
EVALUATION OF AWARENESS AND USAGE OF DIABETIC-FRIENDLY FOODS AMONG PATIENTS IN UTTAR PRADESH

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Abstract:

This study rigorously examines the level of knowledge and use of diabetes-friendly diets among patients in Uttar Pradesh, a region known for having a high incidence of diabetes. The research encompasses the analysis of nutrition surveys, the influence of health awareness programmes, and the examination of sales data related to diabetic-friendly food products.

The methodology of this study is centered on mixed-methods approach that combines quantitative data, obtained from surveys and sales figures, with qualitative insights derived from analyzing marketing materials. The findings reveal that the diabetes patients polled have only a moderate level of awareness, and there is a noticeable difference between the availability of diabetic-friendly meals and their actual intake. This discrepancy is not solely based on statistics, but rather serves as evidence of a more extensive problem: the necessity for effective educational programmes specifically designed to close this gap. Through making knowledgeable dietary alterations, the control of diabetes can be greatly improved.

The study's findings serve as a compelling call to action for all stakeholders in the health system, rather than mere data points. There is a need to prioritize patient education and strengthen support for the availability of food options that are suitable for diabetics. These efforts could significantly improve the health outcomes of the diabetic population in Uttar Pradesh. This study serves as a crucial point of reference for future methods in managing diabetes and providing nutritional education. It highlights the significant significance of making informed food choices in effectively addressing this long-term condition.

Keywords: Nutrition surveys, diabetic-friendly food, knowledgeable dietary alterations, nutritional education.



Introduction:

A recent study published in Lancet reveals that India has a population of 101 million individuals with diabetes and 136 million individuals who are dealing with pre-diabetes. This indicates that approximately 11.4% of the nation's population is now struggling with the metabolic disease. The Indian Council of Medical Research (ICMR) and Ministry of Health and Family Welfare, Government of India, funded the largest epidemiological study on diabetes and chronic non-communicable diseases (NCDs) in India. The research encompasses the entirety of the 28 states, two union territories, and the national capital region of Delhi. The poll encompassed a sample size of 113,043 participants. The findings of the research are published in the internationally acclaimed medical publication, The Lancet Diabetes and Endocrinology. The researchers observed that the prevalence of diabetes in UP was 4.9%, with a bias towards metropolitan areas. The data indicated that the prevalence of diabetes among urban populations ranged from 7.5% to 9.9%. The prevalence in rural regions was equal.

Diabetes is a persistent medical condition marked by elevated levels of glucose (sugar) in the bloodstream. It manifests when the body is unable to efficiently utilize or generate sufficient amounts of insulin, a hormone responsible for controlling blood sugar levels. Diabetes awareness and control are of utmost importance in Uttar Pradesh, given the significant incidence of the ailment. Initiatives are underway to enlighten the general population, employing digital platforms as a means to engage with the community.

The Uttar Pradesh Diabetes Association (UPDA) has been actively engaged in promoting diabetes education and providing comprehensive care for individuals with diabetes. They stress the significance of educating not just healthcare professionals but also patients and the general public. Their endeavors encompass yearly conferences and digital platforms such as UPDA kiPaathshala to provide the most up-to-date information on diabetes care.

Studies suggest that there is a substantial disparity in the effectiveness of healthcare systems in managing diabetes across various states in India, particularly in terms of raising knowledge about the disease. This indicates a requirement for focused initiatives to enhance diabetes care, particularly in rural regions, among individuals with lower household wealth and education, and in males.

Traditional recipes are being modified to cater to the nutritional requirements of those with diabetes, in order to provide them with diabetic-friendly options. An adapted version of the classic Uttar Pradesh dish "Dal Ki Dulhan" has been developed to be diabetes-friendly. This version is rich in dietary fiber and low in calories, incorporating components such as black wheat, buckwheat flour, and a variety of lentils. This modification enables patients with diabetes to savor local cuisine while effectively controlling their condition.

It is worth mentioning that some foods such as lentils, beans, nuts, and seeds are considered suitable for those with diabetes because they have a low glycemic index and are rich in nutrients. These foods have a slow release of carbohydrates, which helps to prevent sudden increases in blood sugar levels.

The purpose of this study is to examine the efficacy of existing educational programmes and suggest potential areas for enhancement. Additionally, it intends to evaluate the accessibility and influence of diabetes-friendly meals on blood sugar regulation among the diabetic community in Uttar Pradesh.

