Farmers' Awareness of Millets in the Marathwada Region

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Abstract: Historically, millets have been integral to diets, offering not only a plethora of health benefits but also contributing to environmental conservation through low water and input requirements. The International Year of Millets, declared by the United Nations for 2023 at the initiative of the Government of India, aims to raise awareness, increase production, and promote consumption of millets. This research explores the awareness and consumption of millets among the farmers of the Marathwada region. The study revealed that Great Millet and Pearl Millet garnered high awareness, while Little Millet, Proso Millet, and Kodo Millet exhibited lower awareness among the respondents. The data also showcased varying awareness of millet nutritional content, with 44.12 per cent having a medium overall awareness. Consumption behaviours unveiled diverse frequency patterns for different millets, with 40.91 per cent at a medium overall consumption level. Consumption patterns of the respondents depicted preferences for staple millet-based items. Reasons for consumption/non-consumption highlighted taste and health as major motivators. Respondents suggested measures like training programs, online resources, and awareness campaigns to boost millet usage. These findings provide a comprehensive understanding of the complex interplay between awareness, consumption patterns, and influencing factors, offering valuable insights for stakeholders aiming to promote millet adoption within communities.
(Keywords : Millets, Awareness, Consumption pattern, Marathwada)

Introduction: The Lancet Commissions underscore the imperative of identifying healthy and environmentally sustainable diets, emphasizing the enhanced utilization of underused plant species, such as millets and sorghum. These grains are recognized for their climate resilience and dense nutritional content. Despite the abundance of 14,000 edible plants, only three crops—rice, maize, and wheat—contribute a significant 60 per cent to caloric intake. The United Nations' Sustainable Development Goals for 2030 set an ambitious target of eliminating all forms of malnutrition, necessitating interventions that replace a substantial portion of the diet, currently dominated by rice, wheat, and maize, with highly nutritious alternatives like millets.

Nutritional Importance of Millets: India, as the largest producer of various millets, plays a crucial role in food security due to the stability of millets under adverse climatic conditions. Once considered coarse grains, millets are now acknowledged as nutritious cereals, standing out as the least allergenic and most digestible grain. Millets boast unique attributes, including calcium richness, dietary fiber, polyphenols, and higher protein content compared to paddy rice. Their amino acid profile, particularly methionine and cystine, along with higher fat content than rice and corn, further highlight their nutritional value. Millets exhibit

nutraceutical properties as antioxidants, contributing to various health benefits such as lower blood pressure, reduced risk of heart disease, cancer prevention, and more [1].

Millets are more nutrient-dense and are a locally cultivated healthy food due to their added health benefits, which include being a source of gluten-free protein, being high in fiber, having a low glycemic index, and being rich in bioactive compounds [2]. Nutritional composition of millets is presented in Table 1 [3], the average carbohydrate content of millets and sorghum varies from 55.8 to 72.6 g/100 g, protein content from 7.3 to 12.5% and fat content ranges between 1.3 and 5 g/100 g.

Millets	Protein (g)	Fat (g)	Fiber (g)	Carbohydrates (g)	Minerals (g)	Iron (mg)	Calcium (mg)
Sorghum	10.40	1.90	1.6	72.6	1.6	4.1	25
Pearl Millet	11.60	5.00	1.2	67.5	2.3	8.0	42
Foxtail Millet	12.30	4.30	8.0	60.9	3.3	2.8	31
Finger Millet	07.30	1.30	3.6	72.0	2.7	3.9	344
Kodo Millet	11.00	3.60	10.0	66.6	1.9	0.5	27
Little Millet	07.70	-	7.6	-	1.5	9.3	27
Proso Millet	12.50	4.20	2.2	73.0	1.9	0.8	14
Barnyard Millet	12.20	3.85	10.1	55.8	3.2	1.4	24

TABLE 1: NUTRITIONAL COMPOSITION OF MILLETS (G/100G)

Millets are a rich source of calcium, especially finger millet or ragi (344 mg/100 g) contains 10 times more than that wheat or rice. The iron content of Pearl millet or Bajra (8.0 mg/100 g) and little millet (9.3 mg/100 g) is higher compared to other staple cereals. They are rich sources of crude fiber as well as dietary fiber and rich in vitamins and minerals [4]. Millets contain a good amount of nutrients like carbohydrates (Low GI), proteins with balanced amino acids, dietary fiber, good quality invisible fat, and have appreciably higher amounts of micronutrients like calcium, potassium, magnesium, iron, manganese, zinc, B complex vitamins and bioactive phytochemicals, making them a superior choice over the cereal grains like rice and wheat [3].

Several research studies have endorsed the role of polyphenols in antioxidant, anti-carcinogenic, anti-inflammatory, antiviral and neuroprotective activities which in all have shown to be beneficial against diseases like cancer and cardiovascular disease, diabetes, high blood pressure, high cholesterol, inflammatory diseases, metabolic syndrome and Parkinson's disease [5]. Millets are rich in dietary fibre and resistant starch which help in weight regulation. Due to the slow release of glucose, millets are an excellent choice of food for diabetics. The non starch polysaccharides found in millets act as prebiotics and stimulate the lactic acid bacteria (LAB) of probiotic cultures and produce short chain fatty acid and antimicrobial agents in the digestive tract. Table 2 [3] represents the total production of millet, which includes Bajra, Sorghum, and Buckwheat, by the top five producing countries over a three-year period (2018, 2019, 2020). India is the largest producer of millet accounting for 17.68% of the total global production in 2020.

