CHANGE DETECTION STUDY ON

MILLETS BASED FOOD HABITS OF TRIBAL PEOPLE IN ODISHA

NOV - 2023

STUDY BY:

Scheduled Castes and Scheduled Tribes Research & Training Institute (SCSTRTI)

ST & SC Development, Minorities & Backward Classes Welfare Department



WITH SUPPORT FROM

Department of Agriculture & Farmers' Empowerment
Government of Odisha

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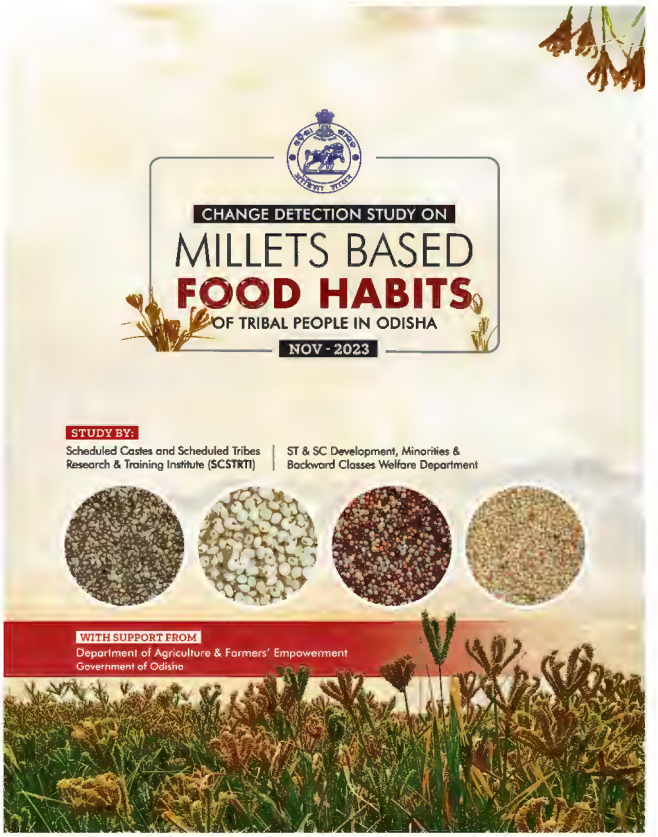
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Indramani Tripathy, IAS
Director, SCSTRTI
Government of Odisha

FOREWORD

Millets were among the first crops to be cultivated by mankind and were once a pivotal source of food for the human civilization. While these ancient grains took a backseat amongst the post green revolution staples, there is an urgent need to revive these superfood millets across the globe owing to their nutrition content and ability to grow in harsh climates. As the largest producer of millets, India has taken the leadership role in reviving millets - which are good for health, good for farmers and great for the planet.

Traditionally the highly nutritious Millets formed a substantial part of the diets and cropping system in the tribal areas of Odisha. Millets are superfood with abundant nutritional benefits, require less water and more resilient to climate vulnerability. In the past, Millets used to be the staple food of tribal communities in Odisha, but with paddy gaining prominence in the Public Distribution System (PDS) it has led to reduction in consumption of millets among the tribal communities of Odisha.

The Special Programme for Promotion of Millets in Tribal Areas of Odisha (Odisha Millets Mission) was launched by Govt of Odisha in 2017 to revive millets in farms and on plates, has set milestones in not only reviving the millets but Odisha has taken strides to empower tribal farmers to revalorise and create an enabling ecosystem to assert the value of these ancient grains that have been part of the human food system since time immemorial.

The Change Detection Study on Millet Based Food Habits of Tribal People in Odisha has been undertaken by SCSTRTI, ST & SC Development, M & BCW Department with support from Department of Agriculture & Farmers' Empowerment, Government of Odisha with an objective to understand different factors responsible for change in millet-based food habits of tribals and how it has influenced production and land use practices. The study has documented the different millet consumption practices and traditional recipes in tribal communities which indicate that millets have always been a part of the culture of the tribal society.

I hope this study report will serve as a handy guide for policy makers for formulating plans and policies relating to revival of the superfood in the food habits of Tribal people as well as other communities in Odisha.

I extend my thanks to the domain experts Ms. Sweta Mishra and Dr. Mihir Kumar Jena for their technical support and the research team Mr. Uttam Kumar Sahoo, Assistant Director, SCSTRTI, Mr. P. K. Rath, Consultant, Miss Ipsita Mohalik, Research Associate, Mr. Harihar Mishra, Mr. Nrusingha Charan Sen, Mr. Benudhar Mahapatra, Research Assistants, Miss Anuradha Behera, Data Analyst for their dedication and hard labour for preparation of this report.

ABBREVIATIONS

AAO	Assistant Agriculture Officer
Ac	Acre
ADO	Agriculture District Officer
AL	Agricultural Labour
ATMA	Agriculture Technology Management Agency
AWC	Anganwadi Centre
BAO	Block Agriculture Officer
BC	Before Christ
BPC	Block Programme Coordinator
CBO	Community Based Organisations
CDAO	Chief District Agriculture Officer
CRP	Community resource Person
CSD	Community Seed Centre
DAFE	Department of Agricultre & Farmer's Empowerment
DPC	District Programme Coordinator
DS	Direct Sowing
FA	Facilitating Agency
FAO	Food &Agriculture Organization
FAQ	Fair Average Quality
FGD	Focus Group Discussion
FPG	Farmer's Producers Group
FIAC	Farmer's Information and Advisory Centre
FPO	Farmer's Producers Organization
FRAL	Forest Right Act Land
FYM	Farm Yard Manure
GP	Gram Panchayat
GT	Germination Test
GDDP	Gross District Domestic Product
Hac	Hectares
HHC	House Hold Consumption
HHs	House Holds
HYV	High Yielding Varieties
ITDA	Integrated Tribal Developmant Agency
IYOM	International Year of Millets
JDA	Joint Director of Agriculture
Kg	Kilogram
KMS	Kharif Marketing Season
KVK	Krushi Vigyan Kendra
LAMPCS	Large sized Agriculture Multipurpose Cooperative Society
LS	Line Sowing

LT	Line Transplanting
MDM	Mid Day Meal
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MSP	Minimum Support Price
NCDS	Nabakrushna Choudhury Centre for Development Studies
NFSA	National Food Security Act
NDDP	Net District Domestic Product
NFSM	National Food Security Mission
Nos	Numbers
OLM	Odisha Livelihood Mission
OM	Organic Manure
OMM	Odisha Millets Mission
OPELIP	Odisha PVTG Empowerment Livelihoods Improvement Programme
ORMAS	Odisha Rural Development and Marketing Society
OTELIP	Odisha Tribal Empowerment and Livelihood Programmee
PACS	Primary Agriculture Co-operatives Society
PC	Project Coordinator
PD	Project Director
PDS	Public Distribution System
PVTG	Particularly Vulnerable Tribal Groups
Qtl	Quintal
RRAN	Revitalizing Rainfed Area Network
SC	Scheduled Caste
SCSTRTI	Schedule Castes and Scheduled Tribes Research and Training Institute
SMI	System of Millet Intensification
ST	Scheduled Tribes
TDCOL	Tribal Development Corporation Limited
UNGA	United National General Assembly
USDA	United States Department of Agriculture
WAP	World Agricultural Production
WASSAN	Watershed Support Services and Activities Network
WEF	With Effect From
WSHG	Women Self Help Group



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EXECUTIVE SUMMARY

Background

Millets are nutritionally superior to most other cereals, making them a favorable crop to address the prevalence of malnutrition in tribal areas. Traditionally, millets have been a major staple food for tribals and significantly address food scarcity during lean season when there is no agricultural harvesting crop on farm. The method of traditional millet recipes is easy to cook, mainly in the form of gruels, and occasionally as a mixture with few other vegetables, pulses and spice ingredients.

Millets are generally considered 'tribals' crops or crops grown in tribal areas. Millets are important from the point of view of food, nutrition and economy of the tribal communities. Also, millets being a major crop grown in tribal areas deserve special attention in research and documentation especially given the millets' relationship with tribal culture, food habit, agro-ecosystems and agronomic practices.

However, with the introduction of mono-cropping, easy availability of rice under PDS and influence of changing food culture there has been rapid decline of millet cultivation and production leading to reduced millet availability for household consumption.

Odisha Millets Mission (OMM) also known as the Special Programme for Promotion of Millets in Tribal Areas of Odisha was launched by the Government of Odisha in 2017 to revive millets in farms and on plates. The aim is to tackle malnutrition by introducing millets in the public distribution system (PDS) and other state nutrition schemes.

The "Change Detection Study on Millet Based Food Habits of Tribal People in Odisha" has been undertaken by SCSTRTI, ST & SC Development, M & BCW Department with support from Department of Agriculture and Farmers' Empowerment, Government of Odisha to document the changes in the millet-based food habits of the tribal people and to understand different factors responsible for change in millet-based food and how it has influenced production and land use practices. The study aims to document the different millet consumption practices and traditional recipes in tribal communities (staple/ supplementary/ ritual food/ beverages) which have always been a part of the culture of the tribal society. It is intended that the findings of the study will help in revival of the millets, widely consumed in the tribal belts and other parts of Odisha traditionally, in farm and plates.

Objectives

This research project has been designed for the first time to explore and know the millet- based food habits of the tribal people of Odisha. The study aims to understand and document the production and consumption of millets, change in millet-based food practices among the tribal communities of Odisha, their daily food habits, traditional millet-based foods, their recipes and methods of cooking.

The key objectives of the study are:

- To study the millet-based food habits of tribal communities in Odisha.
- Assess factors responsible for changes in millet food habit and the consequences thereof on tribal food security.
- Document millet consumption practices and traditional millet recipes of tribal communities.
- To study the factors responsible for change in millet-based food habit of tribal communities in Odisha.
- To study the present status of millet cultivation & production of different varieties of millet in their areas.

Methodology

The study has adopted both exploratory and explanatory methods. In order to have a detail description of this research, the exploratory methods have been adopted with a structured questionnaire on millet consumption patterns, indigenous recipes prepared, cultivation practices, production status, scope of marketing followed by the socio-economic information collection of the respondents.

Similarly, for data collection both qualitative & quantitative approach were used. Individual interviews with households were conducted to get information on change in millet-based food habits & different types of recipes prepared & consumed. Interaction was done with officials & other related stake holders on millet based food habits, area, production, value addition, consumption & marketing system. Focus group discussions were conducted among the different age groups and gender to understand the changing habits of millet consumption among tribal families.

Universe of the Study & sample

The study area has been selected based on the following criteria:

- Tribal dominated districts and has the presence of Particularly Vulnerable Tribal Groups (PVTG)
- Districts having Integrated Tribal Development Authority (ITDA) implementation
- Districts with Intervention of Odisha Millet Mission (OMM)
- Districts having millet cultivation practice and consumption, productivity of millet is high in the district with a scope for future enhancement of millet produce

Based on the above criteria the following 6 districts were identified for the purpose of the study-

1. Malkangiri
2. Koraput
3. Rayagada
4. Kandhamal
5. Mayurbhanj
6. Keonjhar

Selection of Blocks and Gram Panchayats (GPs)

Selection of Blocks and GPs for the study were done based of the following criteria:

- Blocks with concentration of tribal population
- Tribal Sub Plan Blocks (Integrated Tribal Development Agency (ITDA) Blocks
- Blocks covered under OMM.

Selection of Villages & Households

- HH samples were covered using purposive random sampling method
- 50 HHs per Block were covered. A total number of 644 numbers of HHs has been covered for this study.

Key Findings

- Millets are grown in Dongar or uplands in tribal districts of Odisha. Ragi (Mandia) is the dominant millet among all Millets under cutivation. Popular local ragi varieties cultivated are Sana Mandia, Bada Mandia and Dushara Mandia. Other millets under cultivation are suan, koda, kangu,janha, bajra and small millets.
- Millets are grown in marginal, rain fed areas of tribal districts in Odisha. Before sowing tribal people observe Bihan Puja. During Bihan Puja different seeds of millets are offered to their god and they pray for a good harvest during the season.
- Crop season for cultivation of millet is kharif i.e period from 15th June to end of September. Almost all millets are harvested by end of September or may be extended up to 15th October. Millets are grown both as pure crop and mixed cropping with oilseeds, pulses, cotton and vegetables.
- Millets have a significant cultural association in the lives of many tribal communities in Odisha. Various festivals and rituals are associated with millets, celebrating their importance in these communities. These festivals and rituals highlight the cultural significance of millets in the lives of tribal communities in Odisha. They serve to preserve traditional agricultural practices, strengthen community bonds, and express gratitude to the deities for the sustenance provided by millets and other crops. Few noted tribal festivals and rituals connected to millets in Odisha are:
    - **Seed Sowing Rituals**: Several tribal communities in Odisha perform seed sowing rituals during the agricultural season, including millet planting. These rituals are considered sacred and are aimed at seeking blessings from deities for a bountiful harvest.
    - **Millet Harvest Celebrations**: When millets are ready for harvest, many tribal communities organize special celebrations to mark the occasion. These celebrations often involve

singing, dancing, and offering gratitude to the deities for a successful harvest. Millet-based dishes are prepared and shared during these festivities.

- **Wedding Ceremonies**: Millets often play a role in tribal wedding ceremonies. In some communities, millets, especially finger millet (ragi), are considered auspicious, and they are used in rituals and offerings during the marriage ceremonies.

- **Thanksgiving Rituals**: Many tribal communities have thanksgiving rituals or ceremonies when the harvest season comes to an end. These rituals involve expressing gratitude to the gods for the successful cultivation of millets and other crops. Millet-based dishes are an integral part of these ceremonies.

- Millet foods are associated with tribal culture and tradition. Tribal communities prefer to consume indigenous recipes like Jau, Peja, Tampa, Anda, Kheeri. They also prepare Landa and Koiri from sprouted ragi seeds as beverages. They offer different recipes of millets and beverages to their god and spirits during different rituals. They drink beverages with their community people during social functions. These millet-based beverages are often prepared during special occasions, rituals, and festivals and are integral to the cultural and culinary heritage of the tribes in Odisha. They showcase the resourcefulness and creativity of these communities in utilizing locally available ingredients, including millets, to make unique and refreshing drinks.

- Some of the millet based recepies prepared by tribal communities are mentioned below:

  - **Ragi based reciepes**: The tribal communities prepare different recipes mainly using Ragi (Mandia) such as Ragi Laddu, Ragi Namkeen, Ragi Mudki, Mandia Tea, Mandia Peja, Mandia Anda, Mandia Chakuli, Mandia Kakara & Ragi Pakoda

  - **Manduru**: The Bonda tribal community of Malkanigri, Odisha prepare a recipe named as "Manduru" which is prepared using Ragi Powder, Roasted Alsi seeds, Salt and Green chilliy

  - **Suan Muan and Suan Khiri**: In Keonjhar district, the Santala tribal community prepares "Suan Muan" and "Suan Khiri" using Suan, Jaggery, Milk.

  - **Cakes**: Some millet varieties, such as pearl millet and finger millet, are commonly used to make cakes.

- **Porridge**: Millets are often used to make creamy and nutritious porridge. To make porridge millet or millet flour is cooked with more water than usual, sometimes maize, pulses, rice etc are added to it.

- Tribal communities in Odisha have developed various traditional beverages based on millets. These millet-based beverages are not only a source of refreshment but also hold cultural significance. Few examples of millet-based beverages made by tribes in Odisha are presented below.

    - **Kodo Pani**: Kodo pani is a traditional millet-based beverage made from kodo millet. The Koya tribe in Odisha often prepares this drink. It is consumed during festive occasions and as part of their cultural traditions.

    - **Ragi Ambil**: The Kondh tribe in Odisha makes a beverage called ragi ambil from finger millet (ragi). It is considered a nutritious and refreshing drink during hot weather.

    - **Chaula Pani**: This drink is made from rice, including millet varieties like finger millet (ragi), by the Kondh and other tribes in Odisha.

    - **Madhu Pani**: The Koya tribe prepares madhu pani using various ingredients, including millets, to create a sweet and mildly alcoholic beverage. The specific millet used can vary, and the drink is often consumed during celebrations.

    - **Mahua-based Millet Brews**: Mahua, a flowering tree native to India, is used by several tribal communities to prepare alcoholic brews. These brews are often mixed with millets and allowed to ferment, creating traditional beverages with varying degrees of alcohol content.

    - **Millet Porridge**: While not a traditional "beverage" in the conventional sense, millet-based porridge is commonly consumed by tribal communities in Odisha.

    - **Mandia Landa**: The Paraja, Bonda, Kondh and other tribes in Southern Odisha are very fond of Mandia Landa (Finger Millet Beer).

    - **Katul/ Kena**: Katul is a special type of alcoholic beverage prepared by Kutia Kondh out of little millet. It is a festival drink, sometimes also prepared on the occasion of marriage ceremony.

- Millets have a place not only in the tribal diet but also in traditional medicine. Some rituals and festivals are centered around the use of millets as a remedy for various health issues or as a preventive measure

- Post green revolution period millets became supplementary food in most of the tribal families which was staple food earlier. Due to easy availability of rice through different government supported schemes, better economic condition and influence of urban food culture resulted reduction in quantum of millet consumption among tribal communities.

- The millet areas under cultivation are gradually been occupied by different cash crops cultivated under diversification of Crops.

- With the proactive initiatives taken by the Government of Odisha under Odisha Millet Mission, Millets are once again gaining prominence.

- To revive millets as "Nutri-Cereals" in the state, OMM has prioritised creating awareness about production, productivity, consumption and marketing of millet produce and including millets in the state nutrition programme

- Productivity of millets are increasing by using high yielding local varieties and adopting different recommended agronomic practices.

- Procurement of Millets (esp Ragi) is done at MSP by the Government of Odisha due to which farmers are able to sell their products at a fair price. WSHG, FPOs are also being supported for mechanized threshing and processing of Ragi

- Millet tiffin centres have been set up in rural areas to create a demand for millet recipes and ensure access to diet diversity that is locally acceptable and highly nutritious. The WSHGs entirely manage these centres with the logistics support from Odisha Millet Mission.

Challenges Faced

Despite the rich history and cultural significance of millets in tribal communities, these grains face several challenges. Modernization and urbanization are leading to changes in dietary preferences, and many tribal members are shifting towards processed and non-traditional foods. This trend can lead to the erosion of traditional dietary and farming practices. Additionally, the lack of market access and limited infrastructure for millet processing and distribution pose challenges for tribal farmers looking to commercialize their produce.

Way Forward

Adequate Public Support:
Small farmers in hilly regions and dryland plains who are among the poorest households in rural Odisha and other parts of the country will cultivate millets only if it gives them good returns. Adequate public support can make millet cultivation profitable, ensure supply for the PDS, and, ultimately, provide nutritional benefits to a wide section of the population.

Awareness and Education:
Lack of awareness about millets and their health benefits can be addressed through education and promotion.

Availability and Accessibility:
Improving the availability of millets in markets and making them more accessible to consumers can encourage consumption.

Affordability:
Millets are often more expensive than other staple grains, making them less accessible to low-income consumers. Addressing affordability through government subsidies or market interventions can increase consumption.

Changing Perception:
The perception of millets as a poor man's food needs to be changed through marketing and promotion.

Processing and Value-added Products:
Improving processing techniques and increasing the availability of value-added millet-based products can make them more appealing to consumers.

Collaboration:
Collaboration between farmers, processors, and marketers can help increase the supply and demand of millets.





Women farmers observing crop condition on their way after collecting forest daily products for daily needs Village - Kupuliguda, GP-Kollar Block-Baipariguda, District - Koraput





Kamakala Bhumia happy to see the standing Ragi Crop - Village- Kupuliguda, GP-Kollar Block-Baipariguda, District - Koraput



Ragi cultivation at Village Deoghar GP – Belghar Block– Tumudibandh Dist - Kandhamal

CHAPTER - 1

INTRODUCTION



Spikelets of Finger Millet in the field–
Village- Kupuliguda, GP-Kollar Block-Baipariguda, District – Koraput



Barnyard Millet
in the Field,
Village -Kupuligida
GP- Kollar
Block- Baipariguda
Dist- Koraput.





Bonda women farmers in Ragi field: A happy moment -
Village – Padeiguda, GP- Mudulipada Block - Khairiput, District- Malkangiri

Millets are important crops in the semiarid tropics of Asia and Africa with 97% of millet production in developing countries. This crop is favoured due to its productivity and short growing season under dry, high-temperature conditions. In India and other Asian and African countries, Millets play a significant role in the human diet; as one of the most important drought resistant crops. Millets constitute a major source of carbohydrates and proteins for people living in these areas worldwide, especially for the poorest people who live in arid and semi- arid regions.

In the 21st century, climate change, water scarcity, increasing world population, rise in food prices and other aspects has impacted the food security in the context of Global Scenario of Millets according to Food & Agriculture Organization (FAO). Millets are one of the most important drought-resistant crops and the 6th cereal crop in terms of World Agriculture Production (WAP). Also, millet has resistance to pests and diseases, short growing season, and give better productivity under drought conditions, compared to major cereals. Millets increase soil fertility, consume less water and have a high

nutritional value. Millets can adapt to temperature changes, moisture-regimes and input conditions. Millet farmers do not burden the state demanding irrigation or power, and that makes them the Smart Food producer. The Lancet Commission recognizes the need for identifying healthy and environmentally sustainable diets and enhanced usage of under used plant species, such as quinoa, millets, sorghum, or teff grains, due to their climate resilience and dense nutritional content.

Millets are recognized for their resilience, ability to survive under high temperatures and in degraded soils, and minimum requirements of water, pesticides, and fertilizers for crop production. Due to their short growing season, millets can develop from seeds to ready to harvest crops in just about 65 days. This highly beneficial characteristic of the millets is of vital importance in thickly populated regions of the world. If stored properly, millets can keep well for two years or beyond. Millets can not only grow in poor climatic or soil conditions and provide nutritious grain as well as fodder, but these can also very well fit into multiple cropping systems under irrigation as well as dryland farming due to their short growing season.

Millets help small farmers with efficient crop rotation as millets need only 60–90 days to mature while rice takes 100–140 days. Millets are considered as Resource Efficient crop as they are efficient in utilizing the available nutrients and also respond well for improved farm conditions and additional application of inputs, and result in increased yields up to 3 folds. Millets are the most secure crops to small farmers as they are the hardiest, resilient and climate adaptable crops in harsh hot (up to 64 degrees Celsius) and drought environments. They are often the last standing crops in drought seasons and will be the sustainable future food source amidst worsening climatic conditions.

The prolonged and easy storability of millets under ordinary conditions has given them the status of Famine Reserves and this feature is of great importance for India, as the agriculture of our country suffers from unexpected changes in monsoon.

Millets types cultivated in the World:

Millets are native species indigenous to a given region or ecosystem in many parts of the world as they justify their presence in that region as the result of only local natural evolution. The most widely grown millets worldwide are pearl millet (Pennisetum glaucum), finger millet (Eleusine coracana), kodo millet (Paspalum setaceum), proso millet (Penicum miliaceum), foxtail millet (Setaria italic), little millet (Panicum sumatrense), barnyard millet (Echinochloa utilis). They are known as coarse cereals beside maize (Zea mays), sorghum (Sorghum bicolor), oats (Avena sativa), and barley (Hordeum vulgare) (Bouis, Kaur and others 2000).

Millets may have been consumed by humans for about 7,000 years and potentially had "a pivotal role in the rise of multi-crop agriculture and settled farming societies" (Cherfas, 2015)

Millet Varieties

Literatures on millets provide to understand how different cultures in the world domesticated the millets from wild, cultivated them, propagated them and made millets ingrained in their cultural attributes. Millets belong to the grass family, botanically the Poaceae family. They have been cultivated for thousands of years and are widely consumed in many parts of the world, especially in Africa and Asia. There are several different types of millets, each with its unique characteristics and culinary uses. Tracing from many historical and scientific literature the history of cultivation and culinary traditions of some most common types may be described as below:

Pearl Millet (Pennisetum glaucum): Pearl millet is one of the most widely grown millet varieties. It is known for its large, round grains. This millet is commonly cultivated in arid and semi-arid regions of Africa and India. It is often ground into flour and used to make unleavened bread, porridge, and traditional beverages.

Finger Millet (Eleusine coracana): Finger millet, popularly known as ragi, is an annual crop grown abundantly in India, Sri Lanka, and Ethiopia. This superfood is packed with nutrients that enhance digestion, slow ageing, and reduce the risk of heart disease. As the popularity of wheat and rice increased over the years, ragi, which ruled the Indian kitchens for 2000 years, became less popular. It is a highly nutritious millet variety. It is rich in calcium and iron and is a staple food in parts of India and Africa. Finger millet is often used to make porridge, flatbreads, and even fermented products like idlis and dosas.

Foxtail Millet (Setaria italica): Foxtail millet has its root in India and Northern China, where it is cultivated in abundance. The millet is known for its small, fox-tail-shaped grains. It is a drought-tolerant crop and is cultivated in many parts of Asia. In India, this crop is grown in some northeast states along with Maharashtra, Tamil Nadu, Andhra Pradesh, Rajasthan, Telangana, Tamil Nadu, Uttar Pradesh, Madhya Pradesh, and Karnataka. It is widely known that the ancient Ayurvedic text Mahodadhi, written by Sushena, mentions foxtail millet as sweet and astringent grains helpful in increasing Vata Dosha and balancing Kapha, Pitta, and blood vessels. It is versatile and can be used to prepare dishes like upma, pulao, dosa, and idli.

Proso Millet (Panicum miliaceum): Proso millet is primarily grown in the United States, Russia, and China. It has small, round grains that can be white, yellow, or red. Proso millet is often used in the production of birdseed but can also be used to make human food products like porridge, bread, and various dishes.

Little Millet (Panicum sumatrense): Little millet, as the name suggests, has small grains. In India, this crop is grown in some northeast states along with Maharashtra, Tamil Nadu, Andhra Pradesh, Rajasthan, Telangana, Tamil Nadu, Uttar Pradesh, Madhya Pradesh, and Karnataka. It is widely known that the ancient Ayurvedic text Mahodadhi, written by Sushena, mentions foxtail millet as sweet and astringent grains helpful in increasing Vata Dosha and balancing Kapha, Pitta, and blood vessels. It is rich in dietary fiber and is often used to make upma, idlis, and dosas. Due to its nutritional value and versatility, it is gaining popularity in modern diets.

Barnyard Millet (Echinochloa esculenta): Barnyard millet is known for its fast growth and short cultivation period. Produced naturally in

Uttarakhand, barnyard millet is rich in fibre, carbs, and protein, so if you are thinking of losing weight, including this grain in your diet is a great head start. Moreover, it is also an excellent source of phosphorous and calcium, that is great for building bones. It is a staple in parts of India and is used to make dishes like porridge, upma, and idlis.

Kodo Millet (Paspalum scrobiculatum): Kodo millet strengthens the nervous system. It is high in lecithin and is easily digestible. In ancient Ayurveda, kodo millet was used for medicinal, culinary, and therapeutic practices to heal wounds faster and beat fatigue. It is cold in nature; hence, it increases your Vata Dosha and balances your Kapha and Pitta Doshas. Kodo millet is another nutritious variety with a nutty flavor. It is cultivated in India and is used to make various dishes, including rice replacements, porridge, and baked goods.

Amaranth (Amaranthus spp.): Although not a true millet, also called pseudo millet, amaranth is often grouped with millets due to its similar nutritional profile and uses. It is rich in protein and contains essential amino acids. Amaranth is used in various dishes, including porridge, soups, and salads.

Amaranth millet, or rajgira (royal grain) or Ramdana (God's grain), is a popular aspect of the Hindu fasting rituals and a part of the religious ceremonies. People who fast during Navratri and Ganesh Chaturthi replace grains with this millet in their diet. The farmers of India consider this a holy gift from the Gods, and hence it is also labelled as Ramdana. From sweet dishes like laddoo, kheer, halwa, and chikki to savoury puris and parathas, rajgira can be converted into various dishes and is considered versatile.

Teff (Eragrostis tef): Teff is a tiny millet with a high nutritional value and is the primary ingredient in the Ethiopian and Eritrean staple called injera, a sourdough flatbread. It is also used to make porridge and other dishes.



Millets in India:

Millets are one of the oldest foods, these are the small-seeded hardy crops which can grow well in dry zones or rain-fed areas under marginal conditions of soil fertility and moisture. There is evidence of the cultivation of millet in the Korean Peninsula dating 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 was very common, pre-dating to the Indian Bronze Age (4,500BC). Even until 50 years ago millets was the major grain grown in India. From a staple food and integral part of local food cultures, just like many other things, millets have come to be looked down upon by modern urban consumers as "coarse grains".

Consumption of Millet in Indus Valley Civilisation[1]

Indus Valley was a Bronze Age civilisation, which flourished in a large area of the north-western part of the Indian Subcontinent between 3000 and 1400 BCE. Archaeobotanical investigations have revealed a substantial quantity of both sorghum and little millet from various archaeological sites of the Indus Valley Civilisation.

Sorghum millet has been reported from the early Harappan level (3000 – 2500 BCE) at Kunal and Banawali, mature Harappan level (2500 – 2000 BCE) at Banawali and Rohira, and late Harappan level (2000 – 1400 BCE) at Mahorama, Hulas, Sanghol, and Pirak.

Little millet has been reported from all phases of Harappan culture in the core region of the civilisation. Likewise, other varieties of millet including pearl millet, finger millet, Italian millet, and foxtail millet have also been reported from various Indus Valley sites. Though millet was reported from the early phases of Indus Valley Civilisation, its consumption increased towards the later period thus confirming the shifting of food culture from rain-fed to drought resilience. It is established that the erratic behaviour of the Indian monsoon in the middle of the 2nd millennium BCE was one of the major factors for the decline of the Indus Valley Civilisation.

The Northern Vindhyan Plateau

The Northern Vindhyan Plateau is situated in the north-central part of the Subcontinent in the states of Madhya Pradesh and Uttar Pradesh. This hilly tract is characterized by rugged topography of hills and plateaus. The undulating plateau gradually merges at many places with the plains of the Gangetic Valley in the north. The plateau enjoys a transitional climate between the maritime climate of the east and the tropical continental dry climate of the west.

1. Jena, M. K., Mishra , J., & Ota, B. A. (2022, June). Tracing our Millets: History, Archaeology, Cultures and Conservation. ADIVASI 62 (1), 1-15

Neolithic sites excavated in the plateau are Koldhihwa, Mahagara, and Pachoch in the Belan Valley, Indari in the Adwa Valley, and Kunjhum in the Son Valley. Though rice was widely consumed in the region, the neolithic community also subsisted upon little millets. Evidence of little millet has been reported from Koldihwa.

South Indian Neolithic Culture

In and around the granite hills of South India, neolithic culture was well-evolved. In the southern neolithic sites, mostly in Karnataka and Telangana, groups of village-based farmers grew dry farmed millets, both introduced and locally domesticated. The later phase of the Neolithic Period saw a significant innovation in crop regimes. Both domesticated finger millet and imported sorghum and pearl millet from Africa were introduced. The evidence establishes that the neolithic farmers of South India were actively experimenting with plants and animals including millet.

In India, millets play an important role in rainfed regions which contribute to 60% of the total area. India is the largest producer of millet in the world with around 19% of global share in production (2022). In the year 2022, India produced 17.60 Mn MT[2] of millets that included 4.40 Mn MT of sorghum and 13.20 Mn MT of other millets. The per capita consumption of millets has dropped drastically from 30.94 kg/annum in the year 1960 to 3.87 kg/annum in 2022[3].

