and processing

Theoretical as well as practical training addressing the incidence of malnutrition prevalent in the area was the primary focus of the program. Thus, TERI's efforts were focused on development of micro-nutrient rich ready to eat fortified foods to maximize the nutritional impact. Thus, establishing a processing unit could provide gainful employment to the women and enable them to supplement their families' income, provide better nutrition to their children and so on. Furthermore, the objective behind setting up of processing unit for simple fortification of food products was to gain a long-term impact and achieve food and nutritional security.

#### 5.2.3.1 Workshop 5: Site visits to select the ideal location to set up the food processing unit

TERI conducted field visits to the selected villages to ascertain an ideal location for the resource center. A detailed survey was carried out to assess all the available resources such as power, water and so on. As to run a resource center, water and electricity are the two basic needs. Based on the interactions with the government officers and local authorities TERI had first shortlisted Sawarkhand Community Center but owing to the accessibility issue for power and other basic infrastructure, TERI decided to establish the resource center at Vijapur village, Wada in the month of December (2015). TERI shifted the set-up to an appropriate location with better availability of basic facilities. The agreement was signed with the Kone Gram Panchayat for 11 months, after the consent of the village committee members. The permission was granted during the Gram Sabha where all the villagers under the Kone Gram-Panchayat were involved.



Picture No. 4: A few members of 'Jagrut Mahila Udyog Gruh'

#### 5.2.3.2 Infrastructural development- Setting up the food processing unit

A community hall at Vijapur village was chosen after ensuring satisfactory conditions with respect to its clean surroundings, no garbage accumulation, no excessive rodents/ flies and no accumulation of



stagnant water or open sewage near the site. Along with this, the following provisions were made to facilitate the activities to be conducted at the center-

### 5.2.3.3 Facility layout

- The layout of the center was created with adequate spacing between storage areas (raw material, packaging material, finished goods and so on), processing area, packaging area and the utility area.
- An appropriate provision for quantity of water required for drinking, washing and cleaning of utensils was made.
- The unfinished flooring of the center was changed and improved using vinyl flooring.
- A storage facility through provision of cupboard and racks was made to maintain the safety of the materials and products.
- Adequate facilities to hygienically wash hands such as wash basins along with the provision of adequate water of potable quality
- Lighting fixtures provided to ensure smooth running of the center



Picture No. 5: The community hall in Vijapur village, before and after its conversion into a food processing unit/ resource centre

### 5.2.3.4 Equipment

The center was required for the utilization of the equipment in an efficient way to produce samples and showcase the products in the market place. Hence, the following materials were arranged to help increase utilization efficiency.

1. Equipment and re-usable containers suitable for preparing nutritious food products
2. Gas connection and stove for effective cooking practices

3. Resources such as soaps, detergents and sanitizers to clean, disinfect and maintain utensils to avoid contamination of food
4. A granite platform to carry out food preparation activities.

The key functioning of the center is

- To create awareness about food and nutrition, growing fruits and vegetable for self-consumption and cooking nutritious food with innovation.
- To encourage women to participate and understand the technique of food processing and get a hands-on training experience in making simple nutritious food products.
- To provide space, infrastructure for food processing, packaging and marketing of the products
- To develop the skills and confidence for value addition of foods and work for themselves on processing in order to launch their own product.
- To use the center as an incubation unit for product development and market testing<sup>13</sup>

#### 5.2.3.5 Maintaining hygiene at the center

Keeping in mind the importance and sensitivity of foodborne diseases and food contamination, an informative poster of 'Dos and Don'ts', particularly explaining self-hygiene was displayed in the resource center. The emphasis was given on washing hands with soap/ disinfectant after touching any contaminated material (raw material, money, files and so on), unclean utensils or body parts while dealing with food. Appropriate and protective clothing, clean apron, head gears and avoiding hanging jewellery, glass bangles, rings, watches, clean nails without nail polish are the practices highlighted through pictorial format and displayed in the center (Annexure 8.4).

A training workshop on hygiene and safety during preparation of food was undertaken to ensure safe and quality products for consumers. The prevention of contamination of raw materials, packaging and finished products with micro-organisms, chemical or allergens was highlighted. The practice of ensuring materials and ingredients in the correct order and within the allocated shelf life was explained. Moreover, equipment for housekeeping, cleaning and maintaining the hygiene in the resource center was provided by TERI

It also focused on the important requirements for an organized food processing center such as registration and licensing, food procurement and sourcing, simple processing operations such as cleaning, sorting, packaging and storage, awareness generation about nutrition and related activities and food losses and wastage. The women were made aware and thoroughly trained in maintaining the most hygienic conditions in the *khakhra* making process. Right from the uncooked dough to the equipment and utensils used, everything is thoroughly cleaned before starting the procedure. The processing centre hall used for making the *khakhras* is also kept clean and disinfected regularly to ensure zero contamination of the fortified *khakhras*. Hygiene is meticulously maintained at every step of the *khakhra* making process.

