Original Research Article

A STUDY ON AWARENESS AND UTILIZATIONOF MILLETS AND ITS VALUE-ADDED PRODUCTS AMONG RURAL CONSUMERS IN MADURAI DISTRICT

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ABSTRACT

Millets are sustainable and nutritious alternative to cereals. Millets are utilized due to its potential in attaining food security. This study was conducted in Madurai district to assess the awareness and utilization of millets and its value-added products among rural consumers with a sample size of 75 respondents from the selected blocks using random sampling method. Value-added products of millets were categorized into ready to eat, ready to cook, instant mix and snacks. Majority of them were aware of millet flour, millet roti, millet kali and millet murukku. Most of the rural consumers had utilized millet in the form of millet kali and millet roti. Age, educational status, occupational status, annual income, family size, information source utilization, period of consumption of millets had shown significant and positive relationship with awareness and utilization at one and five per cent level of significance.

Add the name of the taluka or block to place of study, what was the tool to assess the awareness, how the data was collected.

Keywords: Consumers; Millets Value-added products; Millet awareness; Utilization;

1. INTRODUCTION

The consumption of millets dates back to 7000 years. India is one of the largest producer and consumer of millets among the world. Millets comes under the group small seeded grasses which is grown as cereal crops and also used as fodder for animals. Millets are significant crop in the semiarid tropic regions of Africa and Asia. There are eight types of millets namely sorghum, pearl millet, finger millet, kodo millet, barnyard millet, little millet,

foxtail millet and proso millet. Key characteristics of millets are drought resistance and climate change resilience. Millets are known as the "powerhouse of nutrients" because they are abundance in vitamins, minerals, proteins, fiber, amino acids, and other nutrients(references).

Millets are also called as “cereals of the poor” due to its significant role in enhancing economic source of the farmers and assist in reducing global hunger. The important properties of millets are gluten free, low glycemic index, atherosclerogenic effects and anti-tumorigenic (references). Millets are also containing tannins, phenols and phytates which prevents cell damage and aids in promoting anti-aging (references). Millets are consumed due to its various health benefits such as helps in weight reduction, controls blood sugar level, helps in detoxifying body, lower the cholesterol levels and prevents anemia(references). This study was carried out to observe the following objectiveswere

- To study the socio-economic characteristics of rural consumers in Madurai district.
- To assess the awareness and utilization of millets and its value-added products among rural consumers.
- To analyse the relationship of profile with awareness and utilization of millets and its value-added products among rural consumers.

2. METHODOLOGY

The study was carried out in Madurai district due to its diverse production of millets. In Madurai, production of sorghum was 16,267 tonnes followed by pearl millet production (1,017 tonnes), kodo millet production was 399 tonnes, finger millet production (32 tonnes) and other millets production such as barnyard millet and foxtail millet production were up to 22243 tonnes during 2022-2023[6]. Among 13 blocks in Madurai district, three blocks were purposively selected namely Sedapatti, T.Kallupatti, Usilampatti based on area and production of millets. Totally, five villages were purposively selected from three blocks. A total of 75 rural consumers were randomly chosen from Seelnaickanpatty village, Thadaiyampatty village in Sedapatti block, S. Keelapatty village, Silaimalaipatty village in T.Kallupatti block and Alligundam village in Usilampatti block. In this way, 15 respondents were randomly selected from each village. (mention the value added products, were they readymade or prepared by the researcher or just knowledge was assessed?)Data on rural consumers were collected using pre-tested interview schedule. The statistical tools such as descriptive statistics, correlation and regression analysis were used in the study. Data were analysed with the help of SPSS software.
(Mention the products classification as ready to eat, ready to cook, instant mix etc., in the methodlogy)

3. RESULTS AND DISCUSSION

Findings obtained through data analysis were interpreted below.