In India varieties of millets are grown suiting to different Agro climatic conditions. They include Sorghum, Pearl millet, Finger millet & Small Millets like Barnyard millet, Proso millet, Kodo millet, Little Millet & Foxtail millet. Traditionally Millets were produced extensively in the country & had almost equal area coverage to Rice & Wheat. India is the leading producer and consumer of different types of Millets; such as finger millet, pearl millet, kodo millet, foxtail millet, barnyard millet, proso millet, and little millet. However, the post Green Revolution period witnessed a drastic decline in the area under cultivation of Nutri-Cereals. The annual per ca-pita intake of sorghum at the National level decreased drastically from 8.5 kg to 1.58 kg in urban areas and by 19.2 kg to 2.424 kg in rural areas between the Year 1972-73 and 2011-12; while pearl millet intake also declined rapidly from 11.5 kg to 0.97 kg in rural areas and from 4 kg to 2.82 kg in urban areas. (Rao et. All 2009)

2. USDA

3. Indexmundi & YES Bank Analysis {Reduction factor includes increase in population and increase in utilization of millets into seed and industry under FSI (Food, Seed & Industry) segment consumption.}

Table – 1 Different types of Millets grown in India

Millets in India		
Millets [4] **(Botanical Names)**	**Common Names**	**Characteri stics/Nutirtional facts**
Eleusine coracana	Ragi, Finger millet	Finger Millet is a staple that is a very good substitute for oats and cereals. It is nutritionally superior to rice and wheat due to high amount of dietary fibers, iron, zinc, Ca, phosphorus, potassium, vitamin B, and essential amino acids (Parameswaran and Sadasivam, 1994).
Panicum miliaceum	Proso millet, broomcorn millet, hog millet, white millet	Proso millet is rich in minerals, dietary fiber, polyphenols, vitamins and proteins. High lecith in which supports the neural health system. It has a low glycemic index and reduces the risk of type-2 diabetes. (Das, et.al. 2019)
Panicum sumatrense	Little millet	Loaded with iron and fibre. Known for several health benefits due to the presence of bioactive nutraceuticals such as phenolic compounds, gamma-aminobutyric acid (GABA), carotenoids, and tocopherols (Guha, et.al. 2015)
Pennisetum glaucum	Pearl millet, Bajra	High source of proteins. Pearl millet has high nutritional value in terms of high level s of energy, dietary fibre, proteins with a balanced amino acid profile, many essential minerals, some vitamins, and antioxidants (Jukanti, et.al. 2016).
Setariaitalica	Foxtail millet, Italian millet	Rich in minerals and vitamins. Its grains contain a comparatively higher amount of essential amino acids, proteins, important nutritional elements like potassium, calcium, zinc, iron, phosphorous, vitamin B, etc. (Bandyopadhyay et al., 2017b).
Echinochloa frumentacea	Indian barnyard millet	Nutritionally, it i s a decent source of protein, which is profoundly absorbable and is an amazing source of dietary fibre. Can be suggested for the patients with cardiovascular sickness and diabetes mellitus. (Rao et al.,
Echinochloa crus-galli	Common barnyard millet	

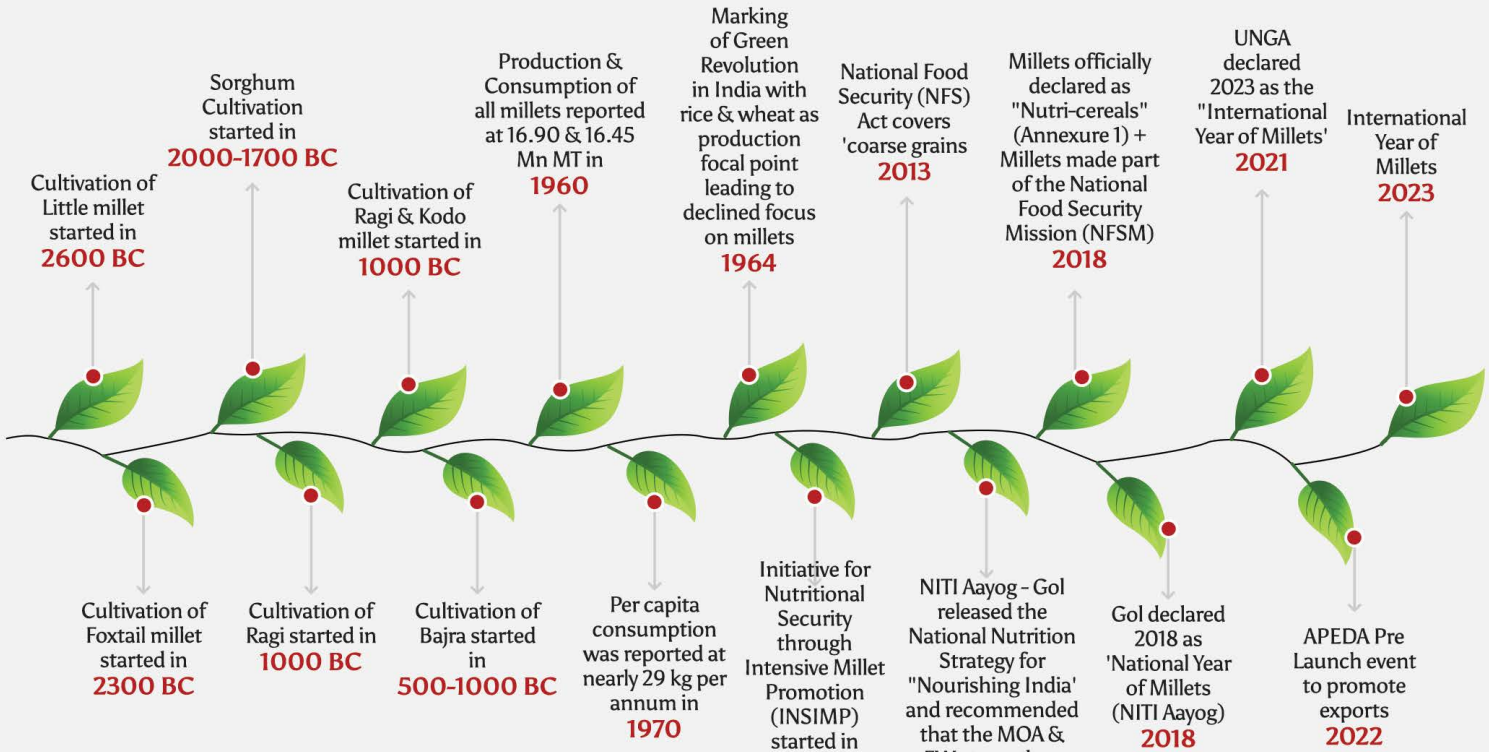
4. Jena, M. K., Mishra , J., & Ota, B. A. (2022, June). Tracing our Millets: History, Archaeology, Cultures and Conservation. ADIVASI 62 (1), 1-15

		2017)
Paspalum scrobiculatum	Kodo millet	Has high protein content, low fat and very high fibre content. It is rich in B vitamins as well as the minerals such as calcium, iron, potassium, magnesium and zinc; and contains a high amount of lecithin and is an excellent for strengthening the nervous system.

Table – 2: Vernacular names of millet varieties

English	Pearl Millet	Finger Millet	Foxtail Millet	Kodo Millet	Little Millet	Barnyard Millet	Sorghum	Buckwheat Millet	Amarnath Millet	Broomcorn Millet
Odia	Bajra	Mandia	Kanghu/ Kangam/ Kora	Kodua	Suan Gurji	Khira	Juara	-	Kosala sag manji	China Bacari bangmu
Hindi	Bajra	Nachani/ Mundua/ Mandika/ Marwah	Kangni/ Kakum/ Rala	Koden/ Kodra	Kutki/ Shavan	Jhangora/ Sanwa	Jowar	Kuttu	Ramadana, Rajgira	Cena, Barri
Tamil	Kambu	Kezhvaragu/ Kelvaragu/ Keppai/ Ragi	Thinai	Varagu	Saamai	Kuthiravali (Kuthiraivolly)	Cholam	-	Keerai vidai	Pani varagu
Telugu	Sajjalu	Ragula/ Ragi Chodi	Korra	Arikelu/ Arika	Sama/ Samalu	Udalu, Kodisama	Jonna	Bukvit	Thotakoora ginjalu	Variga
Kannada	Sajje	Ragi	Navane	Harka	Saame/ Save	Oodalu	Jola	Huruli	Danthu beeja	Baragu
Malayalam	Kambam	Panji Pullu	Thina	Koovaragu	Chama	Kavadapullu	Cholam	-	-	-
Marathi	Bajri	Nagli/ Nachni	Kang/ Rala	Kodra	Sava/ Halvi/ Vari	-	Jowari/ Jondhala	Bataravhita	Chaulai beej	Vari
Punjabi	Bajra	Mandhuka/ Mandhal	Kangni	Kodra	Swank	Swank	Jowar	Ba'ikavata	Cavali biya	Cheena
Gujarati	Bajri	Nagli/ Bavto	Kang	Kodra	Gajro/ Kuri	-	Jowari/ Juar	Biyam satheno dano	Rajgaro	Cheno
Bengali	Bajra	Marwa	Kaon	Kodo	Sama	Shyama	Jowar	Ba'ikavata	Amaratba bijja	Cheena

EXHIBIT 1: MILLET TIMELINE: INDIA



Source: GoI, MoA&FW, MoC&I, NFSM, Various Online Publications

Millets in Odisha:

Little millet has been cultivated in Odisha since the Neolithic Period, Foxtail, barnyard and finger millet have been mentioned in the Yajurveda. This indicates that millet consumption was widespread, pre-dating to the Indian Bronze Age (4,500 BC). It is mostly cultivated in the Eastern Ghats hilly & undulated land, covering southern & western Odisha. In the pre-history of Odisha, the neolithic was the most elaborate and widely spread both in the coastal plains and in the highland river valleys. According to radiocarbon dates, the time bracket of neolithic culture in Odisha is between the 3rd and 2nd millennium BCE. During the Neolithic Period, the early inhabitants of Odisha became food producers from food gathers.

Excavations carried out at different neolithic sites, such as Golabai, Gopalpur in coastal Odisha, and Khamberswarpalli, and Hikudi in Middle Mahanadi Valley have revealed evidence of food including millet. Impressions of rice and millet have been recorded on several burnt clay lamps both from coastal and middle Mahanadi basin sites.

Considering the archaeological evidence and the spread of Mundari (an Austro-Asiatic language group) in highland Odisha it is believed that several bands of Austro-Asiatic communities had arrived in Odisha from Mainland Southeast Asia through the corridors of Northeast India. They brought with them various species of domestic animals, such as water buffalo and pigs, and crops, such as small millets.

The food evidence of neolithic coastal Odisha shows striking similarities with the archaeobotanical remains found in the Belan River Valley of the Vidhyan Mountains of Central India. Both the regions exploited small varieties of millet along with rice and native pulses. Though rice constituted a large percentage of the staple diet at Golbai Sasan during the Neolithic Period, millet was grown as an insurance crop. Millet became staple food during the years of low rainfall. Possibly millet was also cultivated in order to provide fodder for cattle and other livestock.

In Odisha, little millet is widely grown in the hills of the Eastern Ghats and Chotanagpur Plateau. It is generally shorter having smaller panicles and seeds. It grows on a large scale with minimum care on hill slopes and foothills. It matures quickly and withstands both drought and water logging.

Tribes of Odisha and their association with Millets

The nutritious millets traditionally occupied substantial part of the diets and crop systems in tribal areas of Odisha. Millets are part of the traditional staple diet and crop systems in Odisha supplementing nutritional needs of the communities in the rainfed regions. Tribal people of Odisha

well recognise and assert the value of millets, a cereal crop that was once central to their culture and is seen today as a perfect adaptation to ensure nutritional security in the times of climate distress. The tribal communities have centuries old association with millets as evidenced by their religion, festivals, cuisine, and food production pursuits.

There is a preference of different types of millets that these tribals grow. Odisha tribals possess knowledge of making different types of traditional millet recipes. Milletsare consumed as a staple food and drink by the local tribal communities. The tribal communities predominantly cultivate local landraces of millets using traditional agronomic practices.

Millets are mostly raised in kharif (June–September) on marginal lands in the upland and hilly regions with few or no external inputs, either as a pure crop or with a range of pulses, legumes and oilseeds under mixed cropping systems. Tribals practice shifting cultivation on where the crop is cultivated during June to September. Despite great value associated with this nutri-crop by the local communities, there has been decline both in area and in production of the crop. The tribal people are thus the custodians of millets agro-biodiversity in the region where traditionally they have been growing millets that are suited to local climate and terrain.

The potential of millets as a source of nutrition and a tool for hunger eradication is well established. Millets constitute one of the oldest forms of food, particularly in the tribal regions of Odisha and elsewhere. Millets have been the main source of nutrition to these tribal communities. The tribal food habit and religious culture are integrated with the millets. Different ethnic groups know their cuisines prepared out of millets describe it in their language and the millets are associated with rituals and festivals of many tribal communities. The table below presents some of the cuisines prepared out of millets and references to certain cuisines in their religious culture.

Table 3: Different landraces of millets cultivated in Odisha

Type of millet	Landraces	Major Districts where cultivated
Finger millet/ Ragi (*Eleusine coracana*)	Bati Mandia, Mami Mandia, Taya Mandia, Dushera Mandia, Bada Mandia, Budha Mandia, Bhoda Mandia, Khutuni Mandia, Arengu Mandia, Pundikode	Koraput, Malkangiri, Rayagada, Nabarangpur, Gajapati, Nuapada, Kalahandi, Ganjam, Kandhamal
Little millet (*Panicum sumatrense*)	Sana Suan, Bada Suan, Bila Suan, Kala Suan, Guruji, Khosla, Jhati Guruji, Sarian Guruji	Koraput, Malkangiri, Rayagada, Nabarangpur, Gajapati, Nuapada, Kalahandi, Bolangir, Baragarh, Kandhamal
Foxtail millet (*Setaria italica*)	Dhala Kangu, Haladia Kangu, Kala Kangu, Nali Kangu, Sana Kangu, Bada Kangu	Gajapati, Rayagada, Kalahandi, Kandhamal, Nuapada
Kodo millet (*Paspalum scrobiculatum*)	Sana Kodo, Sipayea Kodo	Bolangir, Baragarh, Kalahandi, Boudh
Sorghum (*Sorghum bicolor*)	Bada Gangei, Sana Gangei, Kauajanha, Bhata Janha, Lal Kheda Janha, Lia Janha	Sundargarh, Keonjhar, Koraput, Kalahandi, Kandhamal, Gajapati, Malkangiri, Bolangir
Pearl millet (*Pennisetum glaucum*)		Angul, Keonjhar, Gajapati, Kalahandi

Characteristics of millet landraces and varieties cultivated in Odisha

Table – 4a: Landraces/varieties of Finger millets

Sl	Name of the varieties	Duration (days)	Estimated Yield (ql/ha)	Special Characters	Districts
1	Arengu	130	15-17	Tall, more productive tillers, its gruel is tasty	Gajapati
2	Bada Mandia	130	12.2-14	Higher yield, thick soup & tasty	Koraput, Rayagada, Malkangiri
3	Bada Sikha Mandia	120	15-17	long ear, red, tasty to eat	Rayagada
4	Bagad Mandia	125	12.2-14.2	Long finger, less disease & pests, Dark brown	Bolangir
5	Bhoda Mandia	115	7.5-9	Dwarf, more number of productive tillers, popular, seed colour light brown	Bolangir
6	Bati Mandia	130	13-15	long duration, higher yield, incurved finger, tasty with thick gruel, no disease & pests, seed colour light brown	Koraput
7	Budha Mandia	130	9.5-12	Good plant type with high tillers, Semi Compact Panicles , No disease ,pest occurrence, popular variety	Kandhamal
8	Burkha Mandia	125	8.5-10	Bold grain, less shattering, tasty, No disease and pest	Kandhamal
9	Dushera Mandia	120	10.2-13.5	Less disease & pest, popular variety, medium grain, light brown seed	Koraput, Rayagada, Malkangiri
10	Dhalabagada Mandia	140	8.5-10	Resistance to water stress, Light brown seed,	koraput
11	Dhepka Mandia	120	10.5-12.2	Good tillers with Semi compact panicles and 4 -6 no. of fingers, non - shattering, Sweet in cooking quality, Less disease & pest incidence, good grain filling	Rayagada
12	Hatabhanga Mandia	120	20-22	Good plant type with high tillers, Semi Compact type of Panicles, No. of Fingers are more with well grain filling, No disease ,pest occurrence	Gajapati
13	Jamba Mandia	140	15-17	long duration, compact panicle, copper brown seed colour	Koraput

14	**Jhupa Mandia**	**110**	**9.5-11**	**Uniform grain size, deep red colour seed,**	**Kalahandi**
15	Kala Kerenga Mandia	135	13-16	Popular variety, long duration, dark purple seed colour, more fingers	Koraput
16	Kantamara Mandia	110	15-17	High tillering, good seed establishment, Dark brown colour seed	Gajapati
17	Karkati Mandia	120	7.2-10	medium duration, light purple, bold grain, open panicle	Rayagada
18	Khunta Mandia	110	12.5-15	Dark brown seed colour, resistance to high water stress	Bolangir
19	Lal Mandia	120	7.5-9	uniform panicle, light red colour grain, abiotic stress	Kalahandi
20	Lalsaru Mandia	125	7.5-10	Light red seed, with medium grain, abiotic stress	Kalahandi
21	Maharashtra Mandia	130	14-16	Light red seed, tall, long ear head and finger, branching,	Mayurbhanj
22	Majhisikha Mandia	110	7-9.1	Small panicle, non-lodging, less disease & pests	Kandhamal
23	Manjula Mandia	125	10.4-12.5	copper brown seed colour, with round shape, more non-uniform fingers,	Keonjhar
24	Mami Mandia	120	13.5-16	Dark brown seed colour, small grain with compact panicle, taste of this variety better than other ragi varieties	Koraput
25	Mardimata Mandia	130	18-20	Higher yield, long ear head with long fingers, Bold grain	Kandhamal
26	Miki Mandia	100	10.5-11.2	Dwarf plant type, good vegetative and productive tillers, secondary branching present	Kalahandi
27	Muskul Mandia	145	10.5-12.5	Light brown colour seed, Non-uniform finger branching	Keonjhar
28	Nachika Mandia	120	12.5-14	Higher yield, long ear head with secondary fingers	Kandhamal
29	Pranga Mandia	130	18-20	Long ear head, longest finger, more secondary fingers, light brown seed	Kandhamal
30	Sana Mandia	115	15-17	short duration, higher yield, tasty gruel, small light red colour seed	Koraput, Rayagada, Malkangiri

31	**Sanadei Mandia**	**110**	**11.2-13**	**long panicle and open, Light brown colour seed**	**Nuapada**
32	Sargi Mandia	130	12-15.2	Higher yield, longest panicle with long fingers, more fingers	Malkangiri
33	Sikha Mandia	125	9.5-11	Higher yield, high tillering density both at vegetative & productive stage, long fingers	Kandhamal
34	Tara Mandia	135	9.5-11	Open Panicle ,Tall Plant type ,Non lodging, Dark brown colour	Kandhamal
35	Telenga Mandia	130	13.5-15.5	Light red seed, small grain, open panicle, easy threshing	Rayagada, Koraput

Table – 4b: Landraces/varieties of Foxtail millet

Sl	Crop	Variety name	District
1	Foxtail millet	Desi Kangu	Anugul, keonjhar, Koraput, Rayagada, Gajapati, Kandhamal, Mayurbhanj, Kalahandi, Malkangiri
2	Foxtail millet	Bada kangu	Kandhamal
3	Foxtail millet	Dhala Kangu	Koraput
4	Foxtail millet	Sana Kangu	Rayagada

Table – 4c: Landraces/varieties of Little millet

Sl	Crop	Variety name	District
1	Little millet	Gunduli	Sundergarh, Mayurbhanj
2	Little millet	Bada Koshla	Kalahandi, Rayagada
3	Little millet	Bada Kuiri	Kandhamal
4	Little millet	Bada Suan	Koraput, Rayagada
5	Little millet	Desi Suan	Mayurbhanj, Keonjhar
6	Little millet	Guruji	Nuapada, Keonjhar
7	Little millet	Sana Kuiri	Kandhamal
8	Little millet	Machhli koshla	kalahandi
9	Little millet	Masura Koshla	Rayagada
10	Little millet	Sana Suan	Malkangiri, Rayagada
11	Little millet	Kasam Jhupa	Malkangiri

Table – 4d: Landraces/ varieties of Sorghum

Sl	Crop	Variety name	District
1	Sorghum	Badagangei	Angul, Keonjhar, Sundargarh
2	Sorghum	Sanagangei	Angul, Keonjhar, Sundargarh
3	Sorghum	Kauajanha	Koraput, Malkangiri
4	Sorghum	Bhata janha	Gajapati
5	Sorghum	Janha	Gajapati, Kandhamal, Malkangiri
6	Sorghum	Khedajanha	Kalahandi, Malkangiri, Kandhamal, Rayagada
7	Sorghum	Kuchha Janha	Gajapati
8	Sorghum	Lalkheda Janha	Kalahandi
9	Sorghum	Lia Janha	Gajapati
10	Sorghum	Sana janha	Gajapati

Millets and Tribal Culture: A Symbiotic Relationship

Millets, the ancient grains have been a staple food source for various indigenous communities around the world. In particular, millets have played a significant role in the dietary and cultural practices of tribal communities. The tribal culture in India and around the world depicts the deep-rooted connection between millets and tribal culture, highlighting their historical significance, nutritional value, and their role in preserving traditional knowledge and sustainable farming practices.

Historically, millets have been cultivated for thousands of years and were one of the earliest domesticated crops. The history of millets is intertwined with the history of tribal communities, as they have been growing these grains for generations. The cultivation and consumption of millets have often been integral to the survival and identity of tribal cultures. These grains were well-suited to the diverse climatic conditions that exist in many tribal areas, which allowed these communities to adapt and thrive in challenging environments.

Preservation of Traditional Knowledge

The cultivation and utilization of millets are deeply ingrained in the cultural practices of tribal communities. The knowledge of how to grow, process, and cook millets is passed down through generations, forming an integral part of their traditional wisdom. This knowledge is not only practical but also holds immense cultural and historical significance. It connects the tribal communities to their land, their ancestors, and their identity. The preservation of this knowledge is essential to maintaining the unique cultural heritage of these tribes.

Sustainable Farming Practices

Tribal communities have a long history of sustainable and eco-friendly agricultural practices, and the cultivation of millets is a prime example. Millet cultivation is well-suited to rain-fed agriculture, which reduces the need for irrigation and chemical fertilizers. This not only conserves water resources but also helps maintain the ecological balance in tribal areas. By cultivating millets, tribal communities contribute to sustainable farming practices that benefit not only their own livelihoods but also the environment.

Challenges Faced

Despite the rich history and cultural significance of millets in tribal communities, these grains face several challenges. Modernization and urbanization are leading to changes in dietary preferences, and many tribal members are shifting towards processed and non-traditional foods. This trend can lead to the erosion of traditional dietary and farming practices. Additionally, the lack of market access and limited infrastructure for millet processing and distribution pose challenges for tribal farmers looking to commercialize their produce.

Millets and tribal culture thus share a symbiotic relationship that has endured for centuries. These grains have not only sustained tribal communities but also played a vital role in preserving their traditional knowledge and sustainable farming practices. Millets are a source of nutrition, culture, and identity for tribal societies. It is essential to recognize and support the cultivation of millets among these communities, ensuring that their cultural and agricultural heritage continues to thrive in the face of modern challenges. Promoting the consumption of millets can also be a step towards healthier diets and sustainable agricultural practices, benefiting not only tribal cultures but also the larger global community.

Millets have been traditionally grown and consumed by various tribal communities in India. These tribes have a deep-rooted connection to millet cultivation as a part of their agricultural heritage and dietary traditions. Although almost all tribal communities grow and consume millets, yet some particular tribal communities in India are particularly highlighted for their association with millets. For example, some tribes of India having deep rooted cultures with millets are mentioned below:

Kuruba: The Kuruba tribe, found in parts of Karnataka and Andhra Pradesh, traditionally grow finger millet (ragi). Ragi is a staple in their diet, and they use it to make various dishes, including ragi mudde (millet balls).

Lambada: The Lambada tribe, primarily found in the states of Telangana and Andhra Pradesh, are known for their millet farming practices. They cultivate crops like sorghum and pearl millet.

Bhils: The Bhil tribe, located mainly in the states of Madhya Pradesh, Gujarat, Rajasthan, and Maharashtra, have been cultivating pearl millet for generations. Pearl millet is a significant part of their diet and culture.

Gonds: The Gond tribe, found in central India and parts of Andhra Pradesh, Odisha, and Maharashtra, traditionally grow various types of millets, including finger millet (ragi) and pearl millet.

Santhal: The Santhal tribe, predominantly in the states of West Bengal, Jharkhand, and Bihar, have a long history of cultivating small millets such as little millet and kodo millet.

Korku: The Korku tribe, mainly residing in the central Indian states of Madhya Pradesh and Maharashtra, are known for their cultivation of finger millet (ragi) and pearl millet.

Siddi: The Siddi community, with African roots, resides in parts of Gujarat and Karnataka. They have a history of cultivating millets, including pearl millet and finger millet.

Irula: The Irula tribe, primarily found in Tamil Nadu and parts of Kerala and Karnataka, traditionally grow and consume finger millet (ragi).

Mishing: The Mishing tribe in Assam traditionally cultivate barnyard millet, little millet, and foxtail millet.

Warli: The Warli tribe in Maharashtra and Gujarat are known for cultivating various millets as a part of their subsistence agriculture.

These tribes have a rich cultural and agricultural heritage connected to millet cultivation. Millets have been integral to their traditional diets and are often used to prepare a variety of dishes, such as porridge, rotis, and snacks. The cultivation and consumption of millets among these tribal communities not only contribute to their food security but also play a vital role in preserving indigenous agricultural practices and maintaining biodiversity in these regions.

In the state of Odisha, several tribal communities are well known for their traditional millet cultivation practices. These tribes have a deep-rooted connection to millet farming and have been preserving their indigenous agricultural knowledge for generations. Some of the prominent millet-growing tribes in Odisha include:

Kondh: The Kondh tribe, one of the largest tribal communities in Odisha, is well-known for cultivating millets, especially finger millet (ragi). Millets are a significant part of their diet, and they use ragi to make a variety of traditional dishes.

Saura: The Saura tribe, primarily found in the Gajapati and Ganjam districts of Odisha, have a long history of cultivating millets, including

finger millet (ragi). Millets are an essential part of their traditional cuisine.

Koya: The Koya tribe, located in the hilly regions of southern Odisha, traditionally cultivate millets such as finger millet, pearl millet, and little millet. Millets are a staple food for them and are used to make rotis, porridge, and other dishes.

Saora: The Saora tribe, also known as Sabara, resides in various parts of Odisha. They are known for cultivating finger millet (ragi) and other millet varieties as a source of food and livelihood.

Paraja: The Paraja tribe, found in the Koraput and Rayagada districts of Odisha, traditionally grow millets like finger millet and pearl millet. These millets are vital components of their diet and culture.

Kutia Kondh: The Kutia Kondh tribe, primarily residing in the Kandhamal district of Odisha, are known for their millet cultivation practices. They grow millets like finger millet and pearl millet and use them in their daily meals.

Didayi: The Didayi tribe, found in various parts of southern Odisha, have a history of millet cultivation. They grow different types of millets and incorporate them into their traditional dishes.

These tribal communities in Odisha have been practicing sustainable and traditional millet farming for centuries. Millets play a crucial role in their food security and culture, and they are used to prepare a wide range of dishes, from bread and porridge to snacks and sweets. The cultivation and consumption of millets among these tribes are not only important for their dietary needs but also for the preservation of their cultural heritage and indigenous agricultural practices.

Nutritional importance of millets

The potential of millets as a source of nutrition and a tool for hunger eradication is well established. Each type of millet offers distinct flavors and nutritional benefits. They are gluten-free, low in glycemic index, and packed with essential nutrients, making them an excellent choice for those seeking alternative grains in their diet. Moreover, the cultivation of millets is environmentally friendly due to their ability to thrive in arid conditions with minimal water and chemical inputs, making them an attractive option for sustainable agriculture.

Millets are highly nutritious grains with a range of health benefits. They offer a variety of essential nutrients and are an excellent addition to a balanced diet. Here are some of the key nutritional benefits of millets:

Rich in Dietary Fiber: Millets are high in dietary fiber, which aids in digestion, prevents constipation, and promotes a feeling of fullness. This can be especially beneficial for

weight management and maintaining digestive health.

Good Source of Protein: Millets contain a moderate amount of protein, making them a valuable source of plant-based protein. They are particularly rich in the amino acid methionine, which is often limited in other plant-based protein sources.

Low Glycemic Index: Millets have a low glycemic index (GI), which means they release glucose slowly into the bloodstream. This can help stabilize blood sugar levels, making them an excellent choice for individuals with diabetes or those seeking to manage their blood sugar.

Rich in Vitamins and Minerals: Millets are a good source of various vitamins and minerals, including B vitamins (such as niacin, thiamine, and riboflavin), magnesium, potassium, phosphorus, and iron. These nutrients are essential for energy metabolism, bone health, and overall well-being.

Gluten-Free: Millets are naturally gluten-free, making them a suitable option for individuals with celiac disease or gluten sensitivity.

Antioxidant Properties: Some millet varieties, such as finger millet (ragi), have antioxidant properties due to their content of polyphenols. Antioxidants help protect the body from free radicals, reducing the risk of chronic diseases.

Rich in Micronutrients: Different millet varieties offer specific micronutrients. For example, finger millet is rich in calcium and iron, while pearl millet is a good source of niacin (vitamin B3).

Heart Health: The dietary fiber and potassium in millets can contribute to heart health by helping to maintain healthy blood pressure and cholesterol levels.

Weight Management: The combination of fiber, protein, and a low glycemic index in millets can support weight management and appetite control.

Digestive Health: The high fiber content in millets supports a healthy gut, potentially reducing the risk of gastrointestinal issues.

Bone Health: Millets, especially finger millet and pearl millet, are good sources of calcium and phosphorus, which are crucial for strong and healthy bones.

Table – 5: Nutritional constituents of millets

Food gain	Carbohydrates (g)	Protein (g)	Fat (g)	Energy (KCal)	Crude fiber
Finger millet	72.0	7.3	1.3	328	3.6
Kodo millet	65.9	8.3	1.4	309	9.0
Broomcorn millet	70.4	12.5	1.1	341	2.2
Foxtail millet	60.9	12.3	4.3	331	8.0
Little millet	67.0	7.7	4.7	341	341
Barnyard millet	65.5	6.2	2.2	307	9.8
Sorghum	72.6	10.4	1.9	349	1.6
Pearl Millet	67.5	11.6	5.0	361	1.2
Buckwheat Millet	33.5	5.68	1.04	-	4.5
Amarnath Millet	30	8	1	178	-

Compiled from different sources



The long association of the tribal communities with millets is justified from their selection of millets in consideration to the landscape and ecosystem, their preferred food habits, the importance of millets as offerings to gods and goddesses in various rituals and festivals, the special cuisines prepared out of millets in special social and religious occasions, the involvement of men and women in cultivation and utilization of millets, and above all in considering millets as food they can fall back upon in times of crisis owing to the fact that millets can be stored for years together in ordinary conditions.

Rationality of development intervention in millets

According to the Ministry of Agriculture & Farmers Welfare, in 2016 – 2017, the area under the cultivation of millet declined with 60% less coverage area (to 14.72 million hectares) due to change in consumption pattern, conversion of irrigated area for wheat and rice cultivation, unavailability of millets, low yield, dietary habits, less demand and marauding market. This resulted in fall in the level of nutrients like vitamin-A, protein, iron and iodine in women and children leading to malnutrition.

With regard to the Global Hunger Index – GHI, India ranks 64 among the 81 nations. It occupies second place in child malnutrition highlighting the poor plight of our country. This scenario persists when the Public Distribution System and Targeted PDS are working for nearly six decades. The reason is that the focus has been only on wheat and rice distribution while the millets have long been disregarded.
Despite numerous qualities, utilization of millets as food is confined to the traditional consumers i.e. tribal populations. This is mainly because of the non-availability of consumer friendly ready-to-eat millet-based products. However, recently, millets have gained attention and efforts are underway to obtain their convenient and value-added processed products.

Since many households in dry land and hilly regions depend on millets to meet their food needs, it has now been proposed to enlarge the food basket and include millets like jowar,bajra, ragi etc in the Public Distribution System.

Government has recognized the role of millets in the food chain. Targets have been set under the National Food Security Mission (NFSM) towards more allocations for increasing the millet cropping area and enhancing the production potential to the extent of 8% of the enhanced food grain production. Towards that policymakers in India and Odisha refocused their attention towards millet farming systems and enacted policies to create an enabling environment for the farmers. With respect to millets production, some of the existing schemes by the Government of India and State Government of Odisha include:

- € Integrated Cereals Development Programmes in Coarse Cereals (ICDP-CC) based Cropping Systems Areas under Macro Management of Agriculture (MMA).
- € Initiative for Nutritional Security through Intensive Millet Promotion (INSIMP), a part of Rashtriya Krishi Vikas Yojana (RKVY) which is the only comprehensive initiative to support millet production.
- € Rainfed Area Development Programme (RADP), a component of the Rashtriya Krishi Vikas Yojana (RKVY).
- € Instituting National Millet Mission under the National Food Security Mission
- € Odisha Millet Mission for facilitating promotion in production, processing, marketing and consumption of all millets.

Through the various schemes, programs, missions and sub-missions towards promotion of millets for multi-dimensional implications larger efforts are being given towards increasing the area under millets production, improved package of practices for yield enhancement, technology transfer for processing and value addition of millets products, publicity and marketing seems to have been over emphasized. However, the objective achievement of these noble initiatives is also facing socio-cultural issues challenging the outcomes. It is therefore important that to understand the tribal socio-cultural way of life through research studies and documentations that would provide new insights towards strategizing millet promotion initiatives in tribal areas of Odisha and elsewhere.

Rationale of the Study

Millets are nutritionally superior to most other cereals, making them a favorable crop to address the prevalence of malnutrition in tribal areas. Traditionally, millet has been a major staple for tribals and significantly address food scarcity during lean season when there is no agricultural harvesting crop on farm. The method of traditional millet recipes is easy to cook and need few ingredients. Some of these traditional recipes include mandia jau (finger millet with broken rice, maize and barnyard millet), mandia anda (ragi flour with broken rice), mandia tampa (ragi flour with broken rice and warm water), etc. However, with the introduction of monocropping, easy availability of rice under PDS and influence of urban food culture, tribal youth have reduced their millet consumption. Over the years, there has been rapid decline of millet cultivation and production leading to reduced grain availability for household consumption among tribal communities. Few factors responsible in decline in food habits of Tribes are as follows:

- The influence of urban food culture has reduced the millet consumption in tribal youth and have impacted the change of food habits in their community.
- The decline in millet cultivation & production has led to reduced grain availability for household consumption in tribal communities.
- Increase in area and production of rice, wheat, maize and other course cereals after green revolution caused easy availability of food grains those were tastier than millets.
- Intensification of cash crops and plantation crops in uplands reduced area of millet under cultivation.
- Government welfare schemes adopted and cheap availability of rice and wheat through PDS, mid-day meal etc. reduced consumption of millet.
- Mass consumption of rice in residential schools for tribal students also changed the food habits of tribal children and students.
- After increase in income level millet consumption has a stigma of low in living status in the community.

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Odisha Millets Mission (OMM) also known as the Special Programme for Promotion of Millets in Tribal Areas of Odisha was launched by the Government of Odisha in 2017 to revive millets in farms and on plates. The aim is to tackle malnutrition by introducing millets in the public distribution system (PDS) and other state nutrition schemes.

Change Detection Study on Millet Based Food Habits of Tribal People in Odisha has been undertaken by SCSTRTI, ST & SC Development Department with support from Department of Agriculture and Farmers' Empowerment, Government of Odisha to document the changes in the millet-based food habits of the tribal people and to understand different factors responsible for change in millet-based food and how it has influenced production and land use practices. The study aims to document the different millet consumption practices and traditional recipes in tribal communities (staple/ supplementary/ritual food/ beverages) which have always been a part of the culture of the tribal society. It is intended that the findings of the study will help in revival of the millets, widely consumed in the tribal belts and other parts of Odisha traditionally, in farm and plates.



Display Corner of Millet Landraces of Odisha at Odisha State Tribal Museum, SCSTRTI Campus, Govt. of Odisha





Finger Millet, Village- Padeiguda GP- Muduliguda
Block- Khairput District- Malkangiri





After harvesting Sorghum (Khed Janha) kept for drying on a bamboo tray - Village – Kupuliguda, GP- Kollar, Block- Baipariguda, District - Koraput



Women farmers happily standing in their Ragi field expecting a good harvest – Village – Kupuliguda, GP- Kollar, Block- Baipariguda, Dist- Koraput

CHAPTER - 2

REVIEW OF LITERATURE



Different Varieties of Millets displayed by Villagers
Village- Kupuliguda GP- Kollar Block – Baipariguda District- Koraput.