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<sup>13</sup><http://www.iicpt.edu.in/pages/incubation-center.html>



Picture No. 6: Capacity building on maintaining hygiene while handling food and food products.

## 5.2.4 Food Processing and fortification

The process of fortification is effective and an important intervention as it involves standardization of the food with the addition of standard quantities of nutritious ingredients and mixing them together so as to achieve a uniform fortified food.<sup>14</sup> The process is simple and effective as the fortified food product is rich in quality and is readily consumed by the vulnerable target population, especially children.

TERI meticulously planned the program to ensure that the most appropriate fortification procedure and the ideal food product is selected for the program. Care was taken to make certain that the women involved in preparing the fortified product find the process hassle-free and the fortified, ready to eat product is flavoursome, popular and easy to consume. Thus, a cluster based processing and packaging unit was established in Vijapur village to standardize the recipes of the selected food item, *khakhras* and regulate its processing and packaging procedure.

Determining the right space to set up the fortification and processing unit is important and must take into consideration the geography of the location selected, the environmental conditions, and ease of transporting processed food items and so on. A study of the food distribution system of the specific country or a whole region involving several countries is also a necessity. An ideal example for the same would be the salt iodisation programmes.

### 5.2.4.1 Product Specifications

Keeping the findings of the camp in view, TERI conducted interactive workshops focusing on diet and malnourishment along with training programs for the stakeholders related to nutritious food processing. Wada village being located in a humid coastal area, there is need to provide the option of healthy food

<sup>14</sup><http://www.ffinetwork.org/plan/documents/SmallMillManual.pdf>

products that have a longer shelf life and which would be acceptable to children, the target beneficiaries of the project.

With due diligence, “*Khakhras*” were selected it is considered as a crispy roti variety snack, as the main food product to be fortified. “*Khakhras*” are particularly made with wheat flour alone or could be easily combined with other flours and made healthy. They have a longer shelf-life and can be stored in a container or carried along for a journey. This crunchy snack can be reinforced with various ingredients and made nutritious. (Table No. 3) provides an overview of the nutritional content of plain *khakhras* and the scope of the addition of the nutritious ingredients explored to increase its nutrition value.

Spinach and mushroom were shortlisted as the two additions for fortification that would be prepared by the SHG. Spinach is an excellent source of iron and vitamin A while mushrooms are one of them best sources of vitamin D and minerals. Hence, *khakhras* were fortified with essential micro-nutrients rich spinach and mushroom powders. Therefore, (Table No. 3) shows a comparative analysis of the Plain and fortified *khakhras*.

**Table No. 3: Comparative nutritional analysis of Plain and Fortified Khakhras**

Nutrition Facts			
Calories in Khakhra			
Serving Size: 100g (Khakhra)			
Amount per serving	Plain	Mushroom	Spinach
Energy	405.79 cal	406.94 cal	408.44 cal
Total Fat	6.35 g	6.98 g	8.84g
Total Carbohydrate	74.93 g	71.84 g	73.22g
Sugars	4.53 g	4.61 g	3.89g
Protein	12.23 g	14.19g	9.0g
Vitamin A	-	3911 IU	155 IU
Vitamin D	-	33µg	NIL

Source of Fortified Khakhra: Analysis reports submitted by Equinox Lab (NABL certified laboratory)

Mushroom Khakhra is highly rich in Vitamin A and Vitamin D with the value of 3911IU (International Unit) and 33µg respectively, whereas Spinach Khakhra is observed to be rich in Vitamin A with a value of 155 IU. Thus from the above table if four Mushroom khakhras (approx. 25g) are consumed then the daily recommended value of the of Vitamin A and Vitamin D which is 2600IU and 5 µg respectively could be easily fulfilled. Therefore, fortifying *khakhras* with various other nutritious ingredients such as moringa leaf powder, spirulina, curry leaves, finger millet powder and so on would add following nutrients to *khakhras*.

