

# PROTEIN - Program to Revitalize Overall health of Tribals by Ensuring the Intake of Nutritious food products

Sourcing nutritious food to tackle malnourishment

Pathardi Village, Palghar District, Maharashtra



# Challenges faced by the communities of Pathardi

- Pathardi is the remote tribal village in Mokhada block of Palghar district, Maharashtra, India with partial electric supply.
- Malnutrition is highly prevalent due to poor access to nutritious food, lack of food diversity and poor economic status of the people
- Accessibility, quality and quantity of water is also a great challenge especially during dry summer months.
- Women daily fetch more than 80 lit of water per family from an average distance of 1.5 km, thus suffering from immense physical stress.
- Scarcity of water and stress discourages them to cultivate vegetables in their backyard for self-consumption
- This is one of the major reasons of severe malnourishment.



Women travel long distance to fetch water

# Significance of the project

- TERI's ongoing project at Pathardi village aims at sourcing nutritious food to tackle malnourishment through use of available natural resources and processed grey water.
- Providing water as a key resource was of great relevance for cultivating vegetables round the year for self-consumption.
- **Provision of local fresh food is expected to greatly help circumvent** issues of malnourishment.



# Focus of the project

## Objectives

- To make villagers/ farmers aware of the need for the production of nutritious food
- To make water available through  
➤ Conserving and maintaining the water table of the area  
➤ Treating grey water to grow vegetables in backyard/ kitchen garden.
- To establish and explore market for the product



# Awareness workshops

- **Approach 1: Promotion of Nutri-Gardens**
  - Awareness workshops and capacity Building of stake holders, especially women, anganwadi workers and SHG members were carried out
- **Approach 2: Health Check up camps:**
  - Health check up camp helped in analyzing the micro-nutrient deficiency within the children and women
  - Accordingly, nutrition supplements were provided as an immediate source to improve their health status



Above: Awareness workshops with SHG and anganwadi members

Below: Gram Sabha to seek their participation in the program

# Capacity building to make villagers self-sufficient to grow nutritious food

## ➤ Approach 1: Competition on 'Wholesome Nutri-garden'

- To encourage to grow variety of veggies in the backyard/ nutri-gardens through distribution of seeds
- To generate awareness at village level about simple methods of irrigation and organic fertilizers
- To encourage and make use of organic fertilizers by preparing an organic pit in the backyard



Seed distribution to the participating SHG members

# Capacity building to make villagers self-sufficient to grow nutritious food

- 12 women enthusiastically cultivated variety of vegetables including brinjal, spinach, okra, fenugreek and beans
- Along with this water conservation practices like bottle drip irrigation and reusing grey-water for irrigating plants was carried out effectively in their home gardens.



Nutri-gardens developed by the participants



# Capacity building to make villagers self-sufficient to grow nutritious food

- The criteria of selecting the winners was based on that and the variety of vegetables and fruits planted, along with the conservation practices undertaken at the individual level.
- The awards were given by the hands of Mr. Nighojkar and Mr. Bhattacharjee from GKN Sinter Metals Pvt. Ltd.
- Three winners were selected and were awarded with a **'Smokeless Chulha'**
- Other participants were given with consolation prizes to appreciate their efforts and encourage them to continue such practices for the wellbeing of their family.



Mr. Nighojkar and Mr. Bhattacharjee presenting the awards to the winners of the competition



# Fruit and Energy tree plantation, Afforestation activity

- Large scale plantation of fruit tree s including Mango, Cashewnut, Jackfruit, Papaya, Custard Apple and Amla, was carried to ensure a long-term supply of seasonal as well as economically important fruits
- Energy plantation was carried out with an objective to reduce the dependence of forest for fuel wood. Bamboo and acacia tree sapling were encouraged for plantation activity.
- Plantation of native tree species like Neem, Saag and Arjun was undertaken as an afforestation activity on the community land.



