# Mid Term Evaluation of "Special Programme for Promotion of Millets in Tribal Areas of Odisha" ( Odisha Millets Mission, OMM ) Phase-I Blocks

## Kandhamal District




**Submitted to-**

**Submitted By-**

**Nabakrushna Choudhury Centre**
**for Development Studies (NCDS)**
**(ICSSR Research Institute in Collaboration with Govt. of Odisha )**
**Bhubaneswar**

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**Green India**

## Abbreviations

| | |
|---|---|
| CBOs: | community-based organisations |
| CRPs: | Cluster Resource Persons |
| CSOs: | Civil Society Organisations |
| DAFP: | Directorate of Agriculture and Food Production |
| FAO: | Food and Agriculture Organisation |
| FAs: | Facilitating Agencies |
| FPC | Farmer Producer Company |
| FPO | Farmer Producer Organisations |
| GP: | Gram Panchayat |
| HSC: | High School Certificate |
| ICDP-CC: | Integrated Cereals Development Programmes in Coarse Cereals based Cropping Systems Areas |
| IFS: | Integrated Farming System |
| INSIMP: | Initiative for Nutritional Security through Intensive Millets Promotion |
| LS: | line sowing |
| LT: | line transplanting |
| MFP: | Minor Forest Produce |
| MGNREGS: | Mahatma Gandhi National Rural Employment Guarantee Scheme |
| MMA: | Macro Management of Agriculture |
| MT: | Metric Tonne |
| NAPCC: | National Action Plan on Climate Change |
| NCDS: | Nabakrushna Choudhury Centre for Development Studies |
| NMSA: | National Mission for Sustainable Agriculture |
| NPM: | Non-pesticide Pest Management |
| OMM: | Odisha Millets Mission |
| PCPDC: | Per Capita Per Day Consumption |
| PDS: | Public Distribution System |
| RADP: | Rainfed Area Development Programme |
| RKVY: | Rashtriya Krishi Vikas Yojana |
| SC: | Scheduled Caste |
| SMI: | systemic millets intensification |
| ST: | Scheduled Tribe |
| WASSAN: | Watershed Support Services and Activities Network |

# Chapter-I: Introduction

## 1.1 Background

History of millet is as old as the food history of human civilisation. There is evidence of millet cultivation in the Korean Peninsula dating back to the Middle Jeulmun Pottery Period (around 3,500–2,000BC). In India, millets have been mentioned in some of the oldest Yajurveda texts, identifying foxtail millet (*priyangava*), Barnyard millet (*aanava*) and black finger millet (*shyaamaka*), thus indicating that millet consumption for human food is as old as Indian Bronze Age (4,500BC).[1] It's mentioned in the Bible as one of the grains used to make bread. In ancient China, millet was one of five sacred grains and the Chinese believed that it was brought from the heavens by Houji or "Lord Millet," a culture hero worshiped as the founding ancestor of farming. In Europe, millet formed an important part of the daily diet during the Roman Empire, however lost relevance during Middle Ages in the name of inferior foods and poor men's foods.[2] Martin Jones, in his research work "Origin and Spread of Millets" notes that millets became common in North China heartland around 7500 years ago and later on these millets travelled from North China to Central Asia and Europe and South through Thailand to India through nomadic shepherds.[3]

Millet is an imprecise English term applied to a large number of smaller-grained, largely tropical cereals that are often distantly related. Millets tend to be small-seeded cereals, i.e., distinct from wheat, barley, oats, rice, and maize. The most important types are pearl, finger, proso, and foxtail millets; other types of local significance include kodo, little, barnyard, and fonio millets, and teff.[4] In India, different types of millets continued to be a significant part of adivasi / tribal communities' diets in different parts of the subcontinent until the large-scale promotion of wheat and paddy through the green revolution. Millets were the staple grains of large sections of the population that did not have access to assured irrigation for their lands.[5] Considering the simple cultivation process of millets, most often millet cultivation is ridiculed as 'lazy farmer's crop" because the usual process of cultivation does not require much technical process and inputs for its fruitful harvest. Simply the seeds are broadcasted and harvested after three months. Similarly, there is also social stigma associated with millet consumption as poor man's food.

## 1.2 Increased Relevance of Millet Production and Consumption

Despite societal discouragement for millet production and consumption, millets are nutritionally superior food which contain rich micronutrients compared to rice and wheat. Millets are rich in minerals like iron, magnesium, phosphorous and potassium. Finger millet is the richest in calcium content, about 10 times that of rice or wheat. In this fashion, nutrient to nutrient, every single millet is extraordinarily superior to rice and wheat and therefore can be considered as the solution for the malnutrition that affects a vast majority of the Indian population.

[1] ICRISAT Official website
[2] https://foodprint.org/real-food/millet/
[3] Jones, Martin (2016): " Food Globalisation in prehistory: The agrarian foundations of an interconnected continent", Journal of the British Acdemy, Vol-4, PP 73-87
[4] M.I. Gomez, S.C. Gupta, in Encyclopedia of Food Sciences and Nutrition (Second Edition), 2003
[5] https://themillet.org/a-brief-history-of-millets/

As per one report of the FAO, historically India is the largest global producer of millets. However, during last two decades, the importance of millet as food staples, has been declining in India owing to rising income of the people, growing urbanization, and government policies. More than 50.0% of the millet production is currently finding its way into alternative uses as opposed to its consumption only as a staple.[6] In recent years, in Europe and North America, millets are gaining prominence as staple food owing to their gluten-free and hypoglycemic properties. As per the UN Food and Agriculture Organization's data, agriculture accounts for 70% of total water consumption among these sectors. It is highest for Asia and Africa where agriculture is in primary sector of economy. Among agricultural crops, rice and wheat are staple food in large parts of globe. However, these crops like paddy and wheat are water intensive and are unlikely to be sustainable, as freshwater resources are depleting around the globe. Millet grows easily in dry climate, have smaller harvesting period and require minimal water quantity. Millets could be a sustainable alternative to rice and wheat, as a new staple food. It can also help in providing food security to large population in the coming years. Given the nutritional value associated with millets and its climate resilient capacity there is growing emphasis on millets consumption as well as production. Despite decreased popularity of millets during past decades, continuation of millet cultivation is reemphasized in recent years owing to its historical versatility, resilience in difficult environments, nutritional properties and health benefits, long storage life and economic potential.[7]

### 1.3 Emphasis towards Millet Production in India

Nearly 60 percent of India's cultivated area is rain-fed, the damage caused by climate change is huge in the agriculture sector. In order to save the farmers from climate stresses, there is imperative need of promotion of climate smart agricultural practices among the farmers. Cultivation of millets is considered to be as one of the climate smart agricultural practices.[8] In order to increase millet production in the country, Govt. of India has taken several initiatives under different policies formulated from time to time. The important policies in this regard include Initiative for Nutritional Security through Intensive Millets Promotion (INSIMP) and Rainfed Area Development Programme (RADP) which are part of Rashtriya Krishi Vikas Yojana" (RKVY), and Integrated Cereals Development Programmes in Coarse Cereals based Cropping Systems Areas (ICDP-CC) under Macro Management of Agriculture (MMA). Besides, the National Mission for Sustainable Agriculture (NMSA) adopted by Department of Agriculture & Cooperation, Ministry of Agriculture Government of India in 2014, has the objective of enhancing agricultural productivity especially in rainfed areas focusing on integrated farming, water use efficiency, soil health management and synergizing resource conservation. The programme has a mandate of improving millet production in the country. NMSA derives its mandate from Sustainable Agriculture Mission which is one of the eight Missions outlined under National Action Plan on Climate Change (NAPCC). NMSA aims at promoting sustainable agriculture through a series of adaptation measures focusing on ten key dimensions encompassing Indian agriculture namely; 'Improved crop seeds, livestock and fish cultures', 'Water Use Efficiency', 'Pest Management', 'Improved Farm Practices',

[6] Rao, P. P. and Basavaraj, G. (2015). Status and prospects of millet utilization in India and global scenario, Millets: Promotion for Food, Feed, Fodder, Nutritional and Environment Security, Proceedings of Global Consultation on Millets Promotion for Health & Nutritional Security. Society for Millets Research, ICAR, Indian Institute of Millets Research, Hyderabad, Pp. 197-209.

[7] Apetrei, Cristina (2012), "Food Security and Millet Cultivation in the Kumaon Region of Uttarakhand", Research Report for Gene Campaign, August 2012.

[8] Behera, Manoj. (2017). Assessment of the State of Millets Farming in India. MOJ Ecology & Environmental Science. 2.

'Nutrient Management', 'Agricultural insurance', 'Credit support', 'Markets', 'Access to Information' and 'Livelihood diversification'.[9]

### 1.3.1 Intensive Millet Promotion (INSIMP)

The Central government launched the Initiative for Nutritional Security through Intensive Millet Promotion (INSIMP) in 2011-12 to promote millets as "nutri-cereals". The scheme aimed at increased production of millets in the country. The scheme proposed to bring 0.5 million hectares (ha) under millet cultivation. A key feature of INSIMP is giving input kits, comprising urea and pesticides; costing Rs 2,000-3,000 depending on the type of crop; and seed kits, comprising hybrid seeds to the farmers. These kits are supplied by nodal agencies in a state, and are, in turn, procured from various manufacturers. The other key aspects of the scheme such as the post-harvest handling of millets, involving establishment of processing and value-addition units were also taken into consideration. Composite millet processing centres, that handle de-stoning, de-hulling, flaking and rava- making, were planned to be established across millet producing areas in the country. The scheme has been implemented since Kharif 2011. As per the scheme provisions, Technology demonstrations in compact blocks were organized in selected districts for four categories of millets – Sorghum, Pearl millet, Finger millet and small millets. Technology demonstration kits of critical inputs of nutrients and plant protection measures comprising of micro-nutrients, fungicides and bio-fertilizers, DAP, urea, potash and pesticides including weedicides at a total cost of Rs. 3,000/- per ha for sorghum, pearl millet and finger millet and Rs. 2,000/- per ha for small millets would be supplied to all the farmers in the units. These kits would be supplied free of cost to the beneficiary farmers subject to maximum area of 2 hectare.

### 1.3.2 National Mission for Sustainable Agriculture (NMSA)

National Mission for Sustainable Agriculture (NMSA) has been formulated for enhancing agricultural productivity especially in rainfed areas focusing on integrated farming, water use efficiency, soil health management and synergizing resource conservation.

### 1.3.3 Rainfed Area Development Programme (RADP)

RADP put forward a holistic approach to rainfed area development through the promotion of rainfed farming systems and by focusing on the needs of small and marginal farmers through integrated farming practices, assistance to farmers in improving the productivity of existing cropping patterns and in diversifying production. Support to millets was only one component amongst its programme components. Similarly, millets through MMA under ICDP-CC being a sub-category had limited reach. As a part of the Rashtriya Krishi Vikas Yojana (RKVY), RADP aims at Developing and identifying new areas receiving adequate rainfall for millet farming. Implementation of RADP has been taken up since 2014-15. Rainfed Area Development Programme (RADP) is one of the four components of National Mission for Sustainable Agriculture (NMSA). RADP involves an area-based approach for development and conservation of natural resources along with appropriate integrated farming system. It explores potential utilization of natural assets created / available through Watershed Development and Soil conservation activities under MGNREGS/NWDPRA / RVP /RKVY /IWMP etc. It aims at promoting Integrated Farming System (IFS) with emphasis on multi cropping, rotational cropping, inter cropping, mix cropping practices and allied activities of Horticulture, Livestock, Fishery, Forestry, Apiculture,

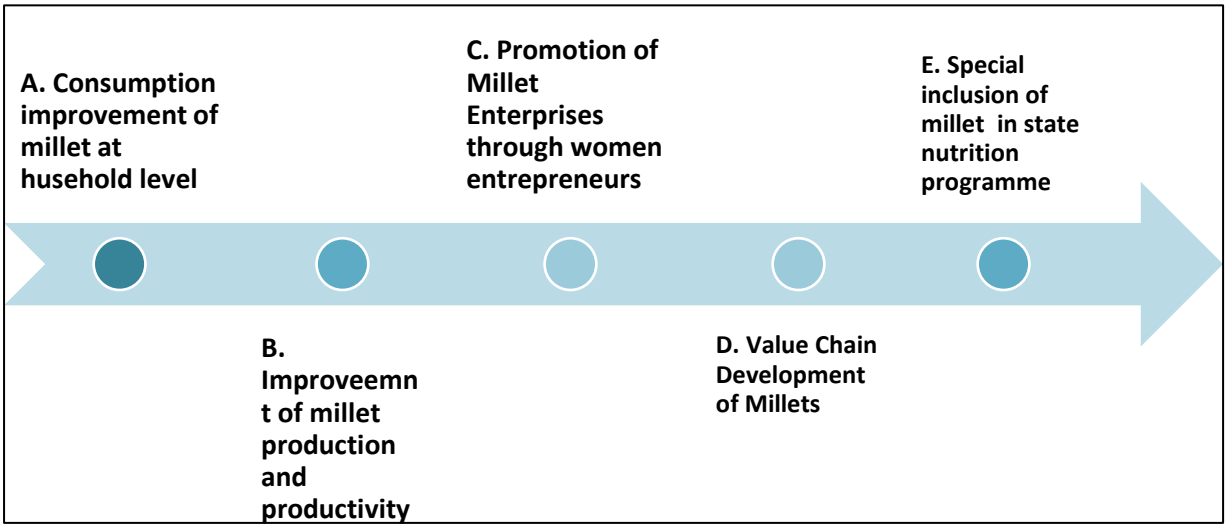
[9] Department of Agriculture & Cooperation, (2014), "National Mission for Sustainable Agriculture (NMSA): Operational Guidelines", Ministry of Agriculture, Government of India

Mushroom etc which enable the farmers in not only maximizing farm production for sustainable livelihood, but also to mitigate the impact of drought, flood and other extreme weather events.

### 1.4 Special Programme for Millets in Tribal Areas of Odisha

Special Programme for millets in tribal areas otherwise called Odisha Millet Mission (OMM) evolved in 2017, after a state level consultation organized by Planning and Convergence Department, Govt. of Odisha on the subject "Comprehensive Revival of Millets in Tribal areas of Odisha" to secure Nutrition Security and mitigate drought in South Odisha held at Nabakrushna Choudhury Centre for Development Studies on 27th January 2016. This led to a series of interactions and a memorandum of understanding (MoU) was signed on 27 February 2017 between the Directorate of Agriculture and Food Production (DAFP) as the state level nodal agency that would monitor and implement the programme, NCDS as the state secretariat that would also anchor the research secretariat, and Watershed Support Services and Activities Network (WASSAN) that would anchor the programme secretariat as part of the state secretariat. The date of signing of the contract was treated retrospectively as the start date of progrmme implementation. The programme period spans over a five-year time period from 2017 to 2022. The first three years of programme period constituted to be programme implementation phase and the subsequent two years comprise of consolidation, expansion and institutionalisation. As per the Programme Guidelines[10], the key project objectives include increased household consumption of millets by around 25 percent, enhancement of household nutrition security and to create demand for millets with special focus on women and children.

The programme also aims at promoting millet processing enterprises at GP and block level to ensure household access for easy processing and value-added millets and millet products. Improvement of millet productivity, profitability from millet cultivation, development of millet-based enterprises with market led value chain activities, promotion of women entrepreneurs for millet-based activities, inclusion of millet in state nutrition programme including public distribution programme are the added objectives for which the special programme on millets is implemented in the state.




[10] National Food Security Mission Cell, Directorate of Agriculture and Food Production, Govt. of Odisha, Guidelines for Implementation of "Special Programme for Millets in Tribal Areas of Odisha", Letter No-40856, dated 25.11.2016.

