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

Rayagada District




Submitted to-

Submitted By-

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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.

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

[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/

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 hypoglycaemic 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,

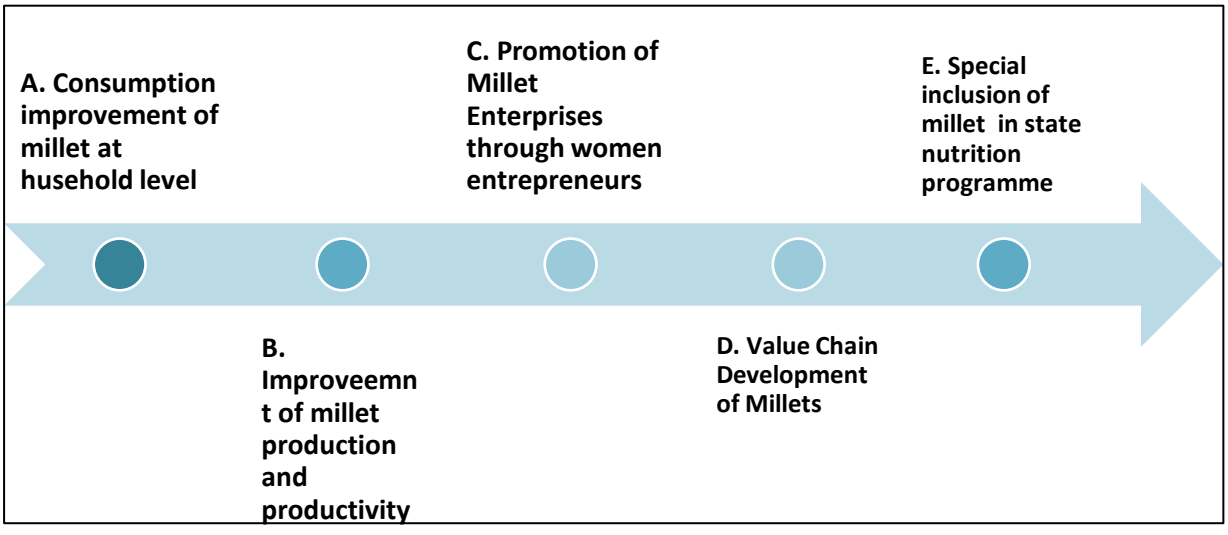
[9] Department of Agriculture & Cooperation, (2014), "National Mission for Sustainable Agriculture (NMSA): Operational Guidelines", Ministry of Agriculture, Government of India

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 Rayagada District

The first phase implementation of OMM in Odisha had covered 22075.8 hectares of land in all of the seven programme districts and about 2937.49 hectares of land. Raygada district accounts about 13.4 percent of the overall OMM outreach in the state. In Rayagada district, during the first phase of OMM, maximum outreach in terms of land area covered for millet cultivation was 36.7 percent in Rayagada district followed by Gunupur (21.9 %), Chandrapur (20.9 %) and Gudari (21.6%).

Table –1.2: Coverage of Ragi under first phase OMM Project Intervention

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**		
Chandrapur	0	189.4	423.2	612.6	20.9	13.3
Gudari	73.05	260.4	271.2	604.65	20.6	
Gunpur	160.26	223.2	258.5	641.96	21.9	
Rayagada	110.48	435.8	532	1078.28	36.7	
Sub total	**343.79**	**1108.8**	**1484.9**	**2937.49**	100.0	
All districts	**3161.03**	**7625.93**	**11288.8**	**22075.8**		**100.0**

Source: Computed from WASSAN Official data

OMM implementation In Raygada district was started in the year 2018-19. Out of the total non ragi millet area taken up by the registered millet farmers during the first phase implementation in the state, percentage share of non-ragi millet cultivated lands in Rayagada block was about 20.7 percent. Similarly, out of the non-ragi millet cultivated lands in the district, percentage share of Gunupur block was about

[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

60.62 percent and the remaining three block jointly accounted around 40 percent of the total ragi cultivated area under OMM.

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

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		
Chandrapur	0	26.0	8.2	34.2	4.27	20.7
Gudari	0	144.4	131	275.4	34.36	
Gunpur	0	219.4	266.4	485.8	60.62	
Rayagada	0	0	6.0	6.0	0.75	
Sub total	**0**	**389.8**	**411.6**	**801.4**	100.00	
All districts	**114.45**	**1880.8**	**1873.71**	**3868.96**		100.0

Source: Computed from WASSAN Official data

Out of the total 63002 millet farmers covered under first phase OMM intervention in the state, about 10.8 percent of millet farmers were covered in Raygada district. Percentage share of millet farmers in Chandrapur, Gudari, Gunupur and Raygada blocks stand at 15.6, 20.0, 32.0, and 32.5 percent respectively.

Table-1.4: Farmer Outreach under first phase intervention OMM in Rayagada 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		
Chandrapur	0	385	680	1065	15.6	10.8
Gudari	156	600	605	1361	20.0	
Gunpur	309	874	996	2179	32.0	
Rayagada	291	824	1099	2214	32.5	
Sub total	**756**	**2683**	**3380**	**6819**	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.

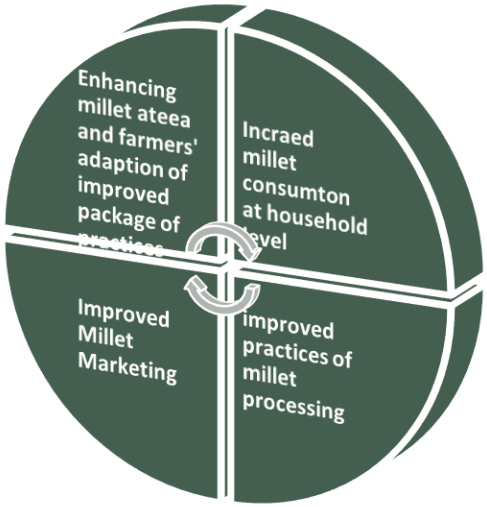
1.7 Objectives

- → 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

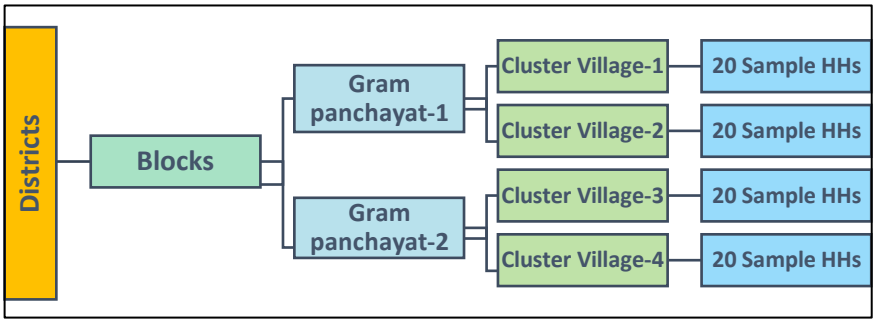
1.8.1 Study Approach

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 240. 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. This is to mention that except Chandrapur block, remaining three blocks i.e., Gudari, Gunupur and Rayagada blocks under first phase implementation of OMM are considered in the sample.