Energy plantation on the community land



Distribution of fruit trees for plantation on private lands

# Capacity building of the youth of the village

- To introduce villagers/ farmers to new and improved agricultural practices
- The participants were given a structured training on “ General Greenhouse Management” at Horticulture Training Centre, Talegaon.
- 3 youths participated for the training workshop
- The training exposed them to different types of farming practices other than traditional/ rain fed agriculture.
- Better understanding of Poly-house and Shade-net technique of cultivating vegetables
- Sale & market demands for organically cultivated vegetables



Participants of the greenhouse management training

# Salient Observations

- The women and youth were encouraged to take up cultivation of vegetables due competitive environment created through various activities.
- The villagers realized the significance of growing their own food through the capacity building workshops and training programs.
- However, acute water shortage was a big challenge in scaling up the activity of promoting nutri-gardens.

*\* It was very important to provide immediate solution to make water available for local vegetable cultivation.*

# TERI's innovative approach

## Approach 1. A analysis of the grey water generated

- Survey of households to assess availability of grey water

Purpose	Quantity per household (4 members) (Litres)
Cooking and drinking	30-40
Bathing	70-80
Washing cloths and utensils	20-30
Cleaning the flooring and other applications	20
Cultivation of Nutri-gardens	30
<b>Total</b>	<b>125-160</b>

Daily requirement of the water per household

- As observed from the table, around **60-80 litres of grey water could be recycled through some simple treatment methods** and villagers may reutilize it for irrigation of kitchen gardens.

# Demonstration and installation of the grey water treatment system

## **Objective**

To train and build capabilities of village youth for better understanding of the process of treating grey-water and its applications.

## **Impacts**

- Around 10 youths were trained to install grey water treatment systems at household level.
- 7 grey water treatment systems have been installed in Pathardi village.
- Created a livelihood option



Training and demonstration- Installation of the grey-water treatment system

# Construction of Man-made Wetland to recycle grey water

The concept of Manmade-wetland was introduced effectively through installation of grey-water treatment system at household level.



Women in the village walk long distances to fetch water

- Making water available for growing veggies even during the dry season.
- Provide water for secondary purposes.
- Minimize the trips of fetching water for secondary purposes
- The requirement of fetching water was reduced by 40%.



Food grown in the backyard -  
A sustainable initiative

# Feedback of the end users

The impact of the pilot grey water treatment unit installed at household level for irrigating nutri-gardens was assessed through interaction and video recording



TERI employees recorded the feedback of the end users. The video is recorded in the local language that is Marathi. Following is the link to access the same.

The very first system was installed at Ms. Heerabai Bendkule's house.

She was pleased to inform that she doesn't have to carry the load of water for watering plants and irrigating her nutri-garden.

She was also happy to inform that the availability of water at the door step has now made it possible to cultivate veggies even in dry period of the year.

# Visit to Natural Wetlands in the village

- ▶ A visit was arranged to assess the status of the natural and only water sources comprising of one pond and two wells in the village.
- ▶ It was observed that holding ponds and wells become dry in the early summer days leading to water scarcity for about 3 months until the onset of the monsoon.

Wells during monsoon



Early drying of the wells



Holding pond in the village



During Monsoon



During Summers



# Portability test of well water

According to the survey carried out by TERI, it was reported that Poor sanitation and un-hygienic practices lead to water borne diseases like dysentery and diarrhea which further leads to malnourishment.

- Thus, water quality analysis of the two well was carried out to check the portability of the water used for drinking.

Sr. No	Parameters	Well 1	Well 2	Upper Permissible limit (IS 10500:1991)
1	pH	5.89	6.40	6.5 – 8.5
2	Electronic Conductivity	235.4	202.6	--
3	Turbidity	14.08	4.91	10 NTU
4	Suspended Solids	10	11	--
5	TDS	143	134	500mg/l
6	TS	304	300	--
7	Acidity	<5.1	NIL	--
8	Alkalinity	115.20	86.40	200mg/l
9	Chlorides	25.95	64.87	250mg/l
10	Fecal coliform	23	23	10per 100ml
	E Coli	+ve	+ve	-ve
11	Sulphate	103.24	108.76	200mg/l
12	Phosphate	1.138	1.055	--
13	Total hardness	114	57	300mg/l
14	Nitrite	0.173	0.178	--
15	Nitrate	0.515	0.522	45mg/l

The water quality of both the wells are within the permissible limit, except for Total coliforms

The presence of E. Coli is twice the permissible limit.

