



International Journal of Environment and Climate Change

12(11): 2214-2220, 2022; Article no.IJECC.90925

ISSN: 2581-8627

(Past name: British Journal of Environment & Climate Change, Past ISSN: 2231-4784)

Consumer Preferences for the Products of Minor Millets in Tumakuru District of Karnataka, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJECC/2022/v12i1131215

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/90925>

Original Research Article

Received 24 June 2022
Accepted 29 August 2022
Published 08 September 2022

ABSTRACT

The study was carried out in Tumakuru District of Karnataka, India during 2021-2022 to examine the consumer preferences for the products of Minor millets. Sample consumers were categorized into urban and rural consumer and data was enumerated from a total sample of 40 consumers comprising of 20 urban and 20 rural consumers. Finger millet was the most consumed among the urban consumers with 3.5 kg per month followed by foxtail millet 2.5 kg per month and little millet 2.0 kg per month, while the urban consumers were equally consuming other millets. The monthly household food expenditure among urban consumers, expenses made on groceries (38.03 percent), vegetables (13.79 percent) and millets (13.65 percent). The total food expenses made by urban consumers were Rs. 5404 of which 13.65 percent was made on millets which amounted to Rs. 745. Rural consumers were Rs.3906 which was less than urban consumers (Rs.5404). For each respondent, part-worth were estimated using OLS regression analysis, rural consumers also found price to be the most significant attributes accounting 40.74 percent of relative importance, gaining awareness among consumers in consumption of millets for nutritional value and health benefits is improving progressively.

Keywords: *Minor millets; consumer preferences; conjoint analysis; percentages.*

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1. INTRODUCTION

Millets are ancient grains and rich source of nutrition. India is one of the world's largest producers as well as consumer of millets. Ninety-seven percent of millets production comes from African and Asian countries. Millets are a group of small-seeded grasses, widely grown around the world as cereal crops or grains for human consumption and also as fodder for livestock. There is evidence of the cultivation of millets in the Korean Peninsula dating to the Middle Jeulmun Pottery Period (around 3,500–2,000BC). In India, millets have been mentioned in oldest Yajurveda texts, identifying barnyard millet (aanava), foxtail millet (priyangava) and black finger millet (shyaamaka), thus indicating that millets consumption was very common practice, pre-dating to the (4500 BC) Bronze Age in India. Even until 50 years ago millets were the major grains grown in India.

Increasing interest in reviving the millets consumption across various countries is favoring the growth prospects of the market in recent years. Many initiatives are being undertaken towards increasing millet cultivation and consumption to reduce health risks [1,2]. Millets contains calcium, iron and fibers which help to fortify essential nutrients for the healthy growth in children. The usage of millets in infant food and nutrition products is increasing, and any manufacturers are expanding their business. In terms of nutritional property, they are superior to certain highly consumed cereals such as rice and wheat [3]. Increasing unsustainable nature of rice and wheat production which are water intensive and likely to be sustainable, as fresh water resources are depleting around the globe. Millet grows easily in dry climates, have smaller harvesting period, and require minimal water quantity [4,5]. High prices for the products in comparison with largely consumed grains are acting as a hindrance for penetration in urban food market. Therefore, growing awareness amongst population regarding health benefits associated with millets consumption will boost industry growth by 2025 [6].

1.1 Millet Scenario

India is the largest producers of all kinds of millets in the world, which are often referred to as coarse cereals. Apart from India, Sudan, Nigeria, China, Ethiopia, Mali, Burkina Faso, Senegal Chad are the leading millet producers in the world. During 2016- 2017, India had 0.62 million

hectare area under small millets with a production 0.44 million tons and yield of around 714 kg per ha [7]. The minor millets area has decreased at the rate of 4.50 percent per annum and production have decreased at the rate of 3.64 percent per annum from 1966 to2016.

Karnataka has the second largest rainfed area after Rajasthan and highest proportion of drought prone area. The Government of Karnataka is supporting small millets cultivation massively by conducting millet melas and increasing area under millets through Sahaja Samrudhi scheme and Savayavabhumi programme [8,9]. Thus, there is a wide scope for producing millets in Karnataka. In 2016, the area under small millets was 21000 hectares with production of 7000 tons and productivity of 333 kg per ha. There is a drastic decline in the area of millets in Karnataka. In case of foxtail millet, little millet and other millets area decreased by 11.78 percent, 10.59 percent and 11.30 percent per annum, respectively. Similar results were observed in small millet production also, which decreased at the rate of 12.45 percent, 12.43 percent and 13.40 percent per annum, respectively. Millet grains offer opportunities for value added products and diversified utilization which create income enhancement opportunities for the farmers. With this background the objective has been framed mainly to examine the consumer preferences for the products of minor millets.