**Table No. 4 Nutritional value of spinach, moringa and spirulina leaves powder**

Nutrition Facts						
Serving Size: 10g (powder)						
Parameters	Spinach	DV%	Moringa leaves	DV%	Spirulina	DV %
Protein	0.3 g	1%	2.7 g	4.2%	4 g	8%
Potassium	55.8 mg	2%	132.4 mg	3.7%	95.4 mg	3%
Calcium	9.9 mg	1%	200 mg	20%	8.4 mg	1%
Iron	0.3 mg	2%	2.82 mg	28%	2 mg	11%
Magnesium	7.9 mg	2%	36.8 mg	12%	13.7 mg	3%
Vitamin A	938 IU	19%	1.63 mg	54%	39.9 IU	1%
Vitamin C	2.8 mg	5%	1.73 mg	2.8%	0.7 mg	1%

Source: <http://nutritiondata.self.com/facts/vegetables-and-vegetable-products/2626/2>  
<http://www.moringaleafpowder.co.za/analysis.html>,

Hence, fortification would prove to be effective in escalating the nutritional value of the food product and can contribute in fulfilling the daily micro-nutrient requirement to some extent, as compared to artificial supplementation.

#### 5.2.4.2 Workshop 6: Khakhra making workshop

To impart the training TERI collaborated with VMRCDI, (Vaikunthbhai Mehta Research Centre for Decentralised Industries) which is a research, extension and training centre especially for SHG's (Self Help Groups), micro, small and medium industries. The trainer, Ms. Niddhi Gupta who has over 12 years of experience, provided training to prepare *khakhras*. The procedure followed in preparation of the nutritious *khakharas* was similar to that of the normal *khakhra*. The ingredients mostly comprised of whole wheat flour, ginger garlic paste, turmeric, green chilli paste or chilli powder, sesame seeds, cumin seeds, oil and salt. The quantity of the add-ons, i.e. mushroom and spinach powder was taken in 1:2 ratio with wheat flour. The recipe was standardized after several experiments considering the flavour and colour as the main parameter.

The workshop was attended by 20 women from 4 selected villages. The main objectives of the workshop were:

- To make them aware about the nutritious potential of the *khakhras* and food fortification
- To teach them how to make *khakhras* and how they can fortify it with different nutritious ingredients to make it a healthy snack
- To encourage the women to establish a self-sustainable processing cluster and demonstrate food processing as an additional livelihood opportunity

The SHG members were very excited to learn the new food item which was simple yet unique. A cursory market survey by the SHGs revealed that such a product was not available in local shops indicating potential to develop good post production retail market networks.

During the course, the trainer explained them about the origin of *khakhra* followed by its nutritious value, potential market, business strategies, what could be the USP of this product, the principles of cleanliness

and hygiene while preparing the products and experimentation during preparation of *khakhras*. Workshops were conducted, one in the month of August 2015 and in February 2016 to encourage women to learn and practice the procedure of making *khakhras*

The women, under the supervision, successfully standardised the recipes of mushroom and spinach *khakhras* in a period of two months along with mastering the skills to make them. They have also been experimenting with sweet potato powder based *khakhras* as sweet potato is rich in potassium and minerals.



Picture No. 7: *Khakhra* training workshops conducted for women in community hall.

### 5.2.4.3 Product Safety Assessment

It is essential that food safety measures be taken in order to ensure absence of microbial/ chemical contamination in the end product. A list of parameters issued by FSSAI for testing of foods was considered for analysing of the food sample. A comparative analysis of the result on the first day of the product and that on the 30<sup>th</sup> day was assessed. The result showed zero presence of micro-organisms and within recommended limit. The product was also assessed for the Organoleptic Evaluation which confirmed the suitability for consumption to be of good quality.

## 6 Creation of an additional livelihood opportunity through food processing and fortification

### 6.1 Assisting in the establishment of market and forward linkages

TERI has provided guidance to the women to launch the products in the market soon. The study on the shelf life of the *khakhras* and its nutritional labelling for commercial purposes has been completed and the information is available in the packaging of the product. To encourage and empower women TERI invited them to promote the *Khakhras* at one of its project sites in Mokhada block, Pathardi village. Women Self Help Group (SHG) members distributed spinach, fenugreek and mushroom khakhras and shared their experiences with the tribal villagers. They also explained the importance and benefits of how food fortification can generate additional livelihood and in return improve the health status of the village. On witnessing the benefits of training given to SHG members, women of Pathardi, Mokhada were highly inspired to prepare fortified food to tackle malnourishment.



Picture No. 8: The SHG members from Wada interacted and promoted nutritious *khakhras* to the residents of Pathardi village, Mokhada

Marketing of products is an extremely important step in setting up a manufacturing or processing business. When it comes to food products, along with the flavor and quality, it is attractive packaging that makes potential customers want to buy the product. Processed food products have very high competition in the commercial market. Most of these food items are low on nutritional content; hence it is important to make nutritious processed food items like *khakhras* stand out. Attractive packages and marketing will help create a customer base that can then be retained with the quality and flavor of the product.