Sr. No.	Country	2018	2019	2020	% share in 2020
1	India	16436.46	13710.92	17260.57	17.68
2	USA	9615.75	9132.20	9772.91	10.01
3	Nigeria	8679.34	8590.08	8495.00	8.70
4	China	5744.18	5952.73	6283.50	6.44
5	Ethiopia	6060.00	6391.54	6276.62	6.43
	Total world	99449.87	92732.52	97614.00	100.00

TABLE 2: TOTAL PRODUCTION OF PRINCIPLE MILLETS (BAJRA + SORGHUM + BUCKWHEAT) (000 MT) *(SOURCE:HTTPS://APEDA.GOV.IN/MILLETPORTAL/PRODUCTION.HTML)*

USA is the second-largest producer making up 10.01% of the world's production. Nigeria, the third-largest producer contributing 8.70% to the global production. The sorghum and pearl millet are combined, they account for 92.6% of global millets production, followed by finger

millet, foxtail millet, proso millet, little millet and kodo millet, which altogether account for 7.94% of global millet production. Unfortunately, witnessed a gradual decline in the area and production of millets globally. The area covered under millets declined from 74.6 million hectares in 2018 to 72.3 million hectares in 2020, while production decreased from 91.8 million metric tonnes to 89.2 million metric tonnes. The declining trend in area and production between 2010 to 2018 was also reported in recently published studies [7, 8]. Despite India being the world's largest producer of millets, more than 40% of millet consumption has been reported in African countries, particularly in Niger, Mali, Nigeria, Burkina, and Sudan. Global consumption has declined at a rate of 0.9% and is predicted to rise between 2019-2024 [9]. According to Food and Agriculture Organization (FAO), global millet production was estimated at 28.33 million metric tons in 2019, which increased to 30.08 million metric tons in 2021. India is the largest global producer, with a 43.0% global market share in 2021 with Sorghum(jowar), Pearl Millet (bajra), Finger millet (ragi), and other minor millets are grown in the country. According to the Ministry of Agriculture and Farmers Welfare, millet production in India has increased from 14.52 million tonnes in 2015-16 to 17.96 million metric tons in 2020-21.

State wise Scenario of Millets Production in India (2021-22): Table 3 to Table 6 provide a summary of the production and area under cultivation for different types of millets in India for the agricultural year 2021-22, showcasing the leading states in terms of production volume and area cultivated. Table 3 indicate that Jowar is cultivated on 3,800.81 thousand hectares (ha) in India with a total production of 4,150.60 thousand tonnes. Maharashtra leads in both area and production, followed by Rajasthan, Karnataka, Tamil Nadu, and Uttar Pradesh (Table 3). In case of Bajra (Pearl Millet) Production, bajra is cultivated on 6,840.80 thousand ha in India with a total production of 9,780.63 thousand tonnes. Rajasthan dominates bajra production, with Uttar Pradesh, Maharashtra, Haryana, and Gujarat also contributing significant volumes. Rajasthan and Uttar Pradesh together account for over half of India's bajra production. Regarding Ragi (Finger Millet) Production (Table 5), Ragi is cultivated on 1,218.43 thousand ha in the country with a production of 1,701.12 thousand tonnes. Karnataka is the largest producer by a substantial margin, followed by Uttarakhand, Maharashtra, Tamil Nadu, and Odisha. In case of small millets production of India, small millets cover an area of 428.92 thousand ha, with a total production of 367.44 thousand tonnes. Karnataka, Uttarakhand, Maharashtra, Tamil Nadu, and Odisha are leading in small millet production, with Karnataka having the largest area under cultivation.

State	Jowar (Sorghum)	
	Area (000 ha)	Production (000 tonnes)
All-India	3 800.81	4150.60
Maharashtra	1648.66	1558.00
Rajasthan	619.98	535.66
Karnataka	615.00	731.48
Tamilnadu	397.23	362.04
Uttar Pradesh	171.00	269.84

TABLE 3: TOP FIVE JOWAR PRODUCING STATES IN INDIA (2021-22) ***(SOURCE: DEPT. OF AGRICULTURE & FARMERS WELFARE, 2023)***

Principle Millet Production in Maharashtra: Rabi Sorghum (19.417 lakh ha), Kharif Sorghum (3.787 lakh ha) and Bajra (6.875 lakh ha) as major crops in terms of area and production of Millet in Maharashtra (Table 4).

The Marathwada region consist of Aurangabad and Latur division, Aurangabad Division has significant cultivation of Rabi Sorghum (2.706 lakh ha) and Bajra (1.299 lakh ha) but does not cultivate Ragi.