Mamata Kirsani carrying Ragi Basket on her head
Village- Padeiguda,
GP- Muduliguda,
Block- Khairiput,
Dist- Malkangiri





Women from Bhumia and Kandha community interacting with each other about ragi crop condition in their field- Village – Kupuliguda, GP- Kollar, Block- Baipariguda, Dist- Koraput

Dayakar Rao et al., (2018) in his paper 'WHITE PAPER ON MILLETS' has revealed the current scenario of millets cultivation, production, processing and consumption in the country is very essential for understanding the challenges and developing a framework for reviving these sustainable food crops for the goodness of the public, planet and economy. There has been a downward trend in millet cultivation in the country; the production of sorghum came down from 7.0 million tones in the year 2010 -11 to 3.5 million tones during the year 2018 – 19; bare production reduced from 10.4 million tones to 8.6 million tones; millets came down to 0.33 million tones from 0.44 million tones in the same period. Millets grown recorded about 12 million ha. with an annual production of 13.7 million tones which is 10% contributing to the country. It is recorded in the year 2000 and 2009 India as the topmost producer of millets than Nigeria.

Longvah et al.'s study (2017) revealed that the protein content of millets ranges between 10% and 12% while the protein content in foxtail millet (12.3%) is higher than that of wheat and rice. Similarly, the dietary fiber (10–12%) content of millets is also higher compared to some of the staple cereals. The total polyunsaturated fatty acid (PUFA) content of Bajra (1984 mg/100 g) and Maize (1606 mg/100 g) are comparatively higher compared to other cereals. Noteworthy nutrient compositions of millets include the high calcium content of finger millet or ragi (364 mg/100 g) which is 10 times higher than that of wheat or rice. The iron content of Pearl millet or Bajra (6.42 mg/100 g) and Barnyard millet (5.0 mg/100 g) is also higher compared to other staple cereals.

It was highlighted in the study by Asmat Ullah, 2017; Low Water Footprint – Millets are often the only crops that can grow in arid regions, requiring only 300– 400 mm of water compared to 1400–1500 mm for rice cultivation. This study says, Millets are the Carbon Neutral Crops by virtue of carbon absorption from the environment equivalent to their carbon emissions of 0.1–0.2 CO2eq kg per kg of production, compared to 0.4 CO2eq kg per kg of Rice production and 0.35 CO2eq kg per kg of Wheat production. It also derived Millets are energy-efficient crops by virtue of less fertilizer and irrigation requirements which are totaling 0.48–0.71 kWh per kg production compared to 1.05 kWh per kg for rice production.

According to the study by Vadez et al., 2012, Schill, (2012) the World Bank, 2013 Millets helping the small farmers with efficient crop rotation as many millets need only 60–90 days to mature while fine cereals take 100–140 days. Millets are Resource Efficient in utilizing the available nutrients and also respond well for improved farm conditions and additional application of inputs, and result in increased yields up to 3 fold. Millet are known as Climate Resilience crop and the most secure crops to small farmers as they are the hardiest, resilient and climate adaptable crops in harsh, hot (up to 64 degrees Celsius) and drought environments. They are often the last standing crops in drought seasons and will be the sustainable future food source amidst worsening climatic conditions.

According to the statistics of FAO, the world production of millets is 94.3 million metric tonnes from an area of 76.18 million ha. Sorghum and Pearl millet are the major millet crops grown, constituting 92.06% of the world millets production followed by Finger millet, Foxtail millet, Proso millet, Barnyard, Little millet and Kodo millet which altogether constitute about 7.94%. Furthermore, Foxtail millet predominates all millets in terms of productivity, yielding about 2166 kg/ha followed by Finger millet (1623 kg/ha), Proso millet (1535 kg/ha), Sorghum (1426 kg/ha), Barnyard millet (1034 kg/ha), Pearl millet (850 kg/ha), Little millet (469 kg/ha) and Kodo millet (419 kg/ha). Sorghum is the major millet grown globally constituting 55.66% of total millets. During 2010–18, the Sorghum area is near stable between 42.16 million hectares to 42.14 million hectares while production between 60.18 million metric tonnes to 59.34 million metric tonnes. During the same decade, the area under other millets showed a declining trend from 36 million hectares during 2010 to 33.56 million hectares during 2018, while production decreased from 32.79 million metric tons in 2010 to 31.02 million metric tonnes in 2018.

According to the BBC World report on 'Why 2023 is the year of millet'; it is reflected that in India, millets are cultivated in an area of 12.09 million hectares, producing 13.71 million tonnes

with a yield of 1134 kg/ha., sorghum is the fourth most important food grain in India after rice where as wheat and maize in terms of area (4.09 Mn. ha) and production (3.47 Mn. MT). India is the top most producer of Barnyard (99.9%), Finger (53.3%), Kodo (100%), Little millet (100%) and pearl millet (44.5%), producing about 12.46 million metric tonnes from an area of 8.87 million ha. Rajasthan has the highest area under millets cultivation (31.3%) followed by Maharashtra (18.9%), Karnataka (13.3%), Uttar Pradesh (8.9%), Tamil Nadu (4.2%) and Madhya Pradesh (3.9%). However, the highest yields were recorded in Tamil Nadu (2137.60 kg/ha), Delhi (1579.50 kg/ha) and Madhya Pradesh (1420.50 kg/ha).

According to the source of apeda.gov.in; Indian Millets scenario has reported that millet production has been on the rise in recent years and our country India is one of the largest producers of millets and Indian farmers have been increasingly planting millet as a drought resistant crop. The Indian Government promoting millet production in National Food Security Mission. India is in the list of top five experts of Millets in the World. India has exported millets worth $64.28 million in the year 2021 – 22, against $ 59.75 million in 2020 – 21. This report has reflected that India has exported cereals Rs. 96,011.42 Crore / 12,872.64 USD Millions during the year 2021 – 22.

Dayakar Rao et al., (2016) in his paper 'WHITE PAPER ON MILLETS' it has revealed the ranges of the cost of three Millet cultivation i.e Jowar, Bajra and Ragi. It has stated in the report that the Jowar cultivation cost has been ranged from Rs. 30712/ha to Rs. 58036/ha among the States with net returns ranged from Rs. 1203/ha to Rs. 9043/ha among the States. Similarly, the cost of the cultivation of Bajra has been ranged from Rs. 29169/ha to Rs. 48486/ha among the States fallowed by the net returns over operational cost which was ranged Rs. 650/ha to Rs. 17580/ha among the States in our Country. It has been also recorded on Ragi cultivation as one of the preferred crop of all States between the range of Rs. 47650/ha to Rs. 70516/ha among all States. In this study it has mentioned that the human labour has been recorded as the major cost causing up-to 50-75%, fallowed by machine or animal labour of 13-21 %, fertilizers and manures of 5-10% among the States for all Millet crops cultivation. The study has reflected the consumption pattern of millets during the last few decades. It has revealed the annual per capita intake of Sorgham has decreased unexpectedly for 8.50 Kg to 1.58 Kg in urban areas and in Rural areas it has recorded up to 19.20 Kg to 2.42 Kg between the year 1972-73 and 2011-12. But in case of the pearl millet intake it also reflected in urban and in rural if saya; 11.50 kg to 0.97 kg. (Rao et al., 2009; Basavary et al., 2010; NSSO, 2012).

According to the NNMB report 2011-2012 Rural Survey, it is recorded the consumption of millets was at the higher side in Gujurat state (156g/CU/day) followed by Maharashtra (79g/CU/day) and Karnataka (61g/CU/day), (NNMB, 2012).

Rashmi Rekha Samal & Srijit Mishra (2020), “Nutrient Deficiencies in a Tribal Community” Odisha economy discussion series & NCDS, September 2020, report According to the report the availability of finger millet has reduced over the time and distribution of rice through PDS has contributed the changed pattern of food habits in the tribal communities. However, under the intervention of Odisha Millet Mission

(OMM) the cultivation & production of Finger millet currently being revived. Accessibility to rice through PDS has become an important part of their daily diet. Through the PRA techniques for data collection, the report has revealed that out of 53 Households, 17 Households have cultivated millet and consumption of millet relatively more in summer in form of finger millet porridge or 'torani' in local language. The little millet also been consumed in form of 'Kheeri' (Semi Liquid), largely it was Kandula (Pigeon peas) is the most preferred pulses among all others. Thus, the analysis of the report says, calcium deficiency is high in the tribal region due to less consumption of food items which are rich in calcium and iron.

According to the book 'Primitive Tribe of Odisha', the Didayi Tribe prefer to eat Ragi and Rice. They cook rice with Ragi powder in semi liquid form and like to eat the most. At the time of scarcity of rice, they prefer ragi to replace rice in their diet pattern. Didayi tribes use the hill –scope for shifting cultivation and these land types has been categorized as Tikara (Upland), Pada (lower upland), Liga (low land), Dugadi (Kitchen garden), Di (Homestead land). They cultivate cereal crops in mostly upland areas with minimum use of water.

The book described that; the Juang tribes depends on forest of their near by areas for their food and other requirements in daily basis. Their dietary habits are purely based on the forest collection and they are not into shifting cultivation. They chase in forest primarily for their food supply. Things have changed now as regards to cultivation and lifestyle of the Juangs. They are now doing shifting cultivation and they prefer major cropping systems like; Kitchen garden in homestead lands, Unirrigated land for crops like Maize, Mustards and horse gram and lastly irrigated low lands on the bank of hill stras used for rice and wheat cultivation.

The Book has stated Saora's livelihood is primarily agriculture. They also depend on forest to collect forest produce and hunt animals to supplements their income from cultivation. Saora mainly prefer three types of cultivation as kitchen garden in areas surrounding to their homes, shifting cultivation as the most important and major type of cultivation in the hill slopes and thirdly paddy cultivation in terraced fields and cereals preferably Ragi, Horsegram and black gram are grown in the uplands. The Saoras make terrace hill –slopes to make paddy fields using their indigenous skills made with very little soil carried down with the water that flows higher to the lower terrace.

Sahoo and Samantaray (2021) have attempted to assess the cultivation and consumption of millet in the tribal region, especially in Koraput. It is based on a primary survey of 150 millet cultivators. The paper provides that, although finger millet cultivation has been taken up by the farmers, it is mostly done for household consumption rather than sale at market. From the study, the authors have observed that, millet cultivation generates significant returns for which farmers prefer to cultivate paddy instead of millet for commercial sales due to procurement and productivity issues, marketing problems. Furthermore, though

millet along with rice is the staple food for a tribal household, rice consumption is highest in the food basket. This is prevalent as rice is being sold by the government at a very subsidised price. The authors suggested that, a proper strategy focussed on revamping millet cultivation and consumption would be beneficial in the fight against food insecurity and climate change, particularly in the tribal regions.

NCDS (2021) conducted a study to encapsulate some of the impact of Ragi distributed under PDS to beneficiary households in Rayagada, Kalahandi, Nuapada, Kandhamal and Gajapati districts covered during phase-I. It is based on the perception of beneficiaries who received Ragi under PDS in rural areas of Odisha. For this study, the researchers adopted stratified random sampling, classified as households covered under Odisha Millets Mission (OMM) and non-beneficiary households. The study observed that the majority of the people in Rayagada, Kalahandi, Nuapada, Kandhamal and Gajapati districts are involved in cultivation and agriculture activities. The study also revealed that there is a growing interest from villages not covered under Odisha Millet Mission to take up ragi cultivation. The study findings indicates that ragi and millets are still part of regular diet of people in the study area, although people have by and large shifted to rice-based food habit.

A discussion paper titled Growth, Instability and Decomposition of Millets in Odisha: 1960-61 to 2017-18 (NCDS, 2020, Odisha Economy Discussion Series 7) authored by Diptimayee Jena and Srijit Mishra provides a diagnostic of the decomposition of millets in Odisha in a time series perspective. The study findings indicates that, in Odisha, the 1960s and 1970s indicate an increasing trend in area and production of millets. There is a reversal for millets with decadal growth since 1980s declining in area and production. The decline started first for small millets in the 1980s and subsequently since the 1990s for the three major millets – bajra, jowar and ragi. Decomposition of millets production indicates that that decline since 1980s is largely on account of area effect, but also because of yield effect in the 1990s and 2010s. The findings add to the understanding of millets vis-à-vis other crop groups and not as a constitutive component of cereals, which has been dominated by paddy and wheat, and also for the four specific millet crops/categories. It provides a context to the ongoing action research on Odisha Millets Mission. As part of the conclusion, the authors' analysis presents that coinciding with the start of green-revolution in Odisha, the 1980s mark a reversal for millets with decline in area and decadal growth for production being significant and negative (except for 1980s when it was not significant and negative and 2000s when it was not significant and positive).

The report on Lessons from Odisha Millets Mission: A Case for Mainstreaming Millets (GoO - WFP, 2021) summarizes key achievements of OMM, the operational model followed, plans, lessons learned and document the best practices of OMM experience to develop a range of knowledge products. The assessment included the end-to-end value chain interventions under OMM and identifying scalable and innovative approaches. In the report, World Food Program has tried to bring together all the relevant information around OMM in a consolidated platform by creating policy briefs, reports, and case studies. The report presents a comprehensive situational analysis thereby providing a holistic overview of

OMM's design, components and implementation mechanism, and learnings while also discussing millet mainstreaming from a climate resilience, gender and policy perspective.

The Annual Report of NABARD (2022-23) provides a trend analysis of millets under the chapter title 'Millets for health and wealth'. The chapter covered many dimensions of millets such as trends of production, demand in India, millet value pyramid, trade in millets, millets to achieve sustainable development goals and provides an outline for strategy and action for building a millet ecosystem. The chapter views that millets as a staple food are yet to gain popularity. Creating 'millet mindfulness' is the need of the hour. It is essential to synchronise millet supply and demand to bring income security for farmers, nutritional security to consumers, as well as provide an operational scale to millet entrepreneurs for a viable enterprise. The chapter also presents the NABARD initiatives in millet promotion.

The primary aim of food security is to ensure enough staple food for the entire population. Islam and Manaloor (2021) are of the view that food security has been a target in India since its independence. Although substantial progress was made through the adoption of green revolution (GR) technologies and implementation of the food public distribution system (PDS), desirable food and nutrition security, as defined by the food and agriculture organization (FAO), is far from being realized. In this context, their paper scrutinized the potential contribution of millets in achieving food and nutrition security in India. The study was conducted based on the secondary data obtained from FAO Corporate Statistical Database and published literature on food and nutrition security. The result of the review provided that both GR technologies and PDS unduly favored two principal crops, namely rice and wheat, marginalizing all other crops cultivated for thousands of years to meet the food and nutrition requirement of mostly developing countries including India. Millets constitute one such neglected group of crops in India, which have tremendous potential for contributing to food and nutrition security. Based on the findings, the authors suggested that Millets are to be included in the PDS alongside rice and wheat so that they receive an appropriate Minimum Price Support. Appropriate implementation of relevant regulations, continued research and development, and adequate support for cultivation and marketing of millets are necessary in this regard.

Satpathi, Saha and Basu in their paper on Policy Response to the Food and Nutrition Crisis – Special Reference to the Odisha Millets Mission have tried to critically analyse the status of food security concern in India and describe the potential of millets as a probable solution. The paper is organised into three sections. The first section discusses the issue of food insecurity and its adverse impact on the nutrition status of India. It also describes the threat of climate change and poor natural resources management in further aggravating food insecurity. The second section highlights the potentials of millets as a key policy response to the present nutritional and agricultural concerns through a case study analysis of the Odisha Millets Mission (OMM). The paper tries to unpack the implementation process and experience of the much appreciated and talked about initiative of Government of Odisha. The third and final section summarizes the findings that have important policy implications for states to adopt similar initiatives.

Jena et.al. (2022) in their paper paper takes a comprehensive view at the history, archaeology, culture and conservation perspectives contextually and suggesting new areas of research studies that may be undertaken to provide inputs for policy level changes and reorientation of strategies. According to them, the tribal communities have centuries old association with millets as evidenced by their religion, festivals, cuisine, and food production pursuits. However, due to several reasons the millets cultivation in tribal areas came through a gradually decreasing trend. Considering the importance of millets in terms of climate resilience, drought proofing, food and nutrition, endemism and their potential to contribute to the food, nutrition, livelihoods and income of communities around, policy level initiatives and programs have been expedited over the years. Many research and studies in this regard have been concentrating more on the agriculture and economics grossly ignoring the society and culture of the tribal communities who are the saviours of millets so far.

Nayak and Das (2022) critically analysed various key components of millet-based production system and its agroecology-conservation, cultivation, consumption and commercialization of millets along with policy recommendations based on the contextual impact assessments. The paper reveals about the various useful information from various programme and action research projects implemented at Koraput through using various statistical tools. Moreover, agricultural impact assessment methods are used for collecting and validating data from the primary and secondary sources, community-based organizations, and agriculture departments. It also focuses on various tangible and intangible impact of interventions to safeguard millet-based production, consumption, processing and marketing for enhancing food, income and nutrition security. The study identifies various grassroots policy recommendations to strengthen interventions like Millet Mission through community-based organizations in the context of climate change and livelihood interventions. The study finds that the production of millets can be enhanced through enabling tribal communities to adopt sustainable agriculture practices, avail timely technical and inputs support from government and CSOs of the locality.

Mohanty (2022) presented the outcome of a study by The Millet Network of India (MINI) that documented millet-based bio-diverse farming pattern, practices and knowledge associated including the food habits, customs and cultural beliefs. The paper presents the observations on the millets and the thematic dimensions associated with millets in Dupi village of Kondhmal district. The paper observed that across the country, it is seen that millets have never grown alone, and always in combination with a host of other crops that include other millets, pulses, oilseeds, vegetables and a host of other crops - each with different cropping cycles and different uses. However, the biodiversity, the organic practice, the marginal-small farmers' survival, livelihoods, nutritional aspects and the agenda of indigenous peoples' knowledge systems, climate change effects have not been adequately addressed yet.

Chaudhury and Pradhan (2022) discussed the existing millet varieties cultivated in tribal areas of Odisha and the geographical indication related to certain varieties of millets. Roy (2022) provided a detailed account of finger millet recipes by tribal people in Koraput based on a primary study on 100 tribal households in Dasamantpur block of Koraput district in Odisha. Information related to the traditional millet recipe was collected, documented and analysed for frequency and time of millet recipe consumption, perceptions on millet recipes, and brings out set of peoples' suggestions towards promoting consumption of millets. The paper views that valuing traditional millet recipes will not only address the food security but also the nutritional security of the people. Likhar (2022) takes a look at the reasons of deterioration in millet production in Malkangiri and the efforts made towards promoting millet production there through comprehensive market led extension under Odisha Millets Mission. The concerted efforts of many actors and agencies have brought about inspiring results in extension of millet cropping, conservation of local varieties, value added marketing through Farmer Producer Organizations (FPOs) and above all in the food and nutritional security of tribal households.







Mother Feeding her child with a traditional Mandia recipe , Village-Kupuligida GP- Kollar, Block- Boipariguda, District- Koraput





Bangarai Majhi showing the traditional millet recipe 'Mandia Anda', Village- Khatalapadar GP-Dangasili Block- Kashipur District- Rayagada



Focus Group Discussion with villagers of Mahuliput Village Tarlakota GP, Korkunda Block, Malkangiri District

CHAPTER - 3

OBJECTIVES, METHODOLOGY AND STUDY DESIGN



Women Farmers Returning From Ragi Field
Village- Kupuliguda , GP- Kollar Block – Boipariguda, District- Koraput



Interaction with Women Members during Focus Group Discussion at Khatalapadar Village , Dangasili GP, Kashipur Block , Rayagada District





Interaction with Women Members at Village -Khatalapadar, GP-Dangasili Block-Kashipur, District- Rayagada

The study has been undertaken with an aim to have certain investigations on socio-cultural linkages and associations of tribals with millets, millet based food habits of tribal people with the proper documentation on the different kinds of food items they prepare & its methods of cooking which are preferred by all age group and specifically the young generation, the value added millet food items and its consumption practices in present days will give a perspective on the acquisition and creation segment of food security. These investigations will have a gateway to create space & scope for the 'Millet based foods' as the great source of nutrients required for healthy lifestyle and safe option for food availability in present days.

The traditional millet-based food items are now consumed and famous in all age groups of our State. This study is mainly focusing on its wide range of consumption practice with more new and interesting food items to popularize all over the country. And this has been possible due to the improved education and knowledge of the village farmers in comparison to the past days during the year i.e 1990-91 to 2000 onwards. This has the scope for improvement in future which could change the entire scenario of millet, its production and consumption across the country and beyond.

Research Objectives:

This research project has been designed for the first time to explore and know the millet- based food habits of the Tribal people of Odisha. To understand and document the change in mllet-based food practice among the tribal communities of Odisha, daily food habits, traditional foods, the recipes and methods of cooking, production and consumption of millets.

The key objectives of the study are:

- To study the millet-based food habits of tribal communities in Odisha
- Assess factors responsible for changes in millet food habit and the consequences thereof on tribal food security.
- Document millet consumption practices and traditional millet recipes of tribal communities.
- To study the factors responsible for change in millet-based food habit of tribal communities in Odisha.
- To study the present status of millet cultivation & production of different varieties of millet in their areas.
- Assess the potential of introduction of millets in supplementary nutrition programs, enterprise development, commercial interventions in popularizing millet products

Research Questions:

- What changes have happened in the millet-based food habit of the tribal people and does it in any way influenced the millet production systems and land use practices?
- What are different millet consumption practices and traditional recipes in tribal communities (staple/ supplementary/ ritual food/ beverages)?
- What are the different kinds of recipes prepared out of millets and the special occasions when particular recipes are prepared?
- What changes have taken place over the years incidental to the consumption, conservation and propagation of millet varieties?

METHDOLOGY

Universe of the Study & sample

The study area has been selected based on the following criteria:

- ❖ Tribal dominated districts and has the presence of Particularly Vulnerable Tribal Groups (PVTG)
- ❖ Districts having Integrated Tribal Development Authority (ITDA) implementation
- ❖ Districts with Intervention of Odisha Millet Mission (OMM)
- ❖ Districts having millet cultivation practice and consumption, productivity of millet is high in the district with a scope for future enhancement of millet produce

Based on the above criteria the following 6 districts were identified for the purpose of the study

✔ Malkangiri I ✔ Koraput I ✔ Rayagada I ✔ Kandhamal I ✔ Mayurbhanj I ✔ Keonjhar



Selection of Blocks and Gram Panchayats (GPs)

Selection of Blocks and GPs for the study were done based of the following criteria:

- Blocks with concentration of tribal population
- Tribal Sub Plan Blocks (Integrated Tribal Development Agency (ITDA) Blocks
- Blocks covered under OMM.

The specific Blocks has been finalized in consultation with SCSTRTI & Programme Secretariat WASSAN at State level. GPs & Villages were finalized in consultation with district administration, officials of ITDAs, Micro Project Agencies, District Project Coordinator, OMM.

Selection of Villages & Households

- HH samples were covered using purposive random sampling method
- 50 HHs per Block were covered. A total number of 644 numbers of HHs has been covered for this study.

Table 6: Study Area

Sl no	District	Block	GP	Village	No of HH surveyed	FGD Completed
1	Malkangiri	Korkunda,	Somnathpur	Bansulbhata	8	1
				Kondelbandha	1	1
				Padakhal	3	1
				Maliguda	25	1
			Tarlakata	Mahuliput	14	1
		Khairiput,	Mudulipada	Padeiguda	26	01
		Mathili	Dhungiaput	Dhungiaput	49	01
2	Koraput	Baipariguda	Kollar	Kupuliguda	19	01
				Kandhapadapadar	30	01
		Laxmipur	Tayaput	Pada Sankuli	54	01
3	Rayagada	Kashipur,	Dangasil	Khatalapadar	52	01
		Rayagada,	Kotapeta	Biranarayanapur	50	01
		Gudari	Asada	Dimiriguda	29	01

				Badarautaguda	14	00
				Paridangar	7	00
4	Kandhamal	Tumudiband h	Belghar	Deoghar	32	01
			Guma	Dupi	18	01
		Baliguda	Midiakia	Sinapadi	15	01
				Sitapadi	37	01
5	Mayurbhanj	Jashipur	Durdura	Durdura	27	01
				Badasialinai	30	01
		Bisoi	Bisoi	Kundulia	25	01
			Bautibeda	Mahubhandar	24	01
6	Keonjhar	Jhumpura	Naradpur	Balabhadrapur	19	01
			Khuntapada	Asuki	36	00
Total		**13 Blocks**	**17 GPs**	**25 Villages**	**644**	**22**

Source: Field survey Data

Tribes covered:

The Kondha or Kandha is the largest tribe of the state in terms of population and are based mainly in the districts of Kandhamal, Rayagada and Koraput. The Santals inhabit the Mayaurbhanj District. The Ho in Mayurbhanj and Kandhamal District. The Saura, are found mainly in the undivided Ganjam and Puri district. The Bonda live in Malkangiri district formerly part of undivided Koraput.



Table 7: Tribes covered under the study

Sl no	District	Tribes covered
1	Malkangiri	Bhumia
		Bonda
		Kutia
		Paroja
2	Koraput	Bhumia
		Kondha
3	Rayagada	Langia saura
		Kondha
		Sabara
4	Kandhamal	Kondha
		Kutia Kondha
5	Mayurbhanj	Santala
		Bathudi
		Kolha
6	Keonjhar	Bhuyan
		Santala
		Saunti
	Total	**17**



Study Design

The study has been a combination of exploratory and explanatory methods integrating the anthropological (Ethnographic) methods. In order to have a detail description of this research, the exploratory methods have been adopted with a structured questionnaire with relevant questions about millet consumption patterns, indigenous recipes prepared, cultivation practices, production status, scope of marketing followed by the socio-economic information collection of the respondents. An expert panel was consulted to ensure the validity and clarity of the questions. Based on the guidance of the expert panel the following steps were included in process of data collection from the study areas:

- Both qualitative & quantitative methods.
- Focus Group Discussion.
- Individual interviews with HH to have related clear information on change in millet based food habits & different types of recipes prepared & consumed.
- Interaction with Officials & other related stake holders on millet based food habits, area, production, value addition, consumption & marketing system.

The broad objective of the research is to understand the generations of Millet based food habits of the Tribal communities of Odisha and to know the trend of millet based food practices through the years i.e 1990-91 (earlier) to 2022-23 (present). Further, the study also explored the factors that are responsible for the changed habits of consumption of millet based food habits.

Pre-study

Before the field work started, the field staff and other members of the study team were given intensive orientation facilitated by SCSTRTI and WASSAN regarding the study objectives and the outcomes. Post training session pilot study was undertaken from 24th April 2023 to 1st May 2023 in Gunpur and Rayagada blocks of Rayagada district where the questionnaires were tested and finalized.

Table 8: Details of Pilot study conducted:

Sl No	Block	GP	Village
1	Gunupur	Sagada	Sagada
		Kulsing	Bunding
		Bhimpur	Tada
			Bhimpur
2	Rayagda	Kotapeta	Kuljing
Total	**2**	**4**	**5**

Tools used for data collection:

In order to test the set of questions developed and collection of information that are relevant for the study, some tools were developed as follows:

- ✧ HH Interview using the Interview Schedule
- ✧ Focus Group Discussion (FGD)
- ✧ Key Informant Interview – PC – KVK, CDAO Rayagada, PA ITDA – Gunupur, Block Agriculture Officer – Gunupur, Programme Officer LSDA Gunupur, Field Officer OPELIP, Coordinator – Facilitating Agency (ASHA, Gunupur), District Program Coordinator – WASSAN etc.

Based on the satisfaction or dissatisfaction, annotations from the pilot study, the questionnaire were modified, improved and finalized to ensure that the questions were both understood by the interviewers and the respondents and to minimize the subsequent errors in future field survey.

Research Methods used for the Study

Descriptive-

- ❖ Review of literature sources from global, national, regional and local level based on the study objectives.
- ❖ Identifying the causes that have impacted the changed status of millet cultivation, production and consumption.
- ❖ Recognize the historical evidences and background of millet.

Descriptive method was used in the study to derive the lived experiences and knowledge of the respondents specific to millet based food habits. Through historical way of collection of information from the year-old methods of millet based food cooking and memorizing the past crop sowing mechanisms of the tribes through has been focused.

Exploratory-

- ❖ It focuses on the age-old practices of millet based food items consumed by the community.
- ❖ Documenting the changed habit of millet consumption of all age group of the community.
- ❖ Documenting the crop or food which has replaced the millet crops and when; in order to know the causes or factors responsible for it.

- ❖ Data collection sources from different level to explore based on the study objectives fixed.
- ❖ Secondary data collection vital for statistics, institutional records, magazines, libraries & Government departments, book etc. explored.
- ❖ Individual interviews gave intense and in depth information which will help for data analysis to find a new conclusion to the research.

Exploratory method of data collection; has few components through which investigations been carried out. The open ended questions played a vital role in collection of information on the study areas, access of millet based foods as the daily diet of the tribes covered. These datas are called from primary sources of data collection methods directly from the study areas by the research team. For this, the structured questions have been prepared to investigate through different tools like; PRA, FGD, Case studies & Pilot testing.

Secondary Data sources used in the research

- Relevant Websites
- Relevant Books
- Library
- Relevant Government department websites and links
- Relevant Online research papers
- Relevant Journals
- Relevant Dissertation

Sampling for the Focus Group Discussion & Intensive Interviews

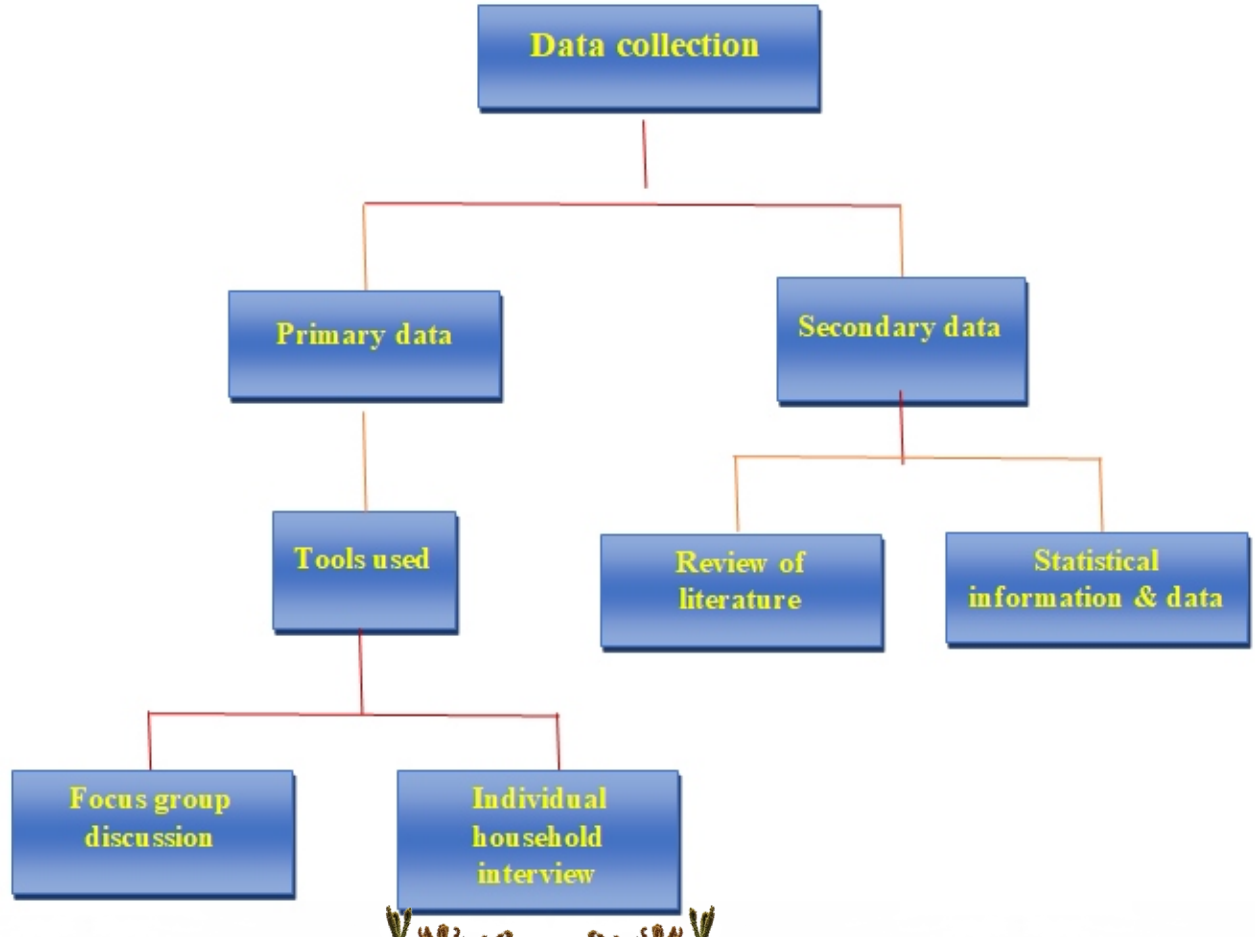
For Focus Group Discussion (FGD), the following were the key points for discussion using purposive sampling. The variant of the purposive sampling that were chosen for the study detailed as under:

- Respondents within the age bracket of 20-35 years, 35-50 years and more than 50 years as they their experience and knowledge about past cropping scenario of their locality and changed pattern of cultivation as well as consumption of millet.
- All tribal farmers who understand the methods and knowledge of cultivation of millet including cultural practices like; sowing transplanting, weeding, nutrient management, pest management, harvesting and threshing. Farmers who have adopted **'natural farming'** in cultivation of agricultural crops.
- Female head household were taken on priority as they are the only income source of their family and their experience on millet cultivation and consumption is important for the study
- The FGDs were done with all kind of socio religious groups of the community in the selected villages.
- A minimum sample of 50 nos of HHs per block was taken and the study has enough diversity of phenomenon in the selection of the samples.
- Case studies of the individuals who have sufficient diverse knowledge on different millet-based recipes and items.
- Discussion on varieties of millet, source of seed, spiritual functions related to seed distribution, sowing and preservation of seeds for sowing in coming season.