2.1. Socio-economic characteristics of the rural consumers

Table 1. Socio-economic characteristics of the respondents

S.No.	Socio-economic characteristics	Number (n=75)	Per cent

I)	**Age**		
1.	Young (Up to 35 years)	26	34.70
2.	Middle (Above 35 to 45 years)	19	25.30
3.	Old (More than 45 years)	30	40.00
II)	**Gender**		
1.	Male	43	57.30
2.	Female	32	42.70
III)	**Educational status**		
1.	Illiterate	15	20.00
2.	Functionally literate	5	6.70
3.	Primary education	4	5.30
4.	Middle education	18	24.00
5.	Secondary education	24	32.00
6.	Collegiate education	9	12.00
IV)	**Occupational status**		
1.	Farming alone	46	61.30
2.	Farming + Wage earner	16	21.30
3.	Farming + Business	8	10.70
4.	Farming + Services	5	6.70
V)	**Annual income**		
1.	Up to ₹ 1,00,000	30	40.00
2.	₹ 1,00,001 to ₹ 2,00,000	38	50.70
3.	₹ 2,00,001 to ₹ 3,00,000	7	9.30
VI)	**Family type**		
1.	Joint family	34	45.30
2.	Nuclear family	41	54.70
VII)	**Family size**		
1.	Upto 3 members	5	6.70
2.	4-5 members	36	48.00
3.	More than 5 members	34	45.30

From the Table 1, it could be inferred that less than half of the rural consumers were(delete) belonged to old age category (40.00%) and secondary education category (32.00%). From the findings, it is elucidated that more than half of the respondents were male (57.30%) and their occupation were farming (61.30%). Slightly more than half of the respondents were belonged to ₹ 1,00,001 to ₹ 2,00,000 annual income category (50.70%) and nuclear family

category (54.70%). Less than half (48.00) of the rural consumers had four to five members in their family (Observation: oldage men as sample was not mentioned and 45 years cannot be taken as old age)

2.2. Awareness and utilization of millets and its-value added products among rural consumers

Rural consumers were well aware about types of millets (98.30%). Majority of the respondents (93.30%) had utilized pearl millet followed by finger millet (89.30%), sorghum (85.30%), kodo millet (77.30%), barnyard millet (72.00%), foxtail millet (69.30%), little millet (64.00%) and proso millet (58.70%).

Table 2. Awareness and utilization of millets – Ready to Eat products

S.No.	Value-Added Products of Millets	Rural consumers			
		Aware		Utilized	
		Number (n=75)	Per cent	Number (n=75)	Per cent
I	**Ready to Eat**				
1.	Millet murukku	75	100.00	67	89.30
2.	Millet Chips	45	60.00	38	50.70
3.	Millet laddu	70	93.30	56	74.70
4.	Millet puffs	13	17.30	6	8.00
5.	Millet energy bars	5	6.70	4	5.30
6.	Millet muesli	4	5.30	3	4.00
7.	Millet ice cream	39	52.00	12	16.00
8.	Millet chocolate	50	66.70	35	46.70
9.	Millet pakoda	63	84.00	52	69.30
10.	Millet mixture	65	86.70	49	65.30
11.	Millet thattuvada	60	80.00	55	73.30
12.	Millet kali	75	100.00	75	100.00
13.	Millet soup sticks	5	6.70	3	4.00
14.	Roasted millets	67	89.30	40	53.30
15.	Puffed millets	65	86.70	16	21.30

(why present same data through both the means?????)

Figure 1. Awareness and utilization of millets – Ready to Eat products

Put the fig title below the fig.

From the Table 2 and Figure 1, It is observed that Cent per cent of the rural consumers (100.00%) were aware about millet murukku and millet kali followed by millet laddu (93.30%), roasted millets (89.30%), puffed millets (86.70%), millet mixture (86.70%), millet pakoda (84.00%), millet thattuvada (80.00%), millet chocolate (66.70%), millet chips (60.00%), millet ice cream (52.00%), millet puffs (17.30%), millet soup sticks (6.70%), millet energy bars (6.70%) and millet muesli (5.30%). It could be inferred that cent per cent of the respondents (100.00%) had utilized millet kali followed by millet murukku (89.30%), millet laddu (74.70%), millet thattuvada (73.30%), millet pakoda (69.30%), millet mixture (65.30%), roasted millets (53.30%), millet chips (50.70%), millet chocolate (46.70%), puffed millets (21.30%), millet ice cream (16.00%), millet puffs (8.00%), millet energy bars (5.30%), millet soup sticks (4.00%) and millet muesli (4.00%).