Table-1.5: Sample Design

Blocks	**Gram Panchayats**	**Villages**	**No. of households covered in the study**
Gudari	Kalraghati, Khariguda	Nuakereda & Papikhal Tala Khariguda & Grengapadar	80
Gunupur	Jaltar, Kulusing	Engraba & Jaltar Abusing & Kumbijal	80
Rayagada	Halua, Tadama	Jamulima & Japakhal Nathama & Pirigaon	80
		Sub total	**240**

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: First Phase Implementation of Odisha Millets Mission: Rayagada District

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 Rayagada district is outlined in this chapter. The pattern of millet production is discussed in the light of changes taking place over time. 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 Rayagada District

Rayagada district is one of the Southern located districts in Odisha. It lies between 82o 54' to 84o 2' East longitude and between 19^{o} 35' to 19o 58' North latitude. It is bounded by the Kandhamal district in north, Andhra pradesh in south, Gajapati district in the east and Koraput district in the west. The district has an area of 7073 sq.kms and 9.68 lakhs of population as per 2011 census. The district accounts for 4.54 percent of the state territory and shares 2.31 percent of the state population. The density of population of the district is 137 per sq. kms., as against 270 persons per sq.km of the state. It has 2665 villages (including 197 un-inhabited villages) covering 11 blocks, 11 Tahasils and 2 Subdivisions. As per 2011 census the schedule caste population is 139514 (14.4 %) and schedule tribe population 541905 (56.0%).

The district lies between 82o54' to 84o2' longitude East and from 19o0' 19o58' North Latitude. It extends in the east upto Gajapati district and in the west upto Koraput district and part of Kalahandi district, in the south up to Parvathipuram sub-division of Andhra Pradesh and in the north upto Kalahandi and Phulbani district of Odisha. The total Geographical area of the district is 7073.00Sq. Kms. Rayagada district is situated in the Eastern Ghat's Agro Climatic region. Soil type of the district is mostly acidic and red laterite in nature. However sandy loam and black soil are also found in some parts of the district. The main river flows in the district are Bansadhara and Nagabali. A brief socio-economic profile of the district is presented in the following table 2.1.

Table 2.1: Brief Statistical Profile of Rayagada District

Sl.	Particulars	Value	Sl.	Particulars	Value
1	Population (in Lakh)	9.7	20	Total Geographical Area (sq.km)	7073
2	Male (in Lakh)	4.7	21	**Land Use Pattern (Area in '000 ha), (2014-15) ***	
3	Female (in Lakh)	5.0		Forest	101
4	Scheduled Caste (in Lakh)	14.4		Land put to Non-agricultural use	30
5	Scheduled Tribe (in Lakh)	56.0		Barren and Non-Cultivable Land	204
6	Others (in Lakh)	29.6		Permanent Pasture and Other Agricultural Land	10
7	HHs (in Lakh)	2.0		Net Area Sown	144
8	Average HH Size	4.8		Cultivable Waste Land	9
9	Sex Ratio	1051		Old Fallow	23
10	Total Worker (In Lakh)	4.7		Current Fallows	42
11	Main Worker (In Lakh)	2.3		Miscellaneous Trees and Groves	9
12	Marginal Worker (In Lakh)	2.4	22	**Agriculture, 2014-15 ***	
13	Non-Worker (In Lakh)	5.1		Fertilizer Consumption (kg/ha)	54.8
14	Work Participation Rate (WPR, %)	48.3		Irrigation, Kharif ('000 ha)	71.6
15	Cultivator as % of Total Worker	49.8		Irrigation, Rabi ('000 ha)	28.1
16	Agricultural Labourers as % of Total Worker	4.8	23	Proportion of Villages Electrified (as on March 2014)	28.8
17	Literacy Rate (%)	49.8	24	Credit Deposit Ratio (as on December 2015)	38.2
18	HHs provided employment through MGNREGS, cumulative 2014-15	75826	25	No. of Aanganwadi Centres, 2014-15	
19	No. of Job Card Issued (cumulative, March 2015)	184488	26		

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

2.2 Production of Millets in Rayagada district

Millet production in the district is shown in terms of decadal variation in the average annual area diverted for ragi and small millet cultivation in 2010s compared to 2000s. As per table 2.2, it is revealed that average annual land area used for ragi cultivation is reduced by 21.30 percent in 2010s compared to 2000s in Rayagada district. However, diversion of ragi lands for other crops in Rayagada district is found almost similar to the overall situation of the state. In the case of small millets, in 2010s, there is decrease in land area under small millet cultivation. The average annual land area used for ragi and small millets cultivation in district as a percentage to respective state area is almost constant during both the decades.

Table-2.2: Area under ragi and small millets cultivation in Rayagada district compared to all Odisha

Sl.	Regions	Decadal variation in the land area under annual ragi and Small Millets cultivation in Rayagada district compared to all Odisha (Land area in 000 hectares)					
		Ragi			Small Millet		
		2000s	2010s	Decadal Variation (%)	2000s	2010s	Decadal Variation (%)
1	Rayagada	25.78	20.29	-21.30	2.76	2.44	-11.59
2	All Odisha	189.07	148.05	-21.70	26.33	23.8	-9.61
	Rayagada district as % to all Odisha	13.64	13.70		10.48	10.25	

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

As per table 2.3, the yield rate of ragi in Rayagada district tends to decrease by 12.24 percent during 2010s compared to 2000s. During the corresponding period, at state level it has increased by 12.83 percent. The yield index of ragi in Rayagada district in comparison to state level performance of the same depicts higher status of the district in 2000s which has become lowered in 2010s. On the other hand, in the case of small millets, the yield index is declined in 2010s compared to 2000s. The decadal variation in yield rate for the district is lower in Rayagada district in comparison to the state level.