- Interview included about their normal and basic lifestyle including their cultivated area under millet production, productivity, method of cultivation, consumption of common recipes including beverages. Quantum of consumption and sell of balance produced were the key points for data collection.
- The narrative interviews were taken to document and present the indigenous millet-based food items and its method of cooking with photographs.

To sum – up research methodologies, both descriptive and explorative methods and tools have been applied to conduct the present study. It is rooted in to gather the information of the changed dimensions of the millet-based food habits of the tribal communities of Odisha. The qualitative perspective has been used primarily through FGD and Individual House hold Interviews. The process of data collection method has been reflected in the diagram below:

Exhibit 2: Method of Data Collection



Limitations of the Study:

The study has its limitations to focus only on the Millet consumption practices among the different Tribes and Sub - Tribes of the selected areas. It also includes the kinds of recipes Tribal people make for their daily consumption and in special occasions like; local festivals and others. In order to understand these aspects, the micro - level analysis of the study is vital in order to provide dimensions to understand the farm households within the limitations of time for the study.

- The study does not contribute to the agricultural practice of Tribal as a whole with land holding detail status.
- It does not focus on the statistics of cultivable land holdings of Tribes to know the economic status of the farmers / tribes.
- Does not cover the gender perspective
- Household level information cannot lead to a large variance for analysis.





Gurubari offering millets (Ragi) harvest to the village diety during celebration of Mandia Rani Parab. Village – Khatlapadar, GP- Dongasil, Block- Kashipur, Dist- Rayagada





Ingredients for preparation of Millet Ambili.
Village – Khatalapadar, GP-Dangasil, Block- Kashipur, District- Rayagada



Sitai Majhi preparing Mandi Ambili. Village -Khatalapadar, GP-Dangasili, Block- Kashipur, District - Rayagada

CHAPTER - 4

STUDY FINDINGS



Grinding of Ragi in traditional method (stone chaki) by Laxmi Bhumia, Village – Kupuliguda, GP- Kollar, Block- Baipariguda, Dist- Koraput



Lachhama Kirsani enjoying drinking 'Mandia Peja' (a traditional millet based beverage), Village – Padeiguda, GP- Mudulipada Block - Khairiput, District- Malkangiri





Brewing Hot Mandia Beverage prepared at Kupuliguda village, GP- Kollar, Block- Boipariguda, District - Koraput

Malkangiri

Malkangiri District is named after its headquarters town, Malkangiri. During formation of Odisha Province in 1936, Malkangiri was a 'Taluk' of Nabrangpur sub–division of undivided Koraput District of Odisha. In 1962 it was upgraded to a subdivision of Koraput District. Malkangiri got its identity as an independent District on reorganization of districts of Odisha as per a notification on 1st October, 1992 and with effect from 2nd October 1992. Covering an area



of 5,791 sq. kms, it lies between 17°45'N to 18°40'N latitudes and 81°10'E to 82°E longitude. This District is sparsely populated. The district has dense Forest Resources on which majority of depend for livelihood. A small percentage of the population are residing in the urban areas. The district is moderately literate and literacy in male is much higher than females. The district has a continental climate i.e very cold during winter and very hot in summer with temperature ranging from 13°C to 47°C. The average annual rainfall is about 1668 mm. Relative humidity is generally high, especially in the monsoon and post–monsoon months. During the rainy season, most areas of the district become impassably swampy and heavy floods isolate it from the outer world. This district is malaria prone.

AGRICULTURE SCENARIO[5]

The district comes under South Easternghat Agroclimatic Zone, Normal annual Rainfall - 1668 mm, Cropping Intensity - 157%, Total No. of Cultivators – 151260, Agriculture Labourers- 106353.

Agriculture is the main occupation of the district. Total cultivated area of the district during 2018-19 is 1,42,000 Ha-including 87,000 High land. Rice is the principal crop grown in low & medium land. Out of total uplands, 11,180 Ha has been covered under millets during 2000-01. Majority of millet area is ragi & coverage is 10,170 Ha. Small millets include 1,010 Ha. Ragi is grown

Table 9: Demography and Administrative Set up of the district

Description	Value
Area	5,791.00 sq.km
No of Sub division	01
No of Tahasil	07
No. of Blocks	07
No of Zilla Parisad	01
No of Municipality	01
No of NAC	01
No of Village	1045

Source: Census 2011

either pure crop or inter cropping with Ground nut, Arhar & Black gram. Area of ragi has been decreasing since 2000-01 but productivity is increasing. In 2018-19 ragi area was 7,670 Ha whereas same was 10,170 Ha during 2000-01. Ragi productivity was 638kgs/Ha & 458kgs/Ha during 2018-19 & 2000-1 respectively for the corresponding years. In case of small millets area decreased from 1,010 Ha to 570 Ha but productivity increased from 367 kgs/Ha to 462kgs/Ha at present in addition to millets, uplands are covered by different non paddy crops like pulses, oilseeds (Sesamum), vegetables & orchard crops under Diversification of Crops (DC) those are remunerative resulting decrease in millet area under cultivation. On adoption of improved varieties, line sowing/transplanting, weeding, fertilizer application & intercropping in ragi gives high farm return.

5 Source: District NIC portal

Millets & Tribes in the District

The eastern part is covered with steep ghats, platues and valleys, sparsely inhabited by primitive tribes with notable tribes Bonda (PVTG), Koya, Paroja, Konda Dora, Gadaba, Kandha, Kotia, Bhuyan, Bhumia, Matya, Bhottoda and Didayi (PVTG). Sample HHs survey included Bonda (PVTG), Bhumia, Kotia & Paroja. The GPs and villages of Malkangiri District have been selected on the basis of the presence of the PVTGs and maximum tribal community, covered by ITDA & OMM. The Millet covered area size is one of the main criterion for selection of the study focus areas.

BONDA: Bondas are a tribal people who currently live in the hills of Odisha's Malkangiri district in Khairiput block. There are two different Bonda tribes. The Upper Bondas with a population of 6,700 who are the most isolated from mainstream of general society, and the Lower Bonda with a population of 17,000. They are declared as PVTG. The primitive Bonda people have started to adapt to development. It is said, the primitive Bonda people had travelled here about 60,000 years ago from Africa. The Bondas of Malkangiri are from the first wave. They are also regarded as the first forest dwellers in the country.

The Bondas are seen in Khairput block on the hill tops in a forest environment. They are simple but independent-minded and have their own rules, customs, festivals, food habits and practices. They are nature lovers. They worship mother earth. They are women-centric families where the women play the main role.

Kondha : The Kondhas very much believe to be from the Proto-Australoid national group. Their language is Kui. The Kondhas are accomplished land dwellers exhibiting great flexibility to the forest environment. Their playground is dense sal forests. Their hunting instruments are of primitive races with bows and axes.

Table 10: Sample HH survey details in Malkangiri District:

Sl No	District	Block	GP	Village	HH Surveyed	FGD
1	Malkangiri	Korkunda	Tarlakata	Mahuliput	51	4
				Kondelbandha		
			Somanathpur	Basulibhata		
				MaliGuda		
				Padalkhal		
		Mathili	Dhungiaput	Dhungiaput	49	1
		Khairiput	Mudulipada	Padeiguda	26	1
Total					126	6

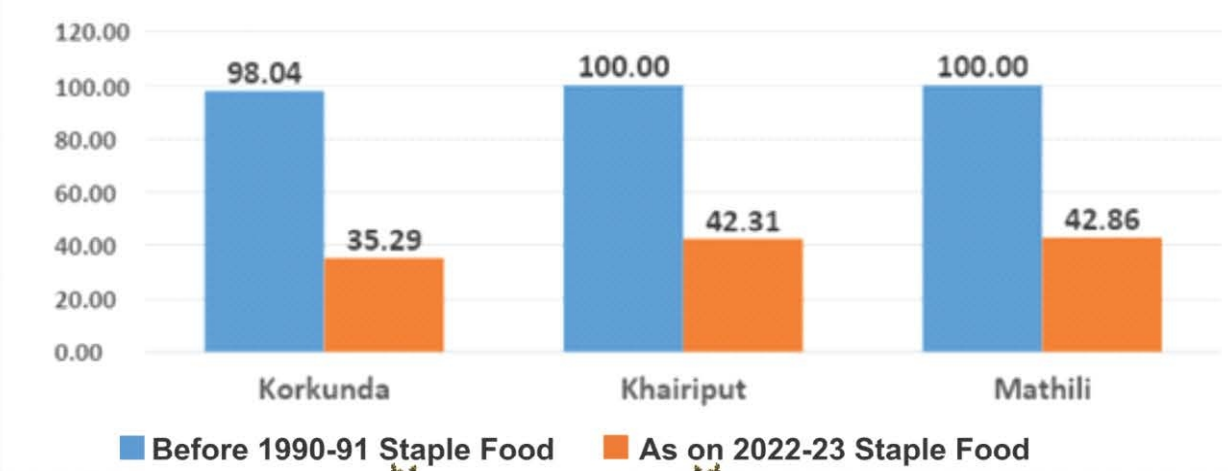
Millet as Staple Food & Supplementary Food

As per the field survey findings shown in Table 7, out of the total 126 Household surveyed in the district, 125 number of Households were taking millet-based food as their staple food in the year 1990-91, but during the year 2022-23 only 50 Household are taking millet as their staple food. Thus, it is seen from the findings that very less numbers of households in the sample blocks are now consuming millet. This is because millet-based food habits have changed to rice based due to supply of subsidized rice under PDS. Therefore, in the current year the household level consumption of millet based food has been changed. Previously it was consumed as staple food by the households which is reflected in the table & graph below:-

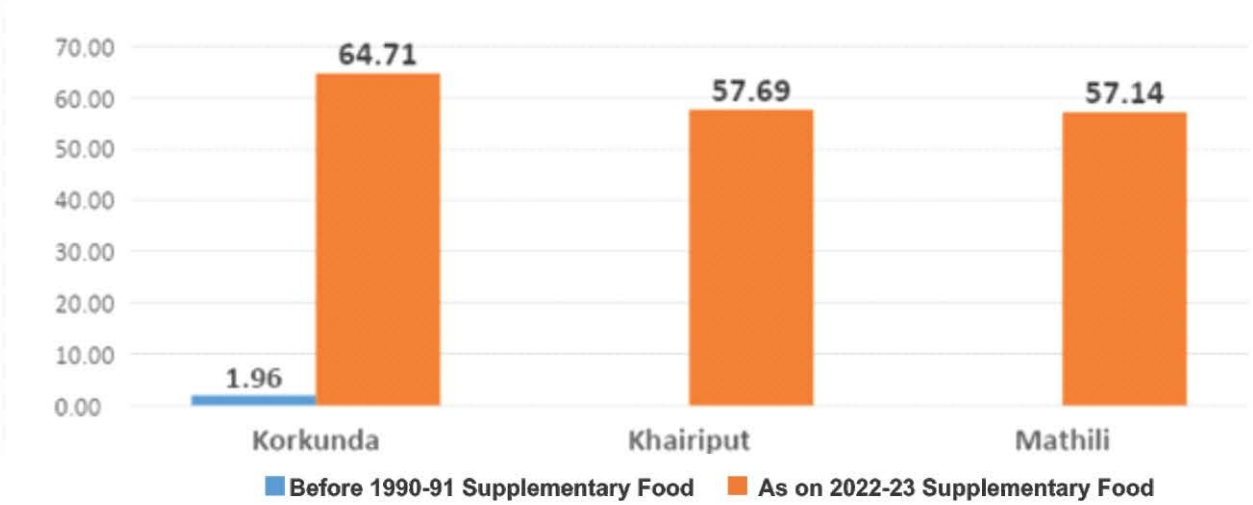
Table -11: Millet consumption status of the selected Blocks under Malkangiri District

Sl No	Block	No. of HH Surveyed	Food before 1990-91		Food as on 2022-23	
			Staple	Supplementary	Staple	Supplementary
1	Korkunda	51	50	1	18	33
2	Khairiput	26	26	0	11	15
3	Mathili	49	49	0	21	18
Total		126	125	1	50	76

Graph 1- Millet as Staple Food before 1990-91 & during 2022-23 (%)



Graph 2- Millet as Supplementary Food before 1990-91 & during 2022-23



From the above figures and graph it is seen that majority of households are consuming millet as their supplementary food in the surveyed areas. Because of easy availability of rice millets have become supplementary food.

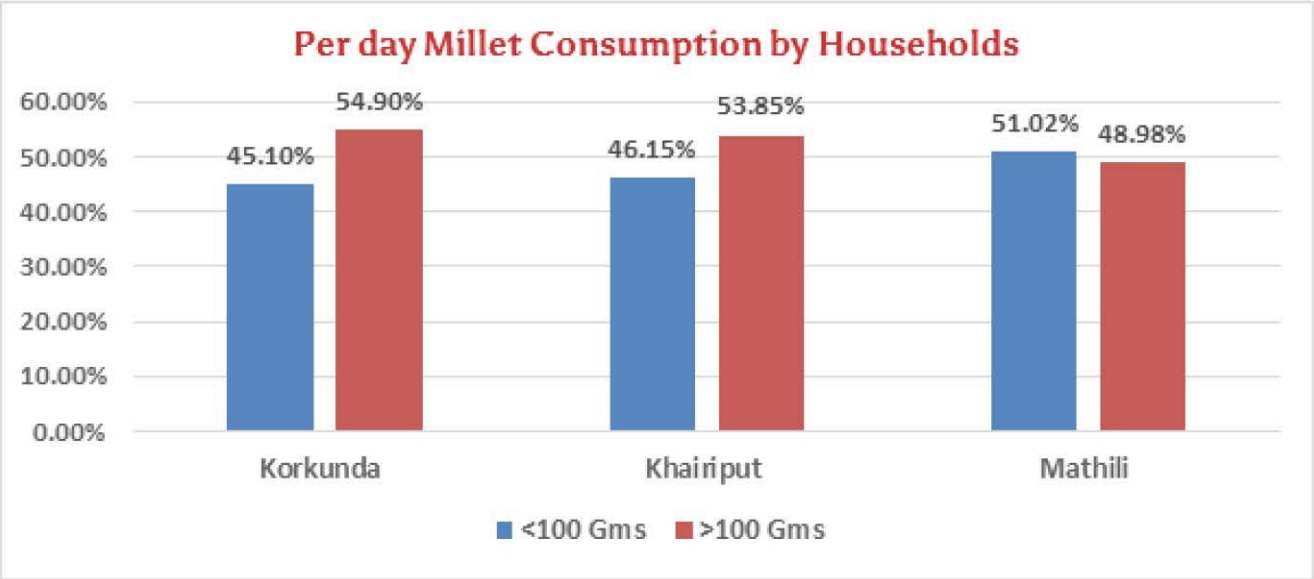
Quantity of Millet Consumption per day by Households during 2022-23

In connection to this the following table reflects the millet consumption by the households at present at the rate of less than 100 Gms, and more than 100 Gms. Out of 126 households taken as sample in the study area, ~~says~~ most of the households have been taking millet more than 100 Gms per day in comparison to those taking less than 100 gm per day because of their preference for Jau and Peja made from rice.

Table 12: Quantity of Millet Consumption per day by Households

Sl No	Block	No. of HH Surveyed	<100 Gms	>100 Gms
1	Korkunda	51	23	28
2	Khairiput	26	12	14
3	Mathili	49	25	24
	Total	**126**	**60**	**66**

Graph 3: Per Day Millet Consumption by Households



Based on the above figures, it is indicated that most of the household are taking millet per day more than 100 Gms in the surveyed areas. They prefer to consume millet in the morning time as a major source of energy to perform physical labour throughout the day. They add millet in rice and make jau to eat as breakfast that provides them nutrition and energy for the whole day.

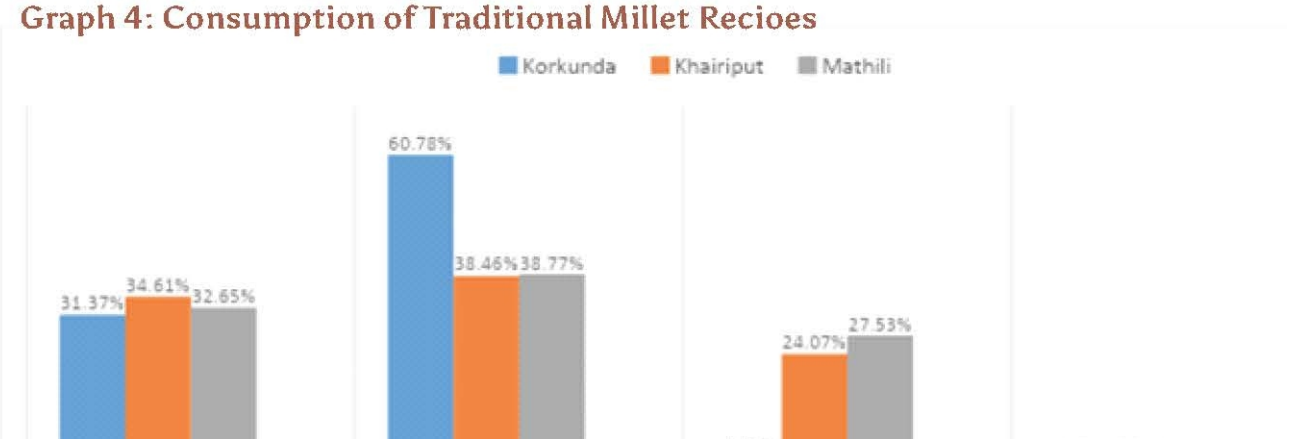
Consumption of Traditional/ Indigenous Millet Recipes

The following table reflects the millet consumption of Traditional/ Indigenous Millet recipes by the households in study area. Out of 126 households taken as sample, 41 households are taking Jau, 60 households are taking both jau & peja, 23 households are taking Jau, Tampa & Peja; rest 2 households are taking other millet recipes including the same.

Table 13: Consumption of Traditional Millet Recipes

Sl No	Block	No. of HH Surveyed	Jau	Jau& Peja	Jau, Tampa & Peja	Jau, Peja & Others
1	Korkunda	51	16	31	2	2
2	Khairiput	26	9	10	7	0
3	Mathili	49	16	19	14	0
	Total	126	41	60	23	2

Graph 4: Consumption of Traditional Millet Recioes



It is seen from the above figures that the trend of Jau consumption in the study areas i.e Korkunda, Khairiput & Mathili are at par with each other where as consumption of jau and peja are at higher side in Korkunda block. Similarly, the consumption of Jau, Tampa & Peja in Khairiput and Mathili block is more or less the same. The other traditional and indigenous recipes consumed in the study areas are almost of similar nature but particularly Jau and Peja are preferred by the Households.

Varieties of Millets Grown

In the study areas varieties of millet grown has been reflected in the following table as out of total 126 Households, total 109 household have grown Ragi, 4 household grown both Ragi & Suan, the rest 13 households have grown ragi and janha. The tribal community of the focused areas thus preferring to cultivated ragi, suan and janha as cereal crops but preference for ragi cultivation is more than other crops.

Table 14: Varieties of Millets Grown

Sl No	Block	No. of HH Surveyed	Ragi	Ragi& Suan	Ragi & Janha
1	Korkunda	51	38	0	13
2	Khairiput	26	22	4	0
3	Mathili	49	49	0	0
	Total	**126**	**109**	**4**	**13**

Graph 5: Varieties of Millets Grown

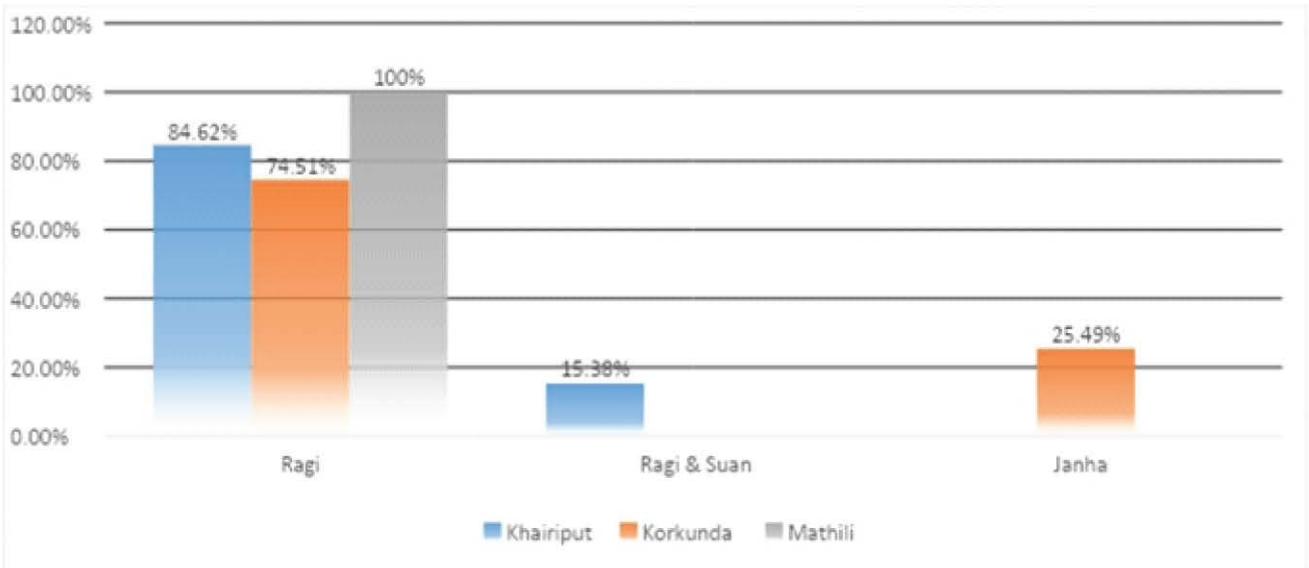


Table 15: Varieties of Millet Recipes

Sl No	Block	No. of HH Surveyed	Roti	Roti & Upama	Sweets & Khiri
1	Korkunda	51	6	28	17
2	Khairiput	26	12	7	7
3	Mathili	49	6	25	18
	Total	126	24	60	42

Graph 6: Varieties of Millet Recipes

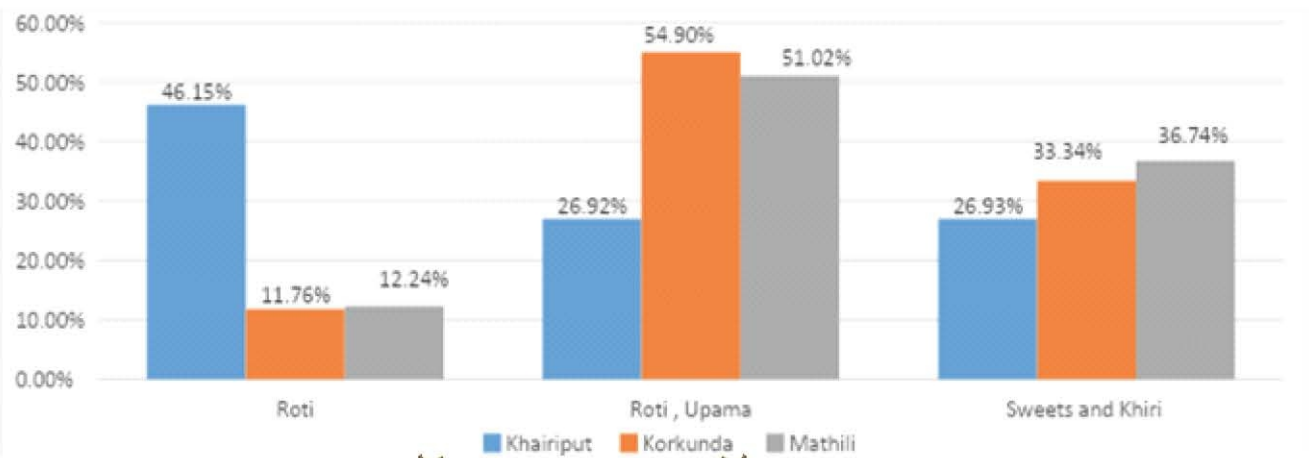


Table 16: Recipes Offered during Worship

Sl No	Block	HHs	Pitha	Mandru	Pitha & Tampa	Others
1	Korkunda	51	7	19	11	14
2	Khairiput	26	19	7	0	0
3	Mathili	49	27	15	7	0
	Total	**126**	**53**	**41**	**18**	**14**

Graph 7: Millet Recipes offered during Worship

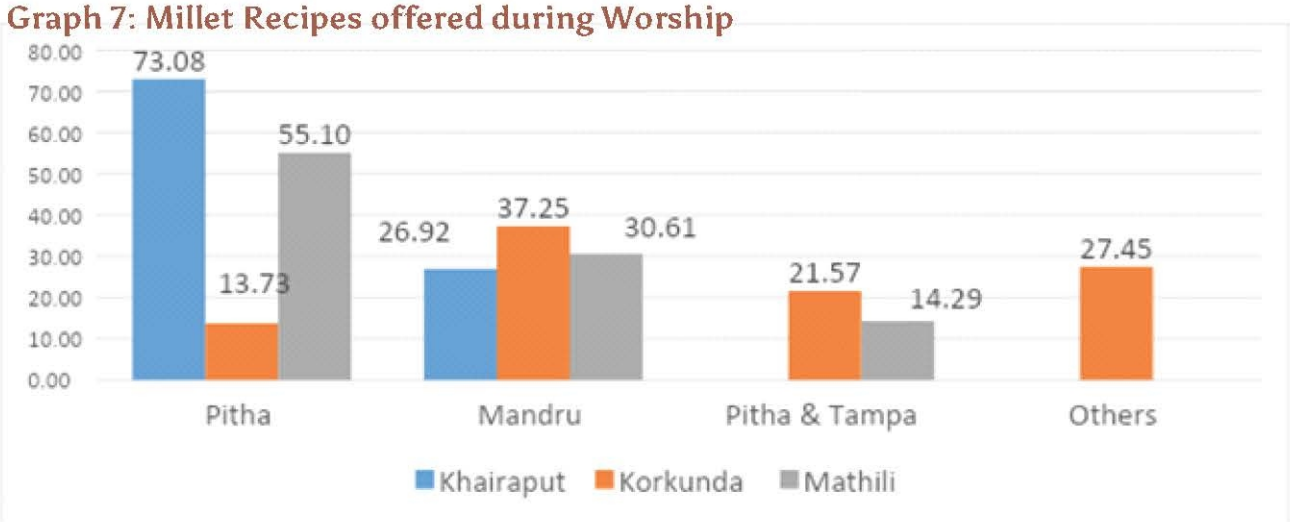


Table 17: Area under Ragi before and after OMM

Sl No	Block	No. of HHs Surveyed	Before OMM (HA)	After OMM (HA)
1	Korkunda	51	28.08	44.60
2	Khairiput	26	15.00	16.20
3	Mathili	49	29.40	41.20
	Total	**126**	**72.48**	**102**

Graph 8: Area under Ragi before and after OMM

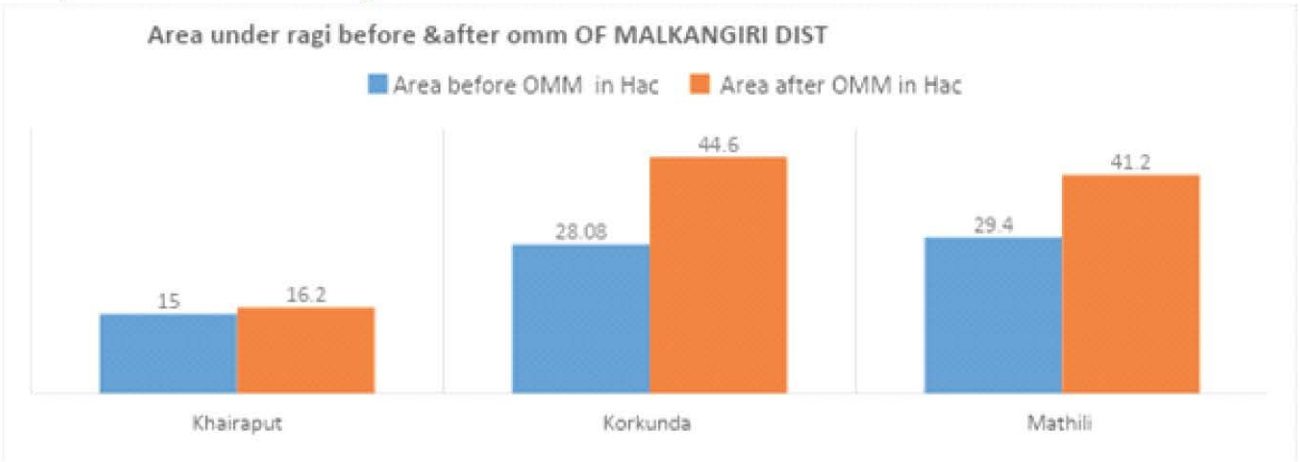
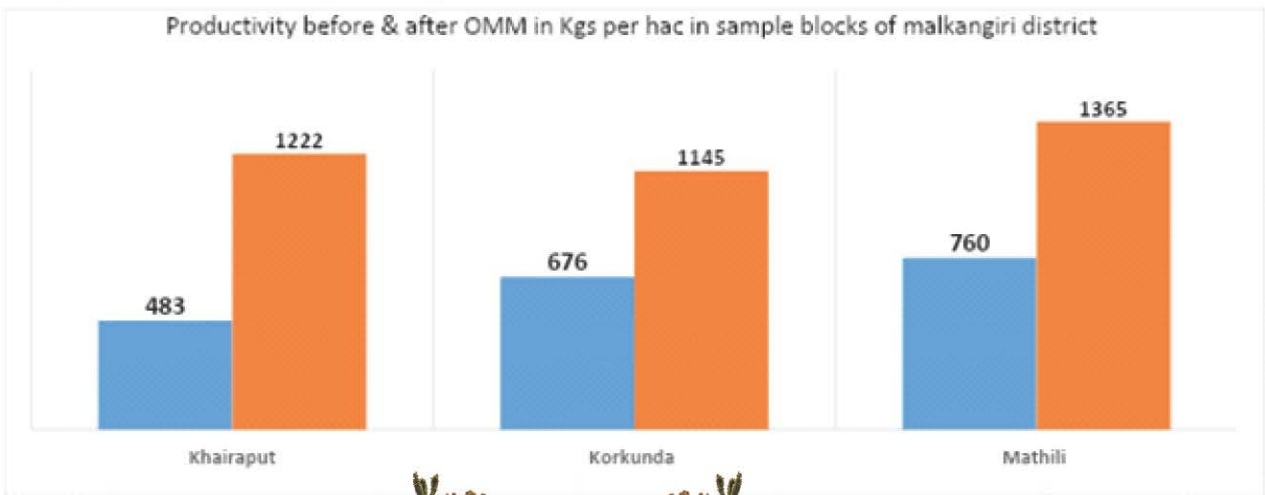


Table 18: Productivity of Ragi

Sl No	Block	No. of HHs Surveyed	Productivity before OMM (Kg per Ha)	Productivity After OMM (Kg per Ha)
1	Korkunda	51	676	1145
2	Khairiput	26	483	1222
3	Mathili	49	760	1365
	Total	**126**		

Graph 9: Productivity of Ragi



Koraput

The District of Koraput derives its name from its headquarters, the present town of Koraput. The origin of the name of Koraput is obscure. There are several theories, none of which is convincing. According to Mr.R.C.S.Bell, the first District Magistrate and Collector, Koraput, the name of the town is "Kora–putti" or "the hamlet of the Nux vomica" and it is derived presumably from a tree or trees that must at one time have been prominent near the site. But today not a single tree of Nux vomica is found near about the town of Koraput and so the assumption of Mr. Bell is open to question.

The whole of the district of Koraput comprises the ex–zamindaries of Jeypore and Kashipur. On 1.4.1936, the erstwhile District of Koraput came into being & Mr.R.C.S.Bell was the first District Magistrate and Collector, Koraput. On 1.10.1992, the District of Koraput was divided into four Districts i.e Koraput, Rayagada, Malkangiri and Nowarangpur.

Table 19: Administrative set-up of the district

Description	Value
Area	8,807 sq.km
No of Sub divisions	02
No of Tahasil	14
No of Police Station	23
No of Blocks	14
No of Gram Panchayats	240
No of Municipality	03
No of Villages	1922

Source: Census 2011

Table 20: Demography of the district

Population	1379647
Male	678809
Female	700838
Main Worker male	286001
Main Worker female	110459
Marginal Worker male	98052
Marginal Worker female	198894

Source: District NIC portal

Bhumias are widely known for their agricultural skills, Bhumia tribes are largely found in Jeypore, Boipariguda and Kundra block of Koraput district. The female members of this tribal group are found with a number of ornaments such as bead necklaces, armlets, bangles, ear rings and nose rings. They are settled agriculturalists who grow gram and oil seeds. The Bhumias supplement their income with the collection of minor forest produce, agricultural labour, basket weaving & fishing.

Agricultural practices of Koraput:

The district comes under Eastern Ghat High land Agro climatic Zone, Normal annual Rainfall - 1567 mm, Cropping Intensity - 146%, Total No. of Cultivators – 207194, Agriculture Laborers- 290626.

Agriculture is the main income source of the farmers in the district. Total cultivated area of the district is 3,04,000 Ha including 1,87,000 Ha Upland, 79,000 Ha medium & 38,000 Ha Low land. Rice is the principal crop grown in low, medium & jhola land. Crops grown in Koraput during Kharif season are - Paddy, Maize, Jowar, Bajra, Ragi, Smallmillet, Arhar, Mung, Biri, Cow pea, Rice Bean (Dangar Rani) Groundnuts, Sesamum, Sunflower, Castor, Niger (Alsi), Mesta, Cotton, Sweet Potato, Different Vegetable crops, Chilly, Turmeric, Ginger, Lemongrass. During Rabi season crops grown are - Paddy, Wheat, Maize, Ragi, Mung, Biri, Gram, Groundnut, Castor, Sunflower, Safflower, Linseed, Vegetables, Chilly, Sugarcane, Tobacco etc. Major crops grown during Kharif are - Paddy (34%), Ragi (21%), Maize (09%), Niger (09%) & Vegetables (11%) and in Rabi- Paddy (27%), Vegetables (30%), Pulses (21%), Sugarcane (09%) and the rest is covered other crops. Crop intensity - 131.93% in the district.