Selected blocks within the districts covered under OMM are assigned to civil society organisations (CSOs), which are called as the facilitating agencies (FAs) of the programme. Mainly the NGOs are involved as the facilitating agencies at Block level. The FAs are very much involved in the last-mile delivery and adoption of OMM. Towards overall implementation of the programme, the government collaborates with CSOs and community-based organisations (CBOs) and seeks advice from external agencies on technical aspects and programme implementation. The programme focusses on training millet farmers to follow improved practices of systemic millets intensification (SMI), line sowing (LS), and line transplanting (LT). Farmers who adopt the improved methods receive a cash transfer directly to their bank accounts, upon successful verification. This is to note that SMI is the application of the principles of systemic rice intensification (SRI) on millets, whereby young seedlings are planted in a specific square pattern. It also involves maintaining a certain level of soil condition over the growing period. Line sowing is a method of sowing seeds directly on the field in the form of a line and maintaining precise spacing. Line transplanting involves transplanting a young sapling raised in a nursery, in the form of lines with specific spacing.[11] The programme also supports farmers in adopting improved crop management practices such as weeding, rolling, crop-cutting, and non-pesticide pest management (NPM). This is done via traditional agricultural extension models, using field demonstrations and trainings by the CSOs in collaboration with CBOs such as farmer producer groups, and women's collectives.

### 1.5 Programme Outreach in Kandhamal District

The outreach of first phase of OMM is extended upto 22075.8 hectares of land area under ragi millet cultivation and the proportionate share of Kandhamal district in the overall ragi area of first phase OMM stands at 12.0 percent. There ae four blocks covered under first phase of OMM intervention in the district. Maximum coverage of land area for OMM ragi cultivation is noticed at Raikia block and minimum at Phiringia block.

**Table –1.2: Coverage of Ragi under first phase OMM Project Intervention in Kandhmal district**

| **Blocks** | **Land area taken up for ragi cultivation by Districts, blocks and crop years (in Hectares)** | | | | **% Share of the block in district total** | **% Share of the district in state total** |
|---|---|---|---|---|---|---|
| | **2017-18** | **2018-19** | **2019-20** | **All Years** | | |
| Daringbadi | 50.4 | 245.7 | 250.5 | 546.6 | 20.7 | 12.0 |
| Kotagarh | 26.4 | 363.6 | 413.8 | 803.8 | 30.4 | |
| Phiringia | 15.2 | 161.1 | 251 | 427.3 | 16.2 | |
| Raikia | 81 | 347.1 | 436.6 | 864.7 | 32.7 | |
| **Sub total** | **173** | **1117.5** | **1351.9** | **2642.4** | 100.0 | |
| **Grand Total** | **3161.03** | **7625.93** | **11288.8** | **22075.8** | | **100.0** |

Source: Computed from WASSAN Official data

[11] Basu, Subhodeep et. al. (2021), "Addressing the nutrition crisis: Reflections from Odisha Millets Mission", Ideas for India, https://www.ideasforindia.in/topics/agriculture/addressing-the-nutrition-crisis-reflections-from-odisha-millets-mission.html

With respect non – ragi millets, out of the total land area covered at the state level, percentage share of kandhamal district is about 11.8 percent. Further, within the district, Daringbadi is having highest share in the overall non ragi millet cultivated area followed by Kotagarh, Phiringia and Raikia blocks.

**Table- 1.3: Coverage of Non ragi Millets under first phase OMM Project Intervention (land Area in Hectares) in Kandhamal district**

| Blocks | Land area taken up for non-ragi millet cultivation by Districts, blocks and crop years (in Hectares) | | | | % Share of the block in district total | % Share of the district in state total |
|---|---|---|---|---|---|---|
| | 2017-18 | 2018-19 | 2019-20 | All Years | | |
| Daringbadi | 0 | 25 | 151.1 | 176.1 | 38.68 | 11.8 |
| Kotagarh | 0 | 30 | 103 | 133 | 29.21 | |
| Phiringia | 0 | 17.6 | 84 | 101.6 | 22.31 | |
| Raikia | 0 | 2 | 42.6 | 44.6 | 9.80 | |
| **Sub total** | **0** | **74.6** | **380.7** | **455.3** | 100.00 | |
| **All districts** | **114.45** | **1880.8** | **1873.71** | **3868.96** | | 100.0 |

Source: Computed from WASSAN Official data

Within the four blocks covered under the first phase OMM intervention in the district, there are about 8228 millet farmers which accounts 13.2 percent share of the overall farmer outreach of OMM in the entire state. Maximum proportion of millet farmers are registered at Daringbadi block followed by Kotagarh, Raikia and Phiringia blocks.

**Table-1.4: Farmer Outreach under first phase intervention OMM in Kandhamal district**

| Blocks | Number of farmers covered under first phase OMM by districts, blocks and crop years (No. of farmers) | | | | % Share of the block in district total | % Share of the district in state total |
|---|---|---|---|---|---|---|
| | 2017-18 | 2018-19 | 2019-20 | All Years | | |
| Daringbadi | 293 | 1004 | 1211 | 2508 | 30.5 | 13.1 |
| Kotagarh | 91 | 1020 | 1157 | 2268 | 27.6 | |
| Phiringia | 55 | 517 | 824 | 1396 | 17.0 | |
| Raikia | 189 | 575 | 1292 | 2056 | 25.0 | |
| **Sub total** | **628** | **3116** | **4484** | **8228** | 100.0 | |
| **All districts** | **8636** | **21972** | **32394** | **63002** | | 100.0 |

Source: Computed from WASSAN Official data

## 1.6 Terms of Reference of the Study

Naba krushna Choudhury Centre for Development Studies (NCDS), Bhubaneswar has commissioned the mid-term evaluation study of Odisha Millet Mission covered under first phase implementation in 29 blocks except Chandrapur block in Rayagada district. Resultingly, the study covers all the 29 blocks of seven districts through a sample-based household survey of the millet farmers covered under OMM. In order to strengthen evidence-based decision making in further project implementation, the study is to compare the findings of the mid-term evaluation study with corresponding baseline findings so as to understand the changes taking place at farmers' household level as a result of OMM intervention. In this background, the objectives stipulated in the baseline study remains valid for the mid-term evaluation study.

## 1.7 Objectives

- → To assess the socio-economic condition of Millet HHs in the project area.
- → To outline the millet production Productivity and Package of Practices in the project area.
- → To assess the consumption pattern of millets among the households in the project area.
- → To examine the method of processing and mode of Marketing of millets produced by the farmers.

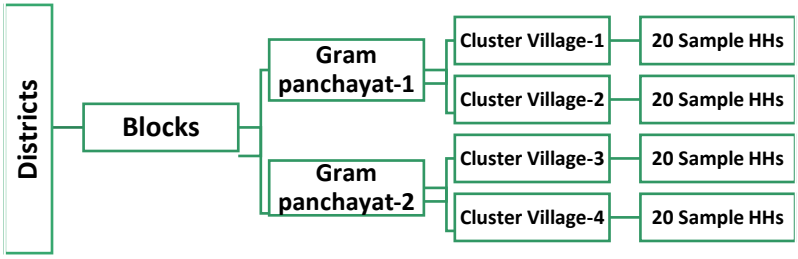
## 1.8 Methodology

### 1.8.1 Study Approach

The midterm evaluation study is carried out with the objective of assessing the performance of OMM implementation on the basis of selected output and outcome and impact indicators as framed in the project log-frame as formulated under the project. The indicators at the district and block level are well aligned to gather consolidated evidence at the state level. The assessment of output and outcome and impact indicators entails the approach of impact pathway of project intervention under different project components. The four major components of OMM intervention comprises increased millet production through enhancing millet area and adaption of improved package of practices by millet farmers, increased millet consumption at household level, improved practices of millet processing and improved millet marketing in the project area. These are collectively levelled as four pillars of OMM's intervention in the project area. This is to mention that the evaluation is carried out to measure the current values of those baseline indicators and to examine the pattern of changes taking place due to OMM intervention in the project area. The horizontal differences in the values of baseline indicators and midline indicators either positive or negative are treated as the outcome and impact of OMM intervention in the project areas.


### 1.8.2 Sampling Process

The Mid-Term Survey is conducted in all of 29 blocks of Seven Districts covered under the first phase implementation of OMM. The household samples at each of the block were selected on the basis of



three stage sampling process involving GP selection process in the first stage, Village selection process in the second stage and ultimately household selection process in the third stage. For each of the intervention block, by looking at the list of programme GPs, two GPs located in a cluster were identified in the first stage. From each of the selected GP, two programme villages located in a cluster were identified in the second stage. Thus, for each block the study ultimately covered four villages. From each of the selected village in a block, ultimately 20 households were randomly chosen from the list farmers registered under OMM. In this process, about 80 households (millet farmers registered under OMM) were covered for each of the selected block and accordingly the overall household sample size stands at 325 in Kandhamal district. Apart from household coverage, one Facilitating Agency in each Block, Community Resource Persons, CRPs/CBOs/ District Coordinators of WASSAN/ Key Informants were also covered. The Sample design of the study is as per table 1.5.

**Table-1.5: Sample Design in Kandhamal district**

| Sl. | Blocks | Gram Panchayats | Villages | No. of households covered in the study |
|---|---|---|---|---|
| 1 | Daringbadi | Bhramarbadi, Greenbadi | Bhramarbadi & Nuasahi, Dasiketa & Linepada | 80 |
| 2 | Kotagarh | Gugurmaha, Ura | Ladimaha & Tiamaha Atali & Dudumaha | 80 |
| 3 | Phirngia | Bandhaguda, Kelapada | Jhamapakal & Pikaradi Behangia & Kelapada | 85 |
| 4 | Raikia | Karada, Ranaba | Anlapata & Kanadi, Ranaba & Sikiriguda | 80 |
| | | | **Total** | **325** |

### 1.8.3 Statistical Instruments

- → Household Questionnaire for Millet Farmers
- → Format for Facilitating Agency
- → Format for CRP/ CBO/ District Coordinator (WASSAN)
- → KII Check list
- → FGD Discussion Points

### 1.8.4 Study Period

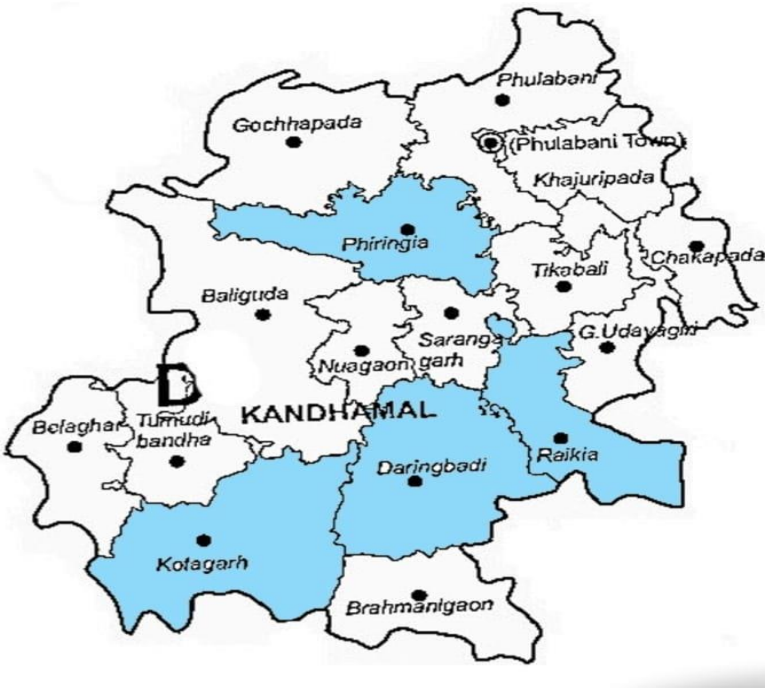
The field work pertaining to the study was undertaken simultaneously in all of the project districts by deploying separate study teams for each of the district during the period 1st June 2021 to 30th June 2021.

# Chapter-II: Project Area under First Phase Implementation of Odisha Millets Mission

The first phase implementation of Odisha Millet Mission was started in seven southern Odisha districts Gajapati, Kalahandi, Kandhamal, Koraput, Malkangiri, Nuapada and Rayagada. A brief statistical profile by major socio-economic indicators of Kandhamal district is outlined in this chapter. With the intension of providing a perspective to the ongoing study, the first phase intervention in terms of coverage of GPs, villages, number of farmers and area put for all types of millet cultivation under all types of agronomic practices are also highlighted in this chapter.

## 2.1 Kandhamal District

Kandhamal revenue district came into existence on 1st January, 1994, after Phulbani District was divided into Kandhamal and Boudh Districts of Odisha. The district lies between 19 degree 34' to 20 degree 36' north latitude and 83 degree 34' to 84 degree 34' east longitude. Kandhamal experiences sub-tropical hot and dry climate in summer. Dry and cold climate in winter. The maximum temperature recorded in the district is 45.5 degree C and minimum temperature is 2.0-degree C. The average annual rainfall recorded is 1522.95 mm. The Kandhamal district covering a geographical area of 7654 sq. kms is bounded by Boudh district in the North, by Rayagada & Gajapati districts in the South, by Ganjam and Nayagarh districts in the East and Kalahandi District in the west.




Physiographic ally, the entire district lies in high altitude zone with inter spreading inaccessible terrain of hilly ranges and narrow valley tracts, which guides the socio–economic conditions of people and development of the district. Kandhamal District is located in central Odisha and is bounded by Boudh District on the north, Rayagada District on the south, Ganjam and Nayagarh Districts on the East and Kalahandi District on the west. The district covers an area of 7654 sq.kms. Kandhamal has 2 subdivisions viz. Phulbani, and Balliguda; with 12 blocks and 153 Gram Panchayats. As per 2011 census, total population of the district was 7,33,110. A brief statistical profile of the district is as per table 2.1.

**Table 2.1: Brief Statistical Profile of Kandhamal District**

| Sl. | Particulars | Value | Sl. | Particulars | Value |
|---|---|---|---|---|---|
| 1 | Population (In Lakh) | 7.3 | 17 | **Land Use Pattern (Area in '000 ha), 2014-15 *** | |
| 2 | Male (In Lakh) | 3.6 | | Forest | 170 |
| 3 | Female (In Lakh) | 3.7 | | Land put to Non-agricultural use | 21 |
| 4 | Scheduled Caste (In Lakh) | 1.2 | | Barren & Non-Cultivable Land | 103 |
| 5 | Scheduled Tribe (In Lakh) | 3.9 | | Permanent Pasture | 13 |
| 6 | No. of HHs (In Lakh) | 1.7 | | Net Area Sown | 57 |
| 7 | Average HH Size | 4.3 | | Cultivable waste Land | 19 |
| 8 | Sex Ratio | 1037 | | Other Fallow | 28 |
| 9 | Total Worker (In Lakh) | 3.3 | | Current Fallows | 28 |
| 10 | Main Workers (In Lakh) | 1.7 | | Misc. Trees and Groves | 1 |
| 11 | Marginal Worker (In Lakh) | 1.9 | 18 | Average Fertilizer Consumption (Kg/H.) | 8.3 |
| 12 | Non-Worker (In Lakh) | 3.8 | 19 | Average size of land holding | 1.01 |
| 13 | Work Participation Rate (WPR) | 48.5 | 20 | Irrigation Potential ('000 ha) | 101.2 |
| 14 | Literacy Rate (%) | 64.1 | 21 | No. of villages electrified | 1044 |
| 15 | No. of job cards issued | 1542217 | 22 | No. of BPL Families | 154217 |
| 16 | No of persons provided employment under MGNREGA | 130020 | | | |

Source: District Statistical Handbook- Kandhamal, 2011, *District at a Glance-2016

## 2.2 Millet Production in Kandhmal District

The millet production in Kandhamal district is analysed on the basis of ragi and small millet production in the district during last two decades 2000s and 2010s. As per table 2.2, area under cultivation of ragi in the district as well as state has declined during 2010s compared to 2000s. But the extent of decrease of argi area in the district is only 8.45 percent relative to the same for the district at 21.70 percent. This indicates, compared to the state situation, relatively there is less shifting of ragi land for non-ragi crops in Kandhamal district. However, during the corresponding period, there is much higher shifting of the land area of small millets to other crops in the district. Compared to state level scenario, in Kandhmal district during last two decades, there is massive shift of land area under small millets to other crops. There is marginal increase in the percentage share of ragi area of the district as a percentage to all Odisha ragi area in 2010s compared to 2000s. On the other hand, as a percentage to total small millet area of the state, there is marginal decline in small millet area in Kandhamal district.