Marketing of the *khakhras* will also make it easier to reach out to the target vulnerable groups and ensure that the outreach of the product is as wide as possible.



## 6.2 Multiple Sector Involvement

The planning and implementation of food fortification programmes requires the active involvement of the industry, trade, planning, transport, regulatory, communication and education sectors to effectively integrate fortification into the food production and distribution system. With the similar objective, TERI organized a sale counter at IOCL canteen to introduce the product to larger consumers.



Picture No. 9: A Khakhra counter set up in the IOCL canteen area

### 6.2.1 Survey- feedback analysis (Khakhras) at the IOCL canteen

A feedback survey was taken for the *khakhras* products prepared by the *Jagrut Mahila Gruh Udyog* from Wada after the *khakhras* had been made available to the employees of IOCL for sale in the IOCL canteen. Of the total number of respondents who sampled the *khakhras* made available at IOCL's canteen it was found that 56.25% of the respondents found the product to be highly satisfactory, while 31.25 % found the product to be satisfactory and 12.50% found the product neither satisfactory nor dissatisfactory.

Over 80% of the respondents rated the *khakhras* to be above average or excellent in terms of the value for money.

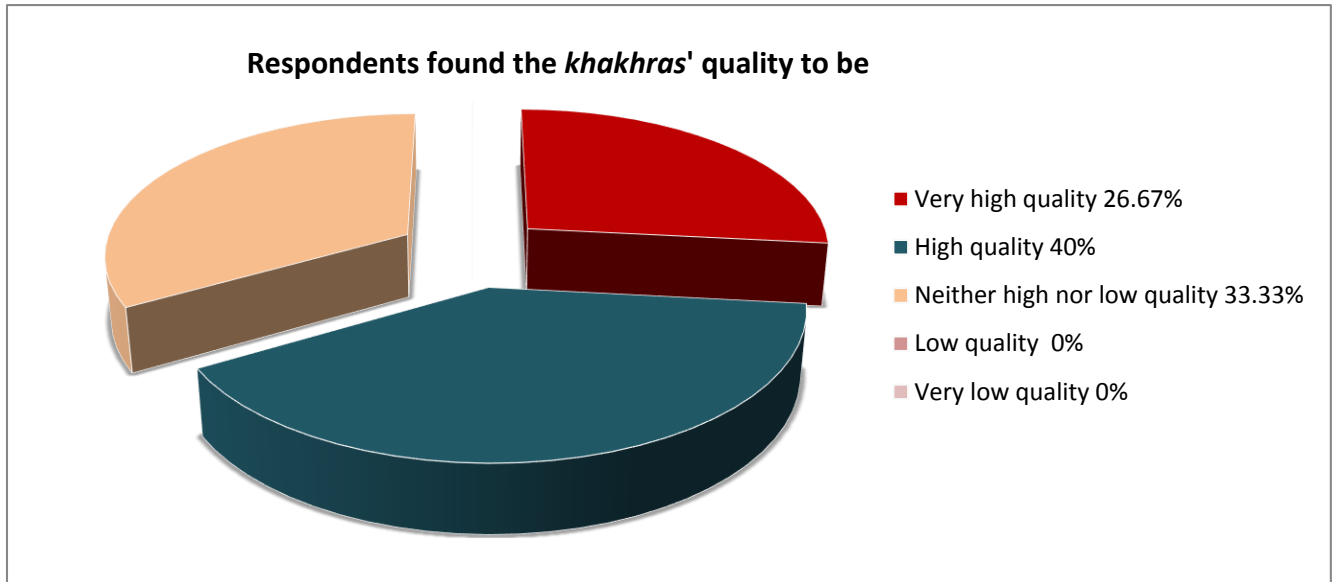


Figure No. 6: Rating of the quality of the *khakhras* by respondents of IOCL

It was also found that most the respondents have a very positive opinion about the nutrient fortification of the *khakhras*. Around 50% were highly positive about nutritionally fortified *khakhras* while 43.75% were somewhat positive.

In terms of the likelihood of the respondents in trying out the mushroom and palak *khakhras* again, the respondents' responses were as follows:

Overall feedback regarding the *khakhras* was found to be highly positive with 33% of the respondents willing to promote the product. A few suggestions were given by them to improve the product further, which have been duly noted.