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

Sl.	Regions	Decadal Variation in average annual yield Rate of ragi and small millets in Rayagada district compared to all Odisha (Yield Rate in Kg/ Hectare)					
		Ragi			Small Millet		
		2000s	2010s	Decadal Variation (%)	2000s	2010s	Decadal Variation (%)
1	Rayagada	882.22	774.25	-12.24	568.89	582.75	2.44
2	All Odisha	791.20	892.70	12.83	453.60	505.00	11.33
	Yield index of the district (All Odisha = 100)	111.50	86.73		125.42	115.40	

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 average annual production of ragi and small millets in Rayagada district compared to all Odisha is separately analysed for 2000s and 2010s in table 2.4. It is revealed that the decadal variation in ragi production in the district as well as the state is negative. However, the percentage fall in 2010s compared to 2000s in the district stands higher compared to all Odisha level. Percentage share of the district in the total ragi production of the district stood at 15.11 percent in 2000s which has slightly decreased to 11.37 percent in 2010s. In the case of production volume of small millets, there is 10.67 percent average annual decrease in 2010s compared to 2000s in the district. There is overall increasing tendency of the total volume of production of small millets in the state during the corresponding period.

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

Sl.	Regions	Decadal Variation in Volume of Ragi and small millets Production in Rayagada district compared to All Odisha (Production in 000 MT/ Hectare)					
		Ragi			Small Millet		
		2000s	2010s	Decadal Variation (%)	2000s	2010s	Decadal Variation (%)
1	Rayagada	22.58	15.39	-31.84	1.50	1.34	-10.67
2	All Odisha	149.39	131.19	-12.18	11.71	12.07	3.07
	Rayagada district as % to all Odisha	15.11	11.73		12.81	11.10	

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 Rayagada District

By the end of Kharif 2019-20, OMM has covered four blocks in Rayagada district. Cumulatively, in all these blocks, there is outreach of OMM in 139 GPs, 628 villages, 6145 farmers and 5784.94 hectares of land area under millet cultivation. The details of progress of OMM in Rayagada district is shown in the table 2.35 given ahead.

Table-2.5: Progress of Odisha Millet Mission in Rayagada Districts

Sl.	Time Period	Coverage of OMM in Rayagada district				
		Blocks	No. of GPs	No. of Villages/ Hamlets	No. of farmers	Land Area (Acres)
1	Kharif 2017-18	Gunupur	9	52	309	394.00
		Gudari	5	22	130	144.50
		Rayagada	3	22	256	238.00
		Sub Total	**17**	**96**	**695**	**776.50**
2	Rabi 2017-18	Gudari	4	9	26	36.00
		Rayagada	3	4	35	31.00
		Sub Total	**7**	**13**	**61**	**67.00**
3	Kharif 2018-19	Gunupur	18	97	874	1095.00
		Rayagada	11	71	835	759.00
		Sub Total	**29**	**168**	**1709**	**1854.00**
4	Rabi 2018-19	Gudari	7	23	77	34.80
		Gunupur	3	5	12	7.60
		K Singhpur	4	5	34	11.00
		Kasipur	6	15	145	57.24
		Rayagada	7	14	87	63.00
		Sub Total	**27**	**62**	**355**	**173.64**
5	Khari 2019-20	Gudari	11	74	606	951.00
		Gunupur	28	79	940	521.80
		Rayagada	15	92	1099	
		Chandrapur	5	44	680	1441.00
		Sub Total	**59**	**289**	**3325**	**2913.80**
		Total	**139**	**628**	**6145**	**5784.94**

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

Concluding Remarks

Average annual land area used for ragi cultivation is reduced by 21.30 percent in 2010s compared to 2000s in Rayagada district. However, diversion of ragi lands for other crops in Rayagada district is found almost like the overall situation of the state. In the case of small millets, in 2010s, there is decrease in land area under small millet cultivation. The average annual land area used for ragi and small millets cultivation in district as a percentage to respective state area is almost constant during both the decades. The yield rate of ragi in Rayagada district tends to decrease by 12.24 percent during 2010s compared to 2000s. During the corresponding period, at state level it has increased by 12.83 percent. The yield index of ragi in Rayagada district in comparison to state level performance of the same depicts higher status of the district in 2000s which has become lowered in 2010s. On the other hand, in the case of small millets, the yield index is declined in 2010s compared to 2000s. The decadal variation in ragi production in the district as well as the state is negative. However, the percentage fall in 2010s compared to 2000s in the district stands higher compared to all Odisha level. Percentage share of the district in the total ragi production of the district stood at 15.11 percent in 2000s which has slightly decreased to 11.37 percent in 2010s. Due to OMM intervention in the district, it is found that, OMM has covered four blocks in Rayagada district by the end of Kharif 2019-20. Cumulatively, in all these blocks, OMM outreach covers 139 GPs, 628 villages, 6145 farmers and 5784.94 hectares of land area under millet cultivation.

Chapter-III: Socio Economic Characteristics of Millet Farmers of Rayagada 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 240 millet households spread across three blocks Gudari, Gunupur, Rayagada. 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

The farmers covered under OMM are predominantly ST farmers and overall ST farmers constitute around 91.7 percent and the remaining 8.3 percent are SC framers. There are 98.8 percent of millet farmers as ST by social category in Gunupur block. In other two blocks their percentage share is more than 85 percent. It is in this background OMM programme is a socially inclusive programme.

Table-3.1: Social Category of farmers

Sl.	Blocks	No. of millet farmers					
		SC	% Share	ST	% Share	Total	% Share
1	Gudari	11	13.8	69	86.3	80	100.0
2	Gunupur	1	1.3	79	98.8	80	100.0
3	Rayagada	8	10.0	72	90.0	80	100.0
	All Blocks	**20**	8.3	**220**	91.7	**240**	100.0

3.2 Age Structure

The age structure is defined in terms of average age of millet farmers which overall found at 45.4 years. The average aga of millet farmers in Rayagada , Gunupur and Rayagada blocks are found at 47.5, 42.6 and 42.4 years respectively.

Table-3.2: Mean Age of farmers by social Category

Sl.	Blocks	Mean age of farmers					
		SC	S.D.	ST	S.D.	Total	S.D.
1	Gudari	49.9	12.8	47.1	13.1	47.5	13.0
2	Gunupur	65.0	-	42.2	11.6	42.6	11.9
3	Rayagada	36.1	11.7	43.0	12.6	42.4	12.6
	All Blocks	**47.2**	13.9	**45.1**	12.6	**45.4**	12.7

3.1 Sex Category

Millet farmers classified on the basis of sex category as male and millet farmers reveals that majority of registered millet farmers are male farmers. Overall, about 55.4 percent of millet farmers of Rayagada district are males and the remaining 44.6 percent are females. Incidence of female millet farmers is comparatively higher at Rayagada block in relation to Gudari and Gunupur districts.

Table – 3.3 No. of Farmers by sex Category

Sl.	Blocks	No. of farmers by sex category					
		Male	% Share	Female	% Share	Total	% Share
1	Gudari	55	68.8	25	31.3	80	100.0
2	Gunupur	41	51.3	39	48.8	80	100.0
3	Rayagada	37	46.3	43	53.8	80	100.0
	All Blocks	133	55.4	107	44.6	240	100.0

3.3 Educational Background

The educational background of millet farmers as indicated in table 3.4 reveals that majority of millet farmers of Rayagada district are illiterates followed primary level of education. In percentage terms, out of the total registered millet farmers, as high as 87.9 percent are illiterates followed by primary level (7.9%), upto HSC standard (2.1%), and above HSC (1.3%).