**Table-2.2: Area under ragi and small millets cultivation in Kandhamal district compared to All Odisha**

| Sl. | Region | Decadal variation in the land area under annual ragi and Small Millets cultivation in Kandhmal district compared to all Odisha (Land area in 000 hectares) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Ragi | | | Small Millet | | |
| | | 2000s | 2010s | Decadal Variation (%) | 2000s | 2010s | Decadal Variation (%) |
| 1 | Kandhamal | 2.13 | 1.95 | -8.45 | 0.83 | 0.54 | -34.94 |
| 2 | All Odisha | 189.07 | 148.05 | -21.70 | 26.33 | 23.80 | -9.61 |
| | Kandhamal district as % to All Odisha | 1.13 | 1.32 | | 3.15 | 2.27 | |

Source: Computed from compiled data base from Odisha Agricultural statistics (2000-01 to 2017-18), Directorate of Agriculture and Food Production, Govt. of Odisha

During the corresponding period between 2000s and 2010s, the yield rate of ragi in Kandhamal district has increased by 42.11 percent in Kandhmal district as against 12.88 percent at all Odisha level. However, during both the decades, the yield rate has remained lower in Kandhamal district that that of all Odisha level. Similar is the case of small millets. There is better improvement in yield rate of small millets in 2010s compared to 2000s. However, the yield rate in Kandhmal district is found lower compared to all Odisha level during both the decades.

**Table-2.3: Yield Rate of ragi and small millets in Kandhamal district compared to All Odisha**

| **Sl.** | **Regions** | **Decadal Variation in average annual yield Rate of ragi and small millets in Kandhamal district compared to all Odisha (Yield Rate in Kg/ Hectare)** | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Ragi** | | | **Small Millets** | | |
| | | **2000s** | **2010s** | **Decadal Variation (%)** | **2000s** | **2010s** | **Decadal Variation (%)** |
| 1 | Kandhamal | 544.11 | 773.25 | 42.11 | 254.00 | 411.13 | 61.86 |
| 2 | All Odisha | 791.20 | 892.70 | 12.83 | 453.60 | 505.00 | 11.33 |
| | Yield index of the district (All Odisha = 100) | 68.77 | 86.62 | | 56.00 | 81.41 | |

Source: Computed from compiled data base from Odisha Agricultural statistics (2000-01 to 2017-18), Directorate of Agriculture and Food Production, Govt. of Odisha

The production volume of ragi and small millets in Kandhamal district compared to all Odisha situation is depicted in table 2.14. It is found that although there is decrease in annual production of ragi in 2010s at all Odisha level, there is positive increase in the amount of annual ragi production in Kandhamal district. Compared to average annual ragi production of the district during 2010s has increased by 30.17 percent as against 12.18 percent reduction at all Odisha level. In the case of small millets also, there is very good positive variation in the annual production during 2010s compared to the preceding decade 2010s. The district share in the annual ragi production of the state was at 0.78 percent which has increased to 1.15 percent during 2010s. Regarding small millets, Kandhamal district was accounting about 1.79 percent in 2000s which has increased to 1.91 percent in 2010s.

**Table-2.4: Ragi and small millets production in Kandhamal district compared to All Odisha**

| **Sl.** | **Regions** | **Decadal Variation in Volume of Ragi and small millets Production in Kandhamal district compared to All Odisha (Production in 000 MT/ Hectare)** | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Ragi** | | | **Small Millets** | | |
| | | **2000s** | **2010s** | **Decadal Variation (%)** | **2000s** | **2010s** | **Decadal Variation (%)** |
| 1 | Kandhamal | 1.16 | 1.51 | 30.17 | 0.21 | 0.23 | 9.52 |
| 2 | All Odisha | 149.39 | 131.19 | -12.18 | 11.71 | 12.07 | 3.07 |
| | **Kandhamal district as % to All Odisha** | 0.78 | 1.15 | | 1.79 | 1.91 | |

Source: Computed from compiled data base from Odisha Agricultural statistics (2000-01 to 2017-18), Directorate of Agriculture and Food Production, Govt. of Odisha

## 2.3. Progress of Odisha Millet Mission in Kandhamal District

By the end of Kharif 2019-20, OMM has covered four blocks in Kandhamal district. Cumulatively, in all these blocks, there is outreach of OMM in 122 GPs, 796 villages, 4991 farmers and 2996.96 hectares of land area under millet cultivation. The details of progress of OMM in Kandhamal district is shown in the table 2.5 given ahead.

**Table-2.5: Progress of Odisha Millet Mission in Kandhamal Districts**

| Sl. | Time Period | Coverage of OMM in Kandhamal district | | | | |
|---|---|---|---|---|---|---|
| | | Blocks | No. of GPs | No. of Villages/ Hamlets | No. of farmers | Land Area (Acres) |
| 1 | Kharif 2017-18 | Daringbadi | 4 | 36 | 348 | 20.24 |
| | | Kotgarh | 1 | 16 | 97 | 0.56 |
| | | Phiringia | 6 | 16 | 52 | 13.20 |
| | | Raikia | 4 | 22 | 141 | 64.91 |
| | | Sub Total | 15 | 90 | 638 | 98.91 |
| 2 | Rabi 2017-18 | Daringbadi | 3 | 4 | 4 | 1.00 |
| | | Kotgarh | 2 | 5 | 9 | 10.00 |
| | | Phiringia | 3 | 4 | 6 | 3.00 |
| | | Raikia | 4 | 24 | 54 | 46.00 |
| | | Sub Total | 12 | 37 | 73 | 60.00 |
| 3 | Kharif 2018-19 | Daringbadi | 20 | 147 | 1049 | 281.90 |
| | | Kotgarh | 14 | 158 | 1015 | 465.40 |
| | | Phiringia | 11 | 73 | 622 | 443.25 |
| | | Raikia | 12 | 90 | 482 | 303.40 |
| | | Baliguda | 4 | 14 | 63 | 32.60 |
| | | K Nuagam | 7 | 51 | 369 | 107.50 |
| | | Tumudibandha | 5 | 48 | 441 | 206.00 |
| | | Sub Total | 73 | 581 | 4041 | 1840.05 |
| 4 | Rabi 2018- 19 | Kotgarh | 2 | 3 | 3 | 2.50 |
| | | Phiringia | 6 | 17 | 18 | 9.00 |
| | | Raikia | 7 | 55 | 189 | 127.50 |
| | | Baliguda | 3 | 3 | 3 | 2.50 |
| | | Tumudibandha | 1 | 3 | 8 | 127.50 |
| | | K Nuagam | 3 | 7 | 18 | 9.00 |
| | | Sub Total | 22 | 88 | 239 | 278.00 |
| 5 | Kharif 2019-20 | Daringbadi | 27 | 164 | 1805 | 358.40 |
| | | Kotgarh | 14 | 119 | 1570 | 495.30 |
| | | Phiringia | 12 | 191 | 1165 | 473.50 |
| | | Sub Total | 53 | 474 | 4540 | 1327.20 |
| | | Total | 122 | 796 | 4991 | 2276.96 |

Source: Compiled from the Tracking Sheets of State Odisha Millet Mission

## Concluding Remarks

Area under cultivation of ragi in the district as well as state has declined during 2010s compared to 2000s. But the extent of decrease of argi area in the district is only 8.45 percent relative to the same for the district at 21.70 percent. This indicates, compared to the state situation, relatively there is less shifting of ragi land for non-ragi crops in Kandhamal district. However, during the corresponding period, there is much higher shifting of the land area of small millets to other crops in the district. Compared to state level scenario, in Kandhmal district during last two decades, there is massive shift of land area under small millets to other crops. the yield rate of ragi in Kandhamal district has increased by 42.11 percent in Kandhmal district as against 12.88 percent at all Odisha level. However, during both the decades, the yield rate has remained lower in Kandhamal district that that of all Odisha level. Similar is the case of small millets. There is better improvement in yield rate of small millets in 2010s compared to 2000s. However, the yield rate in Kandhmal district is found lower compared to all Odisha level during both the decades. Although there is decrease in annual production of ragi in 2010s at all Odisha level, there is positive increase in the amount of annual ragi production in Kandhamal district. Compared to average annual ragi production of the district during 2010s has increased by 30.17 percent as against 12.18 percent reduction at all Odisha level. In the case of small millets also, there is very good positive variation in the annual production during 2010s compared to the preceding decade 2010s. By the end of Kharif 2019-20, OMM has covered four blocks in Kandhamal district. Cumulatively, in all these blocks, OMM outreach extends to 122 GPs, 796 villages, 4991 farmers and 2996.96 hectares of land area under millet cultivation.

# Chapter-III: Socio Economic Characteristics of Millet Farmers of Kandhamal District

The farmer households supported under OMM for undertaking millet production in their lands is defined as millet households in the ongoing study. The study covers a sample of 325 millet households spread across three blocks Daringbadi, Kotagarh, Phiringia & Raikia in Kandhamal district. Details of the sample coverage is already discussed in the previous chapter. The socio-economic conditions of the millet farmers' households based on selected socio-economic characteristics is analysed in this chapter.

## 3.1 Social Category, and Mean age of millet farmers

The farmers covered under OMM are predominantly ST farmers and overall ST farmers constitute around 71.7 percent followed by SC framers. Proportionate share of SC and OC category of farmers in the total OMM registered millet farmers are 28.3 and 0.6 percent respectively. All the farmers of Kotagarh block are ST farmers. Similarly, significant majority of farmers about 97.5 percent of farmers of Daringbadi block are also ST farmers. In Raikia block, about 89 percent of the farmers are ST farmers.

**Table-3.1: No. of farmers by social category**

| Sl. | Blocks | No. of households | | | | % of households | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SC | ST | OC | Total | SC | ST | OC | Total |
| 1 | Daringbadi | | 78 | 2 | 80 | 0.0 | 97.5 | 2.5 | 100.0 |
| 2 | Kotagarh | | 80 | | 80 | 0.0 | 100.0 | 0.0 | 100.0 |
| 3 | Phiringia | 1 | 65 | 19 | 85 | 1.2 | 76.5 | 22.4 | 100.0 |
| 4 | Raikia | 1 | 8 | 71 | 80 | 1.3 | 10.0 | 88.8 | 100.0 |
| | All District | **2** | **231** | **92** | **325** | 0.6 | 71.1 | 28.3 | 100.0 |

## 3.2 Age Structure

The age structure is defined in terms of average age of millet farmers which is overall found at 47.3 years. The average age of millet farmers Of Raikia block relative to other blocks is found on a higher side.

**Table-3.2: Mean Age of farmers by social Category**

| Sl. | Blocks | Mean age of farmers | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SC | S.D. | ST | S.D. | OC | S.D. | Total | S.D. |
| 1 | Daringbadi | | | 46.9 | 11.5 | 41.0 | 7.1 | 46.7 | 11.4 |
| 2 | Kotagarh | | | 45.7 | 10.9 | | | 45.7 | 10.9 |
| 3 | Phiringia | 55.0 | | 44.1 | 9.1 | 48.9 | 10.2 | 45.3 | 9.5 |
| 4 | Raikia | 70.0 | | 56.5 | 7.6 | 50.7 | 11.2 | 51.6 | 11.1 |
| | All blocks | 62.5 | 10.6 | 46.0 | 10.7 | 50.2 | 10.9 | 47.3 | 11.0 |

N: B: S.D. means standard deviation around the mean

## 3.3 Sex Category

Millet farmers classified based on sex category as male and millet farmers reveals that majority of registered millet farmers are male farmers. Overall, about 86.2 percent of millet farmers of Kandhamal district are males and the remaining 13.8 percent are females. Incidence of female millet farmers is comparatively higher at Dsaringbadi block and lowest at Kotagarh block.

**Table – 3.3 No. of Farmers by sex Category**

| Sl. | Blocks | No. of farmers by sex category | | | | | |
|---|---|---|---|---|---|---|---|
| | | Male | % Share | Female | % Share | Total | % Share |
| 1 | Daringbadi | 64 | 80.0 | 16 | 20.0 | 80 | 100.0 |
| 2 | Kotagarh | 73 | 91.3 | 7 | 8.8 | 80 | 100.0 |
| 3 | Phiringia | 76 | 89.4 | 9 | 10.6 | 85 | 100.0 |
| 4 | Raikia | 67 | 83.8 | 13 | 16.3 | 80 | 100.0 |
| | All blocks | **280** | 86.2 | **45** | 13.8 | **325** | 100.0 |

### 3.4 Educational Background

The educational background of millet farmers as indicated in table 3.4 reveals that majority of millet farmers of Kandhamal district are illiterates followed primary level of education. In percentage terms, out of the total registered millet farmers, 53.8 percent are illiterates followed by primary level (33.8%). Altogether, about 87 percent of the millet farmers have on the lower side of educational attainment.

**Table-3.4: Framers' Educational Background**

| Sl. | Blocks | Number of farmers | | | | | |
|---|---|---|---|---|---|---|---|
| | | Illiterate | Primary | Upper Primary | Upto HSC | Above HSC | Total |
| 1 | Daringbadi | 39 | 33 | 5 | 1 | 2 | 80 |
| 2 | Kotagarh | 58 | 18 | 3 | 1 | | 80 |
| 3 | Phiringia | 35 | 30 | 5 | 11 | 4 | 85 |
| 4 | Raikia | 43 | 29 | 1 | 4 | 3 | 80 |
| | All blocks | **175** | **110** | **14** | **17** | **9** | **325** |
| | | % of framers | | | | | |
| 1 | Daringbadi | 48.8 | 41.3 | 6.3 | 1.3 | 2.5 | 100.0 |
| 2 | Kotagarh | 72.5 | 22.5 | 3.8 | 1.3 | 0.0 | 100.0 |
| 3 | Phiringia | 41.2 | 35.3 | 5.9 | 12.9 | 4.7 | 100.0 |
| 4 | Raikia | 53.8 | 36.3 | 1.3 | 5.0 | 3.8 | 100.0 |
| | All blocks | 53.8 | 33.8 | 4.3 | 5.2 | 2.8 | 100.0 |

### 3.5 Farmer Category

On the basis of amount of land holdings farmers are categorised under marginal farmers (MFs), small farmers (SFs), medium farmers and large farmers. As per table 3.5, it is found that majority of millet farmers of the district are small farmers followed by marginal farmers. Small and marginal farmers jointly account 87 percent of the total OMM registered millet farmers of the district. Incidence of small and marginal farmers is found maximum at Raikia block in relation to other blocks under study.