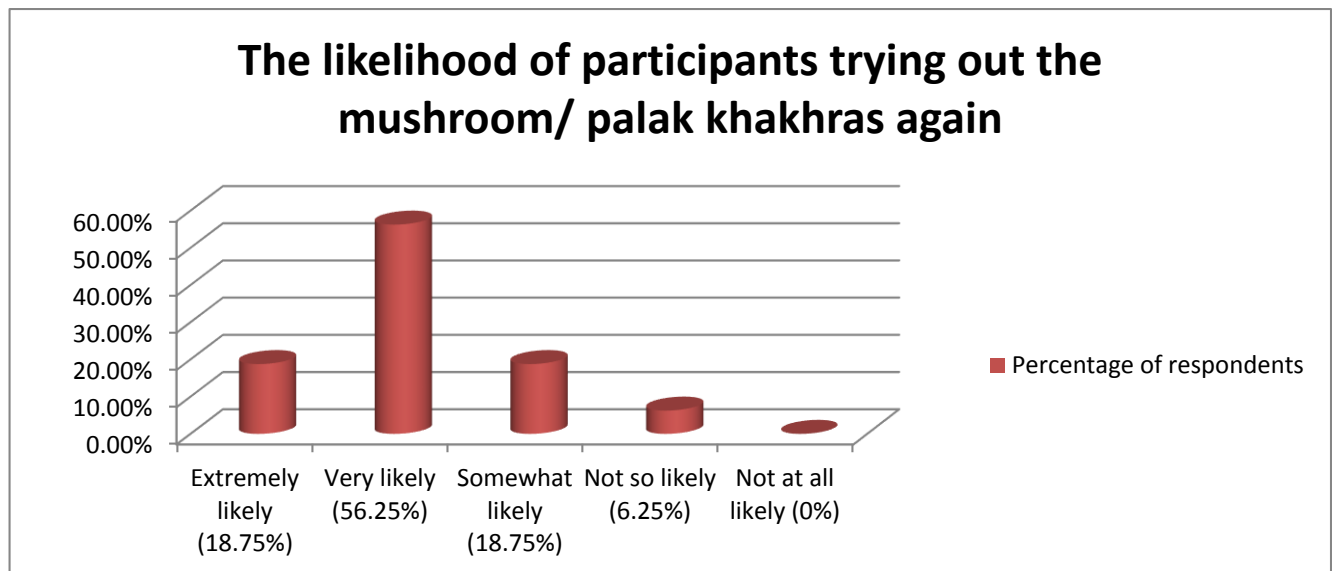


Figure No. 7: Respondents opinion on whether they would purchase the *khakhras* again



## 7 Conclusion and overall Impact of the project:

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The project has had a long reaching and prevailing impact on the way nutrition is viewed by the villagers. More importantly, the women, who are mostly responsible for their family's health and nutritional needs have become aware about hidden forms of malnourishment, nutrient deficiencies, and ways to combat these. They have become oriented towards questioning and ensuring the nutritional content of the food consumed by themselves and their families. This has been possible because of multi-pronged approach TERI undertook- Know your food, Grow your food and Cook your food.

These families are also now equipped with ways and means with which they can provide their families wholesome nutrient rich foods with the limited resources available to them, through the creation of nutri-gardens. The nutri-gardens promise to improve the eating habits of several families in the village, with the inclusion of more vegetables in the daily diet. This possibility of yearlong addition of vegetables in the daily diet will have long term impacts on the health of the villagers, especially children.

Capacity building in the form of workshops and training sessions not only ensured that the women were introduced to the benefits of super-foods like mushrooms and their cultivation, training on food safety and hygiene, and so on, but also gave them the confidence to take charge of the situation and explore various options to tackle malnourishment.

The easy availability of additional nutritious processed food products such as fortified *khakhra*s further boosted the nutritional status of the target groups. The introduction of the fortified *khakhra*s at the local level and the anganwadis slowly increased the consumption of this food product in the area, especially, by children. Children are gradually becoming fond of this tasty snack and being fortified and nutrient rich, its consumption is expected to have a positive impact on the health of the children and others consuming them.

A cumulative impact of these activities along with the nutrition supplements was observed on the health of women and children. The chart below (Figure No. 8) marks 29% improvement in the iron content of targeted women due to consistent efforts of encouraging women to consume a wholesome diet as a source of natural nutrients. A variety of vegetables such as sweet potato, spinach, banana, beetroot and so on were highly recommended and were supplemented with nutrition supplements.