State	Bajra (Pearl Millet)	
	Area (000 ha)	Production (000 tonnes)
All-India	6840.80	9780.63
Rajasthan	3736.10	3739.84
Uttar Pradesh	905.00	1951.18
Maharashtra	666.72	618.72
Haryana	483.10	1119.83
Gujarat	446.21	1089.64
Madhya Pradesh	343.00	868.82

TABLE 4: TOP FIVE BAJRA (PEARL MILLET) PRODUCING STATE IN INDIA (2021-22) ***(SOURCE: DEPT. OF AGRICULTURE & FARMERS WELFARE, 2023)***

State	ragi (Finger Millet)	
	Area (000 ha)	Production (000 tonnes)
All-India	1218.43	1701.12
Karnataka	846.00	1126.87
Uttarakhand	86.00	127.11
Maharashtra	81.26	102.63
Tamilnadu	74.44	227.49
Odisha	54.98	43.65

TABLE 5: TOP FIVE STATE RAGI (FINGER MILLET) PRODUCING STATE (2021-22) ***(SOURCE: DEPT. OF AGRICULTURE & FARMERS WELFARE, 2023)***

Whereas Latur Division has a 1.56 lakh ha area under Kharif Jowar, 3.281 lakh ha area under Rabi Sorghum, and 0.972 lakh ha area under Bajra cultivation. Although there is a considerable proportion of millet production and availability, consumption has declined over the years. A downward trend in per capita consumption of sorghum was seen in both rural and urban India, with consumption dropping from 19.1 to 5.2 kg per year in rural India and from 8.5 to 2.7 kg per year in urban India, indicating 68 per cent and 70 per cent declines, respectively [9]. A similar study also stated that there was a decline in millet consumption and the difference in total millet consumption between rural and urban was 10 kgs in 2004-05 and 4 kgs in 2011-12 [11]. Historically, millets have been integral to diets, offering not only a plethora of health benefits but also contributing to environmental conservation through low water and input requirements. The International Year of Millets, declared by the United Nations for 2023 at the initiative of the Government of India, aims to raise awareness, increase production, and promote consumption of millets. As part of this context, this research explores the awareness of millets among the farmers of the Marathwada region, with specific objectives:

1. To assess the awareness of millets among the respondents.
2. To understand the consumption behaviour of millets among the respondents.
3. To gather suggestions from respondents for increasing the usage of millets.

Methodology: The current investigation aimed to assess the awareness of millets among the farmers of the Marathwada region. The study encompassed all eight districts within the Marathwada region and adopted an ex-post facto research design. A questionnaire was employed as the primary tool for data collection, formulated in Google Form. The Google form link was directly distributed among the farmers, with additional support provided through SMS from Krishi Vigyan Kendras (KVKs) to facilitate participation. A total of 402 responses were received through the Google Form, with 28 incomplete responses excluded from the analysis. Therefore, 374 complete and valid responses from the Marathwada region constituted the respondent

sample for this study. District-wise breakdowns of responses from the people of the Marathwada region are presented in Table 6. The independent variables such as age, education, gender, main occupation, family background, family size, family annual income, and source of information about millets were taken for the study. To gauge the awareness of millets among the respondents, factors such as awareness of different millets,

State	Small Millets	
	Area (000 ha)	Production (000 tonnes)
All-India	428.92	367.44
Karnataka	89.00	23.87
Uttarakhand	60.26	73.27
Maharashtra	52.35	26.03
Tamilnadu	47.00	29.83
Odisha	38.37	19.61

TABLE 6: TOP FIVE SMALL MILLETS PRODUCING STATES (2021-22) ***(SOURCE: DEPT. OF AGRICULTURE & FARMERS WELFARE, 2023)***

knowledge about the nutritional content of millets, awareness of the importance of millets in the human diet, and general awareness about millets were considered for calculating the overall awareness level. Awareness responses of the respondents were recorded on two-point continuum i.e. assigning a score of 1 for "Yes" and 0 for "No.". The total awareness score for each respondent was derived by summing up individual scores. Subsequently, mean scores

Sr. No.	Agriculture Division of Maharashtra	Kharif Jowar		Rabi Sorghum		Bajra (Pearl Millet)		Ragi (Finger Millet)	
		A	P	A	P	A	P	A	P
1	Konkan Division	00.00	00.00	00	00	00	00	318.61	23.29
2	Nashik Division	821.50	1338.79	758.76	1141.18	1719.95	2479.14	227.51	162.75
3	Pune Division	57.31	35.38	9582.42	6791.74	2486.90	3280.23	25.85	20.31
4	Kolhapur Division	726.81	1053.44	2799.27	2686.41	1248.52	1174.91	244.28	426.83
5	Aurangabad Division	87.16	60.70	2706.05	2954.67	1298.59	2064.82	00.00	00.00
6	Latur Division	1560.17	953.11	3281.84	4171.26	97.23	45.90	0.10	0.08
7	Amravati Division	503.73	356.21	214.94	258.62	23.78	11.23	0.00	0.00
8	Nagpur Division	30.72	16.73	73.64	45.00	0.00	0.00	0.00	0.00
	Total	3787	3814	19417	18049	6875	9056	816	939

TABLE 7: AREA AND PRODUCTION OF PRINCIPLE MILLETS IN THE MAHARASHTRA DURING 2020-21 (AGRICULTURE DIVISION WISE) ('00' HA AREA & '00' TONNES PRODUCTION) ***(SOURCE: APEDA – E – CATALOGUE FOR EXPORT OF MILLETS & VALUE ADDED PRODUCTS: MAHARASHTRA, 2022)***

were computed, serving as a basis to categorize respondents into low awareness, medium awareness, and high awareness categories, determined by Mean + Standard Deviation.