**Table-3.5: No. of farmers by Farmer Category**

| Sl. | Blocks | No. of millet farmers by Farmer category | | | | |
|---|---|---|---|---|---|---|
| | | MF | SF | Medium Farmers | Large Farmers | Total |
| 1 | Daringbadi | 15 | 53 | 8 | 4 | 80 |
| 2 | Kotagarh | 6 | 65 | 8 | 1 | 80 |
| 3 | Phiringia | 5 | 62 | 12 | 6 | 85 |
| 4 | Raikia | 32 | 46 | 1 | 1 | 80 |
| | All blocks | **58** | **226** | **29** | **12** | **325** |

| | | % of millet farmers | | | | |
|---|---|---|---|---|---|---|
| 1 | Daringbadi | 18.8 | 66.3 | 10.0 | 5.0 | 100.0 |
| 2 | Kotagarh | 7.5 | 81.3 | 10.0 | 1.3 | 100.0 |
| 3 | Phiringia | 5.9 | 72.9 | 14.1 | 7.1 | 100.0 |
| 4 | Raikia | 40.0 | 57.5 | 1.3 | 1.3 | 100.0 |
| | All blocks | 17.8 | 69.5 | 8.9 | 3.7 | 100.0 |

## 3.6 House Structure

The housing structure of millet farmers as analysed in table 3.6 reveals that overall, marginally higher proportion of millet farmers of the district have semi pucca houses followed pucca houses. The incidence of pucca houses is found with more proportion of millet farmers' households of Raikia block.

**Table-3.6: Housing Structure of millet farmers**

| Sl. | Blocks | No. of millet farmers by house type | | | |
|---|---|---|---|---|---|
| | | Pucca | Semi Pucca | Kutcha | Total |
| 1 | Daringbadi | 8 | 72 | | 80 |
| 2 | Kotagarh | 1 | 79 | | 80 |
| 3 | Phiringia | 8 | 73 | 4 | 85 |
| 4 | Raikia | 17 | 59 | 4 | 80 |
| | All blocks | **34** | **283** | **8** | **325** |
| | | % Share | | | |
| 1 | Daringbadi | 10.0 | 90.0 | 0.0 | 100.0 |
| 2 | Kotagarh | 1.3 | 98.8 | 0.0 | 100.0 |
| 3 | Phiringia | 9.4 | 85.9 | 4.7 | 100.0 |
| 4 | Raikia | 21.3 | 73.8 | 5.0 | 100.0 |
| | All blocks | 10.5 | 87.1 | 2.5 | 100.0 |

## 3.7 Household Structure

A household structure comprises of male as well as female members. As it can be seen from table 3.7, overall, there are 2.6 male and 2.5 female members per each millet farmers' household in the district. The average family size is found at 5 persons. The average family size at Daringbadi, Kotagarh, Phiringia and Raikia blocks is found at 5.2, 4.7 and 4.9 respectively.

**Table-3.7: Household Size**

| Sl. | Blocks | No. of household members/ Household among the millet farmers | | | Number of females per 1000 males |
|---|---|---|---|---|---|
| | | Males | Females | Total | |
| 1 | Daringbadi | 2.5 | 2.8 | 5.2 | 1120 |
| 2 | Kotagarh | 2.8 | 2.6 | 5.3 | 929 |
| 3 | Phiringia | 2.5 | 2.2 | 4.7 | 880 |
| 4 | Raikia | 2.6 | 2.3 | 4.9 | 885 |
| | All blocks | **2.6** | **2.5** | **5.0** | 962 |

### 3.8 Year of joining into OMM

To avail the benefits of OMM project intervention, the farmers in the programme area are required to register themselves with OMM. The sampled-out farmers covered in the study have joined into OMM since 2017-18. As it is evident from table 3.8, overall, 40.3 of millet farmers have joined into OMM in 2017-18 year and another 48.3 percent have joined in 2018-19.

**Table-3.8: Year of joining into OMM**

| Sl. | Blocks | No. of farmers | | | |
|---|---|---|---|---|---|
| | | **2017-18** | **2018-19** | **2019-20** | **Total** |
| 1 | Daringbadi | 73 | 5 | 2 | 80 |
| 2 | Kotagarh | 5 | 73 | 2 | 80 |
| 3 | Phiringia | 4 | 64 | 17 | 85 |
| 4 | Raikia | 49 | 15 | 16 | 80 |
| | All blocks | **131** | **157** | **37** | **325** |
| | | **% of farmers** | | | |
| 1 | Daringbadi | 91.3 | 6.3 | 2.5 | 100.0 |
| 2 | Kotagarh | 6.3 | 91.3 | 2.5 | 100.0 |
| 3 | Phiringia | 4.7 | 75.3 | 20.0 | 100.0 |
| 4 | Raikia | 61.3 | 18.8 | 20.0 | 100.0 |
| | All blocks | 40.3 | 48.3 | 11.4 | 100.0 |

### Concluding Remarks

The farmers covered under OMM are predominantly ST farmers and overall ST farmers constitute around 71.7 percent followed by SC framers. Proportionate share of SC and OC category of farmers in the total OMM registered millet farmers are 28.3 and 0.6 percent respectively. The age structure is defined in terms of average age of millet farmers which is overall found at 47.3 years. Majority of registered millet farmers are male farmers. Overall, about 86.2 percent of millet farmers of Kandhamal district are males and the remaining 13.8 percent are females. Higher proportion of millet farmers of Kandhamal district are illiterates followed primary level of education. In percentage terms, out of the total registered millet farmers, 53.8 percent are illiterates followed by primary level (33.8%). Small and marginal farmers jointly account 87 percent of the total OMM registered millet farmers of the district. Marginally higher proportion of millet farmers of the district have semi pucca houses followed pucca houses. The incidence of pucca houses is found with more proportion of millet farmers' households of Raikia block. There are 2.6 male and 2.5 female members per each millet farmers' household in the district. The average family size is found at 5 persons. Overall, 40.3 of millet farmers have joined into OMM in 2017-18 year and another 48.3 percent have joined in 2018-19.

# Chapter-IV: Millet Production, Productivity and Package of Practices in the project area

One of the objectives of the study is to outline the millet production, Productivity and Package of Practices in the project area. Based on empirical data obtained from millet farmers the pattern of millet production, productivity and package of practices adopted by the farmers, the objectives of the study are analysed in the current chapter. While doing so, a comparative analysis of current situation as a member of OMM and past situation when they were not the members are undertaken with the objective of ascertaining the changes taking place at farmers level because of OMM project intervention. Despite the focus of the chapter on highlighting the production behaviour of millets, the general scenario of cropping pattern is also discussed in the first section of the chapter.

## 4.1 Operational Land holding

The farmers' operational land holding as shown in table 4.1 comprises of of own land, encroached land and shared in land. The overall operational landholding among the millet farmers of Kandhamal district is calculated at 3.5 acres.

**Table-4.1: Millet Framers' Operational Landholding**

| Sl. | Blocks | Land owned (Acres) | Other encroached land, if any (Acres) | Shared in Land (Acres) | Total Operational Land holding (Acres) |
|---|---|---|---|---|---|
| 1 | Daringbadi | 2.5 | 1.9 | 2.0 | 3.3 |
| 2 | Kotagarh | 1.5 | 2.0 | 1.0 | 3.3 |
| 3 | Phiringia | 4.1 | 2.3 | 1.6 | 4.6 |
| 4 | Raikia | 2.3 | 0.7 | 1.7 | 2.7 |
| | All blocks | **2.6** | **1.9** | **1.6** | **3.5** |

## 4.2 Cropping Pattern

Cropping of pattern of the millet farmers in the project area is analysed in terms of crop mix, which is combinations different crops grown by them. The millet farmers not only produce millet. In addition to millet, they cultivate paddy, pulses, vegetables, oil seeds, and cash crops. Ragi, suan, Kangu, Janha and kodo are different types of millets cultivated by the farmers. A comparative picture about number farmers cultivating different crops during post project situation compared to pre project situation is presented in the following table 4.2. It is found that there is highest positive increase in the number of farmers for ragi millet. Compared to pre project situation, there has been 580 percent variation in the number of ragi farmers during post project period. During pre-project period, only 45 farmers out of 325 sampled out farmers cultivated paddy, and now, during post project period 305 farmers are cultivating paddy. Similarly, for suan also, only six farmers were cultivating during pre-project period, which has been increased to 64 farmers during post project situation, registering 966.7 percent variation in the number of farmers. The analysis based on the following table 4.2 reveals that during post OMM phase, in Kandhamal district number of farmers cultivating all other non-millet crops has come down, however, for millet crops, there has been positive changes in the number of farmers.

**Table-4.2: Crop mix among the farmers of project area (No. of Farmers cultivating the crops)**

| Sl. | Districts | Time Period | Overall agricultural practices of sample farmers (No. of farmers) | | | | |
|---|---|---|---|---|---|---|---|
| | | | Daringbadi | Kotagarh | Phiringia | Raikia | **All Blocks** |
| 1 | Paddy | Before Project | 77 | 80 | 83 | 79 | 319 |
| | | After Project | 77 | 80 | 83 | 74 | 314 |
| | | % Variation | 0.0 | 0.0 | 0.0 | -6.3 | -1.6 |
| 2 | Pulses | Before Project | 29 | 49 | 25 | 52 | 155 |
| | | After Project | 14 | 39 | 26 | 33 | 112 |
| | | % Variation | -51.7 | -20.4 | 4.0 | -36.5 | -27.7 |
| 3 | Vegetables | Before Project | 41 | 37 | 46 | 42 | 166 |
| | | After Project | 42 | 17 | 45 | 33 | 137 |
| | | % Variation | 2.4 | -54.1 | -2.2 | -21.4 | -17.5 |
| 4 | Oil seeds | Before Project | 2 | 7 | 4 | 1 | 14 |
| | | After Project | | 4 | 3 | 1 | 8 |
| | | % Variation | -100.0 | -42.9 | -25.0 | 0.0 | -42.9 |
| 5 | Cash Crops | Before Project | 68 | 75 | 64 | 43 | 250 |
| | | After Project | 68 | 76 | 65 | 38 | 247 |
| | | % Variation | 0.0 | 1.3 | 1.6 | -11.6 | -1.2 |
| 6 | Ragi | Before Project | 11 | 9 | 10 | 15 | 45 |
| | | After Project | 78 | 75 | 82 | 71 | 306 |
| | | % Variation | 609.1 | 733.3 | 720.0 | 373.3 | 580.0 |
| 7 | Suan | Before Project | | 3 | 2 | 1 | 6 |
| | | After Project | 29 | 29 | 3 | 3 | 64 |
| | | % Variation | | 866.7 | 50.0 | 200.0 | 966.7 |
| 8 | Kangu | Before Project | | | | 1 | 1 |
| | | After Project | 13 | 7 | | 1 | 21 |
| | | % Variation | | | | 0.0 | 2000.0 |
| 9 | Janha | Before Project | | 1 | | | 1 |
| | | After Project | 2 | 6 | | | **8** |
| | | % Variation | | 500.0 | | | 700.0 |
| 10 | Kodo | Before Project | | 1 | | | 1 |
| | | After Project | | 1 | | | 1 |
| | | % Variation | | 0.0 | | | 0.0 |

## 4.2 Crop Area

Crop wise land area among the sample farmers during pre-project period compared to post project period is separately shown for all the project blocks in the following table 4.3. It is found that overall paddy area of the sampled-out farmers has registered 4.6 percent negative variation. Negative variation in the crop area for other crops including pulses, vegetables, oilseeds, cash crops also register negative variation during post project period. There is positive variation in the land area for all the reported millets during post project period relative to pre project period.

**Table-4.3: Area under crop in post project period compared to pre project period among the sample farmers (Land area in Acres)**

| Sl. | Districts | Time Period | Overall agricultural practices of sample farmers (Land area used for crop cultivation in Acres)) |
|---|---|---|---|

| | | | Daringbadi | Kotagarh | Phiringia | Raikia | All Blocks |
|---|---|---|---|---|---|---|---|
| 1 | Paddy | Before Project | 72.3 | 85.8 | 186.45 | 89.7 | 434.25 |
| | | After Project | 71.45 | 87.55 | 176.45 | 78.9 | 414.35 |
| | | % Variation | -1.2 | 2.0 | -5.4 | -12.0 | -4.6 |
| 2 | Pulses | Before Project | 12.4 | 33.85 | 12.37 | 29.85 | 88.47 |
| | | After Project | 6.6 | 28.65 | 14.87 | 24.25 | 74.37 |
| | | % Variation | -46.8 | -15.4 | 20.2 | -18.8 | -15.9 |
| 3 | Vegetables | Before Project | 20 | 16.3 | 27.5 | 18.05 | 81.85 |
| | | After Project | 17.75 | 8 | 29.7 | 14.45 | 69.9 |
| | | % Variation | -11.3 | -50.9 | 8.0 | -19.9 | -14.6 |
| 4 | Oil seeds | Before Project | 1.0 | 6.0 | 2.3 | 0.5 | 9.8 |
| | | After Project | | 4 | 1.25 | 0.5 | 5.75 |
| | | % Variation | -100.0 | -33.3 | -45.7 | 0.0 | -41.3 |
| 5 | Cash Crops | Before Project | 76.45 | 64.15 | 63.69 | 25.2 | 229.49 |
| | | After Project | 74 | 61.35 | 51.69 | 20.45 | 207.49 |
| | | % Variation | -3.2 | -4.4 | -18.8 | -18.8 | -9.6 |
| 6 | Ragi | Before Project | 8 | 4.75 | 10 | 9.65 | 32.4 |
| | | After Project | 50.4 | 43.5 | 65.1 | 47.1 | 206.0 |
| | | % Variation | 530.0 | 815.8 | 551.0 | 388.1 | 535.8 |
| 7 | Suan | Before Project | | 1.25 | 1 | 0.5 | 2.75 |
| | | After Project | 10.6 | 10.8 | 1.25 | 1.25 | 23.9 |
| | | % Variation | | 764.0 | 25.0 | 150.0 | 769.1 |
| 9 | Kangu | Before Project | | | | 0.5 | 0.5 |
| | | After Project | 4.3 | 1.7 | | 0.5 | 6.5 |
| | | % Variation | | | | 0.0 | 1200.0 |
| 8 | Janha | Before Project | | 0.5 | | | 0.5 |
| | | After Project | 0.8 | 2.3 | | | 3.0 |
| | | % Variation | | 360.0 | | | 500.0 |
| 10 | Kodo | Before Project | | 0.25 | | | 0.25 |
| | | After Project | | 0.25 | | | 0.25 |
| | | % Variation | | 0.0 | | | 0.0 |

## 4.3 Package of Practices for Millet Production

### 4.3.1 Method of Cultivation

With the objective of increasing the productivity of millets improved agronomic practices among the farmers have been popularized by the OMM project. This includes Introducing System of Crop Intensification based on suitability, Promotion of Line transplanting/Line sowing/Inter cropping of millets, Improved manure/ composting / in-situ practices for better crop nutrition Pest and disease management practices in the lines of NPM and other organic/agro ecological practices as deemed necessary as per local needs. In this direction, method of cultivation of millets assumes significance. As it is indicated in table 4.3, method of millet cultivation comprises of mono cropping, mixed cropping, and intercropping. The prevalence mono cropping practices for ragi cultivation was widely prevalent during pre-project situation in all the reporting blocks which is also witnessed during post project period. With respect to Suan, particularly during post project situation, mono cropping as well as mixed cropping pattern is noticed. However, majority of Suan farmers are found with mono cropping practices during post project situation.