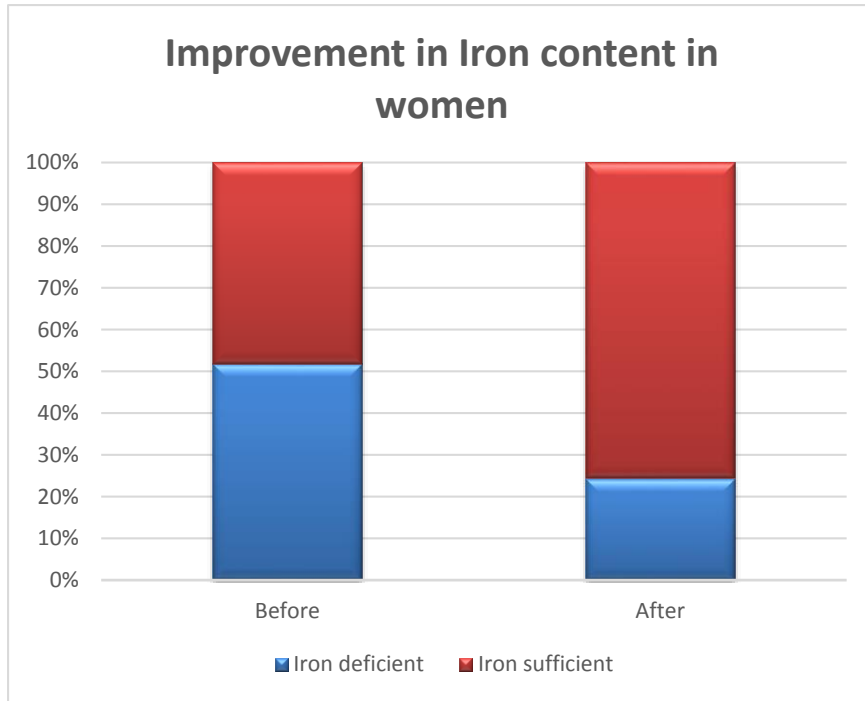


Figure No. 8: Improvement in the iron content in women

On the other hand, 545 children (between 0- 6 years) of the anganwadis from all the four selected villages were selected for nutrient supplements distribution. The supplements were selected according to the deficiencies assessed through the health check-up camp. These supplements were aimed at complementing their daily diet as recommended by the experts, and thereby aimed at increasing nutritional intake. Along with this, mothers of malnourished children were sensitized about micronutrient deficiencies that can affect the physical and mental health of children. That dietary supplementation should only be used under the doctor's prescription and should complement and not replace a nutritious diet was emphasized.



Picture No. 10: Distribution of *khakhras* to children in the anganwadis

Also the additional livelihood opportunity generated by the food processing unit has provided the SHG women with the opportunity to be financially independent and help supplement their families' incomes. This has helped them become self-confident and empowered enough to start taking important financial decisions. Thus, the project has helped promote the empowerment of women in the village.

The project was aimed at enabling the villagers, especially the women to fight against malnutrition with the resources available to them in sustainable manner. The objectives of the project are interlinked and consequently have had a cumulative effect. Thus, the project has created the necessary foundation to strengthen the nutritional status of the village by implementing sustainable, local and hassle-free solutions to counter malnourishment.

Certain major drawbacks were needed to be dealt with, such as, absence of infrastructure lack of facilities like electric supply and absence of adequate storage, inadequate information, and lack of market linkages<sup>15</sup>. These obstacles are a lot more pronounced in the case of tribal areas where these problems are magnified manifold. The activities undertaken were focussed on creating awareness about the nutrition and health, infrastructure development, forming a Self-help group to take an accountability of the provided services and further training the SHG on food fortification and processing. The training workshops were aimed at empowering women on preparing nutritious food products and generating an additional livelihood option

## 7.1 Way forward

Although an improvement in the health status of the target vulnerable groups can be seen, a lot still needs to be done. The fortified food and other nutritious products need to be integrated with the Mid-day meal scheme and the ICDS so as to ensure a regular consumption of fortified food products by the children in the area. Integration of the activities conducted under the project into Govt. schemes could help in the long-term sustainability of the measures taken to improve the health status in the village.

As the food processing unit and the *khakhra* business are still in the nascent stage, TERI has provided a certain amount of handholding to help the women of the SHG set up the business and market their product. TERI has assisted in providing the SHG with an extension of 1 year to use the same community hall till they become self-sufficient. Women have also been provided with support to experiment and generate new fortified products and snacks of high nutritional value. The possibility of weekly distribution in anganwadis along with distribution through the mid may meal is being explored by the women which would act as a source of revenue generation and sustainable supply of fortified food to children. Besides, shops in and around Thane and Bhiwandi were also approached to obtain feedback regarding the *khakhras*, with respect to their quality and commercial viability. The shops approached gave a positive feedback and were open to the idea of keeping the *khakhras* for sale in the shops in the future.