Table 3. Awareness and utilization of millets – Ready to Cook products

Il	Ready to cook	Aware		Utilized	
		Number (n=75)	Per cent	Number (n=75)	Per cent
1.	Millet papad	58	77.30	31	41.30
2.	Millet pasta	14	18.70	7	9.30
3.	Millet noodles	28	37.30	18	24.00
4.	Millet Poha flakes	53	70.70	26	34.70
5.	Millet malt	11	14.70	8	10.70
6.	Millet flour	75	100.00	33	44.00
7.	Millet vermicelli	35	46.70	21	28.00

8.	Millet semolina	55	73.30	28	37.30
9.	Millet pizza base	10	13.30	2	2.70

Figure 2. Awareness and utilization of millets – Ready to Cook products

Put the title of the fig below the graphs

(why present same data through both the means?????)

Awareness and utilization of millets – Ready to Cook products were presented in the Table 3 and Figure 2. It is elucidated that cent per cent of the respondents (100.00%) were aware about millet flour followed by millet papad (77.30%), millet semolina (73.30%), millet poha flakes (70.70%), millet vermicelli (46.70%), millet noodles (37.30%), millet pasta (18.70%), millet malt (14.70%) and millets pizza base (13.30%). It is found that less than half (44.00%)of the rural consumers had utilized millet flour followed bymillet papad (41.30%), millet semolina (37.30%), millet poha flakes (34.70%), millet vermicelli (28.00%), millet noodles (24.00%), millet malt (10.70%), millet pasta (9.30%) and millet pizza base (2.70%).

Table 4. Awareness and utilization of millets – Instant mixes

III	Millet instant mixes	Aware		Utilized	
		Number (n=75)	Per cent	Number (n=75)	Per cent
1.	Millet idly & dosa batter	64	85.30	14	18.70
2.	Millet upma mix	58	77.30	11	14.70
3.	Millet pongal mix	62	82.70	6	8.00
4.	Millet laddu mix	57	76.00	8	10.70
5.	Millet Khichdi mix	32	42.70	11	14.70
6.	Millet idiyappam mix	55	73.30	19	25.30
7.	Millet paniyaram mix	39	52.00	6	8.00

8.	Millet rava idly & dosa mix	38	50.70	13	17.30
9.	Millet bisibele bath mix	14	18.70	3	4.00
10.	Millet Porridge mix	47	62.70	39	52.00
11.	Millet health mix	52	69.30	35	46.70
12.	Millet soup mix	24	32.00	4	5.30

The findings on millet instant mixes were illustrated in the Figure 3. It could be inferred from the Table 4 that majority (85.30%) of the rural consumers were about millet idly & dosa
The findings on millet instant mixes were illustrated in the Figure 3. It could be inferred from the Table 4 that majority (85.30%) of the rural consumers were about millet idly & dosabatter followed by millet Pongal mix (82.70%), millet upma mix (77.30%), millet laddu mix (76.00%), millet idiyappam mix (73.30%), millet health mix (69.30%), millet porridge mix (62.70%), millet paniyaram mix (52.00%), millet rava idly dosa batter (50.70%), millet khichdi mix (42.70%), millet bisibele bath mix (18.70%) and millet soup mix (32.00%). It is elucidated from the Table 3 that more than half (52.00%) of the rural consumers had utilized millet porridge mix followed by millet health mix (46.70%), millet idiyappam mix (25.30%), millet idly dosa batter (18.70%), millet rava idly & dosa mix (17.30%), millet upma mix (14.70%)