Table-3.4: Framers' Educational Background

Sl.	Blocks	Number of farmers					
		Illiterate	Primary	Upper Primary	Upto HSC	Above HSC	Total
1	Gudari	74	4		1	1	80
2	Gunupur	67	7	2	2	2	80
3	Rayagada	70	8.0		2.0		80
	All Blocks	**211**	**19**	**2**	**5**	**3**	**240**
		% of framers					
1	Gudari	92.5	5.0	0.0	1.3	1.3	100.0
2	Gunupur	83.8	8.8	2.5	2.5	2.5	100.0
3	Rayagada	87.5	10.0	0.0	2.5	0.0	100.0
	All Blocks	87.9	7.9	0.8	2.1	1.3	100.0

3.5 Farmer Category

Based on amount of land holdings farmers are categorised under marginal farmers (MFs), small farmers (SFs), medium farmers and large farmers. As per table 3.4, it is found that majority of millet farmers of the district as high as 90 percent are small farmers followed by medium farmers. The proportionate share of small farmers, medium farmers, marginal farmers and large farmers are found at 90.0, 8.8, 0.8 and 0.4 percent respectively. The pattern is similarly noticed in all of the blocks covered under OMM except Gudari block. Incidence of small farmers is relatively higher at Gudari block.

Table-3.6: No. of farmers by Farmer Category

Sl.	Blocks	No. of millet farmers by Farmer category				
		MF	SF	Medium Farmers	Large Farmers	Total
1	Gudari	64	13	2	1	80
2	Gunupur	75	5			80
3	Rayagada	77	3			80
	All Blocks	**216**	**21**	**2**	**1**	**240**
		% of millet farmers				
1	Gudari	80.0	16.3	2.5	1.3	100.0
2	Gunupur	93.8	6.3	0.0	0.0	100.0
3	Rayagada	96.3	3.8	0.0	0.0	100.0
	All Blocks	90.0	8.8	0.8	0.4	100.0

3.6 House Structure

The housing structure of millet farmers as analysed in table 3.5 reveals that overall, marginally higher proportion of millet farmers of the district have semi pucca houses followed kuchha houses and pucca houses. Overall 75.1 percent of respondents have semi pucca houses. The incidence of Pucca, semi pucca and Kutcha houses is found at 12.1, 75.4, 12.5 percent respectively.

Table-3.7: Housing Structure of millet farmers

Sl.	Blocks	No. of millet farmers by house type			
		Pucca	Semi Pucca	Kutcha	Total
1	Gudari	8	59	13	80
2	Gunupur	5	69	6	80
3	Rayagada	16	53	11	80
	All Blocks	**29**	**181**	**30**	**240**
		% Share			
1	Gudari	10.0	73.8	16.3	100.0
2	Gunupur	6.3	86.3	7.5	100.0
3	Rayagada	20.0	66.3	13.8	100.0
	All Blocks	12.1	75.4	12.5	100.0

3.7 Household Structure

A household structure comprises of male as well as female members. As it can be seen from table 3.8, overall, there are 2.3 male and 2.5 female members per each millet farmers' household in the district. The average family size is found at 4.7 persons. The average family size at Gudari, Gunupur and Ragada blocks is found at 4.8, 5.8 and 5.2 respectively. The overall sex ratio among the millet households of the district is found 1087 implying that there is favourable sex ratio among the millet households. Surprisingly, favourable sex ratio is found in all of the blocks covered in the study. This amounts to say that the sex ratio in the OMM project areas of Rayagada district stands advantageous for females. Perhaps this may be one of the reasons for higher participation of female farmers in the OMM in Rayagada district.

Table-3.8: Household Size

Sl.	Blocks	No. of household members/ Household among the millet farmers			Number of females per 1000 males
		Males	Females	Total	
1	Gudari	2.3	2.6	4.8	1130
2	Gunupur	2.9	2.9	5.8	1000
3	Rayagada	2.5	2.8	5.2	1120
	All Blocks	2.3	2.5	4.7	1087

3.8 Year of joining into OMM

In order 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 3.9, almost all of the farmers have joined into OMM in 2017-18 year only. Out of 240 registered millet farmers, 239 farmers have joined in 2017.18 and only one farmer is found joined in 2018-19.

Table-3.9: Year of joining into OMM

Sl.	Blocks	No. of farmers		
		2017-18	2018-19	Total
1	Gudari	80		80
2	Gunupur	80		80
3	Rayagada	79	1	80
	All Blocks	**239**	**1**	**240**

Concluding Remarks

Almost all the farmers have joined into OMM in 2017-18 year only. Out of 240 registered millet farmers, 239 farmers have joined in 2017.18 and only one farmer is found joined in 2018-19. The farmers covered under OMM are predominantly ST farmers and overall ST farmers constitute around 91.7 percent and the remaining 8.3 percent are SC framers in the district. The average aga of millet farmers in Rayagada , Gunupur and Rayagada blocks are found at 47.5, 42.6 and 42.4 years respectively. Overall, about 55.4 percent of millet farmers of Rayagada district are males and the remaining 44.6 percent are females. Majority of millet farmers of Rayagada district are illiterates followed primary level of education. In percentage terms, out of the total registered millet farmers, as high as 87.9 percent are illiterates followed by primary level (7.9%), upto HSC standard (2.1%), and above HSC (1.3%). As high as 90 percent of the millet farmers in Rayagada district are small farmers followed by medium farmers. Marginally higher proportion of millet farmers of the district have semi pucca houses followed kuchha houses and pucca houses. The average family size at Gudari, Gunupur and Ragada blocks is found at 4.8, 5.8 and 5.2 respectively. The overall sex ratio among the millet households of the district is found 1087 implying that there is favourable sex ratio among the millet households.

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. On the basis of 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 as a result 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 operation landholding among the millet farmers of Rayagada district is 2.8 acres. The same in Gudari, Gunupuru and Rayagada blocks are found at 3.1, 2.8 and 2.4 acres respectively.

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	Gudari	1.5	2.0	1.8	3.1
2	Gunupur	1.6	1.4	1.6	2.8
3	Rayagada	1.7	1.3	1.0	2.4
	All Blocks	1.6	1.6	1.4	2.8

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 evident that ragi is the only millet found in all OMM blocks which is practiced by good deal of farmers. Cultivation of other millets are very much sporadic and few farmers do cultivate. The presence of suan, kodo and janha is very much insignificant as few farmers cultivate these crops. Overall it is observed that at district level there is about 2.1 percent increase in the number of ragi farmers during post project period compared to pre project period.