This could be due to poor maintenance or intrusion of sewage water into the wells

# Hydrogeological investigation of the area

- Hydrogeological investigation of the pond was carried out at the site in order to ascertain the hydro-geology located at Village Pathardi.
- The study further helped to determine the action plan to conserve the natural pond in the vicinity of the village. The study results are as follows:

## Geology of the area

- Major formation is **basalt**.
- Secondary porosity is developed due to **fracturing**
- Thin soil cover (1m thickness)

## Groundwater status of the area

- Groundwater occurs in the pore space of basalt
- Presence of **confined & semi confined** aquifer.
- The groundwater is mainly **recharged due to precipitation and seepages**.

## The location of the water table

- Location was identified through Electrical Resistivity Tests (ERT)
- Water table is identified at the **depth of 100-120 m**

# Hydrogeological investigation of the pond



Electrical Resistivity Tests were carried out in order to identify locations for groundwater table at Pathardi.



# A participatory activity to conserve natural wetlands

## *Objective*

- To de-silt the dry pond to increase its water holding capacity.

## *Benefits*

- Enhance collection of surface runoff
- Recharge groundwater table
- Avoiding early drying of wells due to holding pond.

## *Impact*

- Around 25 women offered 'shramadan' (help) for silt removal. De-siltation of up to 4ft was further carried out by deploying additional mechanical devices
- This has enhanced the water holding capacity of the pond by 30%



Participatory 'Shramadaan' activity initiated in the village on "World Wetlands Day"



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# Health check up camp at Pathardi

## Objective

- To get a baseline of the health status of the target population i.e. children and women
- To analyze the prevailing micronutrient deficiency or any other water related problem

## Update

- A health check up camp with the help of “Thyrocare technologies” was organized in the village on December 21, 2015.
- The participants were:
  - Children between age 2 to 12 years
  - Women below age 40
- The baseline report would help in devising the further strategies of promoting nutri-gardens.