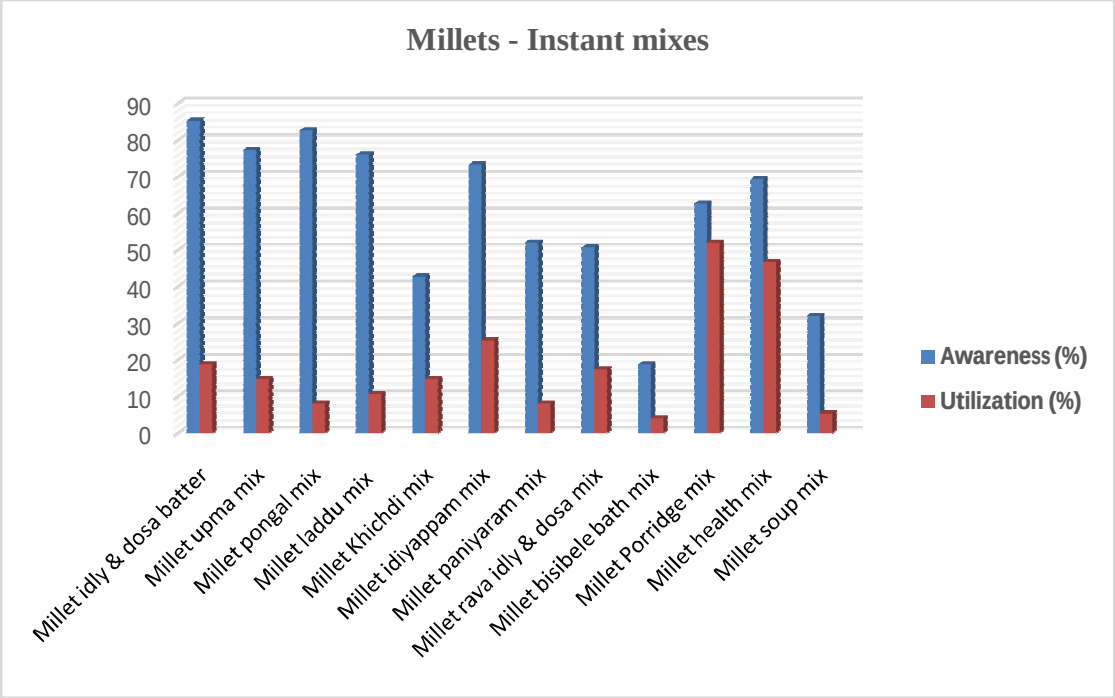
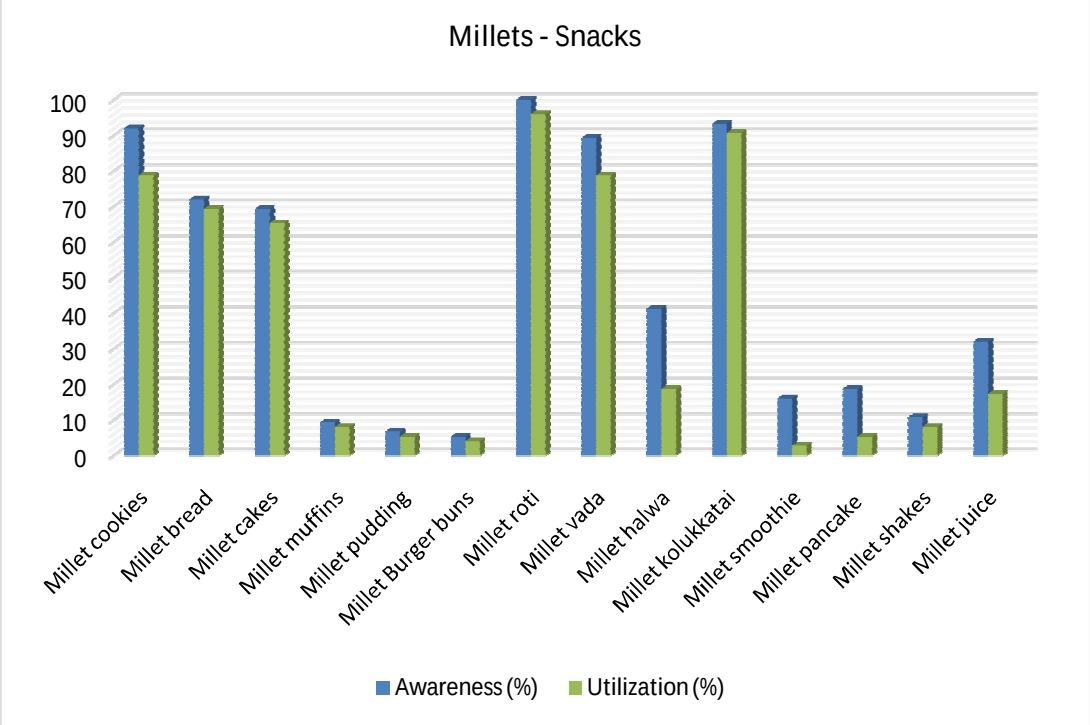