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)			
			Gudari	Gunupur	Rayagada	All districts
1	Paddy	Before Project	41	44	15	100
		After Project	41	44	15	100
		% Variation	0.0	0.0	0.0	0.0
2	Pulses	Before Project	42	29	50	121

		After Project	41	31	53	125
		% Variation	-2.4	6.9	6.0	3.3
3	Vegetables	Before Project	30	20	30	80
		After Project	30	20	30	80
		% Variation	0.0	0.0	0.0	0.0
4	Oil seeds	Before Project	7	3	8	18
		After Project	7	1	6	14
		% Variation	0.0	-66.7	-25.0	-22.2
5	Cash Crops	Before Project	38	47	28	113
		After Project	37	47	29	113
		% Variation	-2.6	0.0	3.6	0.0
6	Ragi	Before Project	80	79	75	234
		After Project	80	79	80	239
		% Variation	0.0	0.0	6.7	2.1
7	Suan	Before Project		1	5	6
		After Project			2	2
		% Variation		-100.0	-60.0	-66.7
9	Janha	Before Project			1	1
		After Project			1	1
		% Variation			0.0	0.0
10	Kodo	Before Project			1	1
		After Project			1	1
		% Variation			0.0	0.0

4.3 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 observed that there has not been much change in the paddy and pulses areas under cultivation. During post project period, area under vegetable cultivation has dropped 4 percent. Similarly, the area under oil seeds and cash crops is decreased by 21.9 and 3.8 percent respectively. With respect to ragi cultivation, there has not been any change in the cultivated area being used by millet farmers for ragi cultivation.

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

			Area under Crops in OMM Blocks of Nuapada district (Acres)			
Sl.	**Districts**	**Time Period**	**Gudari**	**Gunupur**	**Rayagada**	**All districts**
1	Paddy	Before Project	53.0	42.9	12.8	108.7
		After Project	53.5	43.9	12.8	110.2
		% Variation	0.9	2.3	0.0	1.4
2	Pulses	Before Project	40.2	24.8	45.6	110.6
		After Project	39.2	26.3	48.5	114.0
		% Variation	-2.5	6.0	6.4	3.1
3	Vegetables	Before Project	18.7	12.8	18.8	50.3
		After Project	18.7	12.3	17.3	48.3
		% Variation	0.0	-3.9	-8.0	-4.0
4	Oil seeds	Before Project	6.0	1.5	3.9	11.4
		After Project	5.5	0.5	2.9	8.9
		% Variation	-8.3	-66.7	-25.6	-21.9

5	Cash Crops	Before Project	49.6	73.1	29.6	152.3
		After Project	47.6	68.6	30.3	146.5
		% Variation	-4.0	-6.2	2.4	-3.8
6	Ragi	Before Project	85.4	74.5	73.8	233.7
		After Project	80.9	73.0	79.7	233.6
		% Variation	-5.3	-2.0	8.0	0.0

4.4 Package of Practices for Millet Production

4.4.1 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 4.4, method of millet cultivation comprises of mono cropping, mixed cropping and intercropping. The prevalence of different methods of cultivation of different millets by the millet farmers are comparatively shown during pre and post project period. From previous analysis it is noted that ragi is the widely prevalent millet in the OMM areas of Rayagada district, so, the method of cultivation of ragi millet is discussed in this section. It is found that monocropping of ragi is widely practiced by the framers during pre-project as well as post project situation.

Table-4.4: Method of cultivation adopted by millet farmers (Mono crop, mixed crop and inter crop)

Sl.	Millet Varieties	Blocks	Pre-Project (No. of farmers)				Post-Project (No. of farmers)			
			Mono Crop	Mixed Crop	Inter crop	Total	Mono Crop	Mixed Crop	Inter crop	Total
1	Ragi	Gudari	79	-	-	79	79	0	0	79
		Gunupur	66	9	-	75	71	9	0	80
		Rayagada	80	-	-	80	80	0	0	80
		All Blocks	225	9	-	234	230	9	0	239

4.4.2 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 4.5, 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. From the following table, it is

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

evident that despite OMM efforts for promoting modern methods of cultivation, ragi farmers of Rayagada district are still adopting broadcasting method.

Table-4.5: Cultivation Practices

Sl.	Millet Varieties	Blocks	Pre-Project (No. of Farmers)					Post-Project (No. of farmers)				
			SMI	LT	LS	Broadcasting	Total	SMI	LT	LS	Broadcasting	Total
1	Ragi	Gudari	0	0	0	76	76	79	-	-	-	79
		Gunupur	0	0	0	80	80	80	-	-	-	80
		Rayagada	2	0	0	76	78	80	-	-	-	80
		All Blocks	2	0	0	232	234	**239**	**-**	**-**	**-**	**239**

4.4.3 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 4.6, it is evident that weeding practices for ragi during pre-project period was predominantly two times. However, during post project situation, farmers have been habituated with more than two times of weeding.

Table-4.6: Weeding practices followed for cultivating ragi millet in the project area

Sl.	Blocks	Pre-Project (No. of farmers)				Post-Project (No. of farmers)			
		One time	Two times	More than two times	Total	One time	Two times	More than two times	Total
1	Gudari	-	76	-	76	-	1	74	75
2	Gunupur	-	80	-	80	-	0	80	80
3	Rayagada	-	72	4	76	-	0	79	79
	All Blocks	-	231	4	235	**-**	1	233	234

4.5 Production Behaviour of Ragi 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. Production per farmer and production per acre of ragi cultivation in the district is found at 2 and 1.9 quintal respectively. The production behaviour and economics of all reported millets in the district compared to all Odisha situation is analysed in table 4.7, 4.8, 4.9 and 4.10.