**Table-4.3: Method of cultivation adopted by millet farmers (Mono crop, mixed crop and inter crop)**

| Sl. | Millet Varieties | Blocks | Pre-Project (% of farmers) | | | | Post-Project (% of farmers) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mono Crop | Mixed Crop | Inter crop | Total | Mono Crop | Mixed Crop | Inter crop | Total |
| 1 | Ragi | Daringbadi | 100.0 | 0.0 | 0.0 | 100.0 | 92.4 | 7.6 | 0.0 | 100.0 |
| | | Kotagarh | 50.0 | 50.0 | 0.0 | 100.0 | 66.7 | 33.3 | 0.0 | 100.0 |
| | | Phiringia | 100.0 | 0.0 | 0.0 | 100.0 | 96.5 | 3.5 | 0.0 | 100.0 |
| | | Raikia | 93.8 | 6.3 | 0.0 | 100.0 | 91.9 | 8.1 | 0.0 | 100.0 |
| | | All Blocks | 87.8 | 12.2 | 0.0 | 100.0 | 88.0 | 12.0 | 0.0 | 100.0 |
| 2 | Suan | Daringbadi | | | | | 82.1 | 17.9 | 0.0 | 100.0 |
| | | Kotagarh | 0.0 | 100.0 | 0.0 | 100.0 | 38.5 | 61.5 | 0.0 | 100.0 |
| | | Phiringia | | | | | 60.0 | 40.0 | 0.0 | 100.0 |
| | | Raikia | 0.0 | 100.0 | 0.0 | 100.0 | 33.3 | 66.7 | 0.0 | 100.0 |
| | | All Blocks | 0.0 | 100.0 | 0.0 | 100.0 | 59.7 | 40.3 | 0.0 | 100.0 |

### 4.3.2 Agronomic Practices

Comparative analysis of the agronomic practices of millet farmers during post period compared to pre project period suggests that there is declining importance of broadcasting and increasing importance of other type of agronomic practices like SMI, LT and LS methods. As per the following table 4.4, it is evident that for all types of millets almost in all of the project blocks of the district, farmers have shifted from traditional broadcasting method of cultivation and adopted other improved methods of cultivation. It is further observed that there is substantial improvement of LT method particularly for argi and kodo millets, which are found to be the two major millets of the district. During interaction with Community Resource Persons (CRPs)[12] it was elicited that CRPs are providing continuous hand holding support to millet farmers for scientific method of cultivation rather than traditional broadcasting method. Besides, there is also Govt. subsidy to farmers for adopting modern methods of cultivation. This has encouraged farmers for better adoption of SMI cultivation. As it can be seen from the following table, during pre-project situation were mainly adopting broadcasting methods cultivation and now, during post project situation, SMI and LT have emerged as better options by the farmers.

**Table-4.4: Cultivation Practices**

| Sl. | Millet Varieties | Blocks | Pre-Project (% of Farmers) | | | | | Post-Project (% of farmers | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SMI | LT | LS | Broadcasting | Total | SMI | LT | LS | Broadcasting | Total |
| 1 | Ragi | Daringbadi | 0.0 | 0.0 | 0.0 | 100.0 | 100.0 | 26.6 | 69.6 | 2.5 | 1.3 | 100.0 |
| | | Kotagarh | 0.0 | 14.3 | 0.0 | 87.5 | 100.0 | 57.1 | 41.3 | 1.6 | 0.0 | 100.0 |
| | | Phiringia | 0.0 | 0.0 | 0.0 | 100.0 | 100.0 | 62.4 | 36.5 | 1.2 | 0.0 | 100.0 |
| | | Raikia | 0.0 | 0.0 | 0.0 | 100.0 | 100.0 | 36.5 | 63.5 | 0.0 | 0.0 | 100.0 |
| | | All Blocks | 0.0 | 2.5 | 0.0 | 97.6 | 100.0 | 45.5 | 52.8 | 1.3 | 0.3 | 100.0 |
| 2 | Suan | Daringbadi | | | | | | 0.0 | 17.9 | 0.0 | 82.1 | 100.0 |
| | | Kotagarh | 0.0 | 0.0 | 0.0 | 100.0 | 100.0 | 11.5 | 46.2 | 3.8 | 38.5 | 100.0 |
| | | Phiringia | | | | | | 0.0 | 40.0 | 0.0 | 60.0 | 100.0 |

[12] CRPs are the frontline workers appointed by the project to provide handholding support to millet farmers at grass root or community level.

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Raikia | 0.0 | 0.0 | 0.0 | 100.0 | 100.0 | 0.0 | 66.7 | 0.0 | 33.3 | 100.0 |
| | | All Blocks | 0.0 | 0.0 | 0.0 | 100.0 | 100.0 | 4.8 | 33.9 | 1.6 | 59.7 | 100.0 |

### 4.3.3 No. of times weeding

Weeding is a traditional process undertaken in crop fields to remove weeds hampering the growth of crop on the crop field. More number of times of weeding better is the expected yield of the crop and consequently productivity. The OMM project intervention has systematically encouraged millet farmers to undertake a greater number of weeding on the millet fields. As a result of this, more than two-time weeding has positively increased for all types of millets. As per table 4.5, ragi farmers during pre-project period, were mostly undertaking two times of weeding, now, during post project period, farmers are adopting more than two times of weeding.

**Table-4.5: Weeding practices followed for cultivating different types of millets in the project area**

| Sl. | Millet Varieties | Blocks | Pre-Project (% of farmers) | | | | Post-Project (% of farmers) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | One time | Two times | More than two times | Total | One time | Two times | More than two times | Total |
| 1 | Ragi | Daringbadi | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 21.1 | 78.9 | 100.0 |
| 2 | | Kotagarh | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 40.3 | 59.7 | 100.0 |
| 3 | | Phiringia | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 41.5 | 58.5 | 100.0 |
| 4 | | Raikia | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 5.8 | 94.2 | 100.0 |
| | | All Blocks | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 26.5 | 73.5 | 100.0 |
| 1 | Suan | Daringbadi | | | | | 92.9 | 3.6 | 3.6 | 100.0 |
| 2 | | Kotagarh | 0.0 | 100.0 | 0.0 | 100.0 | 73.1 | 23.1 | 3.8 | 100.0 |
| 3 | | Phiringia | | | | | 40.0 | 40.0 | 20.0 | 100.0 |
| 4 | | Raikia | 0.0 | 100.0 | 0.0 | 100.0 | 33.3 | 66.7 | 0.0 | 100.0 |
| | | All Blocks | 0.0 | 100.0 | 0.0 | 100.0 | 77.4 | 17.7 | 4.8 | 100.0 |

## 4.4 Economics of Millet Production in the district

Ragi is found to be the major millet reported in the district. For other types of millets, there are only a few farmers involved during pre-project and post project period. So, taking note of the importance of ragi, the economics ragi production in the district compared to all Odisha situation (All OMM districts) is analysed in this section. It is found that production of ragi production per farmer in Kandhamal district has increased from 3.9 quintal to 7.9 quintals. Similarly, production per acre has increased from 4.6 quintals to 5.8 quintals. The details of economics for all of the reported millets in the district is as per the following tables.

**Table-4.6**: **Behaviour of millet production in Kandhamal District (Pre-project)**

| Sl. | Particulars | Ragi | Suan/ Gurji | Kangu | Janha | Kodo | All millets |
|---|---|---|---|---|---|---|---|
| 1 | No. of farmers involved in millet cultivation | 45 | 6 | 1 | 1 | 1 | 54 |
| 2 | Area under millet cultivation (Acres) | 32 | 3 | 1 | 1 | 0 | 36 |
| 3 | Production /Farmer (Quintal) | 3.9 | 0.6 | 0.3 | 1.63 | 0.5 | 3.3 |
| 4 | Production /Acre (Quintal) | 4.6 | 1.2 | 0.6 | 3.25 | 2 | 5.0 |
| 5 | Total Sales Proceeds/Farmer (Rs.) | 16515 | 2256 | 5290 | 3671 | 3601 | 14700 |
| 6 | Total Sales Proceeds/ Acre (Rs.) | 4607 | 218 | 300 | 2400 | 0 | 4210 |
| 7 | Total Sales Proceeds/ Quintal of marketable surplus (Rs.) | 1190 | 475 | 600 | 4800 | 0 | 1100 |
| 8 | Total Cost /Farmer (Rs.) | 426 | 405 | 421 | 425 | 429 | 421 |
| 9 | Total Cost/ Acre (Rs.) | 1787 | 1698 | 1766 | 1782 | 1799 | 1766 |
| 10 | Total Cost/ Quintal of marketable surplus (Rs.) | 641 | 3286 | 6088 | 1204 | 1898 | 689 |
| 11 | Net Income/ Farmer (Rs.) | 16089 | 1851 | 4869 | 3246 | 3172 | 14279 |
| 12 | Net Income / Acre (Rs.) | 2820 | -1480 | -1466 | 618 | -1799 | 2444 |
| 13 | Net Income/ Quintal of marketable surplus | 549 | -2811 | -5488 | 3596 | -1898 | 411 |

**Table- 4.7: Behaviour of millet Production in Kandhamal District (Post-project)**

| Sl. | Particulars | Ragi | Suan/Gurji | Kangu | Janha | Kodo | All millets |
|---|---|---|---|---|---|---|---|
| 1 | No. of farmer involved in millet cultivation | 306 | 64 | 21 | 8 | 2 | 401 |
| 2 | Area under millet cultivation (Acres) | 206 | 24 | 7 | 3 | 1 | 240 |
| 3 | Production /Farmer (Quintal) | 7.9 | 1.4 | 0.58 | 0.67 | 1 | 6.3 |
| 4 | Production /Acre (Quintal) | 5.8 | 3.7 | 1.86 | 1.79 | 3.8 | 10.5 |
| 5 | Total Sales Proceeds/Framer (Rs.) | 23421 | 2014 | 2679 | 1844 | 2007 | 18228 |
| 6 | Total Sales Proceeds/ Acre (Rs.) | 34790 | 1888 | 538 | 656 | 2700 | 30469 |
| 7 | Total Sales Proceeds/ Quintal of marketable surplus (Rs.) | 2960 | 5055 | 1737 | 1750 | 10800 | 3130 |
| 8 | Total Cost /Farmer (Rs.) | 2838 | 2696 | 2804 | 2831 | 2858 | 2805 |
| 9 | Total Cost/ Acre (Rs.) | 4215 | 4004 | 4164 | 4205 | 4245 | 4167 |
| 10 | Total Cost/ Quintal of marketable surplus (Rs.) | 602 | 4271 | 20723 | 11802 | 3156 | 718 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11 | Net Income/ Farmer (Rs.) | 20583 | -682 | -125 | -987 | -851 | 15423 |
| 12 | Net Income / Acre (Rs.) | 30575 | -2116 | -3626 | -3549 | -1545 | 26302 |
| 13 | Net Income/ Quintal of marketable surplus (Rs. | 2358 | 784 | -18986 | -10052 | 7644 | 2412 |

**Table- 4.8: Behaviour of millet production in the first phase OMM intervention area in the State (29 blocks) during Pre Project period**

| Sl. | Particulars | Ragi | Suan/Gurji | Kangu | Janha | Kodo | All millets |
|---|---|---|---|---|---|---|---|
| 1 | No. of farmer involved in millet cultivation | 1896 | 148 | 11 | 18 | 106 | 2179 |
| 2 | Area under millet cultivation | 1725 | 149 | 6 | 10 | 106 | 1996 |
| 3 | Production /Farmer (Quintal) | 1.7 | 1.7 | 0.73 | 1.28 | 1.3 | 1.6 |
| 4 | Production /Acre (Quintal) | 2.6 | 1.7 | 1.38 | 2.32 | 1.3 | 1.8 |
| 5 | Total Sales Proceeds/Framer (Rs.) | 1044 | 1380 | 6569 | 2457 | 2899 | 1228 |
| 6 | Total Sales Proceeds/ Acre (Rs.) | 1148 | 2097 | 2950 | 2298 | 2942 | 1340 |
| 7 | Total Sales Proceeds/ Quintal of marketable surplus (Rs.) | 1560 | 2076 | 5595 | 4157 | 2937 | 1490 |
| 8 | Total Cost /Farmer (Rs.) | 1904 | 1790 | 1575 | 1622 | 1752 | 1729 |
| 9 | Total Cost/ Acre (Rs.) | 2093 | 1968 | 1731 | 1783 | 1926 | 1900 |
| 10 | Total Cost/ Quintal of marketable surplus (Rs.) | 3128 | 1295 | 3855 | 1907 | 1898 | 2514 |
| 11 | Net Income/ Farmer (Rs.) | -860 | -410 | 4994 | 835 | 1147 | -501 |
| 12 | Net Income / Acre (Rs.) | -945 | 129 | 1219 | 515 | 1016 | -560 |
| 13 | Net Income/ Quintal of marketable surplus (Rs. | -1568 | 781 | 1740 | 2250 | 1039 | -1024 |

**Table- 4.9: Behaviour of millet production in the first phase OMM intervention area in the State (29 blocks) during Post Project period**

| Sl. | Particulars | Ragi | Suan/Gurji | Kangu | Janha | Kodo | All millets |
|---|---|---|---|---|---|---|---|
| 1 | No. of farmer involved in millet cultivation | 2252 | 213 | 29 | 28 | 116 | 2638 |
| 2 | Area under millet cultivation | 2102 | 178 | 10 | 16 | 115 | 2422 |
| 3 | Production /Farmer (Quintal) | 5.6 | 2.1 | 0.83 | 1.45 | 1.2 | 5.0 |
| 4 | Production /Acre (Quintal) | 6.0 | 2.5 | 2.35 | 2.54 | 1.2 | 5.5 |
| 5 | Total Sales Proceeds/Framer (Rs.) | 16515 | 2256 | 5290 | 3671 | 3601 | 14700 |
| 6 | Total Sales Proceeds/ Acre (Rs.) | 17692 | 3886 | 2178 | 4296 | 4955 | 16012 |
| 7 | Total Sales Proceeds/ Quintal of marketable surplus (Rs.) | 2960 | 4646 | 6132 | 7541 | 4990 | 3294 |
| 8 | Total Cost /Farmer (Rs.) | 4341 | 4081 | 3591 | 3699 | 3995 | 3941 |
| 9 | Total Cost/ Acre (Rs.) | 4650 | 4371 | 3847 | 3962 | 4279 | 4222 |
| 10 | Total Cost/ Quintal of marketable surplus (Rs.) | 987 | 2537 | 9342 | 3386 | 3109 | 1030 |
| 11 | Net Income/ Farmer (Rs.) | 12174 | -1825 | 1699 | -28 | -394 | 10759 |
| 12 | Net Income / Acre (Rs.) | 13042 | -485 | -1669 | 334 | 676 | 11790 |
| 13 | Net Income/ Quintal of marketable surplus (Rs. | 1973 | 2109 | -3210 | 4155 | 1881 | 2264 |

## 4.5 Varieties of Ragi Cultivated

Varieties of ragi cultivated in the OMM project area is highlighted in the following table 4.11. In addition to promoting the outreach of existing millets among a greater number of farmers, the OMM has also successfully promoted new improved varieties of millets in selected project areas. However, as it is revealed in the following table, millet farmers of Kandhamal district have introduced improved varieties of regi including Arjuna, VRT 47 and Bhairavi as improved varieties of ragi millet.