Table 5. Awareness and utilization of millets – Snacks

IV	Snacks	Aware		Utilized	
		Number (n=75)	Per cent	Number (n=75)	Per cent
1.	Millet cookies	69	92.00	59	78.70
2.	Millet bread	54	72.00	52	69.30
3.	Millet cakes	52	69.30	49	65.30
4.	Millet muffins	7	9.30	6	8.00
5.	Millet pudding	5	6.70	4	5.30
6.	Millet Burger buns	4	5.30	3	4.00
7.	Millet roti	75	100.00	72	96.00
8.	Millet vada	67	89.30	59	78.70
9.	Millet halwa	31	41.30	14	18.70
10.	Millet kolukkatai	70	93.30	68	90.70
11.	Millet smoothie	12	16.00	2	2.70
12.	Millet pancake	14	18.70	4	5.30
13.	Millet shakes	8	10.70	6	8.00
14.	Millet juice	24	32.00	13	17.30

Figure 4. Awareness and utilization of millets – Snacks



From the Table 5 and Figure 4, It is found that cent per cent (100.00%) of the rural consumers were aware about millet roti followed by millet kolukkatai (93.30%), millet cookies (92.00%), millet vada (89.30%), millet bread (72.00), millet cakes (69.30%), millet halwa (41.30%), millet juice (32.00%), millet pancake (18.70%), millet smoothie (16.00%), millet shakes (10.70%), millet muffins (9.30%) and millet pudding (6.70%), millet burger buns (5.30%). It could be inferred that Majority (96.00%) of the rural consumers had utilized millet as roti followed by millet kolukkatai (90.70%), millet vada (78.70%), millet cookies (78.70%), millet bread (69.30%), millet cakes (65.30%), millet halwa (18.70%), millet juice (17.30%), millet muffins (8.00%), millet shakes (8.00%), millet pancake (5.30%), millet pudding (5.30%), millet burger buns (4.00%) and millet smoothie (2.70%).

In rural areas, consumers bought raw millets or consumers used millets produced in their own field. Then, they do millet processing, which involves milling, roasting, and grinding the millets to get millet flour. Millet flour was utilized to make various dishes such as millet dosa, idiyappam, porridge, and kali. That's why most of the millets' value-added products were not utilized by them.

2.3. Relationship of profile with awareness and utilization of millets and its value-added products among rural consumers.

Table 6. Relationship of profile with awareness of millets and its value-added products among rural consumers.

Variable Number	Variable	Rural consumers (n=75)			
		r value	Regression co-efficient	t value	P value
X_1	Age	0.492**	-0.182NS	-1.603	0.114
X_2	Gender	0.176NS	0.063NS	0.754	0.454
X_3	Educational status	0.382**	0.012NS	0.104	0.918
X_4	Occupational status	0.301**	0.070*	0.801	0.037
X_5	Land holding	0.280*	0.241**	2.837	0.006
X_6	Annual income	0.351**	0.340**	3.591	0.001
X_7	Family type	0.039*	0.207**	2.672	0.010
X_8	Family size	0.350**	0.270**	3.320	0.002
X_9	Period of consumption of millets	0.062*	0.072*	0.874	0.046
X_{10}	Information source utilization	0.721**	0.306**	2.925	0.005
X_{11}	Decision making pattern	-0.165NS	-0.014NS	-0.180	0.858
X_{12}	Social participation	0.242*	-0.107NS	-1.343	0.184
X_{13}	Scientific orientation	0.296*	0.024NS	0.175	0.862
X_{14}	Innovativeness	0.084NS	0.120NS	1.470	0.147
X_{15}	Trainings undergone	-0.005NS	-0.046NS	-0.574	0.568
X_{16}	Attitude towards millets and its value- added products	0.325**	-0.161NS	-1.245	0.218

R^2 value = 0.726 F value = 9.598** - *Significant at one per cent level*
* - *Significant at five per cent level* *NS - Non-Significant*

It could be seen from Table 6 that variables such as age, educational status, occupational status, annual income, family size, information source utilization, attitude towards millets and its value-added products had shown significance and positive relationship with awareness at one per cent level of significance. The variables such as land holding, family type, period of consumption of millets, social participation, scientific orientation had shown significant and positive association with awareness at five per cent level of significance.

The R^2 value 0.726 revealed that 72.60 per cent of the variation in the awareness level were described by the 16 independent variables selected for the study. F value was significant at one per cent level of significance. It can be inferred that regression coefficients of land holding, annual income, family type, family size and information source utilization were positively related to awareness at one per cent level of significance. Regression coefficients of occupation and period of consumption of millets were positively associated with awareness at five per cent level of significance.

