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A comparative study of millet awareness among urban women of Ludhiana and SAS Nagar, districts of Punjab

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Abstract
Millets are nutrient-rich and climate resilient cereals with significant potential to address health and sustainability challenges. This study compared the awareness of millets among urban women in Ludhiana and SAS Nagar, districts of Punjab. A total of 100 respondents, 50 respondents from Ludhiana and 50 respondents from SAS Nagar were selected using random sampling. Data were collected through structured interview schedule and analyzed using SPSS. The results indicated moderate awareness of commonly known millets such as Pearl Millet (with mean score of 3.00), Sorghum (2.82), Barnyard Millet (2.73) and Finger Millet (2.72), while awareness regarding nutritive, health and environmental benefits was generally low in both the districts. No significant district wise differences were observed in most awareness parameters, except for culinary uses, where SAS Nagar respondents showed significantly higher awareness. The study highlights the need for targeted awareness and culinary interventions to promote higher awareness among masses.

Keywords: Millets, awareness, urban women, Ludhiana, SAS Nagar

Introduction
Millets are small-seeded grains in the Poaceae family which are amongst the first cereals to be cultivated. Millets are known as "nutricereals" for their high nutritional value. Millets are also considered as *"Smart Food"* because they are highly nutritious and help address major nutritional challenges. They serve as excellent sources of essential nutrients and each type of millet offers its own unique health benefits (Mounika *et al.*, 2023) [8]. Millets are grouped into two categories: major and minor millets. Major millets include pearl millet, finger millet and sorghum**,** while the minor millets consist of proso, foxtail, little, barnyard and kodo millet (Bommy and Maheswari 2016) [2]. Millets are rich in antioxidants and help combat the growing prevalence of diabetes and heart disease in India (ICRISAT, 2016) [4].
Millet is one of the oldest cultivated grains, historically forming a key part of the Indian diet. Over time, however, changes in farming methods and food preferences have led to a shift toward highly refined grains, causing millet consumption to decline significantly. Recently, after the onset of the pandemic, people were become more health conscious and had renewed their interest in ancient grains, especially millet, due to its high protein content, complex carbohydrates, fibre rich, and naturally gluten-free nature (Shirahatti *et al.*, 2023) [9].
The Indian government has introduced several measures to promote millets after recognizing their value for nutrition, food security, and small farmers' incomes. Under the National Food Security Act (2013), millets were included in the midday meal scheme and the Public Distribution System, boosting their consumption (Mittal & Aggarwal 2019) [7]. In 2018, the government launched the National Year of Millets to increase millet production, awareness, and market opportunities while highlighting their health and nutritional benefits. The UN General Assembly later declared 2023 as the International Year of Millets (IYOM), and India celebrated it by promoting millet-based foods, recipes, and value-added products globally (Kankarwal *et al.* 2023) [5]. Institutions such as KVKs and various incubation and processing centres also help shape consumer purchasing behaviour toward millets (Srilatha 2014) [11].

With their rich nutritional profile, cultural significance, and environmental resilience, millets are poised to reclaim their place in modern diets. By keeping this in mind, the present study was conducted to assess and compare the awareness of various aspects related to millets among urban women in Ludhiana and SAS Nagar districts of Punjab.

Methodology

The present study was conducted to assess the awareness of millets among urban households of Punjab. The survey was conducted in two districts of Punjab, Ludhiana and SAS Nagar. These two districts were selected for the study because both are Tier II cities and both districts belong to Malwa region of Punjab. The selection of these two districts was intended to facilitate a comparative analysis of awareness of millets among urban women. A total of 100 urban women respondents were selected, with 50 respondents from Ludhiana and 50 respondents from SAS Nagar. The respondents were selected using a random sampling technique. Data were collected using a structured interview schedule that included questions on socio-personal characteristics of respondents, awareness of different types of millets, nutritive and health benefits of millets. Data were gathered through personal interviews. The collected data were coded and analysed using SPSS. Ethical considerations were maintained throughout the study and the confidentiality of the respondents were strictly ensured.