Table-4.7: **Behaviour of millet production in Rayagada District (Pre-project)**

Sl.	Particulars	Ragi	Suan/Gurji	Kangu	Janha	Kodo	All millets
1	No. of farmer involved in millet cultivation	234	6		1	1	242
2	Area under millet cultivation (Acres)	234	7		1	3	244
3	Production /Farmer (Quintal)	2.0			2.0	5.3	2.0
4	Production /Acre (Quintal)	1.9			4.0	1.8	2.0

5	Total Sales Proceeds/Framer (Rs.)	1153	1380		581		1116
6	Total Sales Proceeds/ Acre (Rs.)	1155	2097		180	0	1106
7	Total Sales Proceeds/ Quintal of marketable surplus (Rs.)	1800	2076		360	0	1548
8	Total Cost/Farmer (Rs.)	2428	1790		867	945	1413
9	Total Cost/ Acre (Rs.)	2431	1968		1513	1649	1864
10	Total Cost/ Quintal of marketable surplus (Rs.)	3795	1295		4880		3280
11	Net income/ Framer	-1275	-410		-286	-945	-297
12	Net Income/ Acre	-1276	129		-1333	-1649	-758
13	Net Income / Quintal of marketable surplus	-1995	781		-4520	0	-1732

Table- 4.8: Behaviour of millet production in Rayagada district (post-project)

Sl.	Particulars	Ragi	Suan/Gurji	Kangu	Janha	Kodo	All millets
1	No. of farmer involved in millet cultivation	239	2		1	1	243
2	Area under millet cultivation (Acres)	234	2		1	3	239
3	Production /Farmer (Quintal)	5.6	1.2		1.5	0	5.5
4	Production /Acre (Quintal)	5.7	1.6		3.0	0	5.6
5	Total Sales Proceeds/Framer (Rs.)	16606	2256		2060	3601	16343
6	Total Sales Proceeds/ Acre (Rs.)	16990	3886		2575	4955	16610
7	Total Sales Proceeds/ Quintal of marketable surplus (Rs.)	2960	4646		5150	4990	3254
8	Total Cost/Farmer (Rs.)	5411	4708		2122	3995	3348
9	Total Cost/ Acre (Rs.)	5536	4816		3388	4279	4185
10	Total Cost/ Quintal of marketable surplus (Rs.)	1148	2537		2711	3109	1098
11	Net income/ Framer	11195	-2452		-62	-394	12995
12	Net Income/ Acre	11454	-930		-813	676	12425
13	Net Income / Quintal of marketable surplus	1812	2109		2439	1881	2156

Table- 4.9: Behaviour of millet production in the first phase OMM intervention area in State (First Phase intervention area covering 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/ Framer	-860	-410	4994	835	1147	-501
12	Net Income/ Acre	-945	129	1219	515	1016	-560
13	Net Income / Quintal of marketable surplus	-1568	781	1740	2250	1039	-1024

Table- 4.10: Behaviour of millet production in the first phase OMM intervention area in State (First Phase intervention area covering 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/ Framer	12174	-1825	1699	-28	-394	10759
12	Net Income/ Acre	13042	-485	-1669	334	676	11790
13	Net Income / Quintal of marketable surplus	1973	2109	-3210	4155	1881	2264

4.6 Varieties of Ragi Cultivated

Varieties of ragi cultivated in the OMM project area is highlighted in the following table 4.12. 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. Despite continuance of traditional varieties, ragi farmers in selected areas also undertake ragi cultivation by introducing improved varieties.

Table-4.12: Reported varieties of ragi seeds used in the OMM area

Sl.	Blocks	Varieties of seeds used by ragi farmers	
		Traditional Varieties	**Improved varieties**
1	Gunupur	Bada Mandia, Sana Mandia, Dushara, Telenga, Karkati	Nil
2	Rayagada	Bada Mandia, Sana Mandia, Dushara, Telenga, Karkati	Nil
3	Gudari	Bada Mandia, Sana Mandia, Dushara,	Nil

Concluding Remarks

The overall operation landholding among the millet farmers of Rayagada district is 2.8 acres. The same in Gudari, Gunupuru and Rayagada blocks are found at 3.1, 2.8 and 2.4 acres respectively. 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. Ragi is the only millet found in all OMM blocks which is practiced by good deal of farmers. Cultivation of other millets are very much sporadic, and few farmers do cultivate. The presence of suan, kodo and janha is very much insignificant as few farmers cultivate these crops. Overall, it is observed that at district level there is about 2.1 percent increase in the number of ragi farmers during post project period compared to pre project period. There has not been much change in the paddy and pulses areas under cultivation. During post project period, area under vegetable cultivation has dropped 4 percent. Similarly, the area under oil seeds and cash crops is decreased by 21.9 and 3.8 percent respectively. With respect to ragi cultivation, there has not been any change in the cultivated area being used by millet farmers for ragi cultivation. Method of millet cultivation comprises of mono cropping, mixed cropping, and intercropping. The prevalence of different methods of cultivation of different millets by the millet farmers are comparatively shown during pre and post project period. From previous analysis it is noted that ragi is the widely prevalent millet in the OMM areas of Rayagada district, so, the method of cultivation of ragi millet is discussed in this section. For all types of millets almost in all 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. It is evident that weeding practices for ragi during pre-project period was predominantly two times. However, during post project situation, farmers have been habituated with more than two times of weeding. Production per farmer and production per acre of ragi cultivation in the district is found at 2 and 1.9 quintal respectively. Despite continuance of traditional varieties, ragi farmers in selected areas also undertake ragi cultivation by introducing improved varieties.

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 so as 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 on the basis of household survey data obtained from 240 households in all of the programme districts. 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 on the basis 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, ragi was consumed by almost all households during pre-project period which has remained unchanged during the post project period also.

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

Blocks	No. of households consuming Millets					
	Pre- project period			Post-project period		
	Winter season	Rainy season	Summer season	Winter season	Rainy season	Summer season
Gunupur	80	80	80	80	80	80
Rayagada	79	80	80	79	80	80
Gudari	80	80	80	80	80	80
All Blocks	239	240	240	239	240	240
	% of households					
Gunupur	100.0	100.0	100.0	100.0	100.0	100.0
Rayagada	98.8	100.0	100.0	98.8	100.0	100.0
Gudari	100.0	100.0	100.0	100.0	100.0	100.0
All Blocks	99.6	100.0	100.0	99.6	100.0	100.0

5.2 Mean Consumption Pattern

The mean consumption pattern is analysed considering two indicators like mean 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 overall millet consumption per household during Summer, winter and rainy seasons is found at 0.505, 0,458 and 0.475 Kg during post project period registering a slight increase over pre project period.

[13] OMM Guidelines, 25.11.2016.

Table-5.2: Seasonality in average household consumption of millets

Sl.	Blocks	Millet Consumption per household (Kg)					
		Pre- project period			Post-project period		
		Summer season	Winter season	Rainy season	Summer season	Winter season	Rainy season
1	Gunupur	0.600	0.480	0.530	0.600	0.510	0.540
2	Rayagada	0.450	0.400	0.450	0.521	0.460	0.474
3	Gudari	0.483	0.425	0.450	0.488	0.456	0.466
	All Blocks	**0.494**	**0.402**	**0.437**	**0.505**	**0.458**	**0.475**

5.4 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 for which they purchase millets from the market. As per table 5.4, it is observed that number of households purchasing millet for domestic consumption in the district stood at 97.9 percent which has come down to 2.9 percent during post project period. The quantity of millet purchase per household during pre project period was 0.32 Quintal which is substantially increased during post project period. This type of increased purchase of millets during post project period is attributed to increased consumption habits for millets by the households.