Health check up of children (age 2-6 years) and their mothers

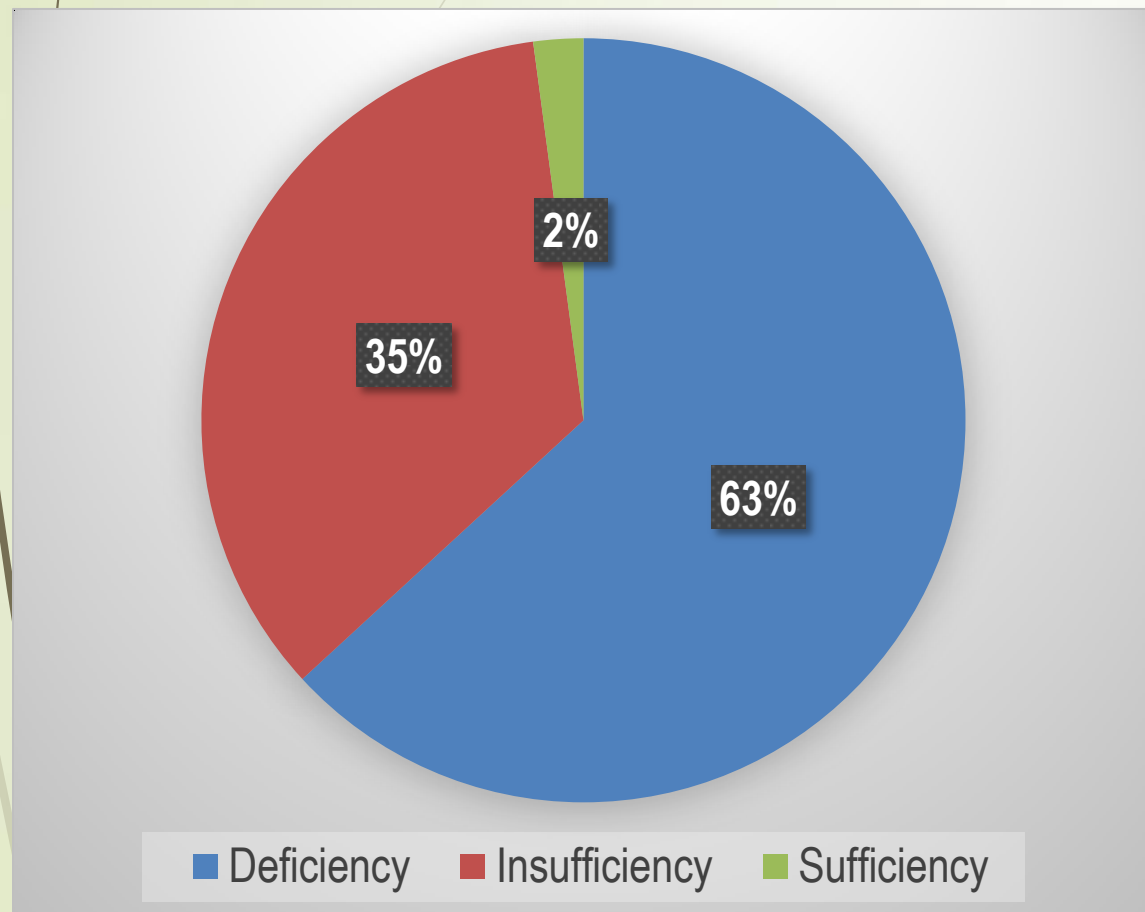
# Health check up camp at Pathardi

- ▶ The major deficiency observed is:
  - ▶ Vitamin D
  - ▶ Iron
- ▶ Both are interdependent as Vitamin D helps in enhancing intestinal absorption of calcium, Iron, magnesium, phosphate, and zinc.



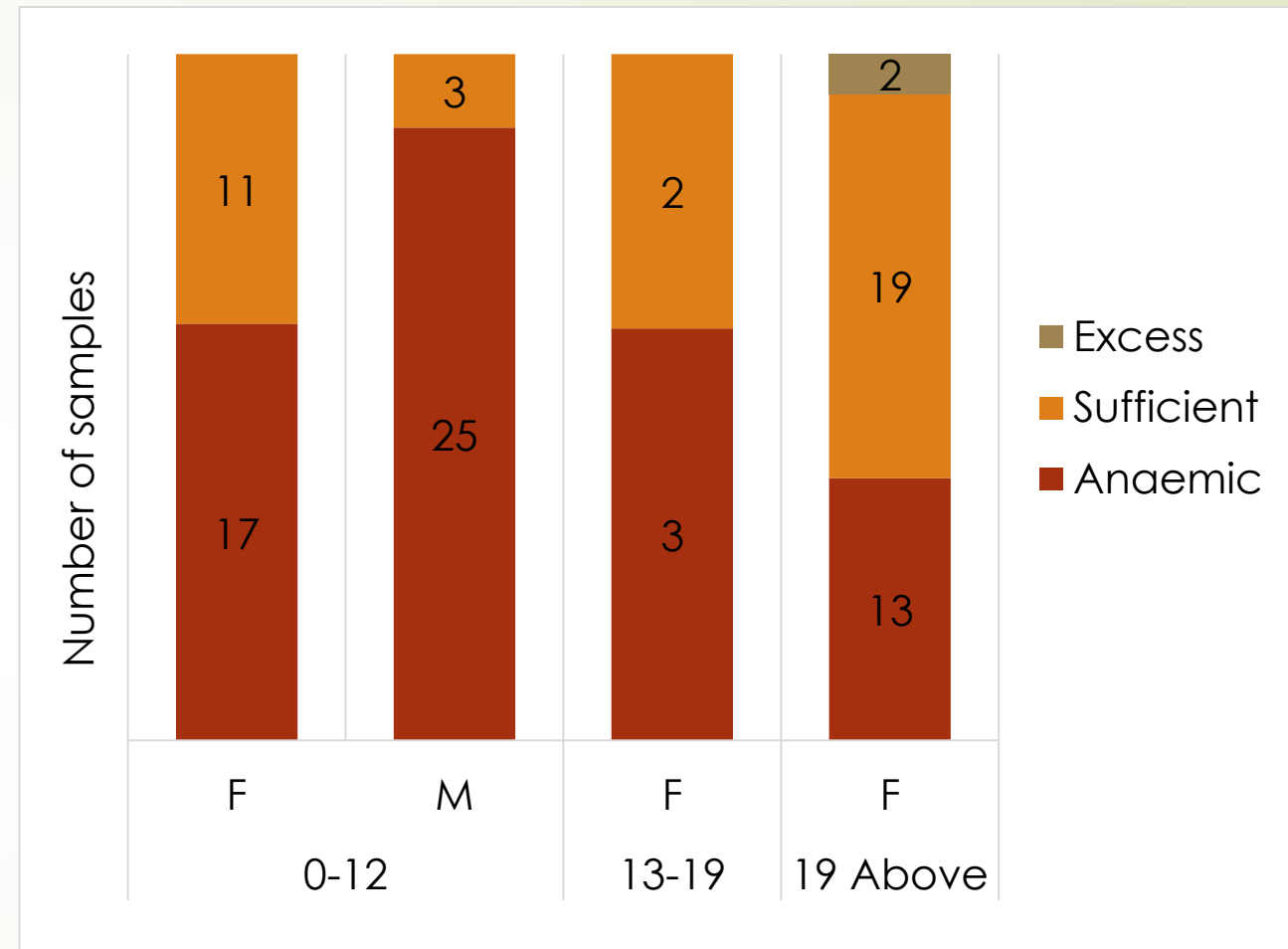
Health check of school student between age 9 to 12 years