Results and Discussion

Table 1: Extent of Awareness among respondents about different types of millets (n = 100)

Awareness about types of millets	Mean		
	Ludhiana ($n_1 = 50$)	SAS Nagar ($n_2 = 50$)	Total ($n = 100$)
Pearl Millet (*Bajra*)	3.00	3.00	3.00
Sorghum Millet (*Jowar*)	2.88	2.76	2.82
Barnyard Millet (*Swank*)	2.64	2.82	2.73
Finger Millet (*Ragi*)	2.74	2.70	2.72
Kodo Millet (*Kodra*)	1.56	1.78	1.64
Foxtail Millet (*Kangni*)	1.48	1.58	1.53
Little Millet (*Kutki*)	1.40	1.28	1.34
Proso Millet (*Cheena*)	1.14	1.22	1.18
Browntop Millet (*Hari Kangni*)	1.20	1.40	1.30
Overall Mean	2.04	2.05	2.02

Score range: 1-3, 1: Not Aware, 2: Somewhat Aware, 3: Aware

The data in table 1 revealed that for Pearl Millet (*Bajra*), the mean awareness scores were highest across Ludhiana and SAS Nagar both at 3.00, indicating awareness among all of the respondents. Among the other commonly known millets, Sorghum Millet (*Jowar*) showed relatively lower mean awareness scores than Pearl Millet (*Bajra*), Ludhiana respondents reported a slightly higher mean at 2.88 than SAS Nagar respondents at 2.76. The total mean score for sorghum millet (2.82) indicates awareness among most of the respondents. For Barnyard Millet (*Swank*), awareness was marginally higher in SAS Nagar with mean awareness score of 2.82 compared to Ludhiana with mean awareness score of 2.64. The total mean score of 2.73 for Barnyard millet indicates that most of the respondents were aware of it. Similarly, Finger Millet (*Ragi*) showed comparable awareness in Ludhiana at 2.74 and SAS Nagar at 2.70 with a total mean of 2.72 reflecting majority of the respondents were aware of it. These findings are with those of Verma *et al.* (2023) [12], who reported greater awareness of commonly consumed millets as pearl millet and sorghum, whereas lesser known varieties like little millet and proso millet exhibited low levels of awareness.

In contrast, awareness mean score of Kodo Millet (*Kodra*) was low in both districts, SAS Nagar at 1.78 slightly more aware than Ludhiana at 1.56. The total mean awareness score for Kodo Millet (1.64) indicates less awareness among respondents across both districts. For Foxtail Millet (*Kangni*), the mean awareness scores were 1.48 for Ludhiana and 1.58 for SAS Nagar, with a total mean of 1.53, suggesting that respondents in both districts were generally not aware of this millet. In case of Little Millet (*Kutki*), Ludhiana respondents (1.40) showed marginally higher awareness than SAS Nagar respondents (1.28). The total mean of 1.34 indicates low awareness in both districts. For Browntop Millet (*Hari Kangni*), SAS Nagar respondents (1.40) were more aware than Ludhiana respondents (1.20). The total mean of 1.30 reflects poor awareness in both districts. Proso Millet (Cheena) recorded the lowest awareness scores, with means of 1.14 in Ludhiana and 1.22 in SAS Nagar. The total mean of 1.18 shows that respondents from both districts were not aware of this millet. Overall the mean awareness score was 2.04 for Ludhiana and 2.05 for SAS Nagar indicating that respondents in both districts had moderate level of awareness about different types of millets, with no noticeable difference between Ludhiana and SAS Nagar. The present findings align with those of Dhiman and Dhaliwal (2021) [2], who reported that awareness levels of millets were significantly greater among respondents in Punjab.

Table 2: Extent of Awareness among respondents about nutritive value of millets (n = 100)

Awareness about nutritive value of millets		Mean		
		Ludhiana ($n_1 = 50$)	SAS Nagar ($n_2 = 50$)	Total ($n = 100$)
Fiber		1.84	1.44	1.64
Protein		1.32	1.26	1.29
Minerals	Calcium	1.92	1.68	1.80
	Iron	1.32	1.46	1.39
	Magnesium	1.16	1.26	1.21
	Potassium	1.16	1.20	1.21
	Zinc	1.14	1.26	1.20
Vitamin B		1.40	1.34	1.37
Overall mean		1.40	1.37	1.38

Score range: 1-3, 1: Not Aware, 2: Somewhat Aware, 3: Aware

Data from table 2 shows that awareness regarding the nutritive values of millets across both districts was generally low as reflected by the awareness mean scores. Respondents from Ludhiana were slightly more aware than those from SAS Nagar for most of the nutrients but still awareness about calcium was highest in both districts, with Ludhiana reporting a higher mean score (1.92) compared to SAS Nagar (1.68), followed by fiber, where Ludhiana (1.84) again showed greater awareness than SAS Nagar (1.44). Awareness regarding iron was marginally higher in SAS Nagar (1.46) than in Ludhiana (1.32).