2. METHODOLOGY

2.1 Study Area

The study was conducted in Tumkur district of Karnataka state as the district ranks first in area and production of millet crop. Keeping this in view, Tumkur district was purposively selected to conduct the research study. Considering maximum area under millet cultivation as criteria, the four taluks viz., Chiknayakanhalli, Tiptur, Sira and Pavagada district were selected to conduct research study.

2.2 Selection of Respondents

Consumer's data related to millets consumption were collected from 40 respondents of Tumkur district using random sampling method. Among 40 respondents, 20 were from rural areas producing millet while remaining 20 respondents were from urban area of the selected district. Rural respondents were surveyed from Tiptur, Chikkanayakanahalli, Sira and Pavagada while

urban respondents were also surveyed from Tiptur, Chikkanayakanahalli, Sira and Pavagada where lot of millet based products processing; value addition and marketing are carried out.

2.3 Research Design

- Conjoint analysis was adopted for the study

The data was tabulated, coded and analyzed using IBM SPSS statistical software. The dependent variable willingness to pay (WTP) was regressed on selected explanatory variables to identify explanatory variables which highly influence the producers and consumers WTP for new variety. The logistic regression coefficient (β_i) can be used to estimate adjusted odds ratios for each of the independent variables in the model. Descriptive analysis was employed to compile the socio-economic status, cost and returns of minor millet cultivation, labour use pattern and marketed surplus.

3. RESULTS AND DISCUSSION

3.1 Socio Economic Profile of Rural and Urban Consumers

The Socio-economic characteristics of sample consumers are presented in Table 1. The sample consumers are categorized into urban consumers and rural consumers. Data was enumerated from a total sample of 40 consumers comprising of 20 urban and 20 rural consumers. Majority of the urban consumers were middle aged between 35 to 55 years while it was 62.50 percent among the rural consumers. It was interesting to note that, majority (95.00 percent) of the millet consumers were literates in both urban and rural areas. The average family size was five members for urban and eight for rural consumers.

3.2 Monthly Average Consumption of Millets by Urban and Rural Consumers

The monthly average consumption of millets among the urban and rural consumers were studied and indicated in Table 2. The millets such as foxtail millet, little millet, finger millet, kodo millet, brown top millet and barnyard millet were the different millets consumed. Finger millet was the most consumed among the urban consumers with 3.5 kg per month followed by foxtail millet 2.5 kg per month and little millet 2.0 kg per month, while other millets are equally

being consumed by the urban consumers. On the other hand, rural consumers consume more quantity of finger millet i.e., 5.5 kg per month followed by foxtail millet 04 kg per month, while little millet also having demand and monthly average consumption of little millet among rural people is 03 kg per month. In value terms kodo millet and brown top millet (Rs.150 & Rs. 95per kg) was priced high for urban consumers. The price of millets is low in rural areas since they use millets which are produced by them. Thus, it can be observed from the Table 2 that urban consumers consumed wide varieties of millets when compared to rural consumers even at a higher price. Rural consumers depended more on millets produced on their own field. Here, urban consumers had taken alone a share in consumption of millets due to its nutritional and health awareness (95.00 percent) whereas in rural consumers, they consume millets because of traditional staple food (90.00 percent) followed by own production (80.00 percent).

3.3 Consumption Pattern of Millet Products among Consumers

Consumption pattern of consumers for millet products are discussed in Table 3. Millet rice items such as palav, colored rice, malt, upma, sweets made out of millets baked products and snacks were the different millet products consumed by both urban and rural consumers. Rice items were consumed on a daily basis by all the consumers while upma was the next form of the millet consumption by both rural (65.00 percent) and urban (55.00 percent) consumers on a weekly basis most of the other products were purchased from retail outlets and hence the rural consumers did not have access to such products and urban consumers occasionally consumed such products.