Sr. No.	Districts	Frequency	Percentage
1	Ch. Sambhaji Nagar	85	22.72
2	Jalna	43	11.50
3	Beed	47	12.57
4	Dharashiv	25	06.68
5	Parbhani	64	17.11
6	Hingoli	39	10.43
7	Latur	30	08.02
8	Nanded	41	10.96
	Total sample (respondents)	374	100.00

TABLE 8: DISTRICT WISE RESPONSES GIVEN BY THE FARMERS OF MARATHWADA REGION (N=374 RESPONDENT FARMERS)

Regarding calculation of frequency of consumption of millet based products among the respondents, nine millets viz., great millet, pearl millet, barnyard millet, finger millet, amaranthus, foxtail millet, little millet, proso millet, kodo millet were selected for the study. The frequency of consumption was measured on a 9-point continuum: daily consumption (8 score), 2-3 times a week (7 score), once a week (6 score), once a fortnight (5 score), once a month (4 score), once every three months (3 score), once every six months (2 score), rarely in a year (1 score), and never consumed millets (0 score). The mean score was calculated from respondents' consumption scores, and respondents were categorized into low consumption, medium consumption, and high consumption based on Mean $\pm$ SD. The statistical tools employed for the study included frequencies, percentages, arithmetic mean, standard deviation, and correlation coefficient.

Results

1. Awareness of millets among the respondents

1.1 Awareness of different millets among the respondents: Table 9 reveals the awareness levels of various millets among the respondents; it is noted that all respondents were fully aware of Great Millet (sorghum) and Pearl Millet (bajra), followed by high awareness for Barnyard Millet (98.13%), Amaranthus (97.86%), Finger Millet (75.13%), Foxtail Millet (50.80%). Whereas low awareness about Little Millet (14.70%), Proso Millet (14.44%), and Kodo Millet (13.10%).

Sr. No.	Name of the millet	Frequency	Percentage
1	Great Millet (Sorghum / Jowar)	374	100.00
2	Pearl Millet (Bajra)	374	100.00
3	Barnyard Millet (Barti / Bhagar)	367	98.13
4	Amaranthus (Rajgira)	366	97.86
5	Finger Millet (Nachni / ragi)	281	75.13
6	Foxtail millet (Rala)	190	50.80
7	Little Millet (Sava)	55	14.70
8	Proso Millet (Varai)	54	14.44
9	Kodo Millet (Kudra)	49	13.10

TABLE 9: AWARENESS OF DIFFERENT MILLETS AMONG THE RESPONDENTS (N=374 RESPONDENT FARMERS)

1.2 Awareness of nutritional content of millets among the respondents: The awareness of the respondents regarding the nutritional content of millets is presented in Table 10. It is reported that the majority of the respondents (80.48%) were aware that millets are a source of iron, while 72.46 per cent of them were aware that millets contain calcium.

Sr. No.	Name of the nutrient content	Frequency	Percentage
1	Iron	301	80.48
2	Calcium	271	72.46
3	Magnesium	149	39.84
4	Zinc	127	33.96
5	Protein	127	33.96
6	Fibre	89	23.70

TABLE 10: AWARENESS ABOUT THE NUTRITIONAL CONTENT OF MILLETS(N=374 RESPONDENT FARMERS)

Whereas, 39.84 per cent of them were knowledgeable about the magnesium content in millets, 33.96 per cent knew about the zinc content, 33.96 per cent were aware of the protein content, and only 23.70 per cent of them were aware about the fibre content in millets.

1.3 Awareness of importance of millets in human diet: The awareness of the respondents about the importance of millets in the human diet is presented in Table 11. The data from Table 11 indicates that the majority of respondents (88.77%) were aware that millets are a healthy diet and can increase the resistance power of human beings, while 79.14 per cent of them perceived that 'millets are easy to digest.' Whereas, 78.07 per cent of them

were aware that 'millets are good for increasing

Sr. No.	Statement	Frequency	Percentage
1	Easy to digest	296	79.14
2	Healthy diet / increase resistance power	332	88.77
3	Good for Diabetics	276	73.80
4	Good for cholesterol control	247	66.04
5	Manage the body weight	228	60.96
6	Good for increase the haemoglobin	292	78.07
7	Good for bone health	235	62.83
8	Beneficial in winter season	217	58.02

TABLE 11: AWARENESS ABOUT IMPORTANCE OF MILLETS IN HUMAN DIET (N=3)

haemoglobin,' followed by awareness that millets are good for diabetics (73.80%), millets are good for cholesterol control (66.04%), millets are good for bone health (62.83%), millets manage body weight (60.96%), and millets are beneficial in the winter season (58.02%).

1.4 Overall awareness of millets: Table 12 reports the overall awareness of millets among the people, indicating that the majority of respondents (44.12%) had a medium level of overall awareness of millets, followed by a low level (31.55%) and a high level (24.33%) of

Sr. No.	Awareness	Frequency	Percentage
1	Low (upto 8.40)	118	31.55
2	Medium (8.41 to 16.24)	165	44.12
3	High (16.25 & Above)	91	24.33
	Mean = 12.32 S.D. = 3.92	374	100.00

TABLE 12: OVERALL AWARENESS OF MILLETS AMONG THE PEOPLE (N=374 RESPONDENT FARMERS)

awareness of millets among the respondents. Table 13 reveals the mean overall awareness of millets among respondents categorized by various profiles. Notably, individuals aged 50 and above show the highest mean awareness score (14.05), indicating a stronger awareness in this age group. Females exhibit a higher mean awareness score (13.11) compared to males (12.23). Regarding family income, respondents with incomes up to Rs. 1,00,000/- have the highest mean awareness (12.70),