**Table-4.11: Reported varieties of ragi seeds used in the OMM areas of Kandhamal district**

| Sl. | Blocks | Varieties of seeds used by ragi farmers | |
|---|---|---|---|
| | | **Traditional Varieties** | **Improved varieties** |
| 1 | Daringbadi | Koiri, Marti Mada | |
| 2 | Firingia | Budha, Kalia, Mami, Bapi, Vruka, Chaulia | Arjuna |
| 3 | Kotagarh | Majhia Sikha, Koiri, Marti Mada, | VRT 47 |
| 4 | Raikia | Jantri,, Budha, Chaulia, Tara, Hadabhanga, Sana Tara, Mami, Kalia | Bhairavi |

## Concluding Remarks

The overall operational landholding among the millet farmers of Kandhamal district is calculated at 3.5 acres. There is highest positive increase in the number of farmers for ragi millet. Compared to pre project situation, there has been 580 percent variation in the number of ragi farmers during post project period. During pre-project period, only 45 farmers out of 325 sampled out farmers cultivated paddy, and now, during post project period 305 farmers are cultivating paddy. Similarly, for suan also, only six farmers were cultivating during pre-project period, which has been increased to 64 farmers during post project situation, registering 966.7 percent variation in the number of farmers. During post OMM phase, in Kandhamal district number of farmers cultivating all other non-millet crops has come down, however, for millet crops, there has been positive changes in the number of farmers. Overall paddy area of the sampled-out farmers has registered 4.6 percent negative variation. Negative variation in the crop area for other crops including pulses, vegetables, oilseeds, cash crops also register negative variation during post project period. There is positive variation in the land area for all the reported millets during post project period relative to pre project period. The prevalence mono cropping practices for ragi cultivation was widely prevalent during pre-project situation in all the reporting blocks which is also witnessed during post project period. With respect to Suan, particularly during post project situation, mono cropping as well as mixed cropping pattern is noticed. However, majority of Suan farmers are found with mono cropping practices during post project situation. For all types of millets almost in all of the project blocks of the district, farmers have shifted from traditional broadcasting method of cultivation and adopted other improved methods of cultivation. It is further observed that there is substantial improvement of LT method particularly for argi and kodo millets, which are found to be the two major millets of the district. Ragi farmers during pre-project period, were mostly undertaking two times of weeding, now, during post project period, farmers are adopting more than two times of weeding. Production of ragi production per farmer in Kandhamal district has increased from 3.9 quintal to 7.9 quintals. Similarly, production per acre has increased from 4.6 quintals to 5.8 quintals. Millet farmers of Kandhamal district have introduced improved varieties of ragi including Arjuna, VRT 47 and Bhairavi as improved varieties of ragi millet

# Chapter-V: Assessment of Household Millet Consumption Pattern in the Project Area

One of the key objectives of OMM is to promote household millet consumption at least by 25 percent to enhance household level nutritional security and to create a demand for millets by the households.[13] In this chapter, an attempt has been made to analyse household consumption pattern of millets based on household survey data obtained from 325 millets households in all of programme blocks of Nuapada district. The consumption pattern examines seasonality of mean household consumption pattern, preferred timing of the day for the consumption of millets, extent of dependence of millet households on market for purchasing millets, average quantity of millet purchased per millet household and source of purchase of millets.

## 5.1 Seasonality of Household Millet Consumption

The seasonality of household millet consumption pattern is analysed because of proportion of households in the project area consume millets during different seasons in a year. The different seasons are categorized as Winter seasons, Rainy seasons, and summer seasons. As per table 5.1, it is found that in the district as well as intervention blocks, millets and particularly ragi is consumed by majority of households during summer season followed by rainy season and winter season. More than 90 per cent of households consume millets during summer season and it is reported in all the OMM blocks. This situation is slightly lower during winter season. However, less than 50 percent of households consume millets during winter season. During pre-project situation about 13.2 percent of households were consuming ragi during summer season which is said to be the peak time-period of millet consumption.

**Table 5.1: No. of households consuming millets during pre-project period**

| Sl. | Blocks | No. of households consuming Millets | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pre- project period | | | Post-project period | | |
| | | Winter season | Rainy season | Summer season | Winter season | Rainy season | Summer season |
| 1 | Daringbadi | | 5 | 10 | 47 | 75 | 79 |
| 2 | Kotagarh | 1 | 3 | 9 | 33 | 73 | 79 |
| 3 | Phiringia | 2 | 6 | 8 | 35 | 82 | 85 |
| 4 | Raikia | 5 | 13 | 16 | 44 | 69 | 73 |
| | All Blocks | 8 | 27 | 43 | 159 | 299 | 316 |
| | | % of households | | | | | |
| 1 | Daringbadi | 0.0 | 6.3 | 12.5 | 58.8 | 93.8 | 98.8 |
| 2 | Kotagarh | 1.3 | 3.8 | 11.3 | 41.3 | 91.3 | 98.8 |
| 3 | Phiringia | 2.4 | 7.1 | 9.4 | 41.2 | 96.5 | 100.0 |
| 4 | Raikia | 6.3 | 16.3 | 20.0 | 55.0 | 86.3 | 91.3 |
| | All Blocks | 2.5 | 8.3 | 13.2 | 48.9 | 92.0 | 97.2 |

## 5.2 Mean Consumption Pattern

The mean consumption pattern is analysed considering household consumption of millets per day among the household members. Further it is disaggregated by winter, rainy and summer seasons. As per the analysis made in table 5.2, it is depicted that during post project period, overall millet

[13] OMM Guidelines, 25.11.2016.

consumption per household during Summer, winter and rainy seasons is found at 0.551, 0.505 and 0.130 Kg respectively. Compared to pre project situation, there has been slight increase in the daily household millet consumption during summer and winter seasons, although it has decreased during rainy season. On the basis of qualitative information obtained from respondents it is found that the quantity of millet consumption per household during post project period is reduced because they have received more PDS rice during last two three years. In the last two three years Odisha has witnessed few cyclones and heavy rainfalls. Besides, rural households have also received relief materials for covid related crisis in the country. Over and above, due to increased real income at household level in the rural areas there is good deal of diversified food pattern. All these factors have contributed reduced average consumption of millets during the post project period.

**Table-5.2: Seasonality in average household consumption of millets**

| Sl. | Blocks | Millet Consumption per household per day (Kg) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pre- project period | | | Post-project period | | |
| | | Winter season | Rainy season | Summer season | Winter season | Rainy season | Summer season |
| 1 | Daringbadi | 0.400 | 0.516 | 0.523 | 0.505 | 0.129 | 0.459 |
| 2 | Kotagarh | 0.415 | 0.520 | 0.586 | 0.470 | 0.112 | 0.508 |
| 3 | Phiringia | 0.556 | 0.449 | 0.510 | 0.579 | 0.149 | 0.796 |
| 4 | Raikia | 0.451 | 0.448 | 0.535 | 0.472 | 0.126 | 0.412 |
| | All Blocks | **0.449** | **0.483** | **0.539** | **0.505** | **0.130** | **0.551** |

## 5.3 Household Dependence on Market for Millets

Despite own production of millets, most often millet farmer households depend on market to meet the household consumption requirement. This implies their own production is insufficient to meet their domestic requirements or self-consumption. As per table 5.4, it is evident that previously during pre-project situation, no household in Kandhamal district was purchasing millet from the market. However, during post project situation, only a few households are purchasing millets form the market. Household dependence for millet purchase from the market is reported by two households out of 80 surveyed households at Kotagarh block. Similarly, about 10 percent of the millet farmers households of Phiringia block purchase millet from the market for household consumption.

**Table-5.3: Household Market dependence for millets**

| Sl. | Blocks | No. of households surveyed | No. of households purchasing millets from market | | Amount of millet purchased from market / household (Quintal) | |
|---|---|---|---|---|---|---|
| | | | Pre-project period | Post Project period | Pre-project period | Post Project period |
| 1 | Daringbadi | 80 | - | | - | 2.00 |
| 2 | Kotagarh | 80 | - | 2.0 | - | 2.00 |
| 3 | Phiringia | 85 | - | 8.0 | - | 2.00 |
| 4 | Raikia | 80 | - | | - | 2.00 |
| | All Blocks | **325** | **-** | | - | 2 |

## 5.6 Source for purchasing millets

As per table 5.5, It is found that during pre-project period, major source of purchasing millets were local market and bartar. However, during post project period owing to mainstreaming of PDS, households are found purchasing millets from PDS.

**Table-5.4: Source for purchasing (procuring) by households**

| Sl. | Source for purchasing millets (% of households) | | | | | |
|---|---|---|---|---|---|---|
| | Pre-Project Period | | | Post- Project Period | | |
| | Source | Kandhamal | All districts | Source | Kandhamal | All districts |
| 1 | Local Market | | 4.6 | Local Market | 0 | 9.8 |
| 2 | Wage good | | 1.5 | PDS | 100 | 86.2 |
| 3 | Barter | 0 | 3 | Barter | 0 | 0.6 |
| 4 | Received as gift from fellow relatives | | 0.4 | Local market & PDS | 0 | 0.8 |
| 5 | Local market & PDS | | 4.7 | Local Market & Wage good | 0 | 1.8 |
| 6 | Local Market & Wage good | 0 | 83.3 | PDS & Barter | 0 | 0.7 |
| 7 | Local Market and Barter | 0 | 2 | | | |
| 8 | PDS and wage good | | 0.2 | | | |
| 9 | Wage good and barter | | 0.1 | | | |
| | Total | 0 | 100 | Total | 100 | 100 |

## Concluding Remarks

Millets and particularly ragi is consumed by majority of households during summer season followed by rainy season and winter season. More than 90 per cent of households consume millets during summer season and it is reported in all the OMM blocks. This situation is slightly lower during winter season. However, less than 50 percent of households consume millets during winter season. During pre-project situation about 13.2 percent of households were consuming ragi during summer season which is said to be the peak time-period of millet consumption. During post project period, overall millet consumption per household during Summer, winter and rainy seasons is found at 0.551, 0.505 and 0.130 Kg respectively. Compared to pre project situation, there has been slight increase in the daily household millet consumption during summer and winter seasons, although it has decreased during rainy season. Previously during pre-project situation, no household in Kandhamal district was purchasing millet from the market. However, during post project situation, only a few households are purchasing millets form the market. Household dependence for millet purchase from the market is reported by two households out of 80 surveyed households at Kotagarh block. Similarly, about 10 percent of the millet farmers households of Phiringia block purchase millet from the market for household consumption. During pre-project period, major source of purchasing millets were local market and bartar. However, during post project period owing to mainstreaming of PDS, households are found purchasing millets from PDS.

# Chapter-VI: Processing and Marketing of millets in the Project Area

With the objective of assessing millet farmers' behaviour with regard to processing and marketing of millets, present chapter is attempted. Processing and marketing relate to the post-harvest management practices of millet farmers. The first section of this chapter deals with millet processing and the subsequent section deals with marketing behaviour of millet farmers. While analysing processing behaviour only post project situation is considered as the data pertaining to this area are obtained through FGD. However, for analysing marketing situation, a comparative analysis of pre and post project situation is undertaken for assessing the type of change in millet marketing system. Processing and marketing behaviour is separately analysed for the varieties of millets reported in the study.

## 6.1 Primary Processing of Millets

The type of first-hand processing of the produced millets by the farmers' themselves is conceptually known as primary processing. From the previous analysis it is well known that millet farmers ultimately use their produced millet for the purpose of self-consumption and sales of marketable surplus. Thus, broadly there are two types of processing activities separately carried out by the millet farmers. This implies for self-consumption; they do undertake one type of processing and for marketing purposes they do undertake different types of processing. Table 6.1 analyses the processing activities undertaken by the households for self-consumption of millets. The different food items prepared for millets are also discussed separately for all the districts. The processing activities mainly comprise of converting ragi to flour and de-husking in the case of other millets. With respect to ragi flour making, majority of households depend on machine for which is readily available at the neighbourhood locality for which they don't require to travel to any distant place. On the other hand, for other types of millets, de-husking of millet is required which is done through traditional means by all households. However, the household's dependent on traditional processing uses locally available traditional instruments like "dhinki", made up of wooden logs, and "chakki", made up of two round stone plates. Dhinki is used for dehusking and chakki is used for grinding. Both these instruments are operated manually.

**Table-6.1: Processing of millets for Self-Consumption in Kandhamal district**

| Districts | Type of millets reported | Type of food items prepared by millet households | Reported Primary Processing activities | Access to Primary Processing Methods | Average distance covered for machine processing |
|---|---|---|---|---|---|
| Kandhamal | Ragi | Soup, Porridge, pan cake, deep fried cake, Vada, Khir, Khichdi, Ladu, Halwa | Ragi to ragi flour | About 40 percent of HHs doing ragi flour manually at home | Those 60 percent cover a distance of 5 -20 kms to access mills |
| | Suan (also called Kueri) | Khir, Muan (Ladu of puffed suan), Khichdi, upma | De-husking for saun rice | All HHs do debussing manually through traditional means like dhenki . | Nil distance |
| | Kangu | Khir, Pakhala | De-husking for kangu rice | | |
| | Janha | Muan (Ladu of puffed Janha) | Dehusking and rosting | | |

So far as processing of marketable surplus is concerned, traditionally millets farmers were categorising millets particularly ragi under two categories as with and without husk. Accordingly, there was price differentiation and obviously they were selling with husked millets at lower price and without husked millets at a higher price. Soon after the introduction of Mandies under OMM, millet farmers are processing their millets as per Mandi standards. They are sun-drying dehusked millets for maintaining required moisture. Very commonly, they sell millets with husk at a lower price. The middlemen undertake value addition activities by making millets husk free. Further middlemen also do sorting and grading of millets according to quality. Now because of OMM intervention and training to millet farmers, slowly they have started value addition activities for the marketable surplus of millets.

## 6.2 Marketing of Millets

The marketable surplus of millets is sold through different channels. As per millet farmers' survey data, it is found that local middlemen, local haat, local money lender, input supplier and barter are different market channels through which surplus millet is sold by the farmers. Barter is a type of market channel, when surplus millet is exchanged for other commodities needed by the millet farmers.

### 6.2.1 Marketing Channels for ragi

As it can be seen from the following table 6.2, during pre-project period local middlemen was the predominant channel which has been shifted in favour of Mandi during post project period. During pre-project situation, around 77.4 percent of surplus ragi surplus were sold through local haat and now, during post project period, as maxim as 98.9 percent of surplus ragi are sold through Mandis. This is a remarkable achievement of OMM. Selling of surplus ragi through middlemen is also found as a major channel during post-project period which is found negligible during pre-project period.

**Table-6.2: Marketing of Ragi by different Marketing Channels**

| **Districts** | **Marketing of Ragi by farmers in different market channels (% of overall quantity) during pre-project period** | | | | | |
|---|---|---|---|---|---|---|
| | **Govt. procurement** | **Middlemen** | **Local Haat** | **local Money Lender** | **Input supplier** | **Barter** |
| Kandhamal | - | 1.3 | 77.4 | 0.0 | 0.0 | 21.3 |
| **All districts** | **-** | 79.8 | 18.3 | 0.7 | 0.0 | 1.1 |
| | **Marketing of Ragi by farmers in different market channels (% of overall quantity) during post-project period** | | | | | |
| Kandhamal | 98.8 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 |
| **All districts** | 81.0 | 15.9 | 1.3 | 0.7 | 1.2 | 0.0 |

### 6.2.2 Marketing Channels for Suan

As it can be seen from the following table 6.3, during pre-project period local middlemen was the predominant channel which is still evident during post project period. During pre-project situation around 83.6 percent of surplus suan were sold to middlemen and now, during post project period also, about 83.7 percent are sold through this channel at all Odisha level. However, in Kandhmal district, major portion of marketable surplus of Suan were sold through middlemen and local haat. About 76.2 percent of suan were sold through middlemen and 23.8 percent were sold through local haat.

Like middlemen, the importance of local haat to offload surplus suan still continues in the project area even during post project period. About 10 percent of surplus suan are sold through local middlemen during post project period.