# Results: Vitamin D and Iron Deficiency



**Percentage distribution of status of Vitamin D across all samples**

- Due to a fixed diet pattern which lacks in diversity in the diet leads to deficiency of certain important micro-nutrients
- Other reason could be impaired absorption of the nutrients, increased requirement, or increased excretion.



# Recommendations

## Iron

- TERI vouch for consumption of green leafy vegetables which would be locally cultivated.
- Thus, to encourage and increase the consumption of the green leafy vegetables, TERI provided them with the seeds and saplings of plants mentioned in the table below.



Dr. Anjali explaining the status and implications of iron deficiency

Vegetable per 100 gm	Iron (mg)
<i>Moringa oleifera</i> , raw leaves	4
<i>Beta vulgaris</i> , tender leaves	3.57
<i>Amaranthus purple</i> , cooked leaves	3
<i>Colocasia esculenta</i> , steamed leaves	1.7
<i>Basella alba</i> , cooked	1.2



# Highly nutritious locally available leafy vegetables rich in iron



*Moringa oleifera*  
(Shevga chi pane)



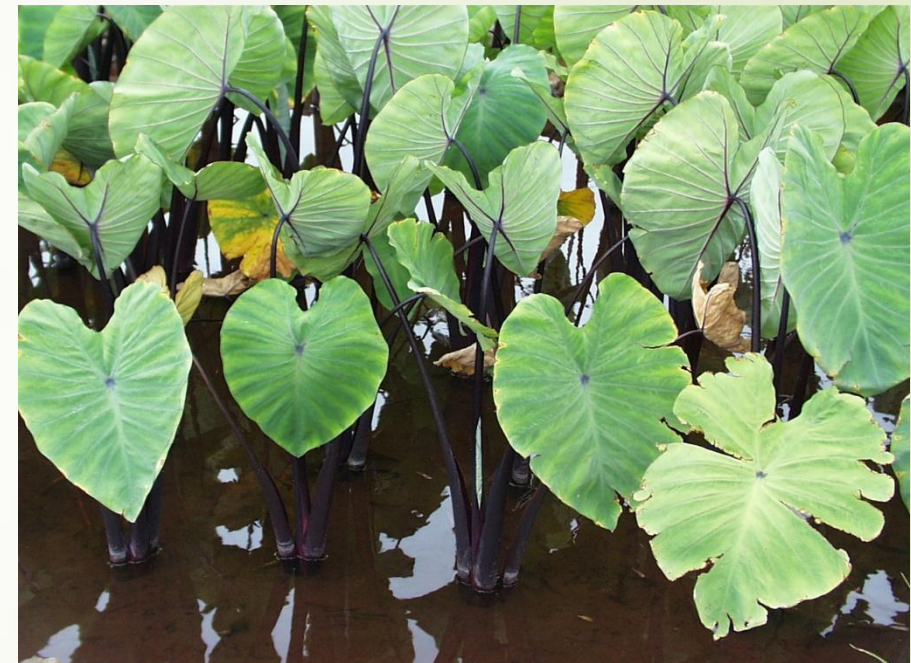
*Basella alba* (Mayalu)