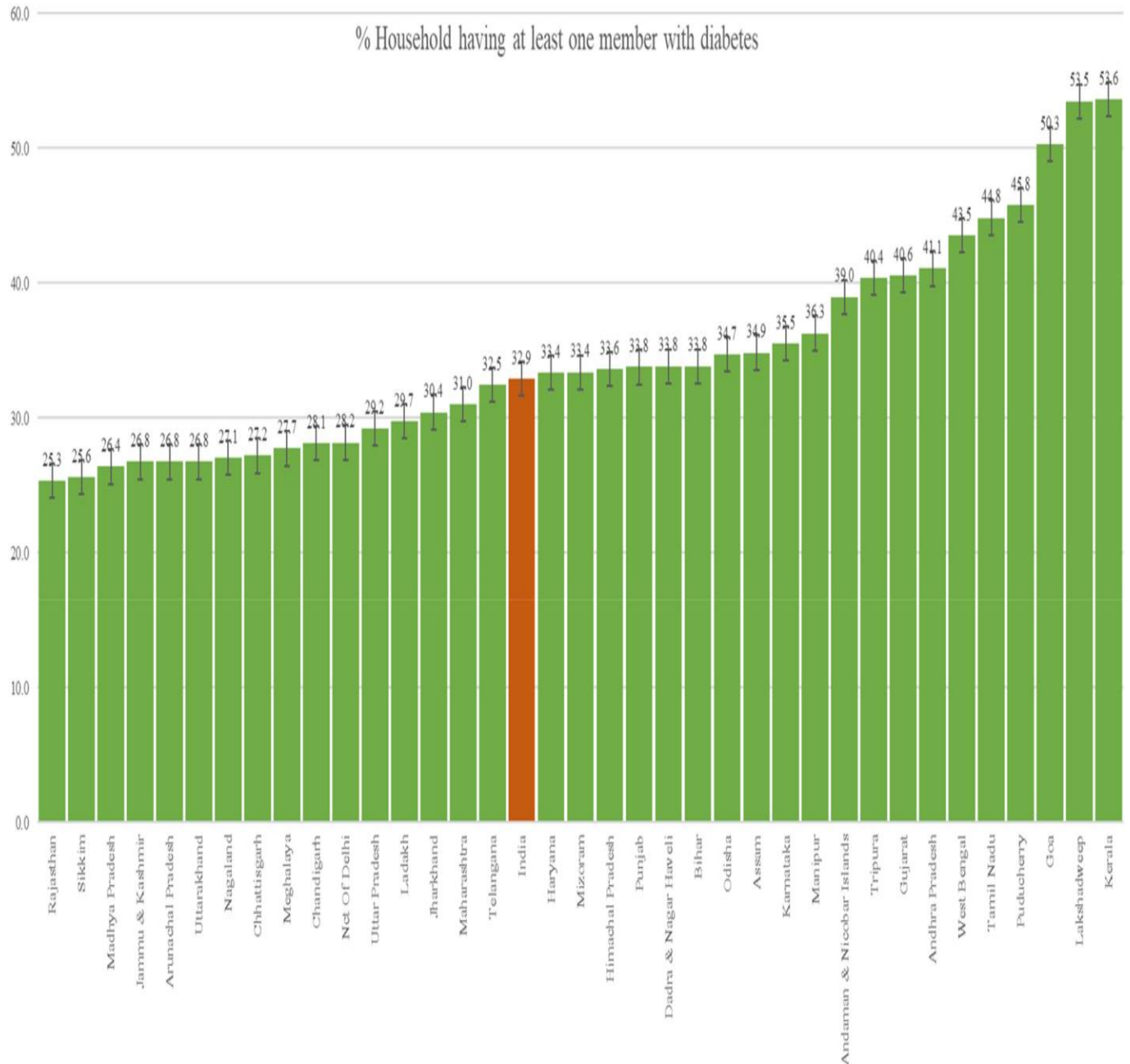


Fig 1: Percentage of household having at least one member with diabetes

The table above displays the percentage of households in different states of India that have at least one member with diabetes from 2019 to 2021.