**Table-6.3: Marketing of Suan by different Marketing Channels**

| Districts | Marketing of Suan by farmers in different market channels (% of overall quantity) during pre-project period | | | | | |
|---|---|---|---|---|---|---|
| | Govt. procurement | Middlemen | Local Haat | local Money Lender | Input supplier | Barter |
| Kandhamal | - | 76.2 | 23.8 | 0.0 | 0.0 | 0.0 |
| **All districts** | **-** | 83.6 | 15.4 | 0.9 | 0.0 | 0.0 |
| | Marketing of Suan by farmers in different market channels (% of overall quantity) during post-project period | | | | | |
| Kandhamal | - | 14.7 | 75.3 | 10.0 | 0.0 | 0.0 |
| **All districts** | **-** | 83.7 | 15.7 | 0.7 | 0.0 | 0.0 |

### 6.2.3 Marketing Channels for Kangu

As it can be seen from the following table 6.4, during pre-project period local haat was the predominant channel for selling of surplus kangu. However, during post project period, there is a declining share of local haat and consequently selling through middlemen and input supplier have also emerged as major channels.

**Table-6.4: Marketing of Kangu by different Marketing Channels**

| Districts | Marketing of Kangu by farmers in different market channels (% of overall quantity) during pre-project period | | | | | |
|---|---|---|---|---|---|---|
| | Govt. procurement | Middlemen | Local Haat | local Money Lender | Input supplier | Barter |
| Kandhamal | - | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 |
| **All districts** | **-** | 97.5 | 2.5 | 0.0 | 0.0 | 0.0 |
| | Marketing of Kangu by farmers in different market channels (% of overall quantity) during post-project period | | | | | |
| Kandhamal | - | 0.0 | 36.5 | 63.5 | 0.0 | 0.0 |
| **All districts** | **-** | 39.4 | 22.1 | 38.5 | 0.0 | 0.0 |

### 6.2.4 Marketing Channels for Janha

As it can be seen from the following table 6.5, during pre-project period there was no janha production by the millet farmers of Kandhamal district. However, during post project period farmers have started cultivation of Janha in the district. As high as 97.4 percent of surplus janha in the district is sold through local money lenders during post project period.

**Table-6.5: Marketing of Janha by different Marketing Channels**

| Districts | Marketing of Janha by farmers in different market channels (% of overall quantity) during pre-project period | | | | | |
|---|---|---|---|---|---|---|
| | Govt. procurement | Middlemen | Local Haat | local Money Lender | Input supplier | Barter |
| Kandhamal | - | | | | | |
| **All districts** | **-** | 62.1 | 37.9 | 0.0 | 0.0 | 0.0 |
| | Marketing of Janha by farmers in different market channels (% of overall quantity) during post-project period | | | | | |
| Kandhamal | - | 1.4 | 1.1 | 97.4 | 0.0 | 0.0 |
| **All districts** | **-** | 16.5 | 8.2 | 75.3 | 0.0 | 0.0 |

### 6.2.5 Marketing Channels for Kodo

As it can be seen from the following table 6.6, during pre-project period there was no production of kodo millet by the millet farmers of the district. During post project period, few farmers have started cultivating these crops and whatever marketable surplus of kodo is found, these are sold through local haats.

**Table-6.6: Marketing of Other millets (Kodo) by different Marketing Channels**

| **Districts** | **Marketing of other millets (Kodo) by farmers in different market channels (% of overall quantity) during pre-project period** | | | | | |
|---|---|---|---|---|---|---|
| | **Govt. procurement** | **Middlemen** | **Local Haat** | **local Money Lender** | **Input supplier** | **Barter** |
| Kandhamal | - | 0 | | | | |
| **All districts** | **-** | 75.9 | 12.6 | 0.0 | 0.0 | 11.4 |
| | **Marketing of other millets (Kodo) by farmers in different market channels (% of overall quantity) during post-project period** | | | | | |
| Kandhamal | - | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 |
| **All districts** | **-** | 74.4 | 19.1 | 0.0 | 0.0 | 6.5 |

### Concluding Remarks

The processing activities mainly comprise of converting ragi to flour and de-husking in the case of other millets. With respect to ragi flour making, majority of households depend on machine for which is readily available at the neighbourhood locality for which they don't require to travel to any distant palce. On the other hand, for other types of millets, de-husking of millet is required which is done through traditional means by all households. However, the household's dependent on traditional processing uses locally available traditional instruments. Soon after the introduction of Mandies under OMM, millet farmers are processing their millets as per Mandi standards. They are sun-drying dehusked millets for maintaining required moisture. Very commonly, they sell millets with husk at a lower price. The middlemen undertake value addition activities by making millets husk free. Further middlemen also do sorting and grading of millets according to quality. Now because of OMM intervention and training to millet farmers, slowly they have started value addition activities for the marketable surplus of millets. During pre-project period local middlemen was the predominant channel which has been shifted in favour of Mandi during post project period. During pre-project situation, around 77.4 percent of surplus ragi surplus were sold through local haat and now, during post project period, as maxim as 98.9 percent of surplus ragi are sold through Mandis. This is a remarkable achievement of OMM. Selling of surplus ragi through middlemen is also found as a major channel during post-project period which is found negligible during pre-project period. During pre-project situation around 83.6 percent of surplus suan were sold to middlemen and now, during post project period also, about 83.7 percent are sold through this channel at all Odisha level. Local haat was the predominant channel for selling of surplus kangu during pre-project period. However, during post project period, there is a declining share of local haat and consequently selling through middlemen and input supplier have also emerged as major channels. During post project period farmers have started cultivation of Janha in the district. As high as 97.4 percent of surplus janha in the district is sold through local money lenders during post project period. During post project period, few farmers have started cultivating these crops and whatever marketable surplus of kodo is found, these are sold through local haats.

# Chapter-VII: SWOT Analysis on the Functioning of Odisha Millet Mission in the District

With the objective of assessing the overall impact of OMM on production, consumption, processing and marketing of millets in the district, the study gathers additional information from the district level Agricultural Officers, Block level Agricultural Officers, District Coordinator (WASSAN), Facilitating Agency (FA), Cluster Resource Persons (CRPs), Community Based Organisations (CBOs). The CBOs and CRPs are appointed by the concerned FA of the block. CBOs and CRPs are appointed at the local level to carry forward the task of farmers mobilisation and motivation for millet cultivation. Besides, the functioning of OMM is also mandated to promote consumption, processing and marketing of millets, so, the Strength, Weakness, Opportunities and Threats associated with each facet of OMM implementation in the programme area is highlighted in this chapter. For this purpose, stakeholders' opinions gathered during the time of field survey are analysed.

| | | 7.1 Strength of OMM | | | |
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| **Sl.** | **Stakeholders** | **Stakeholder' Opinions on the Strength of OMM in the district** | | | |
| | | **Production** | **Consumption** | **Processing** | **Marketing** |
| 1 | District level Agricultural Officers | → OMM has been instrumental in bringing more areas under millet cultivation.<br>→ More numbers farmers are also mobilised for millet cultivation.<br>→ Framer are provided with due training and hand holding support for better and scientific cultivation of millets.<br>→ Framers' training on Best possible agronomic practices is promoted under OMM.<br>→ Organic cultivation of millet is promoted. | → Previously, in the tribal areas, there was also millet consumption habits among majority of households. But owing to insufficient production at their household level they were market dependent.<br>→ Due to self-sufficiency of millet production at household level, more number of household members are consuming millets more number of days in a year. | → Millet de-huskers, flour mills provided at local level have reduced the drudgery of women for processing of millets. | → Due to MSP for millets, farmers are quite encouraged for millet cultivation. |
| 2 | Block level Agricultural Officers | → Millet is a low investment crop for which tribal farmers with low investment capacity can better adapt to millet cultivation.<br>→ Tribals are mostly inhabited in dryland areas, so, millets are most suitable crops in these areas because of their drought | → Considering the life style diseases, now a days there is better awareness among people that millet is a healthy and nutritious food. This has led to more millet consumption.<br>→ Due to diversification of food, people have increased preference for millets. | → Now, people are used to modern methods of processing, previously it was labour intensive and cumbersome. So, OMM has also positively | → Previously, farmers were mainly selling millets to local middlemen, whereby they were exploited by price front. Now due to Govt. procurement of |

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| | | resistant capacity and lower water intake.<br>→ Tribals are historically linked with millet cultivation. So, they are naturally advantageous to undertake millet cultivation. | → Govt has systematically emphasized the relevance and utility of millet consumption, for which more people are attracted for millet consumption. | contributed to millet processing. | millets through mandi, there is better scope for farmers to get authentic value for their produced millets. |
| 3 | District level WASSAN Officials | → Due to OMM intervention, farmers have accepted millets as one of the best crops to be cultivated by them in their own lands.<br>→ Most suitable crop in the rainfed areas.<br>→ It is very much cost effective compared to paddy. | → Millet is a cheap source of nutrition at household level. OMM promoted awareness programmes have influenced millet consumption in the project area.<br>→ Now, millets are distributed through PDS network for which millet consumption has increased.<br>→ Similarly, ICDS has also incorporated millet meals for pre school children at AWCs, which is expected to increase millet consumption of children at household level. | → Locally availability of quality processing, there is time saving by covering reduced distance for millet processing. | → OMM is in the process of creating Farmers Producers Companies and other Producers Groups. This is expected to contribute to better aggregation of millets produced by the small and marginal farmers. |
| 4 | Facilitating Agencies | → Adequate training and handholding support are instrumental in bringing about proactive attitude of millet farmers towards continuance of millet cultivation.<br>→ Modern method of cultivation as provided under OMM is | → Millet consumption is very much important for adolescent girls, pregnant women and youth. Due to Covid pandemic, majority of people do also believe that millet consumption helps to boost immunity. | → Easy processing has contributed to value addition of millets. | → Gradation of millets as introduced by the FAs in the OMM project areas have enabled farmers to get differential prices |

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| | | expected for further increase in millet productivity in the project area.<br>→ Govt incentive scheme has encouraged more number of farmers with increased area of millet cultivation in the project area. | → The food festivals and exhibitions have showcased millet based food and recipes at different district, block and state level . This has contributed to increased millet consumption. | | for different qualities of millets produced by them. |
| 5 | CBOs | → Millet framers under OMM are adequately trained for producing organic fertilizers in their own capacities. This is cheap and highly efficient compared to organic fertilizers. Farmers have been able to minimise costs for which they will be interested to go for organic cultivation of millets.<br>→ The Custom Hiring Centres run by the CBOs have become very much helpful to arrange modern agricultural instruments to the farmers for which they have been able to cultivate millets efficiently. This is expected to contribute more to millet production in time to come.<br>→ The management skills and other skill development | → Previously, there were few traditional millet recipes widely used by the consumers. Now due to diversified millet recipes, there is good scope of millet consumption.<br>→ Some of the affluent class and urbanised people have started thinking about the increased merits of organic branded foods. As millets are mostly organic in nature, thus there is good acceptability of millet as staple foods even among the urban high-end consumers | → De-husking and flour mills run and managed by the CBOs has not only reduced the drudgery of local people but also contributed to value added millets available for local consumption. | → Due to Govt. procurement, farmers have been able to get a justifiable share of consumers' price which was previously not possible as a sizable proportion of consumer price of the product was misappropriated by the middlemen. |

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| | | programmes as provided to millet farmers have strengthened millet farmer's' confidence for millet production. | | | |
| 6 | CRPs | → The modern methods and equipments for agronomic practices, cultivation practices and weeding practices as provided under the OMM, have contributed to better millet production and productivity.<br>→ The handholding and regular monitoring of the Agricultural department officials to millets farmers have increased the confidence level of millet farmers and they are quite optimistic to increase miller production in future also. | → CRPs are also engaged in promoting diversified millet recipes at household level which is augmenting household millet consumption in the project area. | → There are local level evidences that millets powders are found as essential ingredients of "Chhatua Powder". | → Due to the upsurge of millet consumption even among the non-millet producing households has significantly contributed to the upward market demand for millets. |

7.2 Weakness of OMM

| Sl. | Stakeholders | Stakeholder' Opinions on the Weakness of OMM in the district | | | |
|---|---|---|---|---|---|
| | | **Production** | **Consumption** | **Processing** | **Marketing** |
| 1 | District level Agricultural Officers | → Change in the mindset of farmers is a time-consuming process. They are taking their own time from diverting to millets from other crops.<br>→ Further continuance of the OMM supported awareness programme would leverage the adoption of millets as an important dry land crop in the project area. | → There is still lack of awareness among the masses regarding the health benefits of millet consumption.<br>→ Millet should be included in the Food Security Act, of the Govt. of India, so that millet consumption would be further increased. | → Millet processing machineries are not available in all village, so for the purpose of processing, households spend a sizable chunk of their time by undertaking travel to the nearby processing centres. | → Govt. procurement of millets is yet to be full-fledged. Once it gets done, there are good chances of improvement of millet production and consumption. |
| 2 | Block level Agricultural Officers | → Millet farming is a traditional farming practice. Adoption of modern methods of cultivation is yet to be full-fledged. | → By nature, millets are light foods, so, most often people engaged in hard manual works, accord priority to heavy foods rather than millets. | → Most of the people are yet to be trained on the required specialised processing of millets. | → Govt. procurement of ragi is still limited and yet to be strengthened. |
| 3 | District level WASSAN Officials | → Procurements targets currently available is very much limited to ragi only and other non ragi millets are completely excluded from the procurements. Had there been coverage of non ragi millets in the procurement process, perhaps more number | → Lack of sufficient training on tasty millet recipes compels people to use traditional millet recipes, so, the users get bored most often by repeatedly consuming | → Govt. through OMM project intervention is yet to promote access and usage of millet processing units at every village. | → Besides, non ragi millets are yet to be included in the ambit of Govt. procurement through the fixation of MSP. |

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| | | of millet farmers might have adopted non ragi millets.<br>→ The district level project Management Unit (DPMU) might have contributed to more millet production. As the DPMU of OMM is yet to be functional at the district level, perhaps the millet production is limited. | the same traditional millet-based recipes.<br>→ Millet recipes although introduced under ICDS and PDS, still it is optional, so consumption improvement is not getting broad-based. | | |
| 4 | Facilitating Agencies | → The delay in the receipt of incentives and inputs as provided to millet farmers, very often limits the full-scale acceptability of the OMM farmers. | → Since decades, there is social discouragement that millet recipes are poor man's food, which stands on the way of increasing millet consumption. | → Age old food habits may take time to get changed in favour of millet consumption drastically. | → There is imperative need to promote export of millets from India. |
| 5 | CBOs | → Presently, there is limited implementation of the procurement policy for millet crops. If the procurement policy is expanded, there may be further scope for promoting millets in the project area.<br>→ There is limited progress of Custom Hiring Centres as supported under OMM. The full-scale non-functionality limits to the desirable level of millet production in the project area. | → There should be training on the preparation of dry foods from different types of millets. Rural women are acquainted only with the preparation of traditional recipes. | → Electricity facility is not found in all of the villages. Sometimes, despite availability of electricity facility, people find it difficult to pay electricity bills every month.<br>→ Resultingly, even if millet processing units are found, it becomes very difficult to make regular functioning of millet processing machineries. | → Farmers complain that there is payment delay by the Govt, when they sell their millets through mandis. |

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| 6 | CRPs | → Use of certified seeds is practiced by limited number of millets. This is attributed to non-availability of required certified seeds in timely manner. Perhaps use of certified seeds by the millets farmers can enhance millet production in the project area. | → Most of the rural people consume ragi millet as porridge (Jau) only, which is not tasty. Sufficient training and awareness on the preparation of alternative recipes would further increase millet consumption. | → Trained manpower to operate millet processing machines is also limiting factor for machine-based processing of millets in the project villages. | → Owing to higher cost of cultivation, the MSP of millets are still considered lower by the millet farmers.<br>→ Besides, there are delays in the procurement of millets under Mandi system. Framers say that soon after harvest, Mandi system should become effective, so that, there will quick cash inflow to the farmers bank A/Cs. |