*Amaranthus purple*  
(Laal Math)



*Beta vulgaris* (Beet leaves)



*Colocasia esculenta* (Allu chi pane)

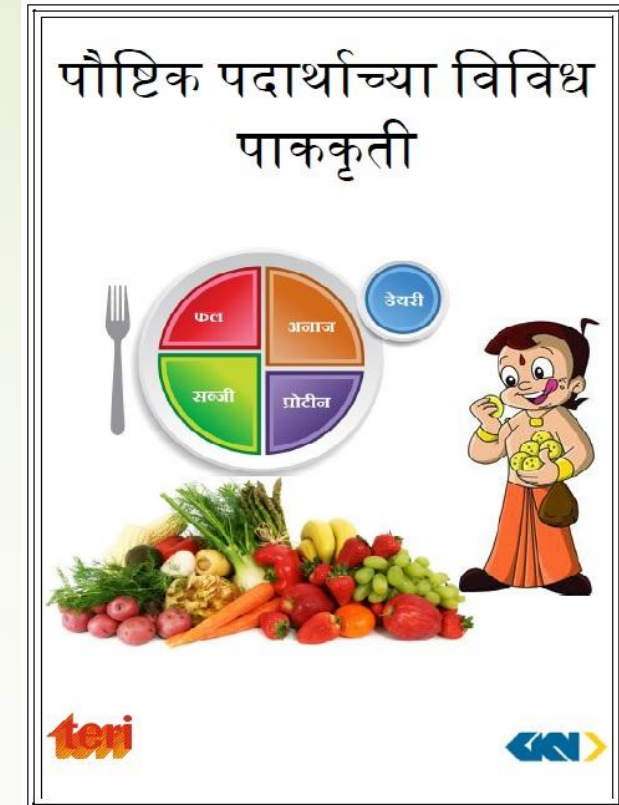
# Recommendations

## ➤ Vitamin D

- Dry mushroom powder was introduced to the villagers
- **Facts:** *Mushroom is the only vegetarian source of Vitamin D*
- A workshop was conducted to elaborate its use in daily cooking practices and its health benefits
- Mushroom cultivation workshop was carried out to encourage growing and consuming mushrooms at the household level

## ➤ Benefit

- It is Rich in vitamin D and Protein
- It was easily accepted by the children



Distribution healthy recipe book



Drumstick with mushroom powder as an ingredient prepared by locals

# Summary

TERI strategically aimed at tackling malnutrition at the local level by-

- Promoting and implementing nutri-gardens as a sustainable source of nutritious food
- Reusing grey water for developing nutri-gardens/ kitchen gardens at the house-hold level.
- Conserving natural pond to collect surface run-off and provide water for various purposes in the future.
- Organizing “ World Wetlands Day” to enhance overall understanding of conserving and creating wetlands for water and

# Discussions and constraints during implementation of the program

- The possibility of drilling a bore-well has been explored but following were the physical constraints faced by TERI
  - Terrain difficulties and the remote location of the village made it difficult for the bore-well drillers to arrange for a vehicle
  - The possibility of failure of bore-well is high due poor water holding capacity of the aquifer. Thus, it is important to make a strategic plan for a recharge pit of the bore-well.
  - Grey-water treatment systems were installed only in 7 house-holds as other houses did not have properly constructed bathrooms in place.

# Thank you



School children of Pathardi village and TERI representatives during the awareness workshop carried out on "World Wetlands Day", 2nd February, 2016