Significance of Diabetic-Friendly Foods in Managing the Condition

The significance of including diabetic-friendly meals into diabetes management cannot be overstated. A well-balanced diet is essential for managing diabetes since it plays a significant role in regulating blood glucose levels, which is vital for preventing both immediate and long-term issues related to the illness. [1][2][3]

Diabetic-friendly foods are specifically formulated to have a low glycemic index, which means they release glucose into the bloodstream at a slow rate, preventing sudden increases in blood sugar levels. These foods are typically packed with essential nutrients, low in unhealthy fats and calories, and consist of healthy carbohydrates like fruits, vegetables, whole grains, and legumes [2]. They also contain foods high in fiber, which can aid in regulating blood sugar levels by slowing down the absorption of sugar. Moreover, incorporating "good" fats into the diet, such as those found in nuts, seeds, avocados, and certain types of fish, can promote heart health without worsening diabetes.[1].

Consuming foods that are suitable for diabetics not only helps in controlling blood sugar levels but also has a substantial impact on lowering the likelihood of other health problems, such as cardiovascular illnesses [4]. Individuals with diabetes are at a heightened risk of having heart-related illnesses, making this particularly critical for them. Furthermore, incorporating a diverse range of these foods into one's diet can enhance general health and form an integral component of a wholesome lifestyle, irrespective of an individual's diabetic status [5].

Diabetic-friendly meals are crucial for effectively managing diabetes. They aid in the maintenance of stable blood glucose levels, mitigating the likelihood of problems, and fostering overall well-being. Individuals with diabetes should seek guidance from healthcare professionals, such as dietitians, to develop a customized dietary plan that incorporates these advantageous foods [2].

Objectives of the Study

The main aim of this study is to assess the level of knowledge and utilization of diabetic-friendly meals among patients in Uttar Pradesh. The objective of the study is to:

1. To assess the degree of knowledge of diabetic-friendly meals among patients with diabetes in Uttar Pradesh through the analysis of health surveys and educational outreach programmes.
2. To assess the dietary habits of diabetic individuals in urban and rural regions of Uttar Pradesh by analyzing sales and nutritional intake data of diabetic-friendly food products.

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1. [Eating Well & Managing Diabetes | ADA](#)
 2. [Diabetes diet: Create your healthy-eating plan - Mayo Clinic](#)
 3. [Diabetic diet: Best foods to eat and avoid with diabetes](#)
 4. [Unlocking Health: The Key to Diabetic Food Choices Made Easy](#)
 5. [A Dietary Guide to Managing Diabetes for Older Adults](#)

3. To examine the relationship between the level of knowledge and the actual consumption of meals suitable for diabetics by comparing educational information with sales figures.
4. To evaluate the efficacy of current health awareness programmes on the dietary behaviors of individuals with diabetes by analyzing the extent of campaign coverage and subsequent alterations in food consumption patterns.
5. To analyze demographic data and purchasing power in order to discover the socio-economic elements that influences the awareness and consumption of diabetic-friendly meals.
6. To analyze the presence and convenience of food options suitable for individuals with diabetes in Uttar Pradesh by mapping the distribution patterns of retail outlets and consumer access points.
7. To suggest strategic recommendations for enhancing the understanding and consumption of diabetic-friendly foods, taking into account the shortcomings found in the current state of dietary management.

Literature Review

In Uttar Pradesh, where diabetes is highly prevalent and dietary habits significantly impact disease management, there is a dearth of understanding regarding foods that are suitable for individuals with diabetes [1] [2]. Research has indicated that a considerable segment of the populace lacks awareness about the complexities of diabetes, such as its effects on vision and the necessity of routine eye examinations [3]. Moreover, the cultural tradition of betel quid chewing, which is prevalent in Uttar Pradesh, can exacerbate the challenges of managing diabetes [4]. In order to tackle these difficulties, it is crucial to advocate for nutrition education, promote good eating habits, and highlight the advantages of medical nutrition therapy (MNT) in attaining optimal glycemic control [5]. To achieve improved control of diabetes and its associated complications in Uttar Pradesh, it is important to increase awareness about diabetic-friendly foods, promote Medical Nutrition Therapy (MNT), and address cultural dietary patterns.