7.3 Opportunities of OMM

| Sl. | Stakeholders | Stakeholder' Opinions on the Opportunities of OMM in the district | | | |
|---|---|---|---|---|---|
| | | **Production** | **Consumption** | **Processing** | **Marketing** |
| 1 | District level Agricultural Officers | → The net income from millet cultivation per acre of land is higher relative to other crops. So, there is good prospect of undertaking millet cultivation and substituting other crops by millets. | → Millet is very much nutritious and hygienic food. | → Ragi threshers and peelers supplied to SHGs will strengthen millet processing.<br>→ Pulverisers are likely to be provided through OMM will strengthen processing activities. | → There is increased scope of marketing of millets domestically as well as internationally. |

| | | | | | |
|---|---|---|---|---|---|
| 2 | Block level Agricultural Officers | → It requires less water and drought resistant. Even in the very unfavourable marginal lands, millet crops can be grown. | → It can be easily accessed in any type of marketing places starting village Haats upto supermarkets. | → Millet farmers to some extent have adopted modern methods of millet cultivation and processing. This is due to the sincere efforts of OMM. | → Millet procurement with MSP support is gradually mainstreamed and there is also systematic attempts to cover all millets under MSP. |
| 3 | District level WASSAN Officials | → It is climate resilient and having solid promise in rainfed agricultural scenarios. | → Multiple millet-based recipes are possible and households have slowly learned the preparation of multiple millet-based recipes owing to systematic intervention of OMM in providing demonstrations of different millet-based recipes. | → Millet farmers are gradually acquiring good deal of knowledge on millet processing and further value addition. | → Few of the Food retailers have already started branding of millets, so as to cater to the needs of brand conscious urban middle class buyers and high-end buyers. |
| 4 | Facilitating Agencies | → Millet can be grown organically, and the concept of organic foods is trending in recent years particularly among the urban middle class people. | → Millet can be consumed along with many other foods.<br>→ It can be a wholesome meal even without combining with other foods.<br>→ Its consumption can be any meal of the day or all the meals of the day.<br>→ Millet is very much a flexible food. | → Millet processing units although not established in all of the villages, but, there is good access to the processing units at least at the GP level. | → Govt. has started millet-based tiffin centres with the support of SHGs, and there is good demand for the items supplied through this millet cafes. |
| 5 | CBOs | → Millet crops can be grown even in the | → Millet is proven immunity booster food and during the time of ongoing Covid-19 | → Millet processing and value addition can enhance the value | → There is good chance of promoting skills for millet-based value |

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| | | sloppy terrains and hilly areas. | pandemic, millet consumption has increased relevance. | chain activity of millets and even the supply chain can be increased to the export market. | addition activities as well as strengthening the supply chain management of millet activities. |
| 6 | CRPs | → All categories of farmers can easily adopt millet cultivation, because of the simplicity of its cultivation process without entailing much of the sophisticated knowledge. | → The outreach of millet consumption could be further reinforced by further promoting millets in the MDMs and AWCS. | → There is plan to undertake systematic intervention for the promotion of millet processing in all of the OMM intervention villages. | → Considering that more number of households and household members are adopting millets as staple foods, there is good chance of marketing of millets in the immediate future. |

7.4 Threat of OMM

| Sl. | Stakeholders | Stakeholder' Opinions on the Threats of OMM in the district | | | |
|---|---|---|---|---|---|
| | | **Production** | **Consumption** | **Processing** | **Marketing** |
| 1 | District level Agricultural Officers | → Farmers will adopt to millet cultivation only in high land areas where paddy and cultivation of other crops are risky. In that way, there can't be any major diversion of paddy lands for millet cultivation in Odisha. | → Millet can't be exclusively consumed by itself. Under current socio-economic situations, millet can't be exclusively considered as the staple food. | → Market needs finest quality flours without presence of any husk in the flour. But in the case of ragi flour, there is every possibility of fibres and starches in the flour. From marketing point of | → Millet farmers in the absence of MSP are likely to sell to middlemen which is very much exploitative in nature and farmers become bound to undergo distress sales of millets. |

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| | | | | view, it is to some extent difficult. | |
| 2 | Block level Agricultural Officers | → It is traditionally believed by the farmers that millet cultivation is a subsistence-oriented farming practice and it is very hard for the farmers to believe about the commercial viability of millet farming. | → As millet are light foods and quickly digests, the hard-working rural people may find it costlier and inconvenient to substitute rice like heavy food for millet. | → There is large scale wastage in the processing of millets. | → Although, there is govt. procurement for ragi, for non ragi millets, such mechanism is yet to be established which is a limitation for millet farmers for proper marketing of their produce. |
| 3 | District level WASSAN Officials | → Millet cultivation can't be possible in all land categories, which is very much a limiting factor for aggressive outreach of millet cultivation. | → Although quality wise millets are very good, but, most often people are detached from millet as taste wise, millets are not very good. | → There is absence of processing facilities at village level. | → Marketing of millets is viewed to be a constraint owing to limited processing facilities of millets. |
| 4 | Facilitating Agencies | → Farmers feel it difficult to consider millet cultivation as principal cultivation of any cropping season. Rather it is supplementary cultivation as perceived by the farmers. | → Despite promotion of so many varieties of millet base recipes, but majority of people consider ragi porridge as the main recipe, which can't be substituted by any other recipe. | → Considering limited demand, private investment in millet processing sector is found limited. | → In the case of non ragi millets, there is very much limited marketable surplus, for which it is becoming difficult to strengthen proper marketing channels for millets. Resultingly, middlemen purchase is found to be the very much established channels for non ragi millets. |
| 5 | CBOs | → Paddy cultivation, over time has influenced the socio, religious and cultural practices of | → Even if there is large scale adoption of millets as staple food, the supply of millet is limited. | → Limited mechanised processing facilities at village level discourage millet | |

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| | | farmers' households, which might hinder the sustained adoption of millet farming. | | processors to go for necessary value addition particularly for millets requiring dehusking. It is the case of suan, kangu and kodo millets. | |
| 6 | CRPs | → Most often the millet farming is considered inferior compared to the prestige value attached to other crops cultivation particularly paddy cultivation. | → Large scale adoption of millet as staple food may lead to scarcity of millets and consequently higher price which may confuse households to consume millets. | | |

# Chapter-VIII: Key Findings and Way Forward

## 8.1 Key Findings

### 8.1.1 Outreach of OMM

Area under cultivation of ragi in the district as well as state has declined during 2010s compared to 2000s. But the extent of decrease of argi area in the district is only 8.45 percent relative to the same for the district at 21.70 percent. This indicates, compared to the state situation, relatively there is less shifting of ragi land for non-ragi crops in Kandhamal district. However, during the corresponding period, there is much higher shifting of the land area of small millets to other crops in the district. Compared to state level scenario, in Kandhmal district during last two decades, there is massive shift of land area under small millets to other crops. the yield rate of ragi in Kandhamal district has increased by 42.11 percent in Kandhmal district as against 12.88 percent at all Odisha level. However, during both the decades, the yield rate has remained lower in Kandhamal district that that of all Odisha level. Similar is the case of small millets. There is better improvement in yield rate of small millets in 2010s compared to 2000s. However, the yield rate in Kandhmal district is found lower compared to all Odisha level during both the decades. Although there is decrease in annual production of ragi in 2010s at all Odisha level, there is positive increase in the amount of annual ragi production in Kandhamal district. Compared to average annual ragi production of the district during 2010s has increased by 30.17 percent as against 12.18 percent reduction at all Odisha level. In the case of small millets also, there is very good positive variation in the annual production during 2010s compared to the preceding decade 2010s. By the end of Kharif 2019-20, OMM has covered four blocks in Kandhamal district. Cumulatively, in all these blocks, OMM outreach extends to 122 GPs, 796 villages, 4991 farmers and 2996.96 hectares of land area under millet cultivation.

### 8.1.2 Socio Economic Characteristics of Millet farmers

The farmers covered under OMM are predominantly ST farmers and overall ST farmers constitute around 71.7 percent followed by SC framers. Proportionate share of SC and OC category of farmers in the total OMM registered millet farmers are 28.3 and 0.6 percent respectively. The age structure is defined in terms of average age of millet farmers which is overall found at 47.3 years. Majority of registered millet farmers are male farmers. Overall, about 86.2 percent of millet farmers of Kandhamal district are males and the remaining 13.8 percent are females. Higher proportion of millet farmers of Kandhamal district are illiterates followed primary level of education. In percentage terms, out of the total registered millet farmers, 53.8 percent are illiterates followed by primary level (33.8%). Small and marginal farmers jointly account 87 percent of the total OMM registered millet farmers of the district. Marginally higher proportion of millet farmers of the district have semi pucca houses followed pucca houses. The incidence of pucca houses is found with more proportion of millet farmers' households of Raikia block. There are 2.6 male and 2.5 female members per each millet farmers' household in the district. The average family size is found at 5 persons. Overall, 40.3 of millet farmers have joined into OMM in 2017-18 year and another 48.3 percent have joined in 2018-19.

### 8.1.3: Behaviour of Millet Production

The overall operational landholding among the millet farmers of Kandhamal district is calculated at 3.5 acres. There is highest positive increase in the number of farmers for ragi millet. Compared to pre project situation, there has been 580 percent variation in the number of ragi farmers during post project period. During pre-project period, only 45 farmers out of 325 sampled out farmers cultivated paddy, and now, during post project period 305 farmers are cultivating paddy. Similarly, for suan also, only six farmers were cultivating during pre-project period, which has been increased to 64 farmers during post project situation, registering 966.7 percent variation in the number of farmers. During post OMM phase, in Kandhamal district number of farmers cultivating all other non-millet crops has come down, however, for millet crops, there has been positive changes in the number of farmers. Overall paddy area of the sampled-out farmers has registered 4.6 percent negative variation. Negative variation in the crop area for other crops including pulses, vegetables, oilseeds, cash crops also register negative variation during post project period. There is positive variation in the land area for all the reported millets during post project period relative to pre project period. The prevalence mono cropping practices for ragi cultivation was widely prevalent during pre-project situation in all the reporting blocks which is also witnessed during post project period. With respect to Suan, particularly during post project situation, mono cropping as well as mixed cropping pattern is noticed. However, majority of Suan farmers are found with mono cropping practices during post project situation. For all types of millets almost in all of the project blocks of the district, farmers have shifted from traditional broadcasting method of cultivation and adopted other improved methods of cultivation. It is further observed that there is substantial improvement of LT method particularly for argi and kodo millets, which are found to be the two major millets of the district. Ragi farmers during pre-project period, were mostly undertaking two times of weeding, now, during post project period, farmers are adopting more than two times of weeding. Production of ragi production per farmer in Kandhamal district has increased from 3.9 quintal to 7.9 quintals. Similarly, production per acre has increased from 4.6 quintals to 5.8 quintals. Millet farmers of Kandhamal district have introduced improved varieties of regi including Arjuna, VRT 47 and Bhairavi as improved varieties of ragi millet.

### 8.1.4 Behaviour of Millet Consumption

Millets and particularly ragi is consumed by majority of households during summer season followed by rainy season and winter season. More than 90 per cent of households consume millets during summer season and it is reported in all the OMM blocks. This situation is slightly lower during winter season. However, less than 50 percent of households consume millets during winter season. During pre-project situation about 13.2 percent of households were consuming ragi during summer season which is said to be the peak time-period of millet consumption. During post project period, overall millet consumption per household during Summer, winter and rainy seasons is found at 0.551, 0.505 and 0.130 Kg respectively. Compared to pre project situation, there has been slight increase in the daily household millet consumption during summer and winter seasons, although it has decreased during rainy season. Previously during pre-project situation, no household in Kandhamal district was purchasing millet from the market. However, during post project situation, only a few households are purchasing millets form the market. Household dependence for millet purchase from the market is reported by two households out of 80 surveyed households at Kotagarh block. Similarly, about 10 percent of the millet farmers households of Phiringia block purchase millet from the market for household consumption. During pre-project period, major source of purchasing millets were local

market and bartar. However, during post project period owing to mainstreaming of PDS, households are found purchasing millets from PDS.

### 8.1.5 Behaviour of Millet Processing and Marketing

The processing activities mainly comprise of converting ragi to flour and de-husking in the case of other millets. With respect to ragi flour making, majority of households depend on machine for which is readily available at the neighbourhood locality for which they don't require to travel to any distant palce. On the other hand, for other types of millets, de-husking of millet is required which is done through traditional means by all households. However, the household's dependent on traditional processing uses locally available traditional instruments. Soon after the introduction of Mandies under OMM, millet farmers are processing their millets as per Mandi standards. They are sun-drying dehusked millets for maintaining required moisture. Very commonly, they sell millets with husk at a lower price. The middlemen undertake value addition activities by making millets husk free. Further middlemen also do sorting and grading of millets according to quality. Now because of OMM intervention and training to millet farmers, slowly they have started value addition activities for the marketable surplus of millets. During pre-project period local middlemen was the predominant channel which has been shifted in favour of Mandi during post project period. During pre-project situation, around 77.4 percent of surplus ragi surplus were sold through local haat and now, during post project period, as maxim as 98.9 percent of surplus ragi are sold through Mandis. This is a remarkable achievement of OMM. Selling of surplus ragi through middlemen is also found as a major channel during post-project period which is found negligible during pre-project period. During pre-project situation around 83.6 percent of surplus suan were sold to middlemen and now, during post project period also, about 83.7 percent are sold through this channel at all Odisha level. Local haat was the predominant channel for selling of surplus kangu during pre-project period. However, during post project period, there is a declining share of local haat and consequently selling through middlemen and input supplier have also emerged as major channels. During post project period farmers have started cultivation of Janha in the district. As high as 97.4 percent of surplus janha in the district is sold through local money lenders during post project period. During post project period, few farmers have started cultivating these crops and whatever marketable surplus of kodo is found, these are sold through local haats.

## 8.2 Key Findings

- → Due to prevalence of MSP and procurement of kharif ragi through Mandi system, the millet farmers have well accepted ragi as a major millet crop in the OMM project areas. Farmers have also expressed their interest to cultivate ragi during Rabi season. It is suggested by the farmers as well as grassroot level OMM officials that procurement of ragi during Rabi season should be introduced so that ragi farmers will be interested to under rabi cultivation of ragi.
- → Besides, there are farmer level suggestion for introducing MSP for other millets like Suan, kangu, janha and kodo millets. Due to non-prevalence of MSP for these millets, farmers are not giving sufficient attention for undertaking cultivation of non ragi millets.
- → Govt. of India has recently focussed on promotion of Farmer Producers Companies (FPC) for increasing farmers income through FPC channels. There seems to be sufficient space for organising small holder millet farmers into FPCs. Besides, promoting millet producers' collectives at block and district level is expected to contribute to strengthening the economics of millet farmers. In some of the OMM areas, early efforts for promoting millet based FPOs have already been attempted and the benefits of such producers' collectives are expected very shortly. It is suggested that millet based FPOs should be organized in all of the OMM districts. Mainstreaming of FPO activity in the project area will provide sustainability of the programme, even after completion of the project.
- → Despite emphasis of OMM for millet processing at GP level, it is not yet fully strengthened for which except ragi, for non ragi millets people undertake manual processing. Even in case of ragi also, a sizable chunk of households is undertaking manual processing of millets. Efforts should be made to strengthen millet processing units at GP level.
- → Due to OMM intervention, there has been improved millet production and consumption in the OMM project area. Based on findings of the study, there is good scope for further improving PCPDC of millets OMM project areas. Further, there should be consumption improvement in non-OMM areas also. It is viewed that there should be continuous research for improving millet production and consumption in the state.