Table 21: Agriculture scenario of the district

Total Cultivable Area	301.50 SqKm
Total Paddy Area(Kharif)	99.000 Ha
Irrigation Potential(Kharif	93908 Ha
Irrigation Potential(Rabi	64057 Ha
Major Kharif Crops	Paddy, Ragi, Maize, Niger, Vegetables
Major Rabi Crops	Paddy, Sugarcane , Vegetables

Source: District NIC portal

Millets are second major crop in the district. Millets like Ragi, Bajra, Jowar, Suan, Kodo & Kangu are cultivated by the farmers. Majority of millet area are ragi. Total millets area reduced from 90,610 Ha to 59,571 Ha during the year between 2000-01 to 2018-19. Due to adoption of better varieties & agronomic practices productivity of Ragi increased from 828kgs/Ha to 906 Kgs/Ha & small millets from 380kgs/Ha to 512Kgs/Ha respectively between the corresponding years.

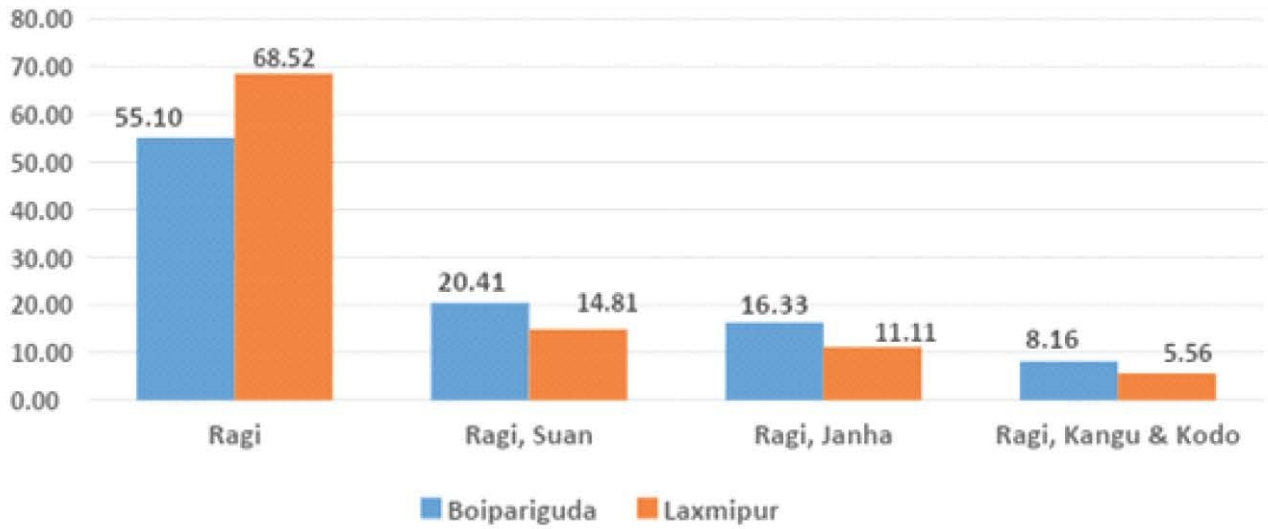
At present different non paddy crops like pulses, oilseeds, vegetables & plantation crops like coffee, Cashew nut, mango are cultivated under Crop Diversification programs resulting decrease in millet area.

Koraput district comes under Eastern Ghat Highland Zone. The lands are characterized with undulated condition. Hill-side cultivation and Jholla land cultivation is a traditional practice of the tribal people of the district. In hill-side sloppy land Ragi, Suan, Kangoo (millet crops); Kandul (Red gram), Dangar Rani (pulses) and Niger localy called Alasi (Oil seed) are commonly grown in these areas. These crops are also grown in undulated high lands where there is no water logging. The present millet growing status of the district is reflected in the table below based on HHs survey:

Table 22: Variety of Millet Grown (2022-23)

Block	No. of HHs Surveyed	Ragi	Ragi, Suan	Ragi, Janha	Ragi, Kangu & Kodo
Boipariguda	49	27	10	8	4
Laxmipur	54	37	8	6	3
Total	**103**	**64**	**18**	**14**	**7**

Source: Field Surveyed



Graph 10: Varieties of Millets Grown (2022-23)

Koraput district comes under Eastern Ghats Highland Zone. The land is characterized with undulated topography. The agricultural land of the district has traditionally been classified into the following broad divisions: 1. Dangar (Land on the hill slopes for shifting cultivation); 2. Upland (Unbonded as well as Bonded); 3. Medium land (Irrigated and Rain fed); 4. Lowland and 5. Jholla land (Terraces between hills). Within each land category, numerous rice varieties are grown, depending on the local preferences for food preparation, cultural practices, palatability, etc. Rice is raised in three distinct seasons, mainly, autumn (July to September), winter (June/July to November/December), and summer (February to May). Koraput district Jeypore region is the Secondary Centre of Origin of Rice.

Millet as Staple Food & Supplementary Food

Table 23: Millet consumption status of the selected Blocks under Koraput District

Sl No	Block	Total HHs Surveyed	Food before 1990-91		Food as on 2022-23	
			Staple	Supplementary	Staple	Supplementary
1	Boipariguda	49	45	4	11	38
2	Laxmipur	54	54	0	18	36
Total		**103**	**99**	**4**	**29**	**74**

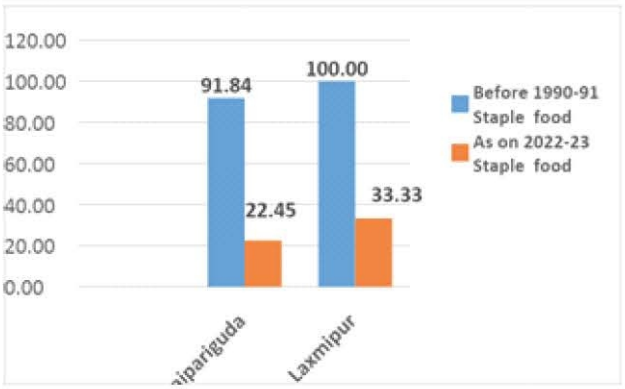
Before 1990-91 different millets were the principal food of tribes in Koraput district. Gradually due to high production of Rice and rise in economic condition they were able to consume more rice. Further the consumption of rice was accelerated by introduction of different Government supported scheme under food Security Act 2013, mid-day meal etc. millets became supplementary food in most of the household.

The household survey covered 49 HH from Boipariguda and 54 household from Laxmipur blocks. In Boipariguda, 45HHs were consuming millets as staple food before 1990-91which changed to 11HHs as on 2022-23. In Laxmipur block all 54 HHs were staple food consumer of millets but same changed to 18 HHs as on 2022-23. Similarly, only 4 HH in Boipariguda block were supplementary consumers—of millets before 1990-91. But supplementary consumers increased significantly to 38&36 in Boipariguda & Laxmipur blocks respectively by 2022-23.

Table 24: Change in Millets based Food Habit (Staple and Supplimentary Food) Koraput

Block	Total HHs surveyed	Before 1990-91 Staple Food	As on 2022-23 Staple Food	Before 1990-91 Supplementary Food	As on 2022-23 Supplementary Food
Baipariguda	49	45	11	4	38
Laxmipur	54	54	18	0	36
Total	**103**	**99**	**29**	**4**	**74**

Graph 11: Change in Millets based Food Habit (Staple and Supplementary Food)



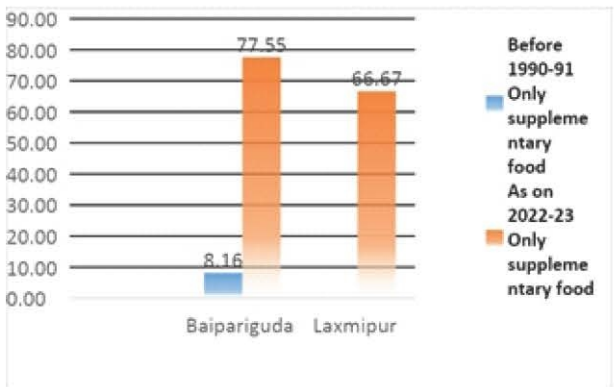
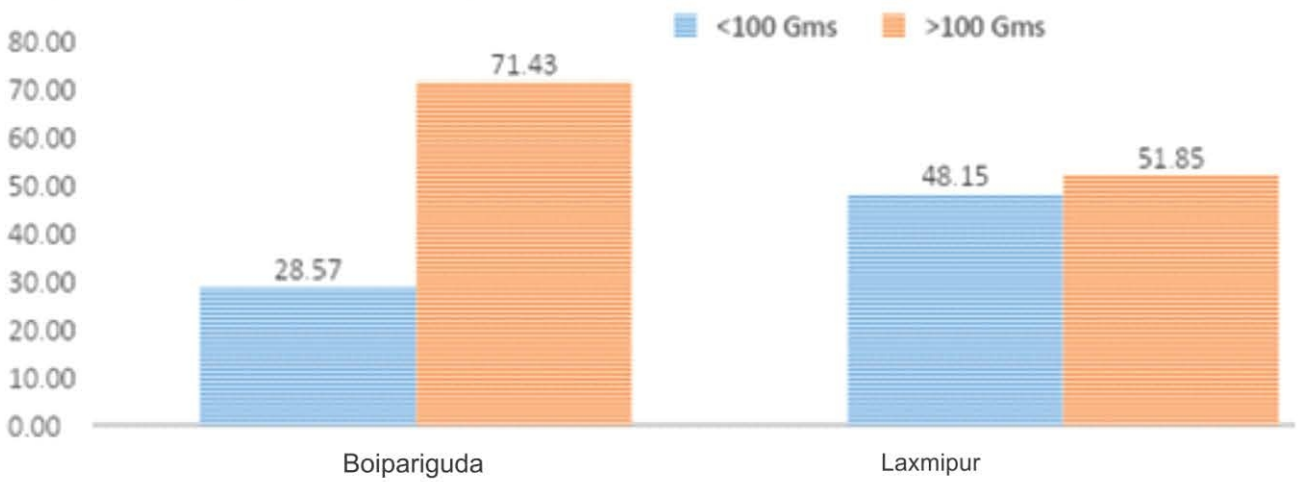


Table 25: Quantity of Millet Consumption per day by Households during 2022-23

Sl No	Block	Total HHs surveyed	<100 Gms	>100 Gms
1	Boipariguda	49	14	35
2	Laxmipur	54	26	28
	Total	**103**	**40**	**63**

Graph 12: Per Day Millet Consumption of Households

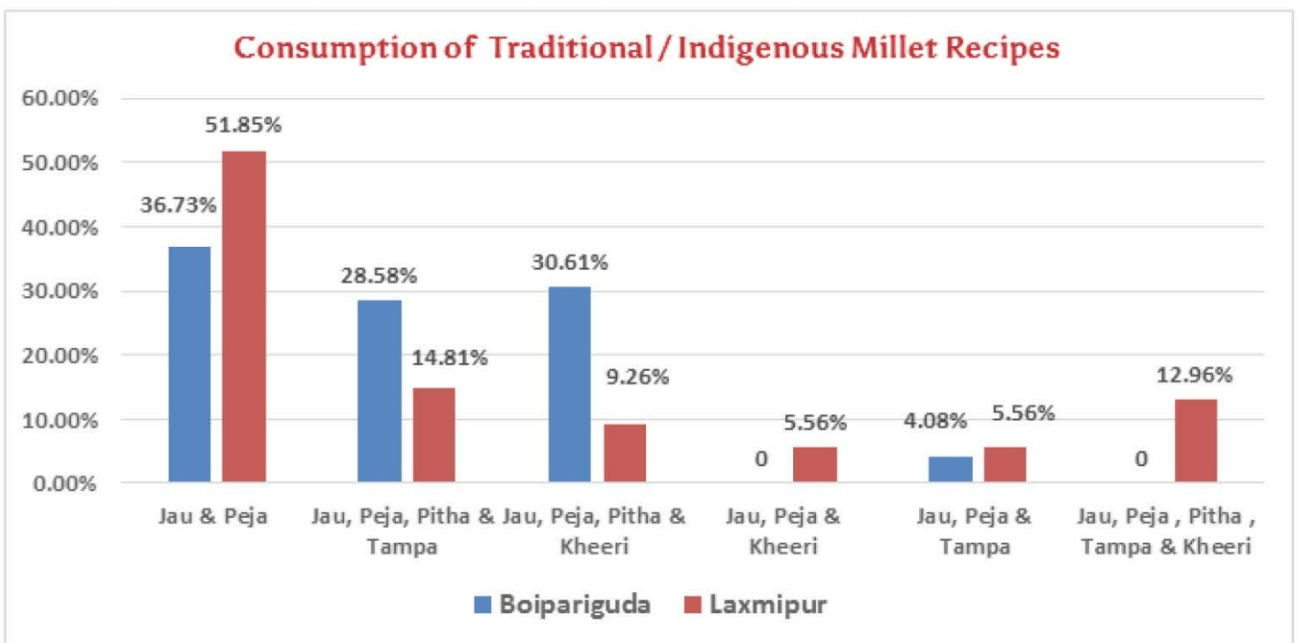


On reduction if millet consumption as staple food the quantum of millet per household consumption has been in a negative trend. But on introduction of Odisha Millet Mission and on motivation for consumption, more households are consuming greater than 100 Gms of millets per day. Tribal people have realized the beneficial effects of millet particularly from nutritional point of view in comparison to Rice. In Baipariguda block 14HHs consumed less than 100gms & 35 HHs consumed more than 100gms millets per day during 2022-23. Similarly, in Laxmipur block 26HHs consumed less than 100gms & 28 HHs more than 100 gms during the same period,

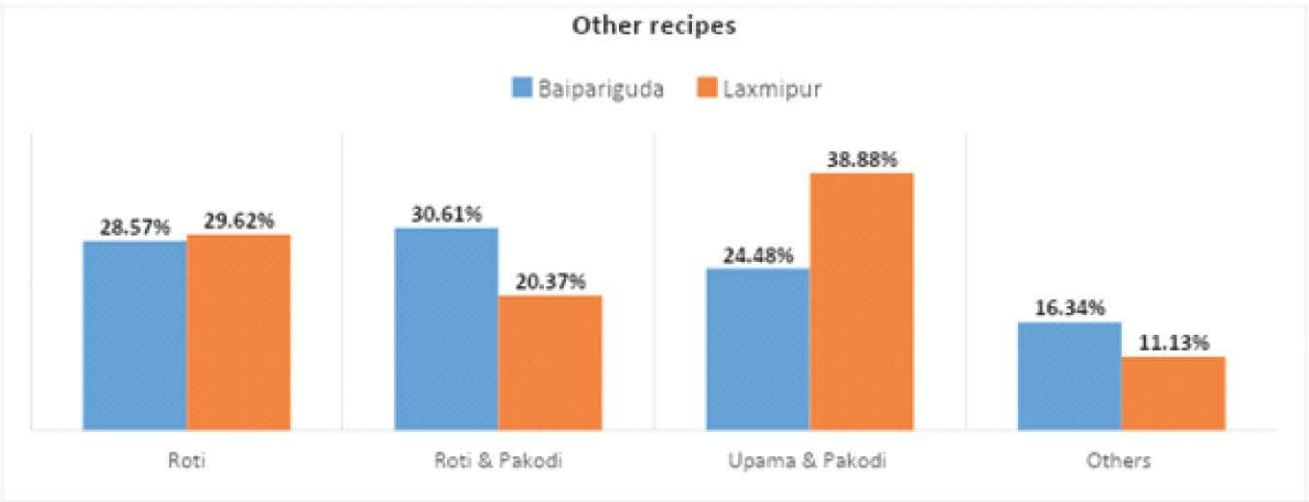
Table 26: Consumption of Traditional / Indigenous Millet Recipes

Sl No	Block	Total HHs surveyed	Jau & Peja	Jau, Peja, Pitha & Tampa	Jau, Peja, Pitha & Kheeri	Jau, Peja & Kheeri	Jau, Peja & Tampa	Jau, Peja , Pitha , Tampa & Kheeri
1	Boipariguda	49	18	14	15	0	2	0
2	Laxmipur	54	28	8	5	3	3	7
	Total	**103**	**46**	**22**	**20**	**3**	**5**	**7**

Graph 13: Consumption of Traditional/Indigenous Millet Recipes



Graph 14: Consumption of Other Millet Based Recipes



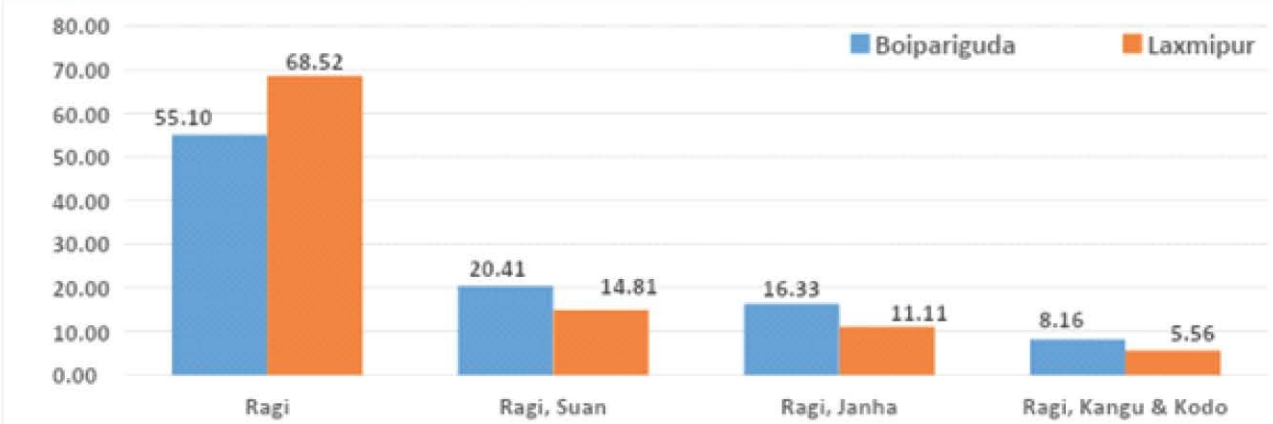
Millet based ancestral food i.e Jau, Peja, Tampa ,Pitha, kheeri etc are still liked by the tribal people of Boipariguda & Laxmipur block . They have habits of consuming indigenous recipes before going to field or jungle for a daily livelihood work. Details of household consuming different indigenous recipes has been mentioned in the table above.

Traditional millet recipes in different forms prepared mostly from Ragi are consumed daily by the tribes of Koraput. Jau and Peja are their familiar food. In addition, they are also habituated on preparation and consumption of other recipes from Ragi, Suan, Kodo etc.

Table 27: Varieties of Millet Grown

Sl	Block	Total HHs surveyed	Ragi	Ragi, Suan	Ragi & Janha	Ragi, Kangu & Kodo
1	Boipariguda	49	27	10	8	4
2	Laxmipur	54	37	08	6	3
	Total	103	64	18	14	7

Graph 15: Varieties of Millet Grown



There are different types of millet under cultivation in Koraput district. Ragi is the principal crop among millets in all surveyed blocks. In addition, tribes are cultivating other millets like Suan, Jowar(Janha), Kangu, Kodo etc in small areas for preparation of the other recipes to offer their God in different rituals

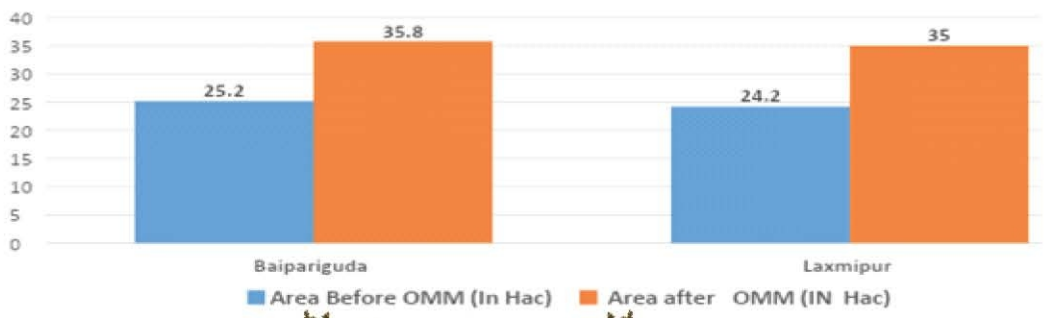
In Boipariguda and Laxmipur blocks tribes are growing different millets since decades.

In Boipariguda and Laxmipur block 49 and 54 HHs have been surveyed respectively for cultivation of different millets during the year 2022-23. All households are cultivating ragi either as pure crop or with other millets and pulses as mixed crops. Suan, Kangu, Jowar, Kodo are cultivated in limited areas by Households and used in preparation of different recipes during special occasions.

Table 28: Area under Ragi before & after OMM

Sl No	Block	No. of Hhs Surveyed	Area Before OMM (In Ha)	Area after OMM (In Ha)
1	Boipariguda	49	25.2	35.8
2	Laxmipur	54	24.2	35.0
	Total	103	49.4	70.8

Graph 16: Area under Ragi before & after OMM



On intervention of Odisha Millet Mission (OMM), the Ragi area under cultivation is gradually increasing. Area enhancement is encouraged due to better minimum support price of Ragi and sale through Government regulated system i.e through Tribal Development Corporation of Odisha Ltd. (TDCCOL). There is competition on area coverage with other cash crops like Oil Seeds, Vegetables and Orchard crops in uplands where Ragi is mainly grown.

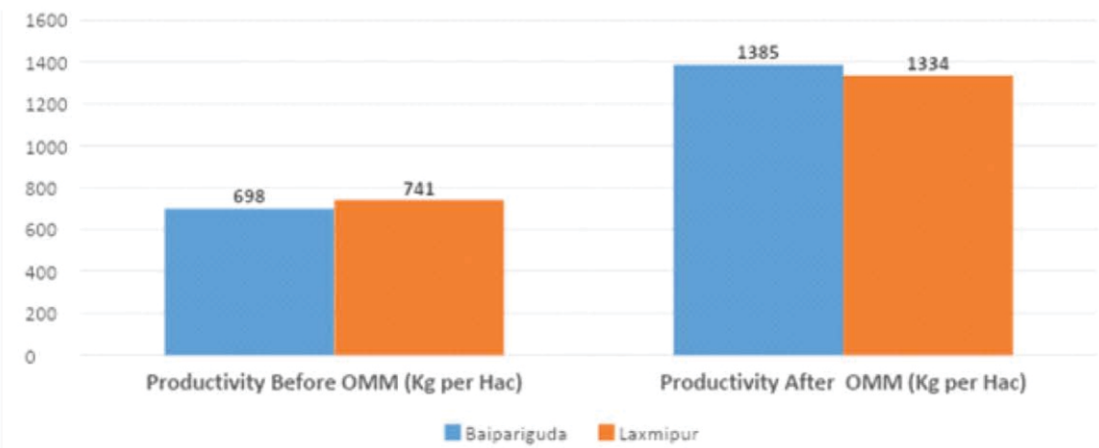
In Boipariguda and Laxmipur blocks survey in 49 and 54 HHs respectively have been done on impact of area coverage of Ragi on intervention of OMM. It is noticed that area under ragi has been increased from 25.2 Ha to 35.8 Ha & 24.2 Ha to 35 Ha respectively in Boipariguda & Laxmipur block due to impact of OMM.

Table 29: Productivity of Ragi

Sl No	Block	No. of HHs Surveyed	Productivity Before OMM (Kg per Ha)	Productivity After OMM (Kg per Ha)
1	Boipariguda	49	698	1385
2	Laxmipur	54	741	1334
	Total	103		

On survey of 49 HHs in Boipariguda &54HHs in Laxmipur block as shown in the table 25 , the productivity of Ragi has been increased significantly after intervention of OMM. The productivity has been increased from 698 Kgs per Hect to 1385 Kg per Hect in Boipariguda & 741Kgs per Hect to 1334 Kgs per Hect in Laxmipur blocks . Productivity has been increased due to use of better seed, adoption of agronomic practices i.e line sowing , line transplanting and SMI for which incentives have been provided to the beneficiaries from OMM. Those practices decreased weed and pest infestation resulting higher productivity.

Graph 17: Productivity of Ragi



Rayagada



Rayagada district is known as the most famous region of the state because of its longest human history. Although the district came into existence on the 2nd October 1992. It has long and glorious historical records evident by copper plates, rock inscriptions as well as different coins, which clearly indicate the region was the centre of attraction in all ages. In the third century B.C., during the reign of Ashoka the Great, it was under Kalinga empire. The hilly track between river Bansadhara and Nagabali, as evident by Andhra Historical Journal XXVII edition at page 46. the district was famous for spices during that period. During the English regime, Rayagada was covered under the Jeypore Zamindari, which continued till Independence.

Table 30: Administrative set up of the District

Description	Value
Area	7073 sq. km
No of Sub division	02
No of Tahasil	11
No of Police Station	15
No. of Blocks	11
No of Gram Panchayat	182
No of Village	2665

Source: District website

Table 31: Demography of the District

RURAL				URBAN			
Male	Female	Total population	Sex ratio	Male	Female	Total population	Sex ratio
397774	423171	820945	1064	74186	72780	146966	981

Source: District NIC portal

Agricultural practices of the District:

Rayagada district comes under North Eastern Ghat Zone characterized by hot, moist and sub-humid climate and consists of Brown forest, lateritic, Red alluvial, Black and mixed Red Soil groups.

- Geographical area 7,58,745 Hc
- Land diverted to social forests, and other plantation other purpose 10,900Ha

Irrigation activities on different Irrigation sources which is 28% of the total land put to Agriculture during Kharif (2017) 45307 ha (25%).

Rayagada Agriculture scenario:

The district comes under North Easternghat Agro climatic Zone, Normal annual Rainfall - 1286 mm, Cropping Intensity - 138%, Total No. of Cultivators – 99265 / Agriculture Labourers- 248175. Agriculture including commercial agriculture are the main income source of farmers in the district. Total cultivated area of the district is 1,93,000 Ha including 1,29,000 Ha Upland, 42,000 Ha medium & 22,000 Ha Low lands. Rice is the principal crop grown in low & medium & jhola land. Millets are second major food crop in the district. Millets like Ragi, Bajra, Jowar & Suan are cultivated by the farmers. Majority of millet area is ragi. Total millets area was 22,980 Ha during 2000-01 and reduced to 17850 Ha as on 2018-19. At present most of the uplands are covered by Cotton & other commercial crops reducing millet area. Influence of neighboring state Andhra Pradesh is visible on agriculture of the district on adoption of commercial agriculture.

Now farmers are giving importance on cultivation of HYV superfine variety, Sunflower, Niger, Ground nut, Horticultural fruit crops & Cotton due to better marketing facility & good return. The tables bellow gives a clear figure of the Millet consumption status of the selected Blocks under Rayagada District:

Table 32: Millet as Staple Food & Supplementary Food

Sl No	Block	No.of HH Survey	Food before 1990-91		Food as on 2022-23	
			Staple	Supplementary	Staple	Supplementary
1	Rayagada	50	41	9	36	14
2	Kashipur	52	52	0	49	3
3	Gudari	50	47	3	42	8
	Total	**152**	**140**	**12**	**127**	**25**

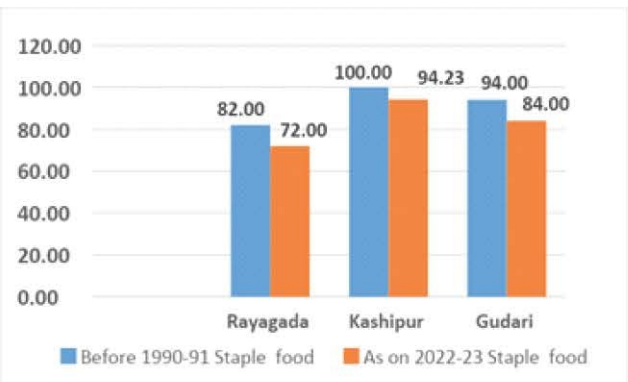
Survey findings on millet based food habits in Tribals of Rayagada, Kashipur and Gudari blocks indicate that no significant change has been made in food habits of tribes. Millets are still the staple food of them with multiple time consumption. Out of 50 House Holds (HHs) surveyed in Rayagada, Ragi was staple food of 41 HHs and 36 HHs before 1990-91 and as on 2022-23 respectively. Similarly millet was supplementary food of tribals in 9 and 14 HHs respectively during the study period.

In Kashipur block out of 52 HHs surveyed, 49HHs consumed millets as staple food and 3HHs consumed as supplementary food during the period of study. In Gudari 50 HHs have been surveyed. Out of which 47 HHs and 42 HHs used millet as staple food for the period before 1990-91 and as on 2022-23 respectively with 3 HHs and 8 HHs consume as supplementary food during the same period.

Table 33: Millets based Food habits (Staple & Supplementary Food)

SL	Block	No. of HHs Surveyed	Before 1990-91 Staple food	As on 2022-23 Staple food	Before 1990-91 supplementary food	As on 2022-23 supplementary food
1	Rayagada	50	41	36	9	14
2	Kashipur	52	52	49	0	3
3	Gudari	50	47	42	3	8
	Total	**152**	**140**	**127**	**12**	**25**

Graph 18: Millet Based Food Habits (Staple & Supplementary) before 1990-01 & as on 2022-23 (%)



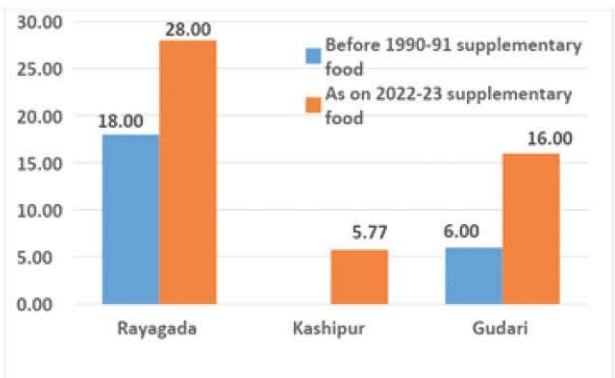


Table 34: Quantity of Millet Consumption per day by HHs

Sl No	Block	No. of HHs Surveyed	<100 Gms	>100 Gms
1	Raygada	50	23	27
2	Kashipur	52	15	37
3	Gudari	50	22	28
	Total	**152**	**60**	**92**

Millets are still staple food of tribes of Rayagada, Kashipur and Gudari block . Consumption quantity on surveyed indicates that proportion of Ragi to rice in common indigenous recipes have been decreased. i.e more quantum of rice is there then millets . As a result some HHs as mentioned in the table still consuming less than 100 Gms of Millets per day.

Study indicates that in Rayagada block 23 HHs and 27 HHs consumed less than 100 Gms and more than 100 Gms in a day respectively out of 50 HHs surveyed. Similarly in Kashipur block out of 52 HHs 15 HHs consumed less than 100 Gms per day and 37 HHs consumed more than 100 Gms per day. In Gudari block 50 HHs have been surveyed and result is 22 HHs consumed less than 100 Gms and 28 HHs consumed more than 100 Gms of Millet per day.

Graph 19: Per Day Millet Consumption by Households

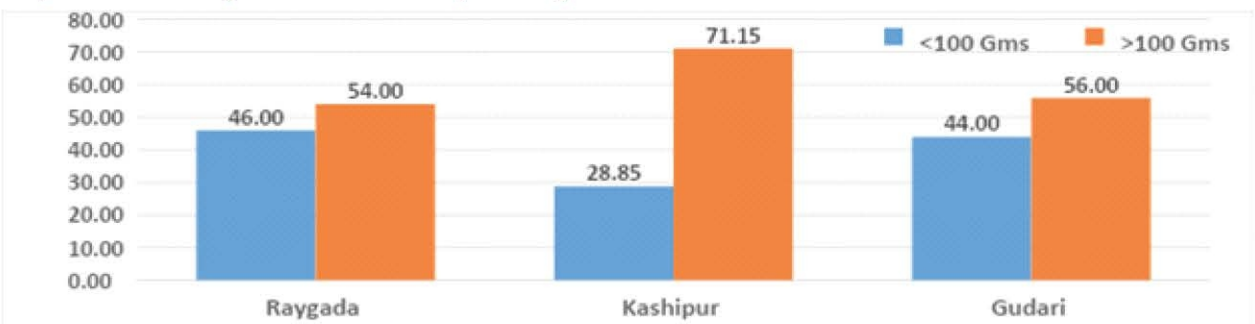
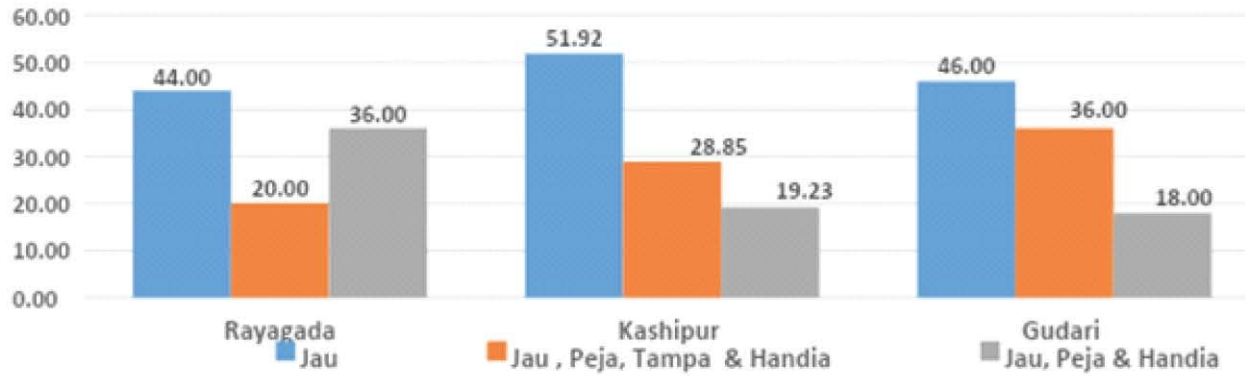


Table 35 Consumption of Traditional/Indigenous Millet recipes

Sl No	Block	No. of HH Surveyed	Jau	Jau , Peja, Tampa & Handia	Jau, Peja & Handia
1	Rayagada	50	22	10	18
2	Kashipur	52	27	15	10
3	Gudari	50	23	18	9
TOTAL		152	72	43	37

Graph 20: Consumption of Traditional/Indigenous Millet recipes (%)

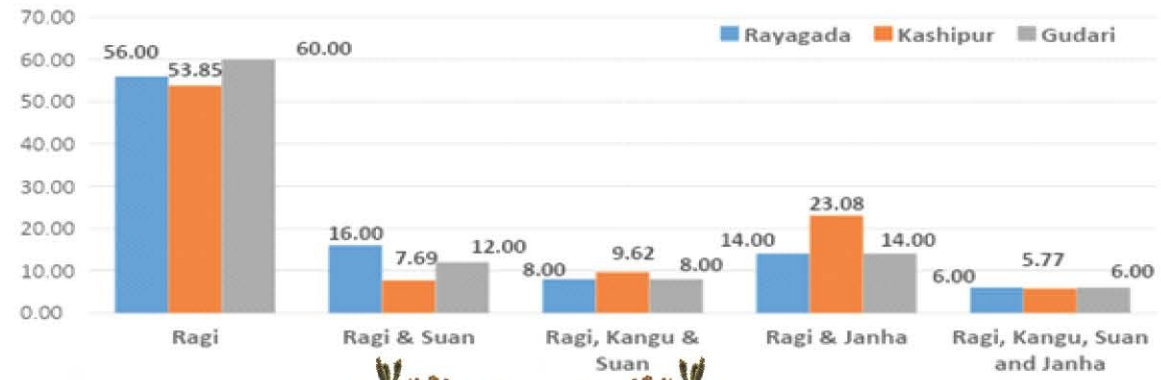


Millet based ancestral food i.e Jau, Peja, Tampa , Handia (Beverages) are still liked by the tribal people of Rayagada, Kashipur and Gudari block. They have habits of consuming indigenous recipes before going to field or jungle for a daily livelihood work. Details of household consuming different indigenous recipes has been mentioned in the table above which may kindly be referred.