For other nutrients such as protein, magnesium, potassium, zinc and vitamin B, awareness levels were low in both districts with only minor differences, however, SAS Nagar respondents showed slightly higher awareness for magnesium, potassium, zinc and iron.

Overall, the mean awareness scores was marginally higher in Ludhiana (1.40) than in SAS Nagar (1.37), indicating that respondents from Ludhiana were slightly more aware. Nevertheless, the combined overall mean of 1.38 suggests that respondents from both districts were generally not aware of the nutritive value of millets. The present results align with the study conducted by Kaur *et al.* (2023) [6], which revealed that a majority of respondents had limited knowledge about specific nutritional components of millets.

Table 3: Extent of Awareness among respondents about health benefits of millets (n = 100)

Awareness about health benefits of millets	Mean		
	Ludhiana (n_1 = 50)	SAS Nagar (n_2 = 50)	Total (n = 100)
Keeps body warm	2.32	1.88	2.10
Improves digestion	1.86	1.52	1.69
Prevents constipation	1.80	1.46	1.63
Helps in weight management	1.68	1.60	1.64
Manage blood sugar level	1.48	1.52	1.50
Improves bone health	1.30	1.38	1.34
Manages blood pressure	1.28	1.24	1.26
Detoxify body	1.32	1.30	1.31
Improves heart health	1.18	1.30	1.24
Overall mean	1.58	1.46	1.52

Score range: 1-3, 1: Not Aware, 2: Somewhat Aware, 3: Aware

Awareness about health benefits of millets was moderately low among respondents in both Ludhiana and SAS Nagar. Majority of the respondents perceived that millets keep the body warm with mean scores of 2.32 in Ludhiana and 1.88 in SAS Nagar (total mean score-2.10). Moderate awareness was also observed for benefits like improving digestion (1.69) and weight management (1.64). Awareness was lowest regarding health benefits such as improving heart health (1.24), managing blood pressure (1.26) and improving bone health (1.34), indicating limited knowledge in these areas. Overall, respondents from Ludhiana with mean awareness score of 1.58 were more aware than those from SAS Nagar with mean awareness score of 1.52. These findings align with the study conducted by Singh *et al.* (2023), who reported that awareness of specific health benefits of millets varied regionally.

Table 4: Extent of Awareness among respondents about environmental benefits of millets (n = 100)

Awareness about environmental benefits of millets	Mean		
	Ludhiana (n_1 = 50)	SAS Nagar (n_2 = 50)	Total (n = 100)
Drought tolerant crop	1.86	1.36	1.61
Water efficient crop	1.66	1.32	1.49
Short growing cycle of crop	1.48	1.24	1.36
Multipurpose use (food, fodder)	1.78	1.32	1.55
Reduce greenhouse gas emission	1.20	1.22	1.21
Low carbon footprint	1.16	1.14	1.15
Biodiversity conservation	1.12	1.20	1.16
Overall mean	1.46	1.25	1.36

Score range: 1-3, 1: Not Aware, 2: Somewhat Aware, 3: Aware

Data from table 4 revealed that respondents were most aware about millets being drought tolerant crop, Ludhiana with mean score of 1.86 and SAS Nagar with mean score of 1.36 (total mean for both districts 1.61 followed by millets being water efficient crop with total mean score of 1.49 and millets having multipurpose uses as a food and fodder with total mean score of 1.55.

In contrast, awareness was lowest for benefits such as low carbon footprint (1.15), biodiversity conservation (1.16) and reducing greenhouse gas emissions (1.21), indicating poor knowledge of environmental benefits of millets.

Ludhiana respondents were consistently more aware of environmental benefits of millets with overall mean score of 1.46 than SAS Nagar with overall mean score 1.25 highlighting lower level of awareness for environmental benefits of millets in both districts.

Hussain *et al.* (2022) [3] similarly reported that millet cultivation has decreased over time largely because of a lack of awareness about the crop. Consequently, the findings indicate that the majority of respondents were unaware of the environmental benefits associated with millets.

Table 5: Extent of Awareness among respondents about culinary uses of millets (n = 100)

Culinary uses of Millets	Mean		
	Ludhiana (n_1 = 50)	SAS Nagar (n_2 = 50)	Total (n = 100)
Millet Kheer	1.64	2.56	2.10
Millet Roti	3.00	2.96	2.98
Millet Upma	1.16	1.36	1.26
Millet Laddu	1.36	1.82	1.59
Millet Porridge	2.00	2.08	2.04
Millet Khichdi	2.80	2.64	2.72
Millet Idli	1.08	1.48	1.28
Overall Mean	1.86	2.12	1.99

Data from table 5 regarding culinary uses of millets revealed that respondents from Ludhiana were most aware of Millet Roti, with mean score of 3.00 and SAS Nagar with mean score of 2.72 followed by Millet Porridge with overall mean score of 2.04 and Millet Kheer with overall mean score of 2.10. They were least aware of less common dishes such as Millet Idli with overall mean score of 1.28, Millet upma with overall mean score of 1.26 and Millet Laddu with overall mean score of 1.59, suggesting limited knowledge of these culinary uses.