Moreover, TERI explored the possibility of registering the SHG for 'Mahalaxmi Saras 2017', an exhibition cum sale of products manufactured by SHGs across Maharashtra, organized by the Maharashtra State Rural Livelihood Mission in order to give the women exposure on how the products could be promoted and sold at large venues. The prospect of making the fortified *khakhras* available at IOCL's canteen could also be explored in the near future.


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<sup>15</sup><http://ficci.in/sedocument/20073/Food-Processing-bottlenecks-study.pdf>








## 8 Annexure

### 8.1 A poster of easy to prepare nutritious recipes, put-up in the community center



# Nutritious and easy to make recipes!



<h4>1. Bhel</h4> <p><b>Ingredients</b>                      10 gms puffed rice                      20 gms moong sprouts                      1/2 onion, chopped                      1 tomato, chopped                      1/2 potato(boiled),chopped                      12-15 peanuts                      2 tsp lemon juice                      Chaat masala as per taste                      Few coriander leaves</p> <p><b>Method</b></p> <ul style="list-style-type: none"> <li>In a bowl mix puffed rice, sprouts, onions, tomato, potato and groundnut.</li> <li>Squeeze lemon juice, add chaat masala and mix again.</li> <li>Garnish with coriander leaves and serve.</li> </ul> 	<h4>2. Ragi Roti</h4> <p><b>Ingredients</b>                      Finger millet (ragi / naclni) flour 1 cup + for dusting                      Salt to taste, Oil 1 tablespoon + as required</p> <p><b>Method</b></p> <ul style="list-style-type: none"> <li>Heat 2 cups water in a non-stick pan. Add salt and oil and bring to a boil.</li> <li>Reduce heat, add millet flour and mix well. Switch off heat, mix, cover and set aside for 10-15 min. till room temperature.</li> <li>Apply some oil on the worktop, place the millet flour dough on it and knead well. Divide the dough into equal shaped balls, dust with flour and roll into rotis.</li> <li>Cook rotis on pre-heated tawas for 2-3 minutes on each side. Place the rotis on direct flame and puff them.</li> <li>Place them on a serving plate and serve hot.</li> </ul> 	<h4>3. Multigrain Chapati</h4> <p><b>Ingredients</b>                      Multigrain Chapati                      Wheat flour - 1 cup                      Millet flour - 1/4 cup                      Maize flour - 1/4 cup                      Soya bean flour - 1/4 cup                      Gram flour - 1/4 cup                      Oil - 2-3 tsp (for kneading dough)                      Ghee - 2 tbsps                      Carom seeds - 1/4 tsp (optional)                      Salt - 1/2 tsp (as per taste)</p> <p><b>Method</b></p> <ul style="list-style-type: none"> <li>Mix the different types of flour, add salt and oil along with lukewarm water and knead. Cover and keep aside for 20 minutes to set.</li> <li>Divide the dough into equal shaped balls, dust with flour and roll into rotis.</li> <li>Cook rotis on pre-heated tawas</li> <li>Other ingredients, nutritious flour like jowar, ragi, moong dal flour and so on, can also be added</li> </ul> 	<h4>4. Chana Chat</h4> <p><b>Ingredients</b>                      1 cup boiled black chana                      1/2 cup mixed sprouts                      1 potato, boiled and chopped                      1 onion, chopped                      1 tomato, chopped                      1 cucumber, chopped                      1 green chilli, chopped                      2 tsp chana masala                      1 tsp lemon juice                      Salt to taste                      1/4 cup coriander leaves, chopped</p> <p><b>Method</b></p> <ul style="list-style-type: none"> <li>Chop tomato, onion, potato and cucumber in small cubes, roughly similar in size.</li> <li>In a big mixing bowl, mix together all the ingredients.</li> <li>Check seasoning and adjust to your taste. You may or may not add chillies depending on your preference</li> </ul> 
<p><a href="http://www.ihealthu.com/healthy-recipe/sprouts-bhel">http://www.ihealthu.com/healthy-recipe/sprouts-bhel</a>  <a href="http://www.sanjeevkapoor.com/Recipe/Ragi-Roti-Sanjeev-Kapoor-Kitchen-FoodFood.html">http://www.sanjeevkapoor.com/Recipe/Ragi-Roti-Sanjeev-Kapoor-Kitchen-FoodFood.html</a>  <a href="http://nishamadhulika.com/en/973-multigrain-roti-recipe.html">http://nishamadhulika.com/en/973-multigrain-roti-recipe.html</a></p>			



## 8.2 A poster on simple techniques of irrigating nutri-gardens during the water shortages

पाण्याची बचत करून भाज्या आणि फळे पिकविण्याच्या सोप्या पद्धती

**परसबाग** करण्यामुळे स्वच्छ व ताजा भाजीपाला वर्षभर उपलब्ध होऊ शकतो. पोषण आणि आरोग्य राखण्यासाठी हा एक सहज पण अतिशय प्रभावी उपाय ठरतो.