Sr. No.	Profile / Characteristics	Frequency	Mean of overall awareness
1	Age		
	Young (Upto 29 yrs)	143	12.03
	Middle (30 to 49 yrs)	179	12.04
	Old (50 & Above)	52	14.05
2	Gender		
	Male	336	12.23
	Female	38	13.11
3	Family Annual Income		
	Upto Rs. 1,00,000 /-	131	12.70
	Rs. 1,00,001 to 2,00,000/-	71	12.60
	Rs. 2,00,001 to 3,00,000/-	28	12.68
	Rs. 3,00,001 to 4,00,000/-	46	11.67
	Rs.4,00,001 & Above	98	11.81

TABLE 13: MEAN OF OVERALL AWARENESS OF MILLETS ACCORDING TO PROFILE OF RESPONDENTS (N=374 RESPONDENT FARMERS)

followed by those with incomes between Rs. 1,00,001 to 2,00,000/- (12.60). These findings offer valuable insights for tailoring targeted awareness campaigns to specific demographic groups with lower awareness levels, contributing to more effective dissemination of information about millets.

2. Consumption Behaviour of Millets among the Respondents

2.1 Frequency of consumption of millet-based products among respondents: The consumption behavior of millets among the respondents was investigated and is presented in Table 14. The results from Table 14 indicate

that 56.95 per cent of the respondents consumed sorghum daily, followed by rarely in a year (15.77%), 2-3 times a week (10.96%), once a week (5.88%), never consumed (4.81%), once in six months (1.87%), once in a fortnight (1.60%), once a month (1.60%), and once in three months (0.53%). This detailed breakdown sheds light on the diverse consumption frequencies of sorghum, providing valuable insights into the dietary habits of the surveyed population. Regarding Pearl millet, majority of the respondents rarely consumed it in a year (50.00%), followed by 34.76 per cent of them were consumed once in six months. While 6.15 per cent of the respondents were never consumed pearl millet. In case of Barnyard millet, 39.57 per cent of the respondents rarely consumed it, while 25.40 per cent of them were consumed it once in a week, followed by once in three months and once in six months (i.e.9.36%). Whereas 7.49 per cent of respondents were never consumed barnyard

Regarding Pearl Millet, the majority of the respondents rarely consumed it in a year (50.00%), followed by 34.76 per cent who consumed it once in six months. Whereas, 6.15 per cent of the respondents never consumed pearl millet. In the case of Barnyard Millet, 39.57 per cent of the respondents rarely consumed it, while 25.40 per cent consumed it once a week, followed by once in three months and once in six months (i.e., 9.36%). Only 7.49 per cent of respondents never consumed Barnyard Millet. This analysis provides insights into the infrequent consumption patterns of these specific millet types among the respondents. Regarding Finger Millet,

Sr. No	Name of the millet	Daily	2-3 times a week	Once in a week	Once in a fortnight	Once in a month	Once in a three monthly	Once in a six monthly	Rarely in a year	Not at all
1	Sorghum (Jowar)	213 (56.95)	41 (10.96)	22 (5.88)	06 (1.60)	06 (1.60)	02 (0.53)	07 (1.87)	59 (15.77)	18 (4.81)
2	Pearl Millet (Bajra)	00 (00.00)	01 (0.27)	06 (1.60)	05 (1.34)	07 (1.87)	15 (4.01)	130 (34.76)	187 (50.00)	23 (6.15)
3	Barnyard Millet (Barti/bhagar)	00 (00.00)	15 (4.01)	95 (25.40)	06 (1.60)	12 (3.21)	35 (9.36)	35 (9.36)	148 (39.57)	28 (7.49)
4	Finger Millet (Nachni / Ragi)	17 (4.55)	12 (3.21)	26 (6.95)	08 (2.14)	26 (6.95)	17 (4.55)	16 (4.28)	195 (52.14)	57 (15.24)
5	Amaranthus (Rajgira)	00 (00.00)	15 (4.01)	120 (32.08)	55 (14.71)	15 (4.01)	09 (2.41)	16 (4.28)	246 (65.77)	33 (8.82)
6	Foxtail millet (Rala)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	15 (4.01)	21 (5.61)	36 (9.63)	81 (21.66)	221 (59.09)
7	Little Millet (Sava)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (0.00)	00 (00.00)	374 (100.00)
8	Proso Millet (Varai)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (0.00)	05 (1.34)	369 (98.66)
9	Kodo Millet (Kudra)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (0.00)	00 (0.00)	374 (100.00)

TABLE 14 : FREQUENCY OF CONSUMPTION OF MILLET BASED PRODUCTS AMONG RESPONDENTS (N=374 RESPONDENT FARMERS)

52.14 per cent of respondents rarely consumed Finger Millet in a year, followed by 15.24 per cent who never consumed it. Whereas, 6.95 per cent of the respondents reported consuming it

once a week and once a month, while 4.55 per cent consumed it daily and with the same percentage once in three months. Concerning the consumption of Amaranthus, the majority of respondents (65.77%) rarely consumed it, followed by once a month (32.08%), and once a fortnight (14.71%). However, 8.82 per cent of respondents never consumed Amaranthus at all. This detailed breakdown provides insights into the diverse consumption patterns of Finger Millet and Amaranthus among the respondents. Majority of the respondents were never consumed foxtail millet (63.10%), followed by 21.06 per cent of the respondents were consumed it rarely in a year, once in a six monthly (9.63%), and once in a three monthly (5.61%). Table 9 further reported that majority of the respondents were never consumed little millet (100.00%), proso millet (98.66%) and kodo millet (100.00%). Most of the respondents never consumed Foxtail Millet (63.10%), followed by 21.06 per cent who rarely consumed it in a year, once in six months (9.63%), and once in three months (5.61%). Table 7 also shows that a significant portion of the respondents refrained from consuming Little Millet (100.00%), Kodo Millet (100.00%), and Proso Millet (98.66%). This data underscores the prevailing tendency of non-consumption of these millet within the respondents.