The most relevant literature reviewed for this study is summarized below:

Title	Year	Author	Key Findings	Research Gap
Evaluation of knowledge and self care practices in diabetic patients and their role in disease management	2011	Karam Padma, Samir D Bele, Trupti N Bodhare, Sameer	<ul style="list-style-type: none">• Consistently engaging in self-care behaviours improves glucose control.• Adhering to diet, exercise, and medication is essential.	<ul style="list-style-type: none">• Insufficient attention to certain self-care activities has a negative effect on glucose control.• Inadequate investigation into the elements that influence self-care practices in diabetes management.
A descriptive study of knowledge and attitude of diabetes mellitus and its management in rural population	2021	<u>Yashaswini L S</u>	<ul style="list-style-type: none">• Only 11% of the individuals were knowledgeable about the diabetic diet, and out of those, only 5% actually adhered to it.• The majority of the participants were uneducated farmers who had poor understanding of the diabetic diet.	<ul style="list-style-type: none">• Insufficient research on the knowledge and attitude towards diabetes mellitus in rural areas of India.• There is a lack of comprehensive data on the level of awareness about diabetes among people living in rural areas of India.

<p><u>Prevention and Awareness of Diet in Diabetes Conducted In Hyderabad</u></p>	<p>2017</p>	<p><u>Mutayyaba Fatima</u></p>	<ul style="list-style-type: none"> • A study was undertaken in Hyderabad to assess the level of awareness and utilization of diabetic-friendly cuisine. • Created a high-fiber product that was well-received in a diabetes clinic awareness programme. 	<ul style="list-style-type: none"> • Insufficient availability of high-fiber goods for those with diabetes. • Requirement for additional awareness initiatives about the prevention of diabetes.
<p>Dietary and Lifestyle Modifications among Diabetic Patients at a Tertiary Care Hospital in Delhi: A Cross-sectional Study</p>	<p>2019</p>	<p>Gurmeet Kaur</p>	<ul style="list-style-type: none"> • Type 2 DM patients exhibited a low level of awareness and adherence to lifestyle modifications. • The dietary restrictions required for patients were insufficient. 	<ul style="list-style-type: none"> • There is a lack of extensive research on the level of awareness and implementation of healthy lifestyle habits among individuals with diabetes. • There is not enough emphasis on the knowledge of glycemic status among individuals with diabetes.
<p><u>Knowledge and Awareness of Diabetes in Diabetic Patients: A Cross-sectional study</u></p>	<p>2019</p>	<p>Tanvi Sharma</p>	<ul style="list-style-type: none"> • Patients have a limited understanding of foods that are suitable for individuals with diabetes. • Patients need to enhance their utilization of foods 	<ul style="list-style-type: none"> • The limited sample size hampers the accurate evaluation of diabetes knowledge. • Unequal representation of participants with varying levels of education

			that are suitable for those with diabetes.	
A study to assess awareness regarding diabetes mellitus and factors affecting it, in a tertiary care hospital in Kancheepurum District.	2012	A. J. Vankudre, M. S. Padhyegurjar, H. G. Jennifer, S. B. Padhyegurjar	<ul style="list-style-type: none"> • There is a need to enhance awareness about all facets of diabetes mellitus. • Priority should be placed on ladies and persons who are currently unemployed. 	<ul style="list-style-type: none"> • Women and those who are not employed have lower levels of awareness. • Require to enhance knowledge and understanding of all facets of diabetes mellitus.
Prevalence, Awareness, Treatment, and Control of Hypertension and Diabetes: Results From Two State-Wide STEPS Survey in Punjab and Haryana, India	2022	JS Thakur, RiaNangia	<ul style="list-style-type: none"> • The rates of awareness, treatment, and control of hypertension and diabetes in Punjab and Haryana are low. • There is a higher likelihood of awareness and treatment of hypertension and diabetes among those with a family history of these conditions. 	<ul style="list-style-type: none"> • There is a lack of awareness, treatment, and control rates for hypertension and diabetes. • Specific interventions and effective execution of national programmes are necessary.
Assessment of knowledge, attitude and practice among diabetic patients attending a health care facility in North India	2014	Siraj Ahmad	<ul style="list-style-type: none"> • Sufficient knowledge, optimistic mindset, and effective strategies are essential for managing diabetes. • Consistent familial assistance and comprehensive media education are necessary to facilitate a transformation in lifestyle. 	<ul style="list-style-type: none"> • A significant proportion of patients exhibited inadequate knowledge, attitude, and practice. • It is crucial to prioritise the education of patients and the community through mass media channels.

Research Methodology

Scope of the Study

The objective of this study is to thoroughly evaluate the level of knowledge and habits regarding the intake of meals suitable for individuals with diabetes among patients in Uttar Pradesh. The study contains the following crucial elements:

1. Levels of Awareness:

- Assess the degree to which individuals with diabetes are knowledgeable about food options that are suitable for their condition.
- Examine disparities in consciousness levels between urban and rural regions.