Comparing both districts, in SAS Nagar with overall mean awareness score of 2.12, respondents were generally more aware of most millet dishes, especially Millet Kheer, Laddu, Upma and Idli, while respondents from Ludhiana with overall mean awareness score of 1.86, showed slightly higher awareness only for Millet Khichdi and Roti.

Table 6: Extent of Awareness among respondents about processed millet products (n = 100)

Millet Product	Mean		
	Ludhiana (n_1 = 50)	SAS Nagar (n_2 = 50)	Total (n = 100)
Biscuits	1.60	1.66	1.63
Breads	1.28	1.42	1.35
Flour	3.00	2.72	2.86
Laddu	2.32	1.92	2.12
Roasted Millet Mixture	1.24	1.26	1.25
Other Products	1.24	1.34	1.29
Overall Mean	1.78	1.72	1.75

Score range: 1-3, 1: Not Aware, 2: Somewhat Aware, 3: Aware

Data from the table 6 indicate variations in respondent's awareness of different millet products across Ludhiana and SAS Nagar. Among the products, millet flour recorded the

highest awareness in both districts, with a mean score of 3.00 in Ludhiana and 2.72 in SAS Nagar and an overall mean of 2.86 indicating that flour was the most familiar and commonly recognised millet product among respondents. This was followed by millet laddu (overall mean score 2.12) and millet biscuits (overall mean 1.63), suggesting moderate awareness of value added millet snacks. Lower awareness (1.29) was observed for products such as roasted millet mixture, other millet products (millet vermicelli, millet noodles, millets bars, millet flakes) and millet breads. Overall, awareness levels were moderate, with an overall mean score 1.75, showing comparable awareness in Ludhiana with overall mean score of 1.78 and SAS Nagar with overall mean score of 1.72.

Table 7: District-wise comparison of awareness scores related to millets

Variables	Ludhiana (n = 50) Mean ± SD	SAS Nagar (n = 50) Mean ± SD	t value	df	p-value
Types of millets	2.00±0.41	2.05±0.43	-0.584	98	0.560
Nutritive value of millets	1.41±0.54	1.37±0.60	0.330	98	0.742
Health benefits of millets	1.58±0.59	1.47±0.65	0.910	98	0.365
Environmental benefits of millets	1.47±0.62	1.26±0.61	1.695	98	0.093
Culinary uses of millets	1.86±0.40	2.13±0.48	-2.999	98	0.003
Millet products	1.78±0.46	1.72±0.49	0.635	98	0.527

Data from table 7 show a district wise comparison of awareness levels related to millets between Ludhiana and SAS Nagar. No statistically significant difference was observed between Ludhiana and SAS Nagar with respect to awareness about types of millets ($p = 0.560$), nutritive value of millets ($p = 0.742$), health benefits of millets ($p = 0.365$), environmental benefits of millets ($p = 0.093$) and millet products (p-0.527), indicating similar level of awareness among respondents from both districts.

A statistically significant difference was observed only for awareness about culinary uses of millets ($t = -2.999$, $p = 0.003$). Respondents from SAS Nagar (Mean ± SD: 2.13±0.48) had significantly higher awareness compared to respondents from Ludhiana (1.86±0.40).

Conclusion

The present study concludes that urban women in Ludhiana and SAS Nagar possess a moderate level of awareness about millets, largely confined to commonly known types such as pearl millet, sorghum, barnyard millet and finger millet. Awareness regarding nutritive, health and environmental benefits of millets was generally low, indicating significant knowledge gaps particularly about micronutrients, chronic disease prevention and sustainability aspects. While respondents were relatively more aware of traditional culinary uses like millet roti, porridge and khichdi, awareness and consumption of less common millet-based dishes and value added products remained limited.

Overall, the findings highlight that although millets are regaining attention due to their health, cultural and environmental significance, their integration into regular urban diets remains limited. Strengthening awareness through government initiatives, extension services and market support can play a crucial role in enhancing millet awareness among masses.

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