Information source utilization plays an important role in enhancing the awareness of millets and its value-added products. This might be a reason for the positive and significant association between information source utilization and awareness. Age, education, family type, family size, social participation, scientific orientation could be responsible for increasing

the awareness of millets and its value-added products. Majority of the rural consumers is possessing farm land, doing farming as their sole profession and consuming millets for prolonged period could be reason for positive and significant association between land holding, occupational status, period of consumption of millets and awareness of millets and its value-added products.

Table 7. Relationship of profile with utilization of millets and its value-added products among rural consumers

Variable Number	Variable	Rural consumers (n=75)			
		r value	Regression co-efficient	t value	P value
X_1	Age	0.435^{**}	0.177^{*}	1.204	0.020
X_2	Gender	0.221^{NS}	0.254^{NS}	2.396	0.234
X_3	Educational status	0.383^{**}	0.063^{NS}	0.410	0.683
X_4	Occupational status	0.264^{*}	0.033^{**}	0.290	0.005
X_5	Land holding	0.053^{*}	0.004^{*}	0.035	0.032
X_6	Annual income	0.397^{**}	0.171^{*}	1.387	0.021
X_7	Family type	0.036^{NS}	0.118^{NS}	1.175	0.245
X_8	Family size	0.090^{NS}	0.047^{NS}	0.445	0.658
X_9	Period of consumption of millets	0.279^{*}	0.300^{**}	2.801	0.007
X_{10}	Information source utilization	0.426^{**}	0.266^{*}	1.953	0.049
X_{11}	Decision making pattern	0.001^{NS}	0.043^{NS}	0.423	0.674
X_{12}	Social participation	0.242^{*}	-0.289^{NS}	-2.788	0.549
X_{13}	Scientific orientation	0.018^{NS}	0.137^{NS}	0.800	0.427
X_{14}	Innovativeness	0.042^{NS}	-0.035^{NS}	-0.324	0.747
X_{15}	Trainings undergone	0.196^{NS}	-0.271^{NS}	-2.602	0.012
X_{16}	Attitude towards millets and its value- added products	0.016^{**}	0.120^{NS}	0.716	0.477

R^2 value = 0.518 F value = 3.980** ** *- Significant at one per cent level*
* *- Significant at five per cent level* *NS - Non-Significant*

It could be seen from Table 7, variables such as age, educational status, annual income, information source utilization, attitude towards millets and its value-added products had shown significance and positive relationship with utilization level at one per cent level of significance. The variables such as occupational status, land holding, period of consumption of millets, social participation had shown significant and positive association with utilization at five per cent level of significance.

The R^2 value 0.518 revealed that 51.80 per cent of the variation in the utilization level were elucidated by the 16 independent variables selected for the study. F value was significant at one per cent level of significance. It can be inferred that regression coefficients of occupation and period of consumption of millets were positively related to utilization at one per cent level of significance. Regression coefficients of age, land holding, annual income and information source utilization were positively associated with utilization at five per cent level of significance.

If age increases, the chance of getting illness will increase. Millets and its value-added products will be utilized because of its health benefits. This might be a reason for positive and significant association between age and utilization of millets and its value-added products. Education, occupational status, land holding, annual income, period of consumption of millets, social participation of the rural consumers had increased the utilization of millets and its value-added products. This could be a reason for positive and significant association between these variables and utilization of millets and its value-added products. Various information sources like mass media, social media, educational and governmental institutions had escalated the attitude towards millets and its value-added products. This could be a reason for a positive and significant association between information source utilization, attitude and utilization of millets and its value-added products.

(There is no discussion part in the paper)

4. CONCLUSION

Millets are also called by the name of miracle of grains due to their nutritional and health benefits. we can broaden our dietary options by utilizing the versatility nature of millets. Most of the rural consumers were aware and utilized millets as roti, kali, porridge, idiyappam and as sweets and savouries. Age, education, occupation, land holding, annual income, period of consumption of millets, information source utilization, social participation, attitude towards millets and its value-added products had shown positive and significant relationship with awareness and utilization of millets and its value-added products. The R^2 square value of millet awareness and utilization of millets and its value-added products were between 0.5 to 0.7 shown that strong relationship between variables in this study. Age, occupation and annual income were the most influencing variable in consumer's awareness and utilization of millets and its value-added products in rural areas. Awareness campaigns, demonstrations and trainings, government subsidies will increase the millet cultivation and utilization among rural consumers.

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