Table 36: Variety of Millet Grown

Sl	Block	No. of HHs Surveyed	Ragi	Ragi & Suan	Ragi, Kangu & Suan	Ragi & Janha	Ragi, Kangu, Suan and Janha
1	Rayagada	50	28	8	4	7	3
2	Kashipur	52	28	4	5	12	3
3	Gudari	50	30	6	4	7	3
	Total	**152**	**86**	**18**	**13**	**26**	**9**

Graph 21: Varieties of Millets Grown (%)



Several varieties of millets are in cultivation in Rayagada, Kashipur and Gudari since their ancestral periods by the tribes. In Rayagada, Kashipur and gudari block 50, 52 and 50 HHs have been surveyed respectively for cultivation of different millets. The above table indicates HHs grown different type of millets during 2022-23. Ragi is the prominent and major millet among them . All household or cultivating ragi either as pure crop or with other millets and pulses as mixed crops. Suan, Kangu , Jowar etc or cultivated in limited areas by Households and used in preparation of different recipes to offer to their God in different auspicious occasions and home consumption also

Table 37: Consumption of Traditional / Indigenous Millet Recipes

Sl No	Block	No. of HHs Surveyed	Jau	Jau , Peja, Tampa & Handia	Jau, Peja & Handia
1	Rayagada	50	22	10	18
2	Kashipur	52	27	15	10
3	Gudari	50	23	18	9
	Total	152	72	43	37

Graph 22: Consumption of Traditional / Indigenous Millet Recipes (%)

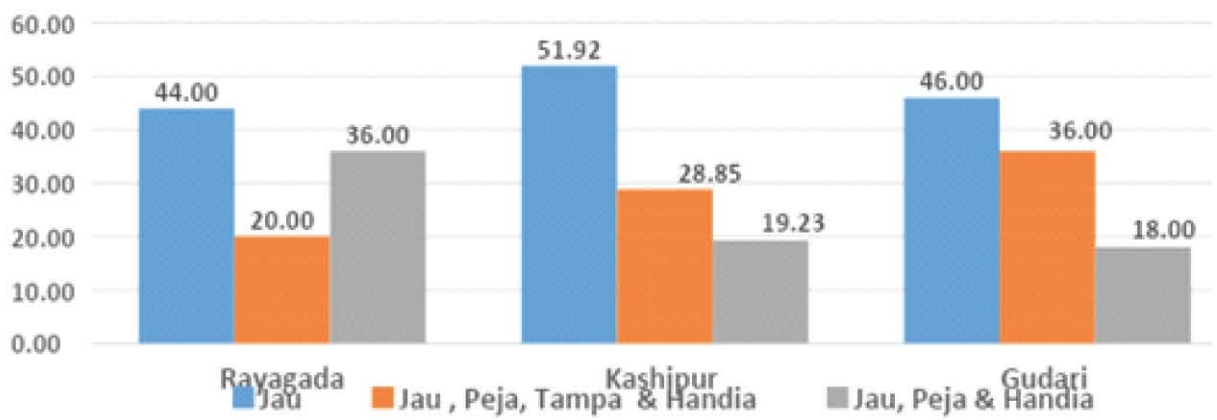
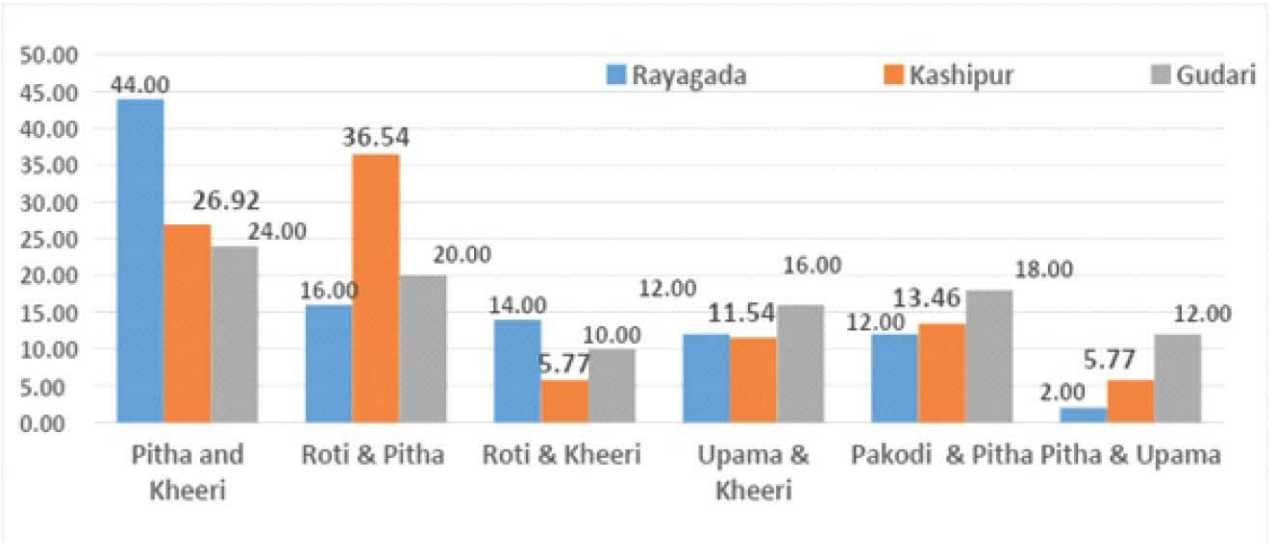


Table 38: Other Recipes

Sl No	Block	No. of HHs Surveyed	Pitha and Kheeri	Roti & Pitha	Roti & Kheeri	Upama & Kheeri	Pakodi & Pitha	Pitha & Upama
1	Rayagada	50	22	8	7	6	6	1
2	Kashipur	52	14	19	3	6	7	3
3	Gudari	50	12	10	5	8	9	6
	Total	**152**	**48**	**37**	**15**	**20**	**22**	**10**

Graph 23: Consumption of Other Millet Based Recipes (%)

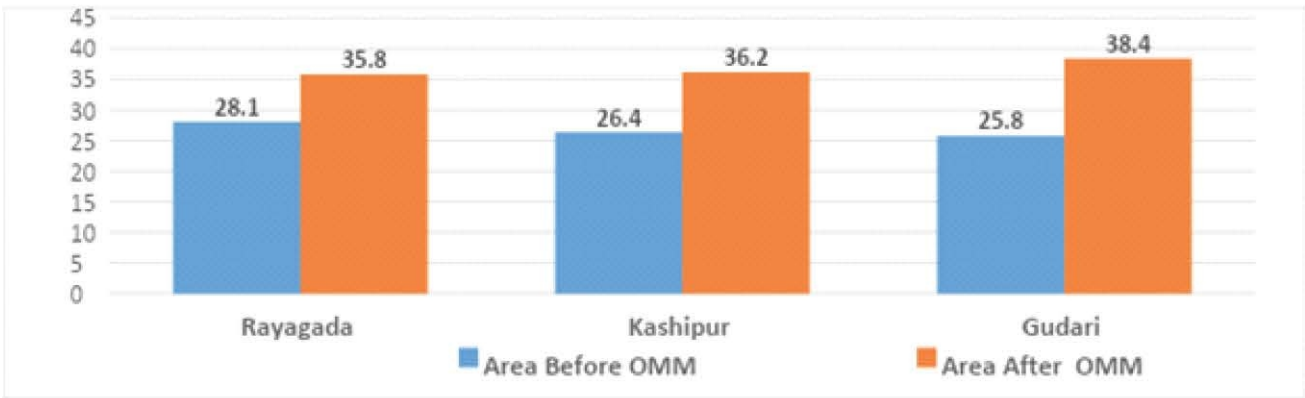


In Rayagada, Kashipur and Gudari 50,52, 50 Households have been surveyed respectively for consumption of other recipes than indigeneous one . It is seen that they are preparing Pitha, Khheri, Roti, Upama, Pakodi recipes like urban food culture in delicious manner. The households are preparing the above recipes in different combinations has been reflected in the table. It is assumed that effect of neighboring state Andhara Pradesh has impact on preparation of some recipes as the tribes of the above area are in social harmony with telugu people of Andhara Pradesh.

Table 39: Area under Ragi Before & After OMM

Sl No	Block	No. of HHs Surveyed	Area Before OMM (In Ha)	Area After OMM (In Ha)
1	Rayagada	50	28.1	35.8
2	Kashipur	52	26.4	36.2
3	Gudari	50	25.8	38.4
	Total	152	80.3	38.4

Graph 24: Area under Ragi Before & After OMM



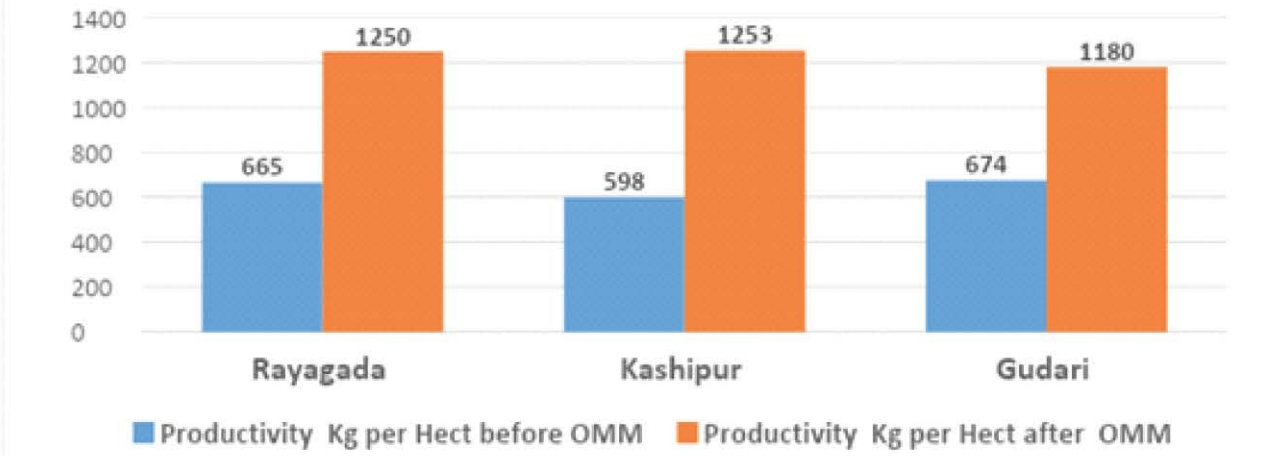
In Rayagada, Kashipur and Gudari blocks survey in 50,52 and 50 HHs respectively have been done on impact of area coverage of Ragi on intervention of OMM. It is noticed that area under ragi has increased to some extent. The study shows that the area has increased from 28.1 Ha to 35.8 Ha, 26.4 Ha to 36.2 Ha and 25.8 Ha to 38.4 Ha respectively in Rayagada, Kashipur and Gudari block by intervention of OMM.

Table 40: Productivity of Ragi

Sl No	Block	No. of HHs Surveyed	Productivity Before OMM (Kg per Ha)	Productivity After OMM (Kg per Ha)
1	Rayagada	50	665	1250
2	Kashipur	52	598	1253
3	Gudari	50	674	1180
	Total	152		

On survey of 152 HHs in 3 blocks i.e Rayagada, Kashipur and Gudari as shown in the table 36, the productivity of Ragi has been increased significantly after intervention of OMM. The productivity has been increased from 665 Kgs per Ha to 1250 Kg per Ha in Rayagada, 598 Kgs per Ha to 1253 Kg per Ha in Kashipur and 674 Kgs per Ha to 1180 Kg per Ha in Gudari block. Productivity has been increased due to use of better seed, adoption of agronomic practices i.e line sowing, line transplanting and SMI for which incentives have been provided to the beneficiaries from OMM. Those practices decreased weed and pest infestation resulting higher productivity.

Graph 25: Productivity before & after OMM in Kgs per Hac in sample blocks of Rayagada





Kandhamal

Kandhamal revenue district came into existence on 1st January, 1994, after Phulbani District was divided into Kandhamal and Boudh Districts of Odisha. The District lies between 19 degrees 34' to 20 degrees 36' north latitude and 83 degrees 34' to 84 degrees 34' east longitude.



Kandhamal experiences sub-tropical hot and dry climate in summer. Dry and cold climate in winter. The maximum temperature recorded in the district is 45.5°C and minimum temperature is 2.0°C. The average annual rainfall recorded is 1522.95 mm. The Kandhamal district covering a geographical area of 7654 sq kms is bounded by Boudh district in the North, by Rayagada & Gajapati districts in the South, by Ganjam and Nayagarh districts in the East and Kalahandi District in the west.

Table 41: Administrative set up of the district

Description	Value
Area	7073 sq. km
No of Sub division	02
No of Tahasil	11
No of Police Station	15
No. of Blocks	11
No of Gram Panchayat	182
No of Village	2665

Source: District NIC portal

Table 42: Demography of the District

Population	7,33,110		
Total Male	359945	Total Female	3,73,165
Urban Male	36422	Urban Female	35,857
Rural Male	323523	Rural Female	3,37,308
Male SC Population	15.83%(56,987)	Female SC	15.69%(58.557)
Male ST Population	52.93 % (1,90,506)	Female ST	54.22% (2,02,314)
Literacy Rate Male	76.93%(2,33,900)	Literacy Rate Female	51.94% (1,65,886)
Sex Ratio (Female per 1000 males)	1037		

Source: District NIC portal



Agricultural Scenario of Kandhamal District:

The district comes under North Eastern hat Agro climatic Zone, Normal annual Rainfall - 1428 mm, Cropping Intensity - 153%, Total No. of Cultivators – 79221, Agriculture Labourers- 162932. Agriculture, goatery & back yard poultry is the main occupation of the district. Total cultivated area of the district during 2018-19 is 1,28,000 Hac including 96,000 High, 21,000 medium &11,000 low land. In addition to Rice, millets, vegetable & Spices i.e Turmeric, Zinger are the important crops grown in the district. Majority of millet area is ragi & coverage was 2,190 Ha with productivity of 520 kgs / Ha during 2000-01. During 2000-01 Small millet area was 1,660 Ha with productivity 320 kgs / Ha. During 2018-19 Ragi & Small millet area were 2,820 Ha & 900 Ha with productivity of 901kgs/Ha &531 kgs / Ha respectively. Ragi is grown either pure crop or inter cropping with Arhar or Black gram. Area of ragi has been increasing & small millet area decreasing since 2000-01.

At present in addition to Millet, uplands are covered by different non paddy crops like Turmeric, Ginger, Pulses, Oilseeds, Vegetables & Orchard crops under Diversification of Crops (DC) those are remunerative resulting decrease in millet area under cultivation. On adoption of improved varieties, line sowing/transplanting, weeding, use of organic fertilizers, Bio-fertilizers & intercropping with ragi, it gives higher return.

Agriculture in Kandhamal District is the mainstay of majority of the populace and thus, holds the key to socioeconomic development of the District. Growth of the agriculture sector is important not only for ensuring food security and reduction of poverty in rural areas, but also sustaining growth of rest of the economy. More so, growth of two non-farm sectors viz. Secondary and Tertiary sectors can be sustained only when the agriculture sector continues to grow and provide adequate demand for goods and services along with market for the farm produce. The aforementioned facts are relevant in the context of District like Kandhamal where nearly 79% people earn their livelihood through agriculture and allied activities. Kandhamal District is predominantly agrarian with Agriculture and Animal Husbandry sector contributing 21.49% to the Net District Domestic Product (NDDP) as per Quick estimates of 2014-15 and 17.35% of the Gross District Domestic Product (GDDP) as per Quick estimates of 2014-15 at current prices. It is a fact that the share of Agriculture sector (which includes Agriculture and Animal Husbandry, Forestry and Fisheries sub sectors) in the District's Gross Domestic Product has been declining over the years. Still this sector continues to be vital for the District's economy. This sector suffers from frequent natural calamities like cyclone, drought and flash floods. Agriculture sector in the Kandhamal District has an impressive long term record of tackling the serious food shortages through a favorable interplay of infrastructure, technology, extension, policy support with strong will and determination of Agriculture field functionaries.

Kharif and Rabi Crops The total cultivated land of Kandhamal District is 1,27,790 hectares. The principal crops grown in this district are paddy, maize, ragi, wheat, minor millet (Jowar, Bajra, etc.) and pulses like arhar, mung, biri, kolthi, cowpea, etc. Among commercial crops turmeric, potato, fruits and vegetables are important. Turmeric is the chief commercial crop and the district is noted for Turmeric cultivation in the State. The Kandhas of Phulbani, Baliguda,

G.Udayagiri, Raikia and Daringbadi Blocks widely cultivate turmeric which is very hereditary crop. This District is also noted for oil seeds like niger, mustard, groundnut and castor. Out of the total cultivated cropped area of 1,27,790 hectares Paddy is the principal crop which alone accounts for 39 % (50,000 Ha) of the area. Next to Paddy is Maize that is widely cultivated and covers 13% (16,970 Ha) of the area. Besides Paddy and Maize, while other cereals and Millet accounted for 2% (3010 Ha), pulses are grown rather extensively accounting for 9 % (11,970 Ha) of the cultivated area. Turmeric, which is the main commercial crop of Kandhamal District accounts for 13 % (12755 Ha). Oil Seeds covers 10% (13,151 Ha) of the cultivated area. Similarly, Vegetable covers 13 % (16,013 Ha) and fibers only 1 % (760 Ha) of the cultivated area. Ragi is extensively cultivated in the district mainly during Kharif season to an extent of about 1920 hectare

The tables bellow gives a clear figure of the Millet consumption status of the selected Blocks under Kandhamal District:

Table 43: Millet as Staple & Supplementary Food

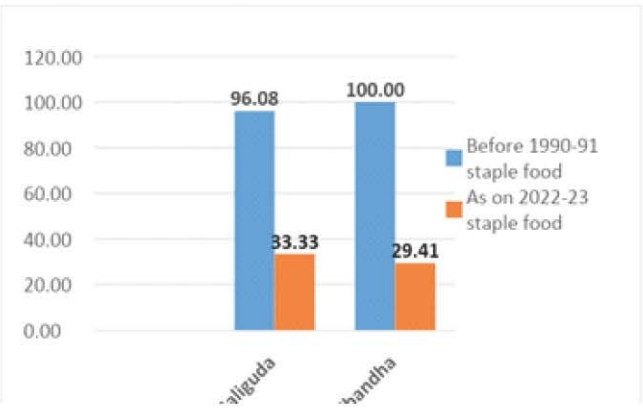
Sl No	Block	No. of HHs Surveyed	Before 1990-91		After 2022-23	
			Staple	Supplementary	Staple	Supplementary
1	Baliguda	52	50	2	17	35
2	Tumudibandha	50	50	0	15	35
	Total	**102**	**100**	**2**	**32**	**70**

Survey findings on millet based food habits in Tribals of Baliguda, and Tumudibandha blocks indicate that there is change in food habits of tribes. Millets are the staple food of some of them. Out of 51 House Holds (HHs) surveyed in Baliguda block, Ragi was staple food of 49 HHs and 17 HHs before 1990-91 and as on 2022-23 respectively. Similarly, millet was supplementary food of tribals in 2 and 34 HHs respectively during the said period. In Tumudibandha block all 51 HHs were consuming ragi as staple food before 1990-91 & same was of 15 HHs during the year 2022-23 & rest 36 HHs used ragi as supplementary food in 2022-23.

Table 44: Change in Millets based food habits (Staple & Supplementary)

Sl No	Block	No. of HHs Surv-eyed	Before 1990-91 staple food	As on 2022-23 staple food	Before 1990-91 Supplementary food	After 2022-23 Supplementary Food
1	Baliguda	52	50	17	2	35
2	Tumudibandha	50	50	15	0	35
	Total	**102**	**100**	**32**	**2**	**70**

Graph 26: Change in Millets based food habits (Staple & Supplementary) (%)



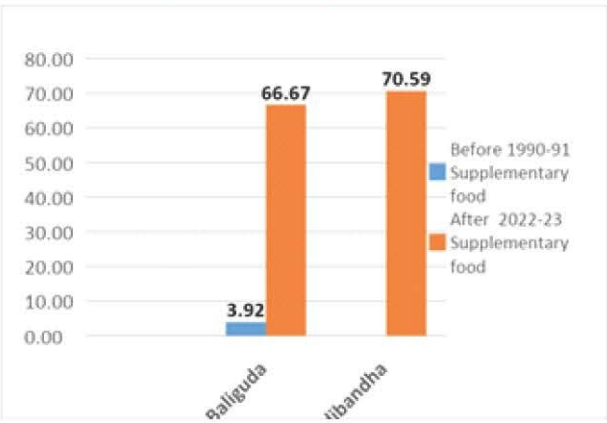
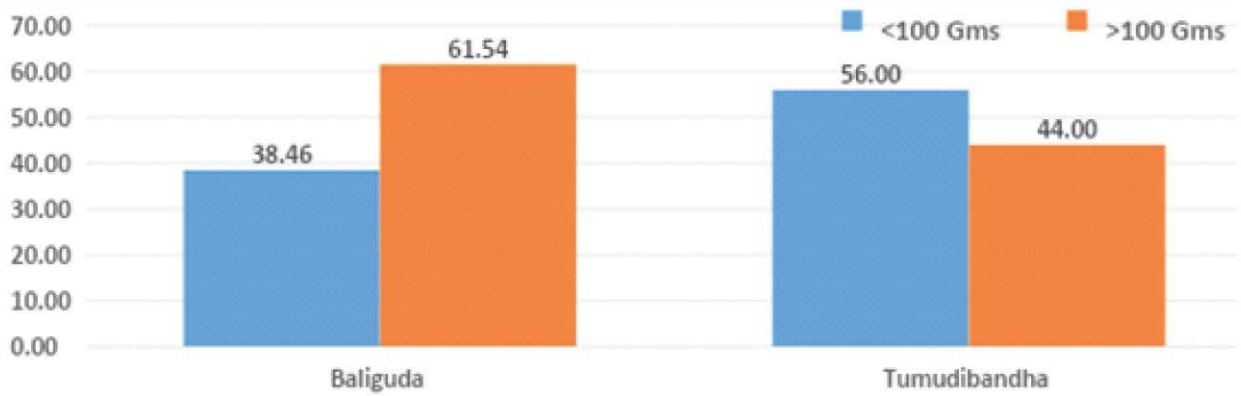


Table 45: Quantity of Millet Consumption

Sl No	Block	No. of HH Surveyed	<100 Gms	>100 Gms
1	Baliguda	52	20	32
2	Tumudibandha	50	28	22
	Total	**102**	**48**	**54**

Graph 27: Per Day Consumption of Millets of Households (%)



Consumption quantity on surveyed blocks Baliguda & Tumudibandha indicates that proportion of Ragi to rice in common indigenous recipes have been decreased. i.e more quantum of rice is there than millets. As a result some HHs as mentioned in the table still consuming less than 100 Gms of Millets per day.

Study indicates that in Baliguda block 20 HHs and 32 HHs consumed less than 100 Gms and more than 100 Gms in a day respectively out of 52 HHs surveyed. Similarly in Tumudi bandha block out of 50 HHs, 28 HHs consumed less than 100 Gms per day and 22 HHs consumed more than 100 Gms per day.

Table 46: Consumption of Traditional / Indigenous Millet Recipes

Sl No	Block	No. of HHs Surveyed	Jau & Tampa	Jau, Peja & Koeri
1	Baliguda	52	32	20
2	Tumudibandha	50	28	22
	Total	**102**	**60**	**42**

Millet based ancestral food i.e Jau, Peja, Tampa & a beverages named Koeri are liked by the tribes of Baliguda &Tumudibandha block. They have habits of consuming indigenous recipes while doing hard work in agriculture field & during collection of wood from the jungle for a daily needs.

Graph 28: Consumption of Traditional / Indigenous Millet Recipes

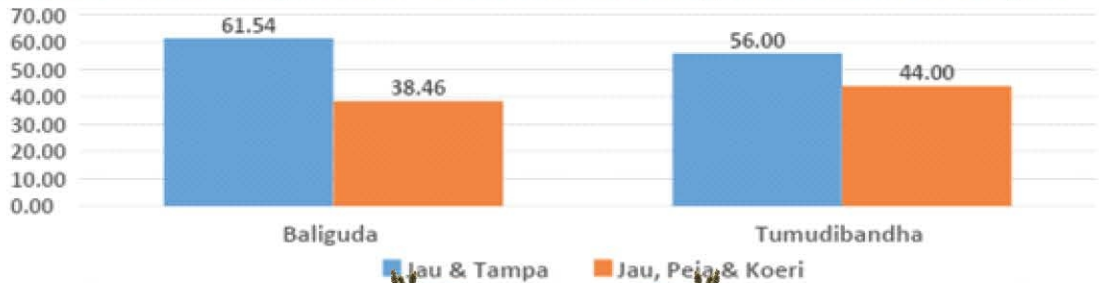


Table 47: Varieties of Millet Grown

Sl No	Block	No. of HHs Surveyed	Ragi	Ragi & Kangu	Ragi & Suan	Ragi & Janha
1	Baliguda	52	33	6	8	5
2	Tumudibandha	50	30	6	9	5
Total		**102**	**63**	**12**	**17**	**10**

Several varieties of millets are in cultivation in Baliguda & Tumudibandha block since long by the tribes. In Baliguda and Tumudibandha block 52 and 50 HHs have been surveyed respectively for cultivation of different millets. The above table indicates HHs grown different type of millets during 2022-23. Ragi is the dominant millet crop among them . All household or cultivating ragi either as pure crop or with pulses as mixed crops. Suan, Kangu, Jowar etc or cultivated in limited areas by Households and used in preparation of different recipes to offer to their God in different auspicious occasions.

Graph 29: Varieties of Millets Grown

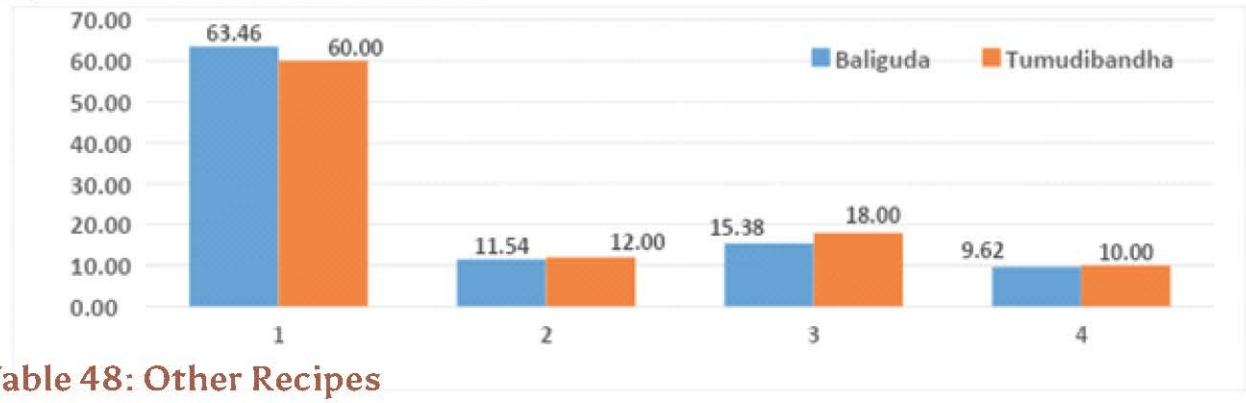


Table 48: Other Recipes

Sl No	Block	No. of HH Surveyed	Roti & Pitha	Khiri & Kakara	Pakodi & Arisa Pita	Pitha & Halwa
1	Baliguda	52	11	14	16	11
2	Tumudibandha	50	15	11	11	13
Total		**102**	**26**	**25**	**27**	**24**

Graph 30: Other Millet Based Recipes (%)

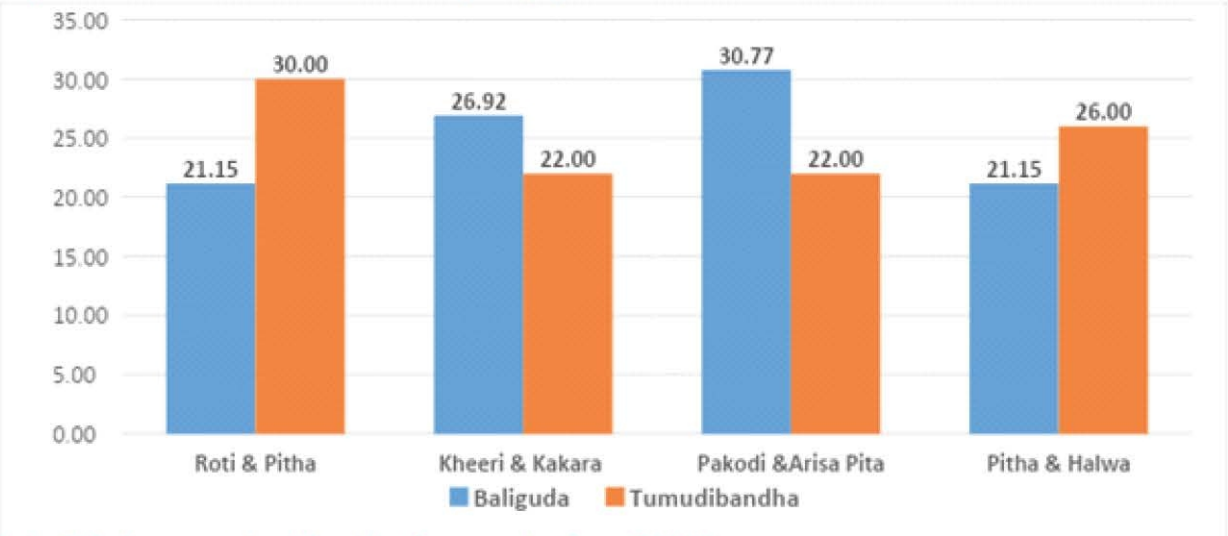


Table 49: Area under Ragi before and after OMM

Sl No	Block	No. of HHs Surveyed	Area Before OMM (In Ha)	Area After OMM (In Ha)
1	Baliguda	52	19.4	19.0
2	Tumudibandha	50	20.2	23.52
Total		**102**	**39.6**	**42.52**

In Baliguda and Tumudibandha blocks, survey on 52 and 50 HHs respectively have been done on impact of area coverage of Ragi on intervention of OMM. It is noticed that area under ragi has not increased in Baliguda & marginally increased in Tumudibandha block. The study shows that the area has been decreased from 19.4 Ha to 19 Ha in Baliguda block & increased from 20.2 Ha to 23.52 Ha in Tumudibandha block on intervention of OMM.