Table-5.4: No of households purchasing millets from outside despite own production

Districts	No. of households' purchase millet for household use					Average quantity of millet purchased for household use (Quintal)		
	Pre-project period	% of HHs	Post-Project period	% of HHs	Total Households surveyed	Pre-project period	Post-Project period	% Deviation
Gudari	79	98.8	2	2.5	80	0.31	1.04	235.5
Gunupur	76	95.0	4	5.0	80	0.25	1.15	360.0
Rayagada	80	100.0	1	1.3	80	0.38	1.01	165.8
All blocks	235	97.9	7	2.9	240	0.32	1.03	221.9

5.5 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 wage good. However, during post project period owing to mainstreaming of PDS, households are found purchasing millets from PDS.

Table-5.5: Source for purchasing (procuring) by households

Sl.	Source for millet purchase	% of households purchasing millets from different sources during pre-project period	
		Rayagada	All districts
1	Local Market	5.8	4.6
2	Wage good	5.8	1.5
3	Barter	0.4	3
4	Received as gift from fellow relatives	0	0.4
5	Local market & PDS	2.5	4.7
6	Local Market & Wage good	79.6	83.3

7	Local Market and Barter	5.4	2
8	PDS and wage good	0	0.2
9	Wage good and barter	0.4	0.1
	Total	100	100
		% of households purchasing millets from different sources during post project period	
1	Local Market	14.3	9.8
2	PDS	0	86.2
3	Barter	14.3	0.6
4	Local market & PDS	0	0.8
5	Local Market & Wage good	71.4	1.8
6	PDS & Barter	0	0.7
	Total	100	100

Concluding Remarks

Ragi was consumed by almost all households during pre-project period which has remained unchanged during the post project period also. Overall millet consumption per household during Summer, winter and rainy seasons is found at 0.505, 0,458 and 0.475 Kg during post project period registering a slight increase over pre project period. Number of households purchasing millet for domestic consumption in the district stood at 97.9 percent which has come down to 2.9 percent during post project period. The quantity of millet purchase per household during pre-project period was 0.32 Quintal which is substantially increased during post project period. This type of increased purchase of millets during post project period is attributed to increased consumption habits for millets by the households. 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 about 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 district. 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 they cover a minimum distance of 2 Kms. and maximum distance of 15 Kms. 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

Sl.	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
1	Ragi	Soup, porridge, ladu, idli, pan cake, Pakoda	Ragi to ragi flour	About 10 percent of HHs doing ragi flour manually at home	Those 90 percent cover a distance of 2 -15 kms to access mills
2	Suan	Upma, khicdi,	De-husking for saun rice	All HHs do debussing manually through traditional means like dhenki.	Nil distance
3	Kangu	Khichidi	De-husking for kangu rice		
4	Janha	Muan (Ladu of puffed suan)	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 79.8 percent of surplus ragi surplus were sold through middlemen and now, during post project period, as maxim as 81 percent of surplus ragi are sold through Mandis. This is a remarkable achievement of OMM. Selling of surplus ragi at local haat was also a solid channel during pre-project period which is found of negligible relevance during post project period.

Table-6.2: Marketing of Ragi by different Marketing Channels

Sl.	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
7	Rayagada	-	0	0.0	100.0	0.0	0.0
	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					
7	Rayagada	98.9	0.0	1.1	0.0	0.0	0.0
	All districts	81.0	15.9	1.3	0.7	1.2	0.0

Concluding Remarks

The different food items prepared for millets are also discussed separately for all the district. 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 they cover a minimum distance of 2 Kms. and maximum distance of 15 Kms. 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 as a result of OMM intervention and training to millet farmers, slowly they have started value addition activities for the marketable surplus of millets. 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. 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 79.8 percent of surplus ragi surplus were sold through middlemen and now, during post project period, as maxim as 81 percent of surplus ragi are sold through Mandis. This is a remarkable achievement of OMM.

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			
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. → More numbers farmers are also mobilised for millet cultivation. → Framer are provided with due training and hand holding support for better and scientific cultivation of millets. → Framers' training on Best possible agronomic practices is promoted under OMM. → 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. → 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. → Tribals are mostly inhabited in dryland areas, so, millets are most suitable crops in these areas because of their drought resistant capacity and lower water intake. → Tribals are historically linked with millet cultivation. So, they	→ 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. → Due to diversification of food, people have increased preference for millets. → Govt has systematically emphasized the relevance and utility of millet	→ Now, people are used to modern methods of processing, previously it was labour intensive and cumbersome. So, OMM has also positively contributed to millet processing.	→ Previously, farmers were mainly selling millets to local middlemen, whereby they were exploited by price front. Now due to Govt. procurement of millets through mandi, there is better scope for

		are naturally advantageous to undertake millet cultivation.	consumption, for which more people are attracted for millet consumption.		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. → Most suitable crop in the rainfed areas. → 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. → Now, millets are distributed through PDS network for which millet consumption has increased. → 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. → Modern method of cultivation as provided under OMM is expected for further increase in millet productivity in the project area. → Govt incentive scheme has encouraged more number of	→ 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. → The food festivals and exhibitions have showcased millet based food and recipes at different district, block and state level . This has	→ 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 for different qualities of millets produced by them.

		farmers with increased area of millet cultivation in the project area.	contributed to increased millet consumption.		
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. → 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. → The management skills and other skill development programmes as provided to millet farmers have strengthened millet farmer's' confidence for millet production.	→ 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. → 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.
6	CRPs	→ The modern methods and equipments for agronomic	→ CRPs are also engaged in promoting diversified millet	→ There are local level evidences that	→ Due to the upsurge of millet

		practices, cultivation practices and weeding practices as provided under the OMM, have contributed to better millet production and productivity. → 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.	recipes at household level which is augmenting household millet consumption in the project area.	millets powders are found as essential ingredients of "Chhatua Powder".	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. → 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. → 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	→ By nature, millets are light foods, so, most often people engaged in	→ Most of the people are yet to be trained on the required	→ Govt. procurement of ragi is still limited and yet to be strengthened.

		modern methods of cultivation is yet to be full-fledged.	hard manual works, accord priority to heavy foods rather than millets.	specialised processing of millets.	
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 of millet farmers might have adopted non ragi millets. → 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.	→ 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 the same traditional millet-based recipes. → Millet recipes although introduced under ICDS and PDS, still it is optional, so consumption improvement is not getting broad-based.	→ 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.
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	→ There should be training on the preparation of dry foods from different types of millets. Rural women are acquainted	→ Electricity facility is not found in all of the villages. Sometimes, despite availability of electricity facility,	→ Farmers complain that there is payment delay by the Govt, when they sell their millets through mandis.

		further scope for promoting millets in the project area. → 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.	only with the preparation of traditional recipes.	people find it difficult to pay electricity bills every month. → Resultingly, even if millet processing units are found, it becomes very difficult to make regular functioning of millet processing machineries.	
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. → 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.	→ Millet is very much nutritious and hygienic food.	→ Ragi threshers and peelers supplied to SHGs will strengthen millet processing.	→ There is increased scope of marketing of millets domestically as well as internationally.