सेंद्रिय पद्धतीने भाजीपाला पिकवूया !!!!

**भारतात** सेंद्रिय शेती पुरातन काळापासून केली जाते. ज्यामध्ये शाश्वत आणि पर्यावरण स्नेही पर्यायांचा अवलंब केला जातो. उदा:

- गांडूळ खत
- हरित खत
- पिक लागवडीतील फेरबदल
- जैविक कीटकनाशक, इत्यादी.



पालक



टोमॅटो



मेथी



गवार



अळंबी

**सोप्या पाणीपुरवठा पद्धती**

- मडक्यातून झिरपणारे पाणी
  - बाटलीमधून ठिबक सिंचन
  - झाडांभोवती गवताचे आच्छादन
- ह्याचा मुख्य फायदा असा की रोपाला गरजेपुरते पाणी नक्की मिळते तसेच दुष्काळाच्या काळात पाण्याची बचत होते.



Contact details:  
The Energy and Resources  
Institute (TERI)  
[www.teri.res.in](http://www.teri.res.in)  
Phone no: 022-27580021



## 8.3 A poster on recycle and reuse of water to cultivate vegetables in the courtyard

### पाणी संवर्धन व बचत

#### पावसाच्या पाण्याची बचत व उपयोग-

- पावसाच्या पाण्याचे नियोजन केल्यास मिळणारे फायदे खालील प्रमाणे आहेत-
  - घराच्या छतावरचे पावसाचे पाणी साठवणे व खालील बाबींकरिता उपयोगात आणणे
    - i. भाजीपाला व फळ-झाडे लावण्यासाठी
    - ii. भांडी व कपडे धुण्यास आणि आंघोळीसाठी



#### स्वयंपाकघरातील पाण्यावर प्रक्रिया आणि पुन्हा वापर .

- स्वयंपाकघरातील भांडी व कपडे धुण्यास आणि आंघोळीसाठी वापरलेल्या पाण्यावर प्राथमिक प्रक्रिया करण्याची गरज असते.
- अश्या पाण्याचा पुन्हा वापर योग्य प्रकारे होऊ शकतो-
  - i. भाजीपाला व फळझाडे लावण्यासाठी
  - ii. शौचालया मध्ये
  - iii. घराची साफसफाई
  - iv. अंगण सारवण्यासाठी
  - v. बांधकामासाठी
  - vi. गुरांना व गोठा धुण्यासाठी

वरील प्रक्रियेच्या अधिक माहितीसाठी खालील नंबर वर संपर्क साधा ०२२-२७५८००२१



## 8.4 A poster on maintaining hygiene while handling food and food products



# अन्नप्रक्रिया कक्षात पाळायचे नियम



**✓ हे करावे**

- ✓ टोपी व्यवस्थित घालणे
- ✓ केस विंचरलेले आणि बांधलेले असावेत
- ✓ एपरन (कोट) स्वच्छ ठेवणे
- ✓ स्वच्छ कपडे घालणे
- ✓ नखं स्वच्छ तसेच नियमित कापणे
- ✓ हात साबणाने स्वच्छ धुणे
- ✓ घड्याळ, अंगठी, इत्यादी वस्तू कक्षात न वापरणे
- ✓ जखम झाल्यास नीट बांधून ठेवणे
- ✓ पाय स्वच्छ धुणे



**✗ हे करू नये**

- ✗ टोपी न घालणे
- ✗ कक्षामध्ये केस विंचरणे
- ✗ अस्वच्छ एपरन (कोट) अथवा कपडे घालणे
- ✗ अस्वच्छ हात
- ✗ घड्याळ, अंगठी इत्यादी वस्तू घालणे
- ✗ जखमा उघड्या ठेवणे
- ✗ नखं वाढलेली अथवा रंगविणे
- ✗ अस्वच्छ पाय

Image source: <http://www.cliparthut.com/clip-arts/243/indian-woman-clip-art-243606.jpg>