2.2 Overall Consumption of Millets among the Respondents Table 15 reports the overall consumption of millets among the respondents, indicating that the majority of the respondents (40.91%) had a medium level of overall millet consumption. This is followed by a low level (35.83%) and a high level (23.26%) of overall millet consumption among the respondents. Table 16 indicate the mean of overall consumption score of the respondents according their profile. It is reported that mean of overall consumption score of the respondents in the category of old age (26.14), female gender (26.85), farming as a main occupation (25.13), rural family background (24.90) and annual family income upto Rs. 1,00,00 /- (24.98) were higher as compare to other respondents. Table 9 presents the mean overall consumption levels of millets based on demographic profiles of the respondents. The data indicates that respondents in the older age group (50 & above) have the highest mean consumption score of 26.14, while females exhibit a higher mean consumption score (26.85) compared to males (23.92). Regarding family annual income, respondents with incomes up to Rs. 1,00,000/- have the highest

Sr. No.	Consumption	Frequency	Percentage
1	Low (upto 20.79)	134	35.83
2	Medium (20.80 to 27.64)	153	40.91
3	High (27.65 & Above)	87	23.26
	Mean = 24.22 S.D. = 3.42	374	100.00

TABLE 15: OVERALL CONSUMPTION LEVEL OF MILLET AMONG THE RESPONDENTS (N=374 RESPONDENT FARMERS)

Sr. No.	Profile / Characteristics	Frequency	Mean of overall consumption
1	Age		
	Young (Upto 29 yrs)	143	22.82
	Middle (30 to 49 yrs)	179	24.78
	Old (50 & Above)	52	26.14
2	Gender		
	Male	336	23.92
	Female	38	26.85
3	Family Annual Income		
	Upto Rs. 1,00,000 /-	131	24.98
	Rs. 1,00,001 to 2,00,000/-	71	24.92
	Rs. 2,00,001 to 3,00,000/-	28	24.57
	Rs. 3,00,001 to 4,00,000/-	46	22.04
	Rs.4,00,001 & Above	98	23.71

TABLE 16: MEAN OF OVERALL CONSUMPTION LEVEL OF MILLETS ACCORDING TO PROFILE OF RESPONDENTS (N=374 RESPONDENT FARMERS)

mean consumption score (24.98), followed closely by those with incomes in the range of Rs. 1,00,001 to 2,00,000/-. The data provides valuable insights into the varying consumption patterns of millets among different age groups, genders, and income brackets, aiding in understanding dietary preferences and facilitating targeted interventions for promoting millet consumption.

2.3 Consumption pattern of millet based products among the respondents: Table 17 illuminates the consumption patterns of millet-based products among the respondents, offering a comprehensive view of their awareness and preferences. The findings highlight that staple items such as Bhakar and Khichadi/Bhagar enjoy widespread recognition, with 100.00 per cent and 97.86 per cent awareness, respectively. The data further reveals a notable inclination towards these products, with 71.12 per cent expressing a preference for Bhakar and 55.08 per cent for Khichadi / Bhagar. Similarly, Kharudya / Kurudya also demonstrates substantial awareness (97.33%) and liking, with 60.69 per cent expressing a preference for this millet-based product. In contrast, certain millet-based products like Chapati and Halva exhibit moderate awareness levels (27.27% and 26.20%, respectively), with corresponding liking percentages of 26.20 per cent and 23.80 per cent. Table 10 also reported the popularity of millet-based sweets, particularly Laddu, which boasts high awareness (95.19%) and a substantial liking rate of 54.54 per cent. Moreover, the inclusion of various millet-based products, ranging from traditional choices like Papdi and Papad to modern options like Noodles and Pasta, showcases the diversity in respondents' consumption habits. The data serves as a valuable resource for stakeholders, allowing them to tailor marketing strategies and educational campaigns to enhance awareness and foster positive attitudes toward millet-based products. Understanding the varying levels of awareness and liking for these products aids in the promotion of healthier dietary choices and the integration of millets into the regular diet of the surveyed population.

Sr. No.	Name of millet-based product	Aware about it	Like to eat
1	Bhakar	374 (100.00)	266 (71.12)
2	Khichadi / Bhagar	366 (97.86)	206 (55.08)
3	Kharudya / Kurudya	364 (97.33)	227 (60.69)
4	Chapati	102 (27.27)	98 (26.20)
5	Shevai / khir	119 (31.82)	101 (27.00)
6	Halva	98 (26.20)	89 (23.80)
7	Laddu	356 (95.19)	204 (54.54)
8	Upma	112 (29.95)	101 (27.00)
9	Dosa	109 (29.14)	98 (26.20)
10	Papdi	297 (79.42)	251 (67.11)
11	Papad	303 (81.02)	293 (78.34)
12	Cake	56 (14.97)	46 (12.30)
13	Pops snakes (Lahya)	368 (98.40)	277 (74.06)
14	Bread / toast	51 (13.64)	24 (6.42)
15	Noodles	48 (12.83)	41(10.96)
16	Biscuit / cookies	183 (48.93)	155 (41.44)
17	Pasta	13 (3.48)	04 (1.07)