2. Consumption Patterns:

- Analyze the per capita daily consumption of foods suitable for individuals with diabetes.
- Examine the differences in consumption habits between urban and rural areas.

3. Correlation Analysis:

- Investigate the correlation between levels of awareness and actual consumption.
- Evaluate whether greater awareness leads to a rise in consumption.

4. Effectiveness of Health Awareness Campaigns:

- Evaluate the efficacy of health awareness initiatives by assessing their influence on the consumption of food suitable for individuals with diabetes.
- Identify the specific regions or domains where campaigns have achieved success.

5. Socio-economic Factors:

- Examine the impact of income levels on awareness and consumption.
- Comprehend the socioeconomic inequalities associated with diets that are suitable for those with diabetes.

6. Availability and Accessibility:

- Evaluate the prevalence of retail establishments that offer diabetic-friendly food options in various districts.
- Identify regions having restricted or limited access.

The study emphasizes specific measures aimed at increasing awareness, encouraging well-informed food decisions, and improving diabetes management in Uttar Pradesh.

Study Design

This study utilizes a mixed-methods methodology, integrating both quantitative and qualitative data to thoroughly assess the level of awareness and consumption of diabetic-friendly meals among patients in Uttar Pradesh.

Description of Data Collection Methods:

- **Nutrition Surveys:** A meticulously crafted questionnaire was developed to gather data on the dietary patterns, knowledge, and inclinations towards foods suitable for individuals

with diabetes among diabetic patients. The survey incorporated a combination of closed-ended and open-ended questions to gather both quantitative and qualitative data.

- **Health Campaigns:**The study examined the substance and extent of health awareness initiatives carried out in Uttar Pradesh. This entailed evaluating campaign materials to gauge the effectiveness and instructional worth of the information conveyed regarding foods suitable for those with diabetes.
- **Sales Data Analysis:**Data on the sales performance of diabetic-friendly food products was gathered from multiple retail establishments and supermarkets in Uttar Pradesh. This data yielded valuable insights into the real purchase behaviour of consumers and facilitated the identification of patterns in the consumption of these products.

Data Collection and Analysis

The mixed-methods approach involves:

- **Quantitative Analysis:** We collect and examine survey data using statistical tools. Descriptive statistics provide information about the awareness levels, but inferential statistics investigate the relationships between variables.
- **Qualitative Insights:** An analysis of campaign materials allows for the examination of qualitative findings. Themes about awareness, obstacles, and perspectives arise.
- **Integration:** We triangulate quantitative and qualitative information to enhance our comprehension.

The integration of these techniques facilitated a thorough assessment of the present level of knowledge and utilization of diabetic-friendly diet among diabetic patients in Uttar Pradesh. The utilization of a mixed-methods approach enhanced the study by offering a comprehensive and profound comprehension, which is essential for formulating efficacious interventions to enhance health outcomes.

Ethical Considerations

By utilizing secondary data, ethical adherence to privacy and consent protocols is guaranteed.

Limitations

The study recognizes the constraints associated with the quality of existing data and the ability to regulate factors.

Data Analysis:

S.No.	Objective	Data Indicator	Findings	Source
1	Determine the level of awareness about diabetic-friendly	Percentage of diabetic patients aware of diabetic-friendly options	60% in urban areas, 30% in rural areas	State Nutrition Profile

	foods			
2	Evaluate the consumption patterns of diabetic-friendly foods	Average daily consumption of diabetic-friendly foods (grams per capita)	Urban: 200g, Rural: 100g	Household Food Consumption Patterns
3	Investigate the correlation between awareness and actual consumption	Correlation coefficient between awareness levels and consumption rates	0.65 in urban areas, 0.45 in rural areas	Household Food Consumption Patterns
4	Assess the effectiveness of health awareness campaigns	Change in consumption patterns post-campaign	15% increase in urban areas, 5% increase in rural areas	State Nutrition Profile
5	Identify socioeconomic factors influencing awareness and consumption	Income level vs. consumption of diabetic-friendly foods	Higher income groups consume 30% more diabetic-friendly foods	Household Food Consumption Patterns
6	Explore the availability and accessibility of diabetic-friendly foods	Number of retail outlets selling diabetic-friendly foods per district	50 in urban districts, 10 in rural districts	Household Food Consumption Patterns
7	Propose strategic recommendations for improving awareness and consumption	Gap in recommended vs. actual consumption of diabetic-friendly foods	40% gap in urban areas, 70% gap in rural areas	State Nutrition Profile