Graph 31: Area under Ragi before and after OMM

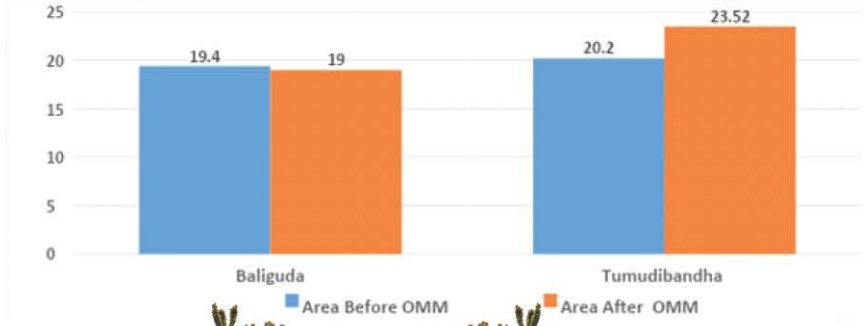
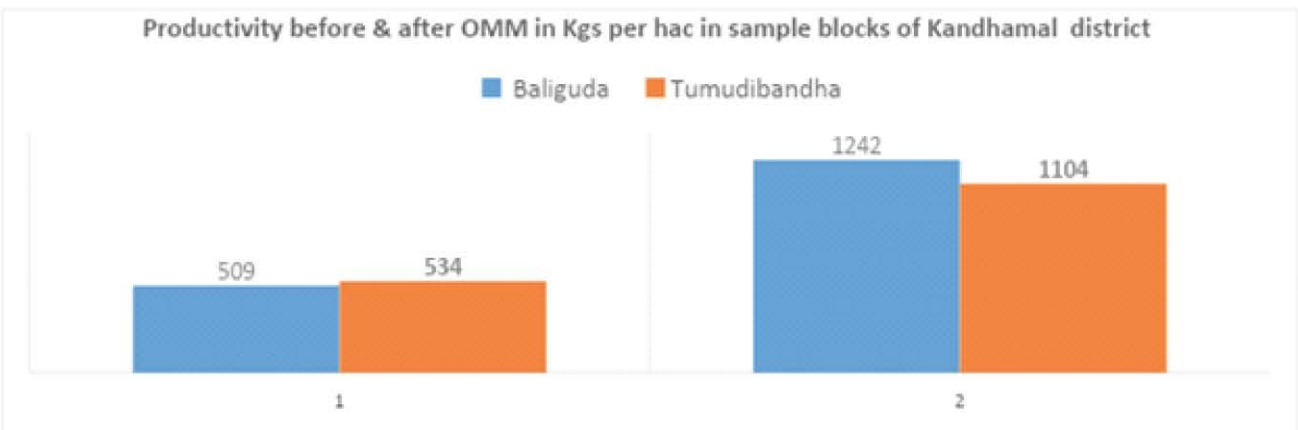


Table 50: Productivity of Ragi

Sl No	Block	No. of HHs Surveyed	Productivity Before OMM (Kg per Ha)	Productivity After OMM (Kg per Ha)
1	Baliguda	52	509	1242
2	Tumudibandha	50	534	1104
Total		102		

Graph 32: Productivity of Ragi



On survey of 102 HHs in two blocks i.e Baliguda and Tumudibandha as shown in the table , the productivity of Ragi has been increased significantly after intervention of OMM. The productivity has been increased from 509 Kgs per Hect to 1242 Kg per Hect in Baliguda, and 534 Kgs per Hect to 1104 Kgs per Hect in Tumudibandha block . Productivity has been increased due to use of improved variety of seeds &adoption of agronomic practices like line sowing , line transplanting and SMI incentivesed to the beneficiaries from OMM. Those practices have control over weed and pest infestation .

Mayurbhanj

Mayurbhanj is a land locked district with a total geographical area of 10418 Sq.km. and is situated in the Northern boundary of the state with district headquarters at Baripada. The district is bounded in the North-East by Medinipur district of West Bengal, Singhbhum district of Jharkhand in the North-west, Baleshwar district in the South-East and by Kendujhar in the South-West. More than 39 % of total geographical area (4049 Sq. Km.) is covered with forest and hills. The district comprises of 4 numbers of Sub-divisions with 26 nos of blocks with 404 Gram Panchayats and 3966 villages. The district comes under "North Central Plateau agro-climatic region with an average rainfall of 1648.20 mm per annum. Being away from the coastal belt, the district experiences a sub-tropical climate with a hot summer, chilling winter with good precipitation. Red-laterite category of soil dominates all over the district including Bamanghati and Panchpir plateau.Mayurbhanj occupies a unique position being endowed with



lush green vegetation, different fauna and rich cultural heritage. The district has a rich mineral base and is home to the Similipal Biosphere. This was a princely state until its merger with the state of Odisha on 1st January, 1949. Since the date of its merger, Mayurbhanj has been organized and is administered as one of the districts of Odisha.

Table 51: Administrative set-up of the District

Description	Value
Area	10,418 Sq Km
No of Sub division	4
No of Tahasil	26
No of Police Station	32
No of Blocks	26
No of Gram Panchayat	404
No of Village	3966

Source: Census 2011

Table 52: Demography of the District

Description	No	Description	No
Population	2,519,738	Total Female	1263525
Total Male	1,256,213	SC	184682
		ST	147957

Source: District NIC Portal

Agriculture Scenario of the district

The district comes under Northern Central Plateau Agroclimatic Zone. Normal annual Rainfall - 1601mm, Cropping Intensity - 128%, Total No. of Cultivators – 238772, Agriculture Laborers- 568755. Agriculture, poultry, Goatery & minor forest products are the income source of farmers in the district. Total cultivated area of the district is 4,37,000 Ha including 1,86,000 Hac High,1,25,000 Ha medium &1,26,000Ha Low lands. Rice is the principal crop grown in low & medium land. Other crops include pulses, oil seeds, vegetable, orchard crops & Oil palm. Millet are secondary crop in the district. Millet like Ragi, Bajra, Jowar, Suan are cultivated by the farmers. Majority of millet area is Ragi. Total ragi & small millet area during 2018-19 was 550 Ha &150 Ha respectively. Productivity of Ragi & small millet during same period was 686 kgs/ Hac & 465 kgs/Hac respectively. After intervention of OMM millet area is gradually increasing. The tables bellow gives a clear figure of the Millet consumption status of the selected Blocks under Mayurbhanj District:

Table 53: Millet as Staple & Supplementary Food

Sl No	Block	No. of HH Surveyed	Before 1990-91		After 2022-23	
			Staple	Supplementary	Staple	Supplementary
1	Bisoi	49	45	4	6	43
2	Jashipur	57	42	15	9	48
Total		**106**	**87**	**19**	**15**	**91**

Survey findings on millet-based food habits in Tribals of Bisoi and Jashipur block of Maurbhanj district indicate that there is change in food habits of tribes. Millets are the staple food of few HHs during 2022-23 where as same was staple food of many before 1990-91 . Out of 49 House Holds (HHs) surveyed in Bisoi block, Ragi was staple food of 45 HHs and 6 HHs before 1990-91 and as on 2022-23 respectively.

Similarly, millet was supplementary food of tribals in 4 and 43 HHs respectively during the said period. In Jashipur block out of 57 HHs surved Ragi was staple food of 42 HHs and 9 HHs before 1990-91 and as on 2022-23 respectively. Similarly millet was supplementary food of tribals in 15 and 48 HHs respectively during the said period.

Table 54: Change in Millets based Food habits (Staple Food)

Sl No	Block	No. of HHs Surveyed	Before 1990-91 Staple Food	As on 2022-23 Staple Food	Before 1990-91 Supplementary Food	As on 2022-23 Supplementary Food
1	Bisoi	49	45	6	4	43
2	Jashipur	57	42	9	15	48
Total		106	87	15	19	91

Graph 33: Change in Millets based Food habits (Staple & Supplementary Food)

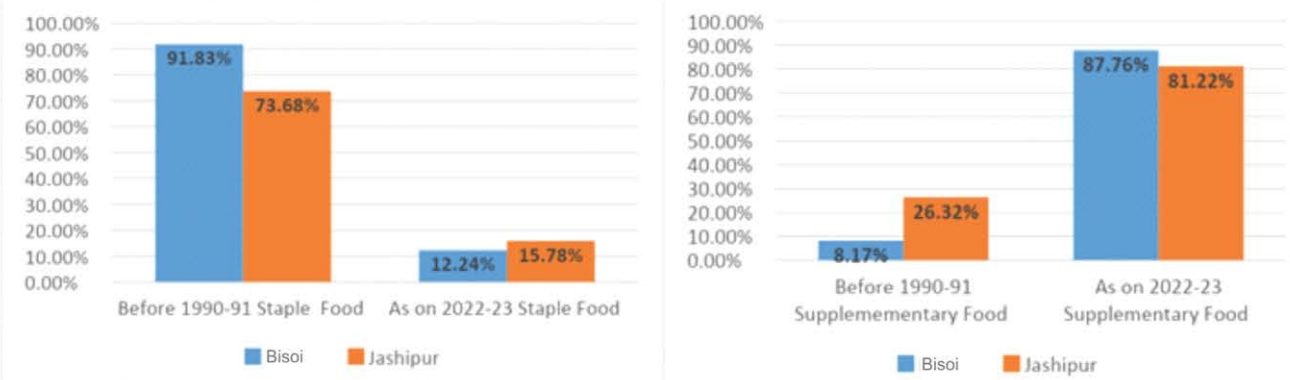


Table 55: Quantity of Millet Consumption per day by HHs

Sl No	Block	No. of HHs Surveyed	<100 Gms	>100 Gms
1	Bisoi	49	25	24
2	Jashipur	57	46	11
Total		**106**	**71**	**35**

On survey on consumption quantity of millets by HHs in Bisoi & Jashipur block indicates that proportion of Ragi to rice in common indigenous recipes have been decreased due to easy availability of rice . As a result more HHs as mentioned in the table consuming less than 100 Gms of Millets per day.

Study indicates that in Bisoi block 25 HHs and 24 HHs consumed less than 100 Gms and more than 100 Gms in a day respectively out of 49 HHs surveyed during 2022-23. Similarly in Jashipur block out of 57 HHs, 46 HHs consumed less than 100 Gms per day and 11 HHs consumed more than 100 Gms per day during the said year.

Graph 34: Per Day Millet Consumption of Households

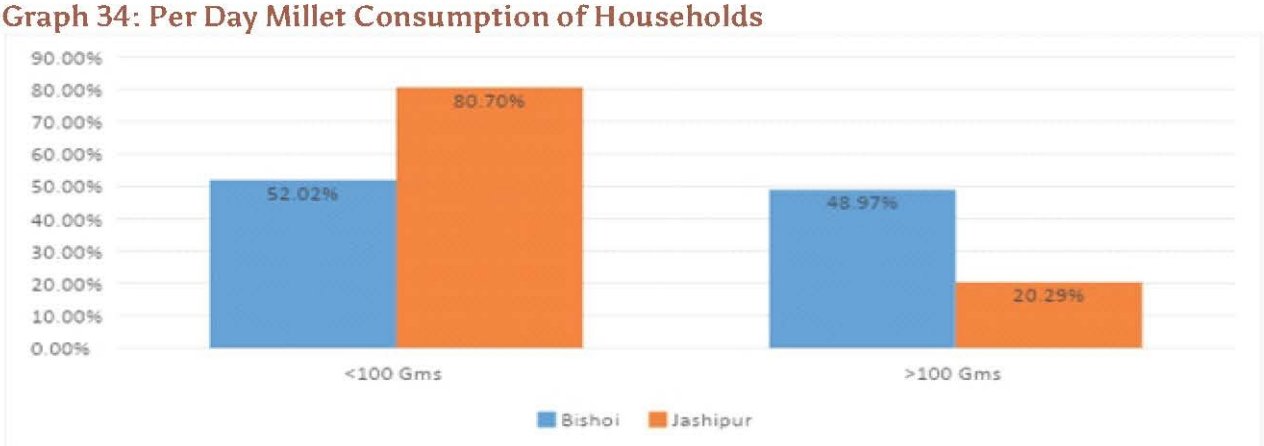


Table 56: Consumption of Traditional/ Indigenous Millet recipes

Sl No	Block	No. of HHs Surveyed	Jau	Pitha	Pitha & Kheeri
1	Bisoi	49	21	20	8
2	Jashipur	57	24	17	16
Total		106	45	37	24

Millet based food recipes like Jau, Pitha & Kheeri are liked by the tribes of Bisoi &Jashipur block. They have habits of consuming indigenous recipes during work in agriculture field. Details of household consuming different indigenous recipes has been mentioned in the above table.

Graph 35: Consumption of Traditional/ Indigenous Millet recipes

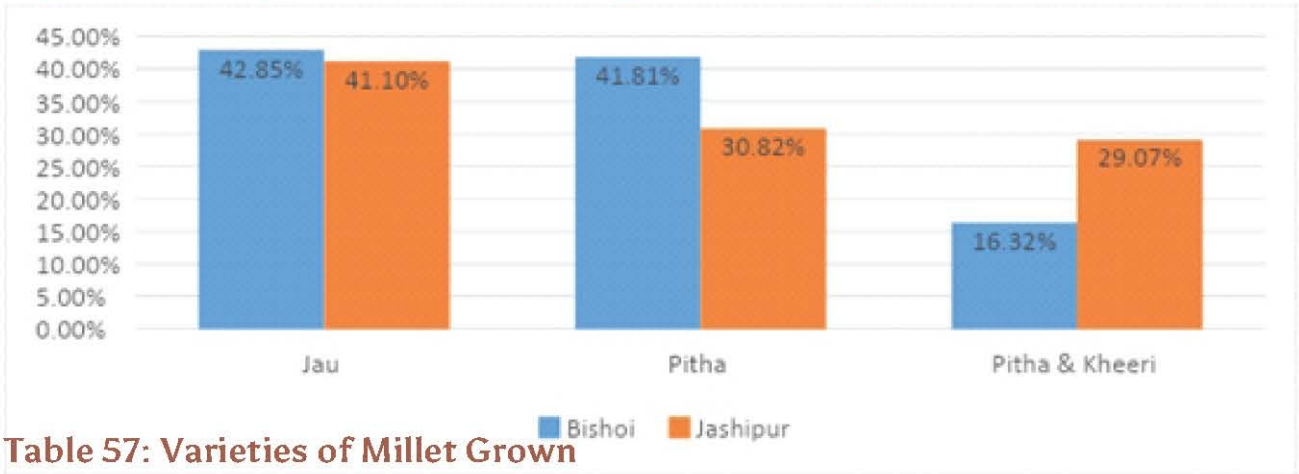


Table 57: Varieties of Millet Grown

Sl No	Block	No. of HHs Surveyed	Ragi	Ragi & Suan	Ragi& Janha	Ragi & Kangu
1	Bisoi	49	22	11	10	6
2	Jashipur	57	28	11	11	7
Total		106	50	22	21	13

Several varieties of millets are in cultivation in Bisoi &Jashipur block since long by the tribes. In Bisoi and Jashipur block 49 and 57 HHs have been surveyed respectively for cultivation of different millet crops. It is seen all HHs have grown ragi. 27HHs of Bisoi &27 HHs of Jashipur also grown other millets in addition to Ragi during 2022-23. Ragi is the dominant millet crop among them . All household or cultivating ragi either as pure crop or as inter crop with Arhar, Groundnut & Pulses.

Graph 36: Varieties of Millet Grown

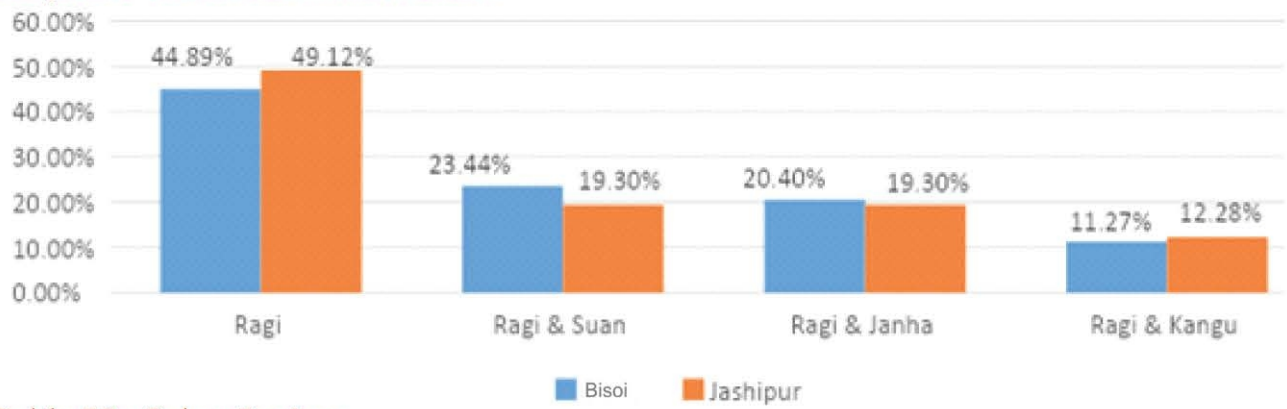


Table 58: Other Recipes

Sl No	Block	No. of HHs Surveyed	Khiri	Khiri & Pitha	Sweets & Khiri
1	Bisoi	49	31	13	5
2	Jashipur	57	35	12	10
Total		**106**	**66**	**25**	**15**

In Bisoi and Jashipur block 49& 57 House Holds have been surveyed respectively for consumption of different recipes in addition with indigeneous ones . They are preparing Kheeri, Pithas & other Sweets adding different ingredients & sugar/jaggery in delicious manner for their consumption also. The households preparing recipes in different combinations has been reflected in the table .

Graph 37: Other Millet Based Recipes



Table 59: Recipes offered during worship

Sl No	Block	No. of HHs Surveyed	Pitha	Pitha & Tampa	Pitha & Khichidi	Other
1	Bisoi	49	14	17	13	5
2	Jashipur	57	20	15	16	6
	Total	**106**	**34**	**32**	**29**	**11**

Graph 38: Recipes offered during worship

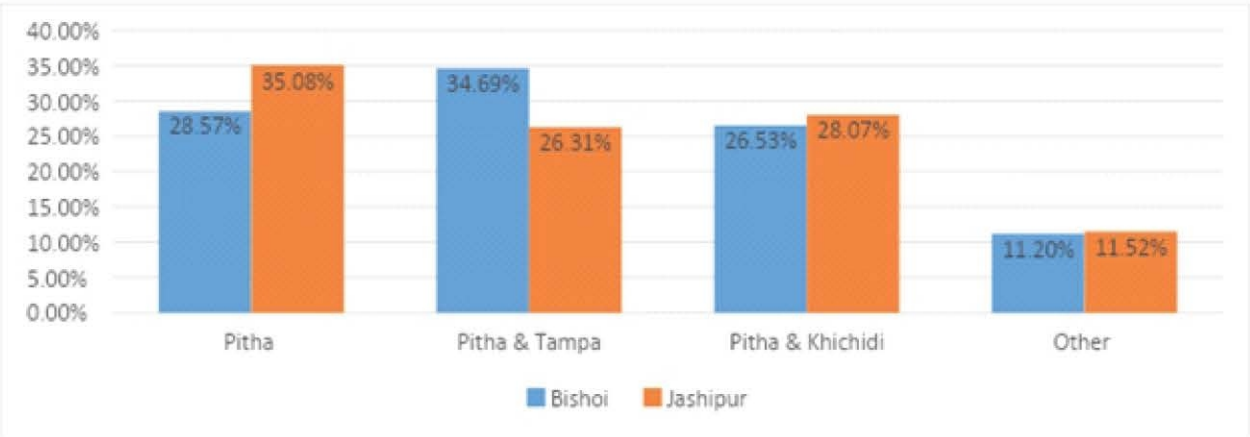


Table 60: Area under Ragi before and after OMM

Sl No	Block	No. of HHs Surveyed	Area before OMM in Ha	Area after OMM In Ha
1	Bisoi	49	19.18	20.25
2	Jashipur	57	19.74	24.18
	Total	**106**	**38.92**	**44.43**

In Bisoi and Jashipur blocks, survey on 49 and 57 HHs respectively have been done on impact of OMM IN area coverage of Ragi. It is noticed that area under ragi has increased marginally in both the blocks. The study shows that the area has been increased from 19.18 Ha to 20.25 Ha in Bisoi block & increased from 19.74 Ha to 24.18 Ha in Jashipur block on intervention of OMM.

Graph 39: Area under Ragi before and after OMM

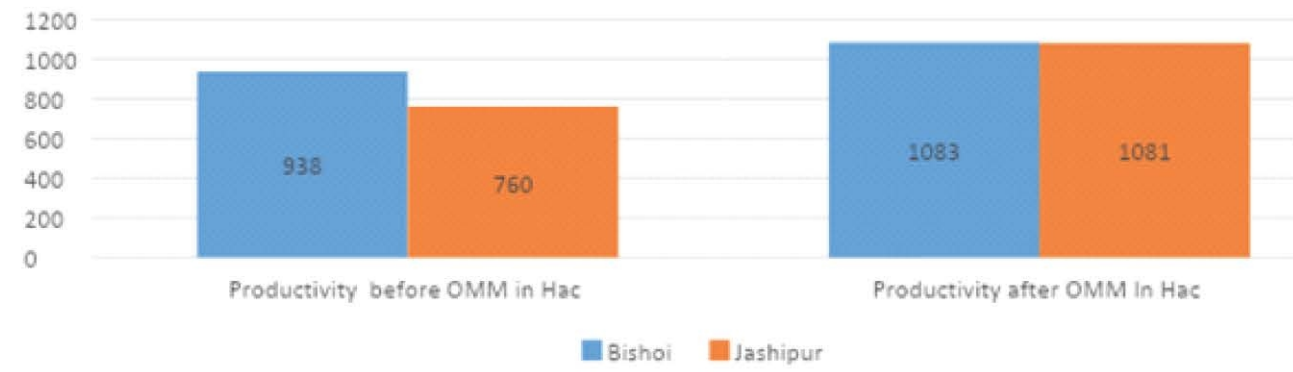


Table 61: Productivity of Ragi

Sl No	Block	No. of HHs Surveyed	Productivity before OMM in Ha	Productivity after OMM In Ha
1	Bisoi	49	938	1083
2	Jashipur	57	760	1081
	Total	**106**		

On survey of 106 HHs in two blocks i.e Bisoi and Jashipur as shown in the table, the productivity of Ragi has been increased marginally in Bisoi & significantly in Jashipur block after intervention of OMM. The productivity has been increased from 938 Kgs per Ha to 1083 Kg per Ha in Bisoi and 760 Kgs per Ha to 1081 Kgs per Ha in Jashipur block. For increasing productivity, intervention like seed replacement, line sowing/Transplantig, SMI& use of cycle weeder has been made.

Graph 40: Productivity of Ragi



Keonjhar

The Keonjhar district emerged as one of the district on 1st January, 1948. The district is bounded by Mayurbhanj District and Bhadrak District to the east, Jajpur District to the south, Dhenkanal District and Sundargarh District to the west and West Singhbhum district of Jharkhand State to the north. Covering a geographical area of 8303 sq kms, the Keonjhar District lies between 21° 1' N to 22° 10' N latitude and 85° 11' E to 86° 22' E longitude. As per 2011 census, the total population of Keonjhar district is 1,801,733. The district comprises total 9,06,487 male populations and total 8,95,246 female populations. Total SC population of the district is 2,09,357 whereas the ST population is 8,18,878.



As per the administrative set up is concerned, the Keonjhar district has got three sub divisions namely Anandpur, Champua and Keonjhar. There are 13 tahsils, 13 blocks, 297 GPs, 2132 villages,4 Municipalities and 1 NAC functioning in the district.

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Table 62: Administrative set-up of the District

Description	Value
Area	8240 Sq Km
No of Sub division	3
No of Tahasil	13
No of Police Station	25
No of Blocks	13
No of Gram Panchayat	297
No of Village	2132

Source: Census 2011

Table 63: Demography of the district

Description	Number	Description	Number
Population	18,01,733		
Male Population	9,06,487	Female Population	895246
Literacy	1052518	Average Literacy	68.24%
Literacy Rate Male	78.12%	Female Literacy	58.28%
Sex Ratio (Female per 1000 males)	988		

Source: District NIC Portal

Agriculture Scenario of the District:
The district comes under Northern Central Plateau Agroclimatic Zone, Normal annual Rainfall - 1488mm, Cropping Intensity - 141%, Total No. of Cultivators – 198044 and Agriculture Labourers- 310075. Agriculture is the main income source of farmers in the district. Total cultivated area of the district is 2,98,000 Hac with 1,59,000 Hac High,1,00,000 Hac medium & 39,000Hac Low lands. Rice is the dominant crop grown in low & medium land followed by pulses (Black gram), oil seeds, vegetable & orchard crops in high lands. Millets are minor crops in the district.

Millets like Ragi,Bajra, Jowar, Suan are cultivated by the farmers. Majority of millet area is ragi. Total ragi & small millets in the district during 2018-19 was 60 Hac & 50Hac with productivity of 655kgs/Hac & 478kgs/ Hac respectively. However, on intervention of OMM area is gradually increasing.
At present different non paddy crops like pulses, oilseeds, vegetables & plantation crops like litchi, mangoes are under cultivation in large scale. Besides agriculture source of income are from Animal Husbandry.

Table 64: Millet as Staple & Supplementary Food

Sl No	Block	No. of HHs Surveyed	Before 1990-91		After 2022-23	
			Staple	Supplementary	Staple	Supplementary
1	Jhumpura	55	55	0	0	55
	Total	**55**	**55**	**0**	**0**	**55**

Survey findings on millet based food habits in Tribals in Jhumpura block of Keonjhar district indicate that there is change in food habits of tribes completely from staple to supplementary. Millets are the supplementary food of all HHs during 2022-23 where as same was staple foodof all before 1990-91 . Out of 55 House Holds (HHs) surveyed in Jhumpura block, Ragi was staple food of all HHs before 1990-91 and nil as on 2022-23 . HHs surved switched over to rice so for staple food is concerned but every HHs consuming millets as supplementary food.

Graph 41: Millet as Staple & Supplementary Food



Table 65: Quantity of Millet Consumption per day by HHs

Sl No	Block	No. of HHs Surveyed	<100 Gms	>100 Gms
1	Jhumpura	55	38	17
	Total	**55**	**38**	**17**

On survey on consumption quantity of millets by HHs in Jhumpura block indicates that more HHs are consuming less than 100 Gms of Millets per day. Study indicates that in Jhumpura block 38 HHs and 17 HHs consumed less than 100 Gms and more than 100 Gms in a day respectively out of 55 HHs surveyed during 2022-23.

Graph 42: Quantity of Millet Consumption per Day by HHs

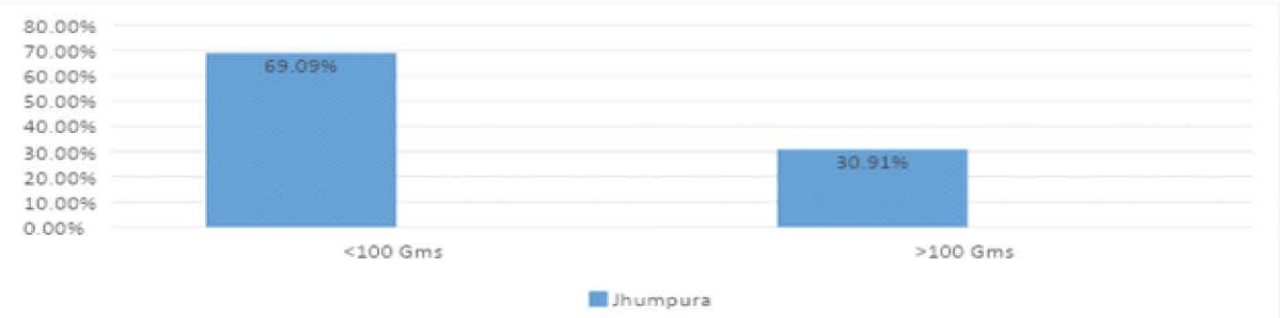


Table 66: Consumption of Traditional/ Indigenous Millet Recipes

Sl No	Block	No. of HHs Surveyed	Jau	Jau , Pitha	Jau, Tampa & Khiri
1	Jhumpura	55	11	24	20
	Total	55	**11**	**24**	**20**

Millet based food recipes like Jau, Pitha & Kheeri are liked by the tribes of Jhumpura block like neighbouring district Maurbhanj . They have habits of consuming indigenous recipes during work in agriculture field. Details of household consuming different indigenous recipes has been mentioned in the above table.

Graph 43: Consumption of Traditional/ Indigenous Millet Recipes

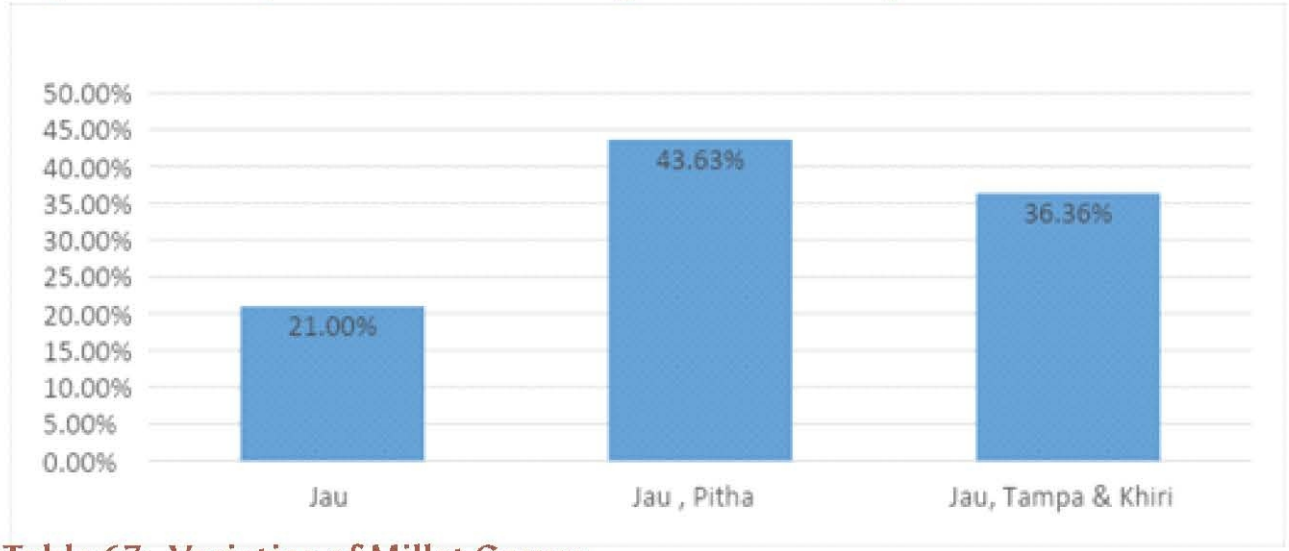


Table 67: Varieties of Millet Grown

Sl No	Block	No. of HH Surveyed	Ragi	Ragi & Suan	Ragi, Koda & Suan
1	Jhumpura	55	28	17	10
	Total	**55**	**28**	**17**	**10**

Several varieties of millets are in cultivation in Jhumpura block by the tribes. In Jhumpura block 55HHs have been surveyed for cultivation of different millet crops. It is seen all HHs have grown ragi. 27 HHs also grown other millets in addition to Ragi during 2022-23. Ragi is the dominant millet crop in the block . All household or cultivating ragi either as pure crop or as inter crop with Arhar, Groundnut & Pulses.

Graph 44: Varieties of Millet Grown

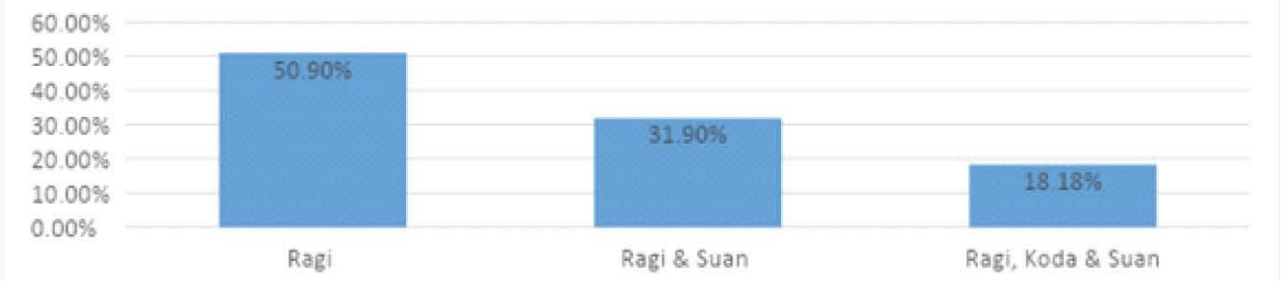


Table 68: Other Recipes

Sl No	Block	No. of HH Surveyed	Khiri	Khiri & Pitha	Sweets & Khiri
1	Jhumpura	55	21	19	15
	Total	**55**	**21**	**19**	**15**

In Jhumpura block 55 House Holds have been surveyed for consumption of different recipes in addition with indigeneous ones . They are preparing Kheeri, Pithas & other Sweets adding different ingredients & sugar/gur for their consumption also . The households preparing recipes in different combinations has been reflected in the table .

Graph 45: Other Millet Based Recipes

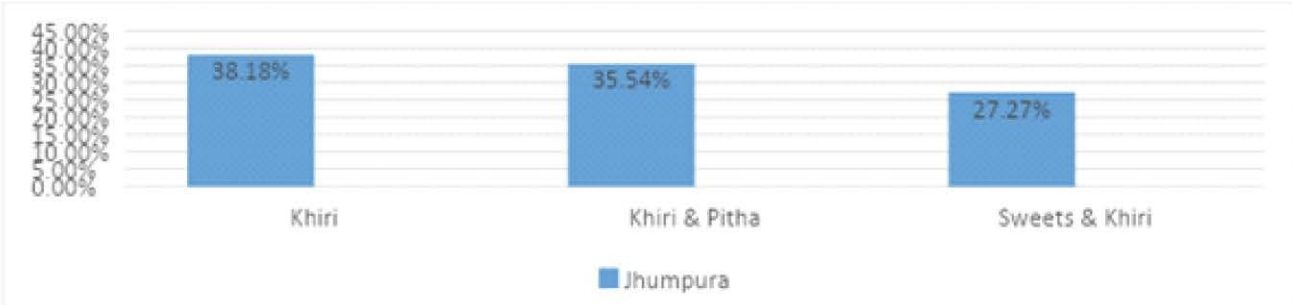


Table 69: Area under Ragi before & after OMM

Sl No	Block	No. of HH Surveyed	Area after OMM in Ha	Area after OMM in Ha
1	Jhumpura	55	21.32	23.26

In Jhumpura blocks survey on 55 HHs have been made on impact of OMM in area coverage of Ragi. It is noticed that area under ragi has been increased marginally in the block. The study shows that the area has been increased from 21.32 Ha to 23.26 Ha on intervention of OMM.