TABLE 17: CONSUMPTION PATTERN OF MILLET BASED PRODUCTS AMONG THE RESPONDENTS (N=374 RESPONDENT FARMERS)

3. Major Reasons for Consumption / Non-Consumption of Millets among the Respondents

3.1 Major reasons for consumption of millet based product: Table 18 offers a detailed exploration of the key motivations driving the consumption of millet-based products among the respondents, with a breakdown for each millet type. The first notable trend is the widespread perception that millet-based products are "Easy to Digest." Great Millet (Sorghum) leads in this category, with an impressive 85.56 per cent, suggesting that the digestibility factor is a significant influencer across all millet varieties. Taste emerges as a

Sr. No.	Statement	Great Millet (Sorghum)	Pearl Millet (Bajra)	Barnyard Millet (Bhagar)	Amaranthus (Rajgira)	Finger Millet (Nachni)	Foxtail Millet (Rala)
1	Easy to digest	320 (85.56)	210 (56.15)	44 (11.76)	280 (74.87)	263 (70.32)	23 (6.15)
2	Tasty	230 (61.50)	258 (68.98)	139 (37.16)	284 (75.93)	152 (40.64)	17 (4.54)
3	Healthy diet / increase resistance power	301 (80.48)	232 (62.03)	136 (36.36)	192 (51.34)	183 (48.93)	24 (6.42)
4	Good for Diabetics	201 (53.74)	102 (27.27)	28 (7.49)	54 (14.44)	53 (14.17)	23 (6.15)
5	Good for cholesterol control	181 (48.40)	113 (30.21)	33 (8.82)	73 (19.52)	65 (17.38)	26 (6.95)
6	Manage the body weight	159 (42.51)	108 (28.88)	37 (9.89)	74 (19.79)	158 (42.25)	28 (7.49)
7	Good for increase the haemoglobin	114 (30.48)	130 (34.76)	25 (6.68)	188 (50.27)	167 (44.65)	19 (5.08)
8	Good for bone health	98 (26.20)	119 (31.82)	33 (8.82)	86 (22.99)	80 (21.39)	23 (6.15)
9	Beneficial in winter season	110 (29.41)	279 (74.60)	15 (4.01)	15 (4.01)	52 (13.90)	17 (4.54)
10	Main food in fasting	00 (00.00)	00 (00.00)	302 (80.75)	235 (62.83)	00 (00.00)	00 (00.00)

TABLE 18: MAJOR REASONS FOR CONSUMPTION OF MILLET BASED PRODUCT (N=374 RESPONDENT FARMERS)

crucial factor, notably for Pearl Millet (Bajra), which scores a high percentage of 68.98 per cent under "Tasty." This underscores the importance of flavor in influencing food choices, highlighting that taste plays a pivotal role in the consumption of certain millet-based products. Finger Millet (Nachni) also registers a noteworthy 40.64 per cent under this category, indicating that a sizable portion of respondents associates this millet type with a palatable eating experience. The finding are in line with [12]. Moreover, the data reveals that respondents perceive millets as a "Healthy Diet/In. crease Resistance Power," with Great Millet (Sorghum) leading at 80.48 per cent. This points to a prevalent belief among respondents that millets offer health benefits, aligning with a broader trend of conscious and nutritious eating. Furthermore, health-related reasons such as being "Good for Diabetics," "Good for Cholesterol Control," and "Managing Body Weight" demonstrate substantial percentages across various millet types. This suggests that respondents are not only aware of the potential health benefits of millets but also consider these factors when incorporating millet-based products into their diets. The Table 18 also highlights specific health outcomes associated with millet consumption, such as being "Good for Increase in Haemoglobin" and promoting "Bone Health." These findings signify that respondents perceive millets as contributing to specific aspects of their well-being. The association of certain millets, particularly Pearl Millet (Bajra), with being "Beneficial in Winter Season" reflects a seasonal dietary preference among respondents. The recognition of Barnyard Millet (Bhagar) and Amaranthus
(Rajgira) as the "Main Food in Fasting" emphasizes the cultural and ritualistic significance of these millets during fasting periods. Table 18 provides a nuanced understanding of the multifaceted motivations behind millet-based product consumption, encompassing taste preferences, health consciousness, and cultural practices among the surveyed population.

3.2 Major reasons for non-consumption of millets despite having awareness: Table 19 elucidates the factors hindering the consumption of millets among the respondents, despite their awareness of these grains. The predominant reason, highlighted by 77.54 per cent of respondents, is the "Lack of proper knowledge about all millets," indicating a substantial gap in comprehensive understanding about different millets and their benefits. Following closely, "Lack of proper knowledge about preparation of millet-based products" stands as a significant barrier at 58.86 per cent, suggesting that respondents may struggle with incorporating millets into their diets due to uncertainties about how to prepare millet-based dishes. Furthermore, the Table 19 underscores the practical challenges faced by respondents, with "Non-availability of millet-based products" cited by 76.20 per cent of respondents. This signals a potential accessibility issue, emphasizing the importance of making millet products more readily available in the market. Whereas, taste considerations play a role, as "Taste not preferred by child" is noted by 17.91 per cent of respondents, indicating the influence of family preferences on millet consumption. The "High price of millet-based products" emerges as a notable concern for 38.50 per cent of the respondents, highlighting the economic aspect as a critical factor influencing dietary choices. The findings underscore the multifaceted challenges that need to be addressed, ranging from knowledge gaps to practical accessibility and affordability issues, to promote widespread adoption of millets in the surveyed population's diets.