3.4 Reasons Influencing for the Purchase of Minor Millets for Consumption

It was noticed from the Table 4 that the major factors considered by the urban consumers while purchasing minor millets were as nutritional and health benefits (95.00 percent) followed by doctor's advice (55.00 percent) delicious taste in nature (30.00 percent) and suggestions from friends and relatives (25.00 percent). Similarly for rural consumers were expressed as traditional staple food (90.00 percent) followed by own production (80.00 percent) that is produced by household itself and nutritional value and health

Table 1. Socio economic profile of Rural and Urban consumers

Sl. No	Particulars	Urban consumers (n=20)		Rural consumers (n=20)		Pooled (n=40)	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
I	Age						
A	Young age (<35 years)	01	5.00	06	30.00	07	17.50
B	Middle age (35-55 years)	14	70.00	11	55.00	25	62.50
C	Old age (>55 years)	05	25.00	03	15.00	08	20.00
Total		20	100.00	20	100.00	40	100.00
II	Education level						
A	Illiterate	-	-	02	10.00	02	5.00
B	Primary	-	-	12	60.00	12	30.00
C	High school	01	5.00	04	20.00	05	12.50
D	Pre-University	06	30.00	01	05.00	07	17.50
E	Degree	04	20.00	01	05.00	05	12.50
F	Post Graduation	09	45.00	-	-	09	22.50
Total		20	100.00	20	100.00	40	100.00
III	Average family size						
A	Men	2.00	40.00	3.00	37.50	2.50	38.00
B	Women	1.00	20.00	2.00	25.00	1.50	23.00
C	Children	2.00	40.00	3.00	37.50	2.50	38.00
Total		5.00	100.00	8.00	100	6.50	100.00
IV	Average family annual income		788620	35440		412030	

Table 2. Monthly average consumption of millets by Urban and Rural consumers

Sl. No	Millets	Urban consumers (n=20)			Rural consumers (n=20)		
		Quantity (kg)	Price/kg	Value(Rs.)	Quantity (kg)	Price/kg	Value(Rs.)
1	Foxtail millet	2.5	58.00	145	04	45	180.00
2	Little millet	2.00	85.00	170	03	50	150.00
3	Finger millet	3.5	35.00	122.5	5.5	25	137.5
4	Kodo millet	1.0	150.00	150	0.75	80	60.00
5	Browntop millet	1.5	95.00	142.5	0.5	60	30.00
6	Barnyard millet	0.5	75.00	37.5	-	-	-

Table 3. Consumption pattern of millet products among Urban and Rural consumers

Sl. No.	Millet Products	Urban consumers (n=20)			Rural consumers (n=20)		
		Numbers	Percent	Frequency of Consumption	Numbers	Percent	Frequency of Consumption
1	Millet Rice items	20	100.00	Daily	20	10.00	Daily
2	Malt	09	45.00	Weekly	08	40.00	Weekly
3	Upma	11	55.00	Weekly	13	65.00	Weekly
4	Idli/dosa	08	40.00	Weekly	07	35.00	Weekly
5	Sweets	05	25.00	Weekly	-	-	Weekly
6	Baked products	04	20.00	Occasionally	-	-	Weekly
7	Snacks	03	15.00	Occasionally	02	10.00	Occasionally

benefits (65.00 percent). Urban Consumers bought these products along with the monthly grocery in retail stores or they purchase it whenever they felt to consume these millet products. In case of the rural consumers household itself acts as a producer since majority of the rural respondents consumed as traditional staple food. Nutritional content was major factor for urban consumers which was influencing the purchase as most of the consumers were educated and having health consciousness as well as were aware about the nutritional benefits.

3.5 Preferences for the Products of Minor Millet among Rural and Urban Consumers

The important attributes of millet that determine consumer preferences in urban and rural area were taste, colour, aroma, nutrition quality, size of grain, price, texture, taste and acceptability. For each respondent, the parts-worth's were estimated using Ordinary Least Squares (OLS) regression analysis. The relative importance of the part-worth functions was compared across different attributes within segments to arrive at each attribute's relative importance of. Average part-worth's and the relative importance of the attributes for urban and rural area are presented in Table 5. Among all the attributes of millets studied for urban consumers, price was found to be the most important and first consideration for consumers, accounting for 32.22 percent of relative importance with low price having the utility of -7.44. Nutritional quality strongly influenced consumer's preference after price in urban area accounting for 17.03 percent with further improve having the utility 10.44. The individual utilities for small, medium and bold size grain (13.09 percent preference) were -6.63, -9.51 and -8.65 respectively. Texture formed the fifth most important factor having a relative importance of 8.38 percent, with soft one having the utility of 1.22. Aroma had the least important