Graph 46: Area under Ragi before & after OMM

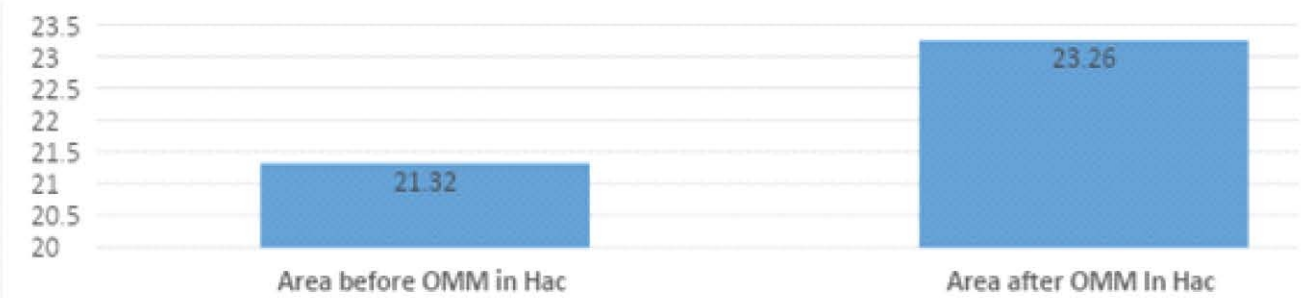
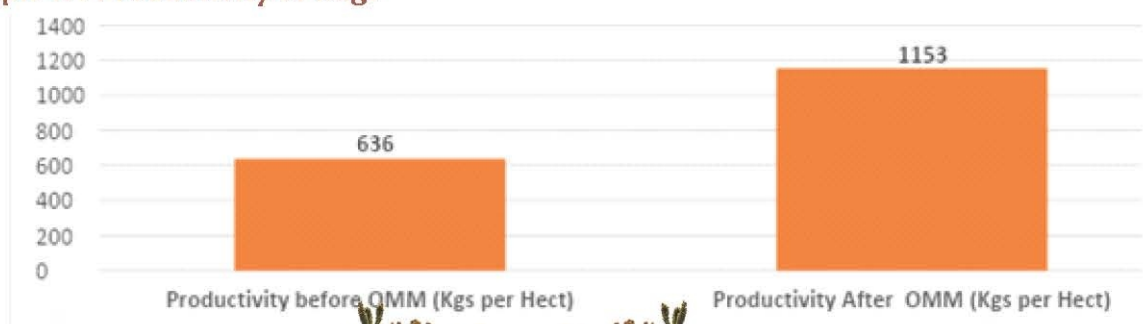


Table 70: Productivity of Ragi

Sl No	Block	No. of HH Surveyed	Productivity before OMM (Kg per Ha)	Productivity after OMM (Kg per Ha)
1	Jhumpura	55	636	1153

On survey of 55 HHs in Jhumpura block as shown in the table , the productivity of Ragi has been increased significantly from 636 Kgs/Ha to 1153 Kgs per Ha in the block . For increasing productivity, intervention like seed replacement, line sowing/Transplantig, SMI& use of cycle weeder has been made.

Graph 47: Productivity of Ragi





Preparation process of Mandia Jau on Chullah- Village- Kupuliguda, GP-Kollar Block-Baipariguda, District - Koraput





Janita Majhi preparing Mandia Poda Pitha. Village – Khatalapadar, GP-Dangasil, Block- Kashipur, District – Rayagada



Preparation of Mandia Peja - Village – Khatalapadar, GP-Dangasil, Block- Kashipur, District- Rayagada

CHAPTER - 5

MILLET BASED FOOD ITEMS & RECIPES OF TRIBALS IN ODISHA

'Mandia Anda', a traditional recipe made of Ragi.
Village – Khatalapadar, GP-Dangasil, Block- Kashipur, District – Rayagada



Mandia Pitha prepared by Juli Majhi.
Village – Khatalapadar, GP-Dangasil, Block- Kashipur, District – Rayagada





Preparation of Mandia Ambili -
Village – Khatalapadar, GP-Dangasil, Block- Kashipur, District- Rayagada

Millets constitute one of the oldest forms of source of food, particularly in the tribal regions of Odisha and elsewhere. Millets have been the main source of nutrition to these tribal communities. The tribal food habit and religious culture are integrated with the millets. Different ethnic groups know their cuisines prepared out of millets describe it in their language and the millets are associated with rituals and festivals of many tribal communities. The table below presents some of the cuisines prepared out of millets and references to certain cuisines in their religious culture.

Millets have a significant place in the food culture and heritage of numerous tribal communities in India. Adivasis have been cultivating and consuming them for centuries, and they have developed various indigenous types of millet. Millets are linked with several festivals, rituals, and ceremonies that celebrate the tribal way of life.

For tribal farmers, millets can be a valuable source of income and a means of livelihood. By selling their surplus produce in local or urban markets, they can generate revenue. Additionally, millet can help reduce the

reliance on external inputs like seeds, fertilisers, and pesticides, thereby promoting self-reliance and autonomy within tribal communities.

The modern world might be in awe of millets and celebrate them as superfoods now. But the tribal communities across the country have been cultivators and consumers of millets for times immemorial. This hilly terrain of Odisha has been the home of several tribal populations and, thus, retains many primitive cultural nuances. Foods are no exception. The tribal people of Odisha have been skilled in preparing several traditional millet dishes for centuries. The use of finger millets is prevalent. The tribals of Odisha have an assortment of rustic finger millet or ragi recipes which form their daily diet. Jau or finger millet blended with warm water is an everyday staple food. Mudde and tampa are other varieties. Apart from these steamed dumplings, porridge and leaf-wrapped steamed or toasted grubs are some of the highlighted recipes.

Cooking with Millets: The tribal culinary traditions

It's important to note that the nutritional content can vary among different types of millets. Therefore, including a variety of millets in your diet can help ensure a broader range of nutrients. Millets can be used to make a wide array of dishes, including porridge, flatbreads, salads, and more, making them a versatile and nutritious addition to your meals.

Cooking with millets can be a delightful and nutritious experience, offering a wide range of culinary possibilities. Here are some of the ways the tribal people cook millets as pure millet dishes and also by adding other ingredients like pulses and grains. The most common steps for preparation of dishes with millets are as below:

Rinsing: Before cooking millets, rinsing the millets with cold water is a good practice. This helps remove any impurities or debris that may be present. After rinsing, the millet grains are drained using a fine mesh strainer.

Water-to-Millet Ratio: The water-to-millet ratio can vary depending on the type of millet used and the cooking method. Generally, for most types of millets the ratio of water to millet is 2:1. For example, for 1 cup of millet, 2 cups of water are used. However, this ratio is adjusted based on personal preference and the specific recipe.

Boiling Method: To cook millets, the rinsed millet or millet flour is taken in a pot and added with water. On hearth it is cooked to a boiling point and then the heat is reduced and the content is covered with a pot. In slow flame it is cooked for about 15-20 minutes, or until the millet is tender and has absorbed the water.

Fluffing: After cooking, the millet is allowed to sit, covered, for a few minutes. Then it is fluffed by a hat spoon or spoon to separate the grains. If millet flour is used there is no need of fluffing. This step helps prevent the millet from becoming too sticky.

Toasting: The husked little millets are sometimes dry toasted before cooking. This enhances the flavour of millets. For that the millets are toasted with a dry skillet or pan over medium heat until it becomes lightly golden and emits a pleasant aroma. After that water is added and the millet is cooked with normal process.

Cakes: Some millet varieties, such as pearl millet and finger millet, are commonly used to make cakes. These can be made by mixing millet flour with water and sometimes other flours like wheat or rice to form a dough. The dough is then shaped into cakes and cooked.

Porridge: Millets are often used to make creamy and nutritious porridge. To make porridge millet or millet flour is cooked with more water than usual, sometimes maize, pulses, rice etc are added to it.

Combining Millets: Sometimes millets are cooked in combination. For example, in making ragi porridge, little millets or bajra millets are added to it.

While cooking millets the tribal people keep in mind that each variety may has its own unique characteristics and cooking times based on experience.

Beverages with millets

Tribal communities in Odisha have developed various traditional beverages based on millets. These millet-based beverages are not only a source of refreshment but also hold cultural significance. Few examples of millet-based beverages made by tribes in Odisha are presented below.

Kodo Pani: Kodo pani is a traditional millet-based beverage made from kodo millet. The Koya tribe in Odisha often prepares this drink. Kodo millet is soaked, fermented, and then the liquid is extracted to create this mildly alcoholic beverage. It is consumed during festive occasions and as part of their cultural traditions.

Ragi Ambil: The Kondh tribe in Odisha makes a beverage called ragi ambil from finger millet (ragi). Ragi grains are soaked and allowed to ferment. The resulting liquid is a mildly sour and tangy drink. It is considered a nutritious and refreshing drink during hot weather.

Chaula Pani: This drink is made from rice, including millet varieties like finger millet (ragi), by the Kondh and other tribes in Odisha. Rice is soaked, fermented, and then the liquid is consumed as a mildly alcoholic beverage during special occasions.

Madhu Pani: The Koya tribe prepares madhu pani using various ingredients, including millets, to create a sweet and mildly alcoholic beverage. The specific millet used can vary, and the drink is often consumed during celebrations.

Mahua-based Millet Brews: Mahua, a flowering tree native to India, is used by several tribal communities to prepare alcoholic brews. These brews are often mixed with millets and allowed to ferment, creating traditional beverages with varying degrees of alcohol content.

Millet Porridge: While not a traditional "beverage" in the conventional sense, millet-based porridge is commonly consumed by tribal communities in Odisha. It is made by boiling millets in water and is a nutritious and comforting drink.

Mandia Landa: The Paraja, Bonda, Kondh and other tribes in Southern Odisha are very fond of Mandia Landa (Finger Millet Beer). It is prepared with ragi flour cooked to make cake along with other herbal ingredients that raise the level of intoxication. Water is added to the preparation and then it is allowed to ferment properly to be consumed as an alcoholic beverage. Sahoo, et.al. (2023) have provided a detailed account of the alcoholic beverage preparation by the Bonda tribe in Malkangiri district.

Katul/ Kena: Katul is a special type of alcoholic beverage prepared by Kutia Kondh out of little millet. It is a festival drink, sometimes also prepared on the occasion of marriage ceremony. However, during Punikalu festival in December-January, each household prepare Katul for self-consumption and also for treating guests. To make the preparation, first, little millet rice is cooked. After that, the cooked stuff is wrapped in siali leaves and kept in a dark place in the house. After four days, the colour of little millet becomes pink. Then it is mixed with water. The preparation is stocked for about three to four days for fermentation. After that the beverage is ready for consumption.

These millet-based beverages are often prepared during special occasions, rituals, and festivals and are integral to the cultural and culinary heritage of the tribes in Odisha. They showcase the resourcefulness and creativity of these communities in utilizing locally available ingredients, including millets, to make unique and refreshing drinks.

Millet Recipes Associated with Tribal Culture

Millets have a significant cultural and agricultural presence in the lives of many tribal communities in Odisha. Various festivals and rituals are associated with millets, celebrating their importance in these communities. Here are some tribal festivals and rituals connected to millets in Odisha:

Seed Sowing Rituals: Several tribal communities in Odisha perform seed sowing rituals during the agricultural season, including millet planting. These rituals are considered sacred and are aimed at seeking blessings from deities for a bountiful harvest. Traditional songs, dances, and offerings are a part of these rituals.

Millet Harvest Celebrations: When millets are ready for harvest, many tribal communities organize special celebrations to mark the occasion. These celebrations often involve singing, dancing, and offering gratitude to the deities for a successful harvest. Millet-based dishes are prepared and shared during these festivities.

Wedding Ceremonies: Millets often play a role in tribal wedding ceremonies. In some communities, millets, especially finger millet (ragi), are considered auspicious, and they are used in rituals and offerings during the marriage ceremonies.

Thanksgiving Rituals: Many tribal communities have thanksgiving rituals or ceremonies when the harvest season comes to an end. These rituals involve expressing gratitude to the gods for the successful cultivation of millets and other crops. Millet-based dishes are an integral part of these ceremonies.

Millets in Traditional Medicine: Millets have a place not only in the tribal diet but also in traditional medicine. Some rituals and festivals are centered around the use of millets as a remedy for various health issues or as a preventive measure.

These festivals and rituals highlight the cultural significance of millets in the lives of tribal communities in Odisha. They serve to preserve traditional agricultural practices, strengthen community bonds, and express gratitude to the

Table 71 - : Tribal Cuisines with Millets in Odisha

Tribal Cuisines with Millets in Odisha				
Tribe	Name of the Cuisine			Ritual Significance
	Tribal	Odia	English	
Bonda	Sametura/ Intira Riktar Uidhar Barijana Pendam Kirimatar	Mandiapej Suanbhata Kangubhata Jana bhata Mandiamada Mandiapitha	Ragi porridge Little millet rice Minor millet rice Sorghum rice Ragi beverage Ragi cake	Kirimatar is a cake prepared out of ragi, little millet, cow pea and carpet legume, offered to gods and goddesses during Sumegelirak and Kurukgige festivals
Binjhia	Gangeiruti Mandiaruti Suanbhata Gundlibhata Mandiajau	Bajra roti Mandiaruti Suanbhata Gurjibhata Mandiajau	Bajra chapatti Ragi chapatti Little millet rice Minor millet rice Ragi porridge	
Bhatara	Mandiapej	Mandiajau	Ragi porridge	Bihan Puja

Bhumia	Suanbhat Mandiapej	Suanbhata Mandiajau	Little millet rice Ragi porridge	
Dongaria Kondh	Mande kape Pagalahi Jana lahi Larkalahi Akapite	Mandiajau Kosala bhata Bajra bhata Kangu Khiri Mandia pitha	Ragi porridge Little millet rice Bajra rice Minor millet kheer Ragi cake	Millets and millet cakes are worshipped/ offered to spirits in festivals like Mandiarani or Pabda Parba, Bicha parba for better yield
Didayi	Mandiapej Suanbhat Pendam	Mandiajau Suanbhata Mandiamada	Ragi porridge Little millet rice Ragi beverage	Pendam is prepared for offering to spirits during Pusa Parab
Durua	Beu/ Beyu Rata bawa/pita Koelabawa/pita	Suanbhata Mandiajau/pitha Suanjau/pitha	Little millet rice Ragi porridge/cake Millet gruel/cake	In the Landakhia Parab, fermented beverage prepared out of little millet is offered to spirits.
Gadaba	Samelida/ pita Samelpendam	Mandiajau/pitha Mandia landa	Ragi porridge/cake Ragi beverage	Fermented beverage offered to spirits
Gond	Gora jawa Gora pitha	Mandiajau Mandia pitha	Ragi porridge/cake Ragi beverage	Offered to spirits in Dijputan ritual
Holva	Mandiajau	Mandiajau	Ragi porridge	
Juang	Kude tana/jau Kudealak Gangeialak	Mandiabhata/jau Mandia pitha Gangei pitha	Ragi porridge Ragi cake Millet cake	Cakes are prepared out of millets to offer to spirits in festivals and rituals
Koya	Padkedoda Garra	Suanbhata Mandiajau	Little millet rice Ragi porridge	Millets are worshipped during Kurumpandu festival
Kutia Kondh	Mandesia Kueri bidi Katul/ Kena	Mandiajau Kosala bhata Katulmada	Ragi porridge Little millet rice Little millet Beverage	Millets worshipped in Burlangakalu, fermented beverage offered to spirits in Punikalu festivals
Lanjia Saura	**Burairungarakul Kambarungarakul Mandiatundakul**	**Kangubhata Bajra bhata Mandiajau**	**Little millet rice Sorghum rice Ragi porridge**	

Paroja	Mandiapej/pitha Suananda/pitha Pendam/Landa	Mandiajau/pitha Suanbhata/ pitha Pendam	Ragi gruel/cake Millet rice/cake Fermented Beverage	Millet cakes are offered to spirits in Puspuni. Cakes are ritually fed to a woman after conceiving
Paudi Bhuyan	Gangeibhat Tisidiabhat Kangu/suanbhat Gangei mad/pita	Bajra bhata Mandiajau Kangu/suanbhata Bajra mada/pitha	Sorghum rice Ragi porridge Millet rice Beverage/ Cake	The fermented beverage and cake prepared out of sorghum is offered to spirits in Puspunei.

Source: Jena, Mishra, Ota (2022)



District wise tribal recipes with millets

During the field survey for collection of data and relevant information, one of the focus was on identifying the names of Recipes made of Ragi and its method of preparation. The traditional millet recipes has its own significance in Tribal community. They make these millet-based food items mainly during the festivals they follow with their culture & traditions. They prefer to make few special millet-based food items to offer God while worshiping at the time of observing occasion in different season.

MALKANGIRI
PEJA (RAGI)
Block - Kairput, GP - Mudulipada
Village – Padeiguda,
Name of the person - Sania Kirsani
W/O -Laxmana Kirsani
Ingredients used:

- Ragi powder
- Sindhikoli
- Salt

Method of preparation:
Soak the Ragi powder in a bowl. Then boil water in a pot adding salt when water starts to boil and gradually add the soaked ragi powder with constant stirring. After 3 to 4 minutes the solution will start concentrating and, in this stage, add Sindhi koli to boil it and soften it. Keep it in low heat till it becomes smooth and thick but flowing consistency.



It is a common recipe of the Bonda samaj. They prefer to eat this item before going to the field to gain strength for doing laborious work for the entire day. In the afternoon they make rice with other curry, vegetables and eat in the early evening. Because, at the time doing physical labor they normally do not prefer to eat heavy food, rather prefer to eat light but nutritious food to gain energy and strength to work entire day. The Bonda samaj mainly depends on the agriculture and forest products for their food items and their main occupation is cultivation. They prefer to cultivate mainly Paddy, Ragi, Suan, Kangu and vegetables like pumpkin, black gram etc.

MANDURU

Block –Korkunda, GP – Torlakota
Village – Mahuliput
Name of the Cook: Smt Padma Khillo
W/O - Malli Khillo
Ingredients to make:

Ragi Powder
Roasted Alsi seeds
Salt
Green chilliy



Method of Preparation:
Ragi powder is boiled after which roasted Alsi seeds with salt and green chilly is added. The blackish coloured recipe named Mandru is prepared.
This recipe is consumed during their festivalcelebrated by *Paroja* Tribal community like Chaiti Parba, Pushapunia and Bandapana (Nuakhai) afterworshipingGod.

MAYURBHANJ
RAGI LADDU
Block – Jasipur, GP –Durdura
Village – Durdura
Name of the Cook: Sanju Rani
(member of SHG Jhansirani)
W/0 – Sanjaya kumar
Ingredients used:
Ragi powder
Chuda powder
Jaggery Salt
Cardamom powder
Oil

Method of preparation:
Heat the oil and add Ragi powder and sauté for 2 minutes. In the same hot frying pan add poha powder and warm it up for 2 minutes.

Then, heat the Jaggery, to make it soft and liquid consistency. Add the Ragi and poha powder into the Jaggery and mix it well. Add salt to taste and cook for 5 minutes. Then add cardamom powder for aroma and taste. Mix them together and



knead into a tight dough. Make small balls with little bit oil greasing in the hands for crackles balls or laddus. Now, it is ready to eat.

They make these laddus and sell it in the local market of the village @ 5/- and all age group likes to eat these laddus.

RAGI NAMKIN
Block – Jasipur, GP – Durdura Village – Durdura
Name of the person – Parbani Mohanta (member of SHG Jhansirani)
W/0 – Bhimsen Mohanta
Ingredients used:
Ragi powder
Flour
Salt
Onion seeds

They make these namkins together and sell it in their local market @ 10/- and all the children and young people likes it buy it and regularly they eat these too.



RAGI KHIRI
Block – Jasipur, Gp – Durdura
Village – Badasialinai
Name of the Cook: Rani Nayak
W/o – Rabindra Nayak,
Ingredients used

Ragi powder
Salt
Sugar
cardamom powder
water

Method of preparation:

Heat the water till it boil, then add the salt to taste. Add the Ragi powder into this and mix it well. In medium flame cook it for 5 to 10 minutes and boil well. Add cardamom powder for taste and smell then add sugar as per taste. Cook it another 2 minutes and then bring it out of flame. After it will be cool down then serve it to eat.



Name of the items: Ragi Mudki Khurma & Laddu
GP – Jana / Village – Padmapur, Block – Jasipur
Dist – Mayurbhanj
Name of the Cook - Sanjurani Mohanta
W/o – Sanjay kumar Mohanta



RAYAGADA



MANDIA LANDA (Beverage prepared from Sprouted Ragi)
Village- Khatalapadar, GP - Dongasil
Block- Kashipur
Name of the Interviewee: Shri Arjun Sabar
Tribe: Sabara
Ingredients

Pre germinated sprouted Ragi
Ragi powder from dried sprouted Ragi

Method of Preparation:

First Ragi seeds are soaked in water, after which the soaked seeds are put in a Gunny Bag. The seeds are sprouted in the gunny bag. Then sprouted seeds are dried and powdered. 50% of the powder is added to the water and boiled. After boiling rest powder is added to it.

A watery product is prepared which is cooled. After cooling the product it is left for fermentation for 6 to 7 days. After 7 days a beverage called Landa is prepared.

This recipe is mostly drunk in their social festivals like Rani Paraba, Push Paraba, Mandia Paraba and other social functions. Like Marriage. Some elderly people also drink regularly as beverage.



MANDIA PEJA
Ingredients:

Ragi Powder
Broken rice
Salt as per taste

Method of Preparation:

First water is warmed then pre soaked ragi powder is added to it. On boiling broken rice is added with salt after 15-20 minutes a watery mixture of Ragi and rice named "Mandiapeja" is prepared. On cooling over night it is consumed next day preferably in the morning while going to field for laborious work. It is also consumed during Lunch on return . It is a traditional family food. Before eating this, Sour milk or Torani is added for taste.

MANDIA TEA
Village- Khatalapadar
GP – Dongasil, Block- Kashipur
District- Rayagada
Name of the Cook: Bangari Majhi,
W/O- Mohan Majhi, Khatalapadar
Tribe: Kandha
Ingredients



Fried Ragi Powder
Sugar
Milk or Milk powder
Cardamon powder
Method of Preparation:
First Ragi seeds are fried and powdered. Water with milk and sugar is boiled. At this stage of boiling, add a small quantity of fried Ragi powder with Cardamom powder. 'Ragi Tea' is ready to be served to the guests.

MANDIA ANDA

Village- Khatalapadar
GP – Dongasili Block- Kashipur
District-Rayagada
Name of the Cook: Sanai Majhi
W/O- Bansi Majhi
Ingredients



Ragi Powder
Rice
Tomato
Tamarind
Salt, Chili and spices as per taste

Method of Preparation:
Boil water, then add pre soaked Ragi powder. After the water starts boiling, add Rice, Tomato, Salt and Spices.
Keep stirring till a semi solid recipe called "Anda" is prepared. Then a Ambli (Chutney) is prepared using tamarind and chili which is served with Anda for better taste.

MANDIA CHAKULI



Village- Dimiriguda, GP - Asada
Block-Gudari
Dist- Rayagada
Name of the Cook: Banita Sabar
W/O – Kumbha Sabar
Tribe: Sabara

Ingredients:
Ragi Powder
Jaggery / Guda
Salt

Method of preparation:
In plain water mix Ragi powder, Salt, Jaggery and allow it to rest for 1 hour.
Then heat a pan and put a little oil in the pan, pour the batter in small quantity and cook it for 3 to 4 minutes. Flip it and cook for another 2 minutes. Remove it from the flame and Mandia Chakuli is ready to serve.

MANDIA AMBILI



Ingredients Required:
Ragi Powder
Matar Chana (whole yellow peas)
Green Chillies
Onion
Tamarind
Rice

PATRA PODA PITHA

Name - Julie Majhi, W/o – Munni Majhi, Village – Khatilapada, GP – Dongasil, Block – Kashipur, District – Rayagada
Tribe –Kandha

Ingredients Used:

- Millet powder 500 gm
- Jaggery – 200 gm
- Cardamom 10 gm
- Banana leafs
- Oil for shallow fry
- Salt to taste

Method of Preparation –

- First of all, take the ragi powder and warm water in a bowl to make a solution.
- Put a Kadhai on the flame and heat for 2 mnts.
- Pour the ragi, jaggery, cardamom & water solution into the kadhai to cook for 5 to 7 mnts on medium flame.
- Constantly stir it for make it a thick and fully concentrated smooth dough.
- Then put it on a plate and mix it together well.
- Take banana leaf and a hand full of the prepared dough and put it on the chulha ash or tandur to bake it slowly under the ash for 20 to 25 mnts.

Bring out it from the ash with a spoon and open it up to serve finally either hot or cold.



KANDHAMAL
MANDIA KAKARA & RAGI PAKODA
Block - Baliguda, GP – Mediakia,
Village - Sitapadi
Name of the Cook: Srimati Mallik,
D/o Kamadev Mallik,
(Member of Maa Durga SHG)
Tribe: Kui Kandha

On interview; about intervention of Millet Mission & association of SHG thereof on preparation of value added recipes of Ragi she told that; on completion of her education i.e +3 Arts she became a member of the SHG. At present she is leading the SHG which has taken up different activities of the Mission Shakti including Odisha Millet Mission.

She attended different food festivals with other women members organized by a facilitating agency namely Santi Maitri at Baliguda supported by Odisha Millet Mission (OMM). She has been trained on preparation of different value added recipes of Ragi and other millets which are tasty, palatable and preferred by the young generation. These recipes include Pokoda, Kakara, Arissa, Ragi soup, Khiri, Halwa and others. She including all members of the SHG are preparing the above recipes during their local festivals in their houses. Some of these items like, Arisa, Kakara & Khiri are offered to God during worshiping. In important



functions like; Chaiti paraba, Dharani penu puja, Mahada Puja Pushpunnami, Dushera etc. different recipes are made with Ragi.

Ragi Arisa



Ragi Khai



Ragi Soup



KEONJHAR

SUAN MUAN

Village – Balabhadrapur, GP – Naradpur
Block – Jhumpura
Name of the Cook: Jasoda Nayak
W/o -Tikaranjan Nayak
Tribe: Bhuyan



Ingrediants used:

- Suan
- Ragi powder
- Jaggery

Method of preparation:
Fry the suan, ragi powder and jaggery to mix it well on flame, remove it from the flame and add suan pups and mix well. Then make small balls to shape it. It is now ready to eat.

SUAN KHIRI

Village – Balabhadrapur, GP – Naradpur
Block – Jhumpura
Name of the Cook: Jasoda Nayak
W/o -Tikaranjan Nayak
Tribe: Bhuyan



Ingredients used:

- Suan
- Milk powder or milk
- Ssugar
- Cardamom powder

Method of preparation:
Wash the Suan then fry the suan in hot pan. Grind the fried Suan to make powder. Heat 1 liter water and add amul / milk powder, sugar, cardamom powder and then add suan powder to mix it well. Boil it in medium flame for 5 to 10 minutes. The simmer the flame and cook for another 2 minutes to make it smooth and flowing consistency. Remove it from the flame and cook it down. Now, it's ready to eat.

KORAPUT

MANDIA JAU
Village – Kupuliguda, GP - Kollar
Block - Baipariguda
Name of the Cook– Budai Bhumia
W/o – Gobardhan Bhumia



Ingrediants used:

- Ragi powder
- Rice powder
- Kamara leaf
- Ginger
- Salt
- Chilli

Method of preparation :

Heat the water as per requirement, then add Ragi powder into this and mix it well. Cook for 5 minutes in medium flame, then add rice powder and salt, ginger, chilies as per taste. Cook for 10 minutes and then add the Kamara leaf. Cook for another 2 to 3 minutes keeping it in low flame and then remove it from the flame. It is served little hot or after cooking down also it taste good and healthy.

These 'Bhumia Tribe' usually prefer to eat this particular 'Mandia Jau' made with Ragi powder at least thrice in a day and almost in all seasons. They eat this as their comfort food and health wise it is healthy and full of nutrition.

PEJA
Name of the Cook - Kamakala Bhumia
W/o- Kamala Sen Bhumia



Ingredients:

- Broken raw rice,
- Ragi powder &
- Salt

Method of preparation:

Heat the water as per requirement and add broken raw rice to cook for 10 to 15 minutes. Then add Ragi powder & salt to taste into this and cook for 5 to 7 minutes more. Remove it from the flame and rest for overnight to consume next day morning for its enhanced taste.

MANDIA DOSA
Name - Kama kala Bhumia,
W/o – Kamala Sen Bhumia,
Village – Kupuliguda, Gp – Kollar

Block – Boipariguda, District – Koraput
Tribe – Bhumia
Ingredients Used:

- Millet powder 500 gm
- Black gram – 200 gm
- Oil for shallow fry
- Salt to taste



Method of Preparation –

Soak the black gram in water for over night. Next day morning make a smooth batter of the black gram using grinder or manual chhakki. Soak the millet powder of 500 gm in a bowl.

Take the black gram batter in a bowl and the soaked ragi powder to mix it together using 2 cups of water to form a smooth solution in flowing consistency. Add salt to taste.

Heat a pan / tawa on the flame, put a little oil to the pan and pour one medium size of round full spoon of batter on the heated pan to cook for 5 mnts on low to medium flame. After 5 to 7 mnts cooked on low flame it will be crisp and golden colour. Now its ready to serve.

Change in dietary habits of tribals of Odisha

The dietary habits of tribal communities in Odisha, including their consumption of millets, have been subject to changes due to various factors over the years. These changes are often driven by shifts in agricultural practices, market influences, and cultural dynamics. Some of the key changes in millet food habits among the tribes of Odisha over the recent years have mainly occurred due to following reasons.

Shift from millet-based food habit to rice-based food habit: One of the most significant changes has been a shift from millets to rice as the primary staple food. The introduction of high-yielding rice varieties and government policies promoting rice cultivation has led many tribal communities to reduce their millet consumption in favour of rice.

Market Access: Increased access to markets has made rice more readily available than millets. As a result, tribes have found it more convenient to purchase rice, which has affected their traditional millet consumption.

Cultural Changes: Some tribes have experienced cultural shifts, and younger generations may not value traditional millet-based dishes as much as their ancestors did. This can result in a decreased interest in preparing and consuming millet foods.

Dietary Diversification: With greater exposure to urban influences and changing lifestyles, there has been a diversification of diets. People from tribal communities tend to incorporate more processed and convenience foods, which often contain less millets.

Nutrition and Health Awareness: As awareness about nutrition and health has increased, some tribal communities have started to reintroduce millets into their diets due to their nutritional benefits. Millets are known for their high fiber and micronutrient content.

Government Initiatives: Government programs and initiatives promoting the cultivation and consumption of millets as a means to improve food security and nutrition have had some positive impact in certain areas.

Climate and Agricultural Changes: Climate change and altered agricultural practices have influenced crop choices. Some regions might face challenges in millet cultivation due to changing weather patterns, which can affect millet availability.

Urbanization: Migration to urban areas has exposed tribal populations to new food preferences. People living in urban areas may adopt more mainstream dietary habits, which often rely on rice and wheat.

Social Factors: In some cases, social factors such as caste, religion, and interactions with

other communities have influenced dietary preferences, including a shift away from millets.

Food Processing and Marketing: The commercialization and marketing of processed foods and cereals can influence food choices. These processed foods often lack the traditional millet dishes' cultural and nutritional significance.

The changes in millet food habits vary among different tribal communities and regions in Odisha. While some communities have retained their traditional millet consumption practices, others have seen significant shifts in their dietary patterns. Efforts are being made to promote the cultivation and consumption of millets to preserve the cultural significance and nutritional benefits of these grains among tribal communities.



Sarita Muduli a Bonda community Woman cleaning and processing Ragi in traditional method - Village – Padeiguda, GP- Mudulipada Block - Khairiput, District- Malkangiri





Kam Kala Bhumia, a bhumia tribal women cooking Mandia Peja – Village – Kupuliguda, GP- Kollar, Block- Baipariguda, District - Koraput



Grains of Sorghum stored in Bamboo Basket Village – Kupuliguda, GP- Kollar, Block- Baipariguda, District - Koraput

CHAPTER - 6

KEY INITIATIVES TAKEN BY STATE GOVERNMENT AND WAY FORWARD



Research team members interacting with women members on preparation of beverages namely ' Landa' - Village – Khatalapadar, GP-Dangasil, Block- Kashipur, District- Rayagada



Prepared Mandia Jau in clay container for consumption- Village- Kupuliguda, GP-Kollar Block-Baipariguda, District - Koraput





Finger Millet Grains stored in a Bamboo Basket Village – Kupuliguda, GP- Kollar, Block- Baipariguda, District - Koraput

Key Initiatves taken by Government of Odisha

✔ Odisha Millets Mission (OMM): OMM was launched in 2017 to promote the production and consumption of millets

✔ Price Support Scheme (PSS): Provides financial assistance to farmers for the cultivation of millets. Odisha became the first state to declare direct incentive to farmers for three years through DBT

✔ Minimum Support Price: Minimum Support Price for Millets introduced in Odisha. Procurement of Ragi is done at Minimum Support Price in Odisha

✔ Development of Value-Added Products: Encourages the production of value-added millet-based products to increase the demand and consumption of millets

✔ Promoting Millets in PDS: The government has introduced millets in the Public Distribution System to make it accessible and affordable to the masses

✔ Improved Agronomy in Millet Crops: Odisha became first state to develop standard specifications for the minor millet machinery through recognised panel of experts from different scientific institutions.

- **Inclusion in Supplementary Nutrition Programme (SNP) -ICDS & Mid Day Meal (MDM)**: Odisha is the first state to include Ragi laddu in ICDS through support of District Mineral Foundation

- **Promotion of Organic Farming**: The government is promoting organic farming of millets to increase the production and consumption of organic millets. Community Seed Centers with Participatory Varietal Trials of local landraces each Block

Way Forward

Adequate Public Support:
Small farmers in hilly regions and dryland plains who are among the poorest households in rural Odisha and other parts of the country will cultivate millets only if it gives them good returns. Adequate public support can make millet cultivation profitable, ensure supply for the PDS, and, ultimately, provide nutritional benefits to a wide section of the population.

Awareness and Education:
Lack of awareness about millets and their health benefits can be addressed through education and promotion.

Availability and Accessibility:
Improving the availability of millets in markets and making them more accessible to consumers can encourage consumption.

Affordability:
Millets are often more expensive than other staple grains, making them less accessible to low-income consumers. Addressing affordability through government subsidies or market interventions can increase consumption.

Changing Perception:
The perception of millets as a poor man's food needs to be changed through marketing and promotion.

Processing and Value-added Products:
Improving processing techniques and increasing the availability of value-added millet-based products can make them more appealing to consumers.

Collaboration:
Collaboration between farmers, processors, and marketers can help increase the supply and demand of millets.

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