		So, there is good prospect of undertaking millet cultivation and substituting other crops by millets.		→ Pulverisers are likely to be provided through OMM will strengthen processing activities.	
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. → It can be a wholesome meal even without combining with other foods. → Its consumption can be any meal of the day or all the meals of the day.	→ 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.

			→ Millet is very much a flexible food.		
5	CBOs	→ Millet crops can be grown even in the sloppy terrains and hilly areas.	→ Millet is proven immunity booster food and during the time of ongoing Covid-19 pandemic, millet consumption has increased relevance.	→ Millet processing and value addition can enhance the value chain activity of millets and even the supply chain can be increased to the export market.	→ There is good chance of promoting skills for millet-based value 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	→ 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	→ 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.

		paddy lands for millet cultivation in Odisha.		flour. From marketing point of 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	

		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 OMM Outreach in the district

Average annual land area used for ragi cultivation is reduced by 21.30 percent in 2010s compared to 2000s in Rayagada district. However, diversion of ragi lands for other crops in Rayagada district is found almost like the overall situation of the state. In the case of small millets, in 2010s, there is decrease in land area under small millet cultivation. The average annual land area used for ragi and small millets cultivation in district as a percentage to respective state area is almost constant during both the decades. The yield rate of ragi in Rayagada district tends to decrease by 12.24 percent during 2010s compared to 2000s. During the corresponding period, at state level it has increased by 12.83 percent. The yield index of ragi in Rayagada district in comparison to state level performance of the same depicts higher status of the district in 2000s which has become lowered in 2010s. On the other hand, in the case of small millets, the yield index is declined in 2010s compared to 2000s. The decadal variation in ragi production in the district as well as the state is negative. However, the percentage fall in 2010s compared to 2000s in the district stands higher compared to all Odisha level. Percentage share of the district in the total ragi production of the district stood at 15.11 percent in 2000s which has slightly decreased to 11.37 percent in 2010s. Due to OMM intervention in the district, it is found that, OMM has covered four blocks in Rayagada district by the end of Kharif 2019-20. Cumulatively, in all these blocks, OMM outreach covers 139 GPs, 628 villages, 6145 farmers and 5784.94 hectares of land area under millet cultivation.

8.1.2 Socio Economic Characteristics of Millet Farmers

Almost all the farmers have joined into OMM in 2017-18 year only. Out of 240 registered millet farmers, 239 farmers have joined in 2017.18 and only one farmer is found joined in 2018-19. The farmers covered under OMM are predominantly ST farmers and overall ST farmers constitute around 91.7 percent and the remaining 8.3 percent are SC framers in the district. The average aga of millet farmers in Rayagada , Gunupur and Rayagada blocks are found at 47.5, 42.6 and 42.4 years respectively. Overall, about 55.4 percent of millet farmers of Rayagada district are males and the remaining 44.6 percent are females. Majority of millet farmers of Rayagada district are illiterates followed primary level of education. In percentage terms, out of the total registered millet farmers, as high as 87.9 percent are illiterates followed by primary level (7.9%), upto HSC standard (2.1%), and above HSC (1.3%). As high as 90 percent of the millet farmers in Rayagada district are small farmers followed by medium farmers. Marginally higher proportion of millet farmers of the district have semi pucca houses followed kuchha houses and pucca houses. The average family size at Gudari, Gunupur and Ragada blocks is found at 4.8, 5.8 and 5.2 respectively. The overall sex ratio among the millet households of the district is found 1087 implying that there is favourable sex ratio among the millet households.

8.1.3 Behaviour of Millet Production

The overall operation landholding among the millet farmers of Rayagada district is 2.8 acres. The same in Gudari, Gunupuru and Rayagada blocks are found at 3.1, 2.8 and 2.4 acres respectively. 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. Ragi is the only millet found in all OMM blocks which is practiced by good deal of farmers.

Cultivation of other millets are very much sporadic, and few farmers do cultivate. The presence of suan, kodo and janha is very much insignificant as few farmers cultivate these crops. Overall, it is observed that at district level there is about 2.1 percent increase in the number of ragi farmers during post project period compared to pre project period. There has not been much change in the paddy and pulses areas under cultivation. During post project period, area under vegetable cultivation has dropped 4 percent. Similarly, the area under oil seeds and cash crops is decreased by 21.9 and 3.8 percent respectively. With respect to ragi cultivation, there has not been any change in the cultivated area being used by millet farmers for ragi cultivation. Method of millet cultivation comprises of mono cropping, mixed cropping, and intercropping. The prevalence of different methods of cultivation of different millets by the millet farmers are comparatively shown during pre and post project period. From previous analysis it is noted that ragi is the widely prevalent millet in the OMM areas of Rayagada district, so, the method of cultivation of ragi millet is discussed in this section. For all types of millets almost in all 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. It is evident that weeding practices for ragi during pre-project period was predominantly two times. However, during post project situation, farmers have been habituated with more than two times of weeding. Production per farmer and production per acre of ragi cultivation in the district is found at 2 and 1.9 quintal respectively. Despite continuance of traditional varieties, ragi farmers in selected areas also undertake ragi cultivation by introducing improved varieties.

8.1.4 Behaviour of millet consumption

Ragi was consumed by almost all households during pre-project period which has remained unchanged during the post project period also. Overall millet consumption per household during Summer, winter and rainy seasons is found at 0.505, 0,458 and 0.475 Kg during post project period registering a slight increase over pre project period. Number of households purchasing millet for domestic consumption in the district stood at 97.9 percent which has come down to 2.9 percent during post project period. The quantity of millet purchase per household during pre-project period was 0.32 Quintal which is substantially increased during post project period. This type of increased purchase of millets during post project period is attributed to increased consumption habits for millets by the households. During post project period owing to mainstreaming of PDS, households are found purchasing millets from PDS.

8.1.5 Behaviour of Millet marketing and Processing

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 they cover a minimum distance of 2 Kms. and maximum distance of 15 Kms. 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 as a result of OMM intervention and training to millet farmers, slowly they have started value addition activities for the marketable surplus of millets. 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. 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 79.8 percent of surplus ragi surplus were sold through middlemen and now, during post project period, as maxim as 81 percent of surplus ragi are sold through Mandis. This is a remarkable achievement of OMM.

8.2 Way Forward

- → 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.