attribute accounting 4.80 percent of relative importance. In general, consumption of millet in urban areas was relatively lower, compared to rural areas may be due to availability of other food substitutes. Likewise, rural consumers also found price to be the most important attribute accounting 40.74 percent of relative importance, with low price having the utility of 9.86. Color had more influence on consumer's preference after price among rural consumers with a relative importance of 25.24 percent with 'white' having the utility of 6.7. Taste was the third most important factor influencing consumer's preference after nutritional quality, accounting 9.7 percent of relative importance, with sweet having the utility of 5.01. While, size of grain was less important attribute with relative importance at 3.06 percent. Acceptability was also least preferred attribute even by rural consumers also (3.90 percent). Additive model was fit to the individual data and in case of urban consumers, Pearson's rank correlation value with 0.878 was significant at 5 percent level, similarly, the Kendall's correlation value with 0.617 was also found to be significant at 5 percent level. Similar pattern of correlations Pearson's rank (0.809) and Kendall's rank (0.617) were observed at 5 percent level of significance for rural consumers (Table 5). Thus it gives strong confidence in the suitability of the additive model. The urban and rural consumers would prefer reduction in price of millets rather than taste and aroma because the price of millets was very high compared to other cereals in the market. Consumers were aware of nutritional aspects and expressed to improve further and to reduce sweetness in millets because it was mainly consumed by diabetic patients, people with obesity and health conscious. Colour was also one of the most preferred attribute in which most them preferred yellow/white because polishing of millets would lead to loss of nutritional value. Consumers also preferred non-scented bold seed for consumption. These results show there is a scope for development of crops.

Table 4. Reasons influencing for the purchase of minor millets for consumption

Sl. No.	Particulars	Urban consumers (n=20)		Rural consumers (n=20)	
		Numbers	Percent	Numbers	Percent
1	Delicious taste	06	30.00	-	-
2	Nutritional and health conscious	19	95.00	13	65.00
3	Suggested by friends and relatives	05	25.00	-	-
4	Own production	-	-	16	80.00
5	Traditional staple food	-	-	18	90.00
6	Advice from doctors	11	55.00	-	-

Table 5. Consumer preferences for the products of minor millet (n=40)

Sl. No.	Attributes	Attribute levels	Urban consumers (n=20)		Rural consumers (n=20)	
			Utility	Relative importance (%)	Utility	Relative importance (%)
1	Price	Low	-7.44	32.22	9.86	40.74
		High	-3.72		19.73	
2	Color	White	-2.74	13.55	6.7	25.24
		Yellow	-3.49		7.7	
		Black	-2.74		3.1	
3	Size of grain	Small	-6.63	13.09	-0.33	3.06
		Medium	-9.51		-0.65	
		Bold	-8.65		-0.98	
4	Aroma	Natural	-0.36	4.80	-0.26	5.76
		Scented	-0.72		-0.53	
5	Nutritional quality	Maintain same	5.22	17.03	1.5	5.75
		Further improve	10.44		3.0	
6	Texture	Soft	1.22	8.38	-0.47	5.74
		soggy	2.45		-0.94	
		fluffy	3.67		-1.4	
7	Taste	Pungency	-0.40	4.92	2.50	9.7
		Sweet	-0.81		5.01	
8	Acceptability	Acceptable	-0.66	5.98	-0.97	3.9
		Not acceptable	-1.32		-1.95	
Total			50.57	100	-26.23	100
Correlations			Values		Values	
Pearson's rank correlation			0.878		0.809	
Kendall's rank correlation			0.617		0.617	

Note: Significant at 5 percent level

4. CONCLUSION

Majority of the urban consumers were middle aged between 35 to 55 years, while 62.50 percent among the rural consumers. It was instructing to notice that most of the millet consumers were literates. Though the prices of millets are high but Urban consumers consumed more types of millets than rural consumers. Whereas, rural consumers depended more and more on locally available or millets produced on their own field. Major share of the expenditure by both urban and rural consumers was on groceries. The share of millets in culinary of urban consumers was 13.65 percent, and that of rural consumers was 14.21 percent. Minor millets are neglected in terms of support for both production and promotion, compared to other crops. Since Tumakuru is leading producer of minor millets (little millet, finger millet, foxtail millet, kodo millet) and now area under barnyard millet (*korale*) is also increasing in the study area. There is opportunity for the economic improvement of millets production, value addition and marketing have done in the area pertained for study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
<https://www.sdiarticle5.com/review-history/90925>