Sr. No.	Reasons	Frequency	Percentage
1	Lack of proper knowledge about all millets	290	77.54
2	Lack of proper knowledge about preparation of millet based products	219	58.86
3	Non-availability of millet-based products	285	76.20
4	Taste is not preferred by child	67	17.91
5	High price of millet based product	144	38.50

TABLE 19: REASONS FOR NON-CONSUMPTION OF MILLETS DESPITE HAVING AWARENESS (N=374 RESPONDENT FARMERS)

4. Suggestions of the respondents about increasing the usage of millet in diet: Table 20 provides the suggestions put forth by the respondents to enhance the incorporation of millets into their diets. The most prominent suggestion, voiced by 77.00 per cent of respondents, is that "Extension agencies should organize training programs on millet-based value-added products/ready-to-eat products." This underscores the perceived importance of educational initiatives in equipping farmers with the knowledge and skills necessary to incorporate millets into their dietary routines. The second most prevalent suggestion, expressed by 68.98 per cent of respondents, is "Upload videos on the preparation of various recipes related to millet-based value-added products on YouTube/social media." This indicates a recognition of the power of visual content and online platforms in disseminating information and promoting the culinary versatility of millets. "Awareness/Publicity campaigns coupled with advertisements about the importance of millets in the diet should be organized at retailers' shops, malls, etc." emerges as the third most frequent suggestion, with 57.49 per cent of respondents endorsing this idea. This underscores the significance of targeted awareness campaigns to influence consumer perceptions and choices. Other noteworthy suggestions include an increase in the Minimum Support Price (MSP) of millets (45.72%), advocating for the availability of millets in public distribution systems/ration

Sr. No.	Suggestions	Frequency	Percentage
1	The extension agency should organize training programs on millet-based value-added products/ready-to-eat products.	288	77.00
2	Upload videos demonstrating the preparation of various recipes related to millet-based value-added products on YouTube/social media.	258	68.98
3	An awareness / publicity campaign, along with advertisements emphasizing the importance of millets in the diet, should be organized at retailers' shops, malls, etc.	215	57.49
4	MSP of millets should be increased	171	45.72
5	Availability of millets in public distribution system / ration shop	166	44.38
6	An awareness program about millet-based products should be organized in schools and colleges.	162	43.31
7	Millet-based products should be included in midday meals at schools.	155	41.44
8	Guidance on the use of millets tailored to different diseases.	121	32.35

TABLE 20: SUGGESTIONS OF THE RESPONDENTS ABOUT INCREASING THE USAGE OF MILLET IN DIET (N=374 RESPONDENT FARMERS)

shops (44.38%), organizing awareness programs about millet-based products in the schools / colleges (43.31%), proposing the inclusion of millet-based products in midday meals in schools (41.44%), and seeking guidance on the use of millets tailored to different diseases (32.35%).

In summary, Table 20 reflects the diverse perspectives of the respondents on how to enhance millet consumption, ranging from educational initiatives and online resources to awareness campaigns, policy interventions, and targeted programs for specific demographics like school children. These suggestions collectively provide valuable insights for stakeholders aiming to promote millet consumption in the community.

The findings of the study are consistent with the previous studies [13, 14 and 15].

Conclusions:

1. The study found that respondents were highly aware of Great Millet (sorghum) and Pearl Millet (bajra). However, in case of other minor millets viz., Little Millet, Proso Millet, and Kodo Millet having lower awareness levels. This information can guide targeted awareness campaigns to bridge knowledge gaps for specific millets.
2. The results revealed that a significant proportion were aware of millets as a source of iron and calcium, whereas low awareness levels for other nutrients. This underscores the need for comprehensive nutritional education to enhance awareness of millets' health benefits.
3. The study indicated a medium level of awareness among respondents, with variations based on age, gender, and income. Tailoring awareness campaigns to specific demographic groups may improve overall awareness levels.
4. Consumption patterns revealed that sorghum was consumed most frequently, daily (56.95%) by the respondents. While millets,

such as Little Millet, Proso Millet, and Kodo Millet, were rarely or never consumed by the majority. Understanding these consumption trends is crucial for promoting diverse millet varieties.

5. Consumption patterns of specific millet-based products were explored, emphasizing the popularity of staples like Bhakar and Khichadi/Bhagar. This information is valuable for promoting certain millet-based products based on consumer preferences.

6. Reasons driving millet-based product consumption were explored, including taste, health benefits, and cultural practices. These insights aid in tailoring marketing strategies to align with consumer preferences and health-conscious choices.

7. Barriers to millet consumption, despite awareness, were identified in the study. Lack of knowledge about millets and their preparation, non-availability of millet-based products, taste preferences, and pricing were highlighted as significant challenges. Addressing these barriers is essential for promoting millet consumption. Respondents provided valuable suggestions to increase millet consumption. Recommendations included organizing training programs, leveraging digital platforms for recipe promotion, conducting awareness campaigns, increasing Minimum Support Prices, and advocating for millet inclusion in school meals. Implementing these suggestions can contribute to enhancing millet adoption.

In conclusion, the study provides a comprehensive understanding of millet awareness, consumption behavior, and influencing factors among farmers of the Marathwada region. The insights can inform targeted interventions to promote millet consumption and address existing barriers, contributing to improved dietary diversity and overall health outcomes.

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