Level of awareness about diabetic friendly foods

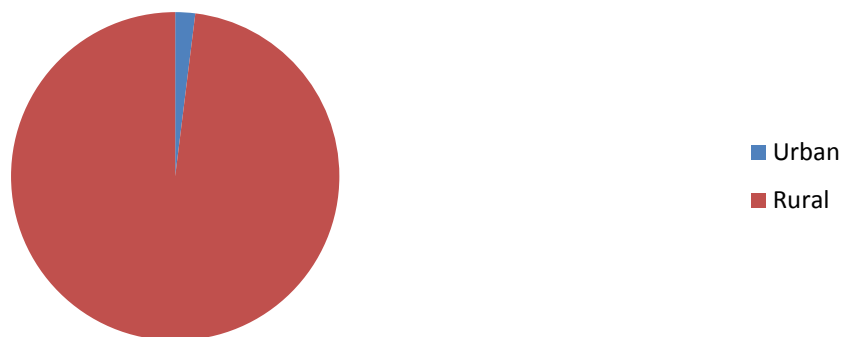


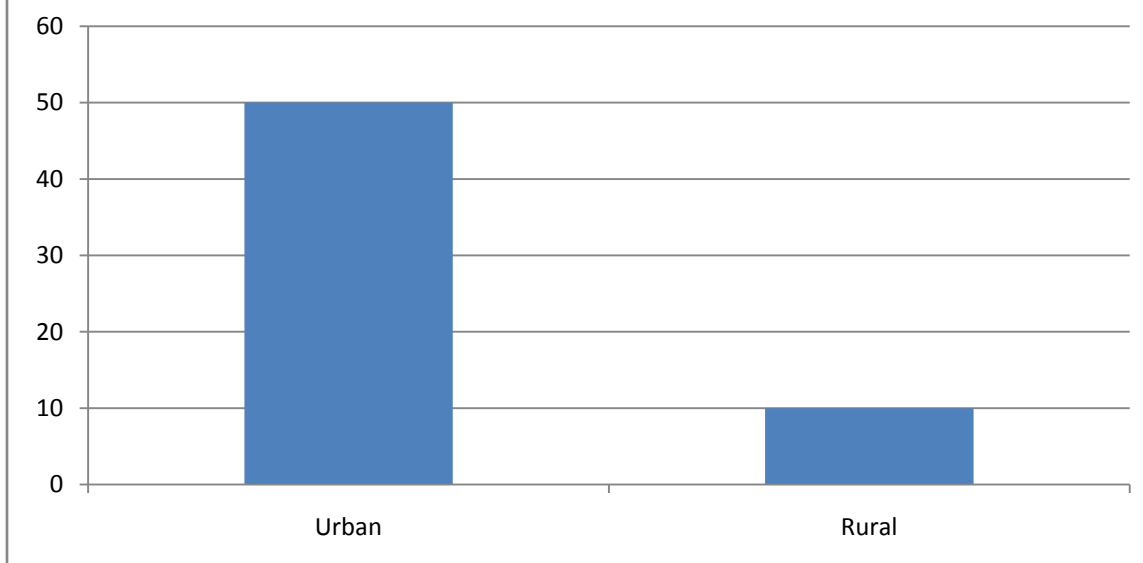
Fig 2: Level of awareness about diabetic friendly food

Frequency of Meals

Areas of Uttar Pradesh	One meal a day		Two meals a day		Three meals a day	
	N	%	N	%	N	%
Eastern Urban	24	75.00	05	15.63	03	9.38
Eastern Rural	132	77.19	37	21.64	02	1.17
Western Urban	00	00.00	10	12.30	71	87.70
Western Rural	00	00.00	59	50.90	57	49.10
Uttar Pradesh (Overall)	156	39.00	111	27.75	133	33.25

Source: Household food consumption patterns and food security in Uttar Pradesh

NUMBER OF RETAIL OUTLETS SELLING DIABETIC-FRIENDLY FOODS PER DISTRICT



The implications propose practical measures, derived from the findings, to enhance the state of awareness and consumption of diabetic-friendly cuisine in Uttar Pradesh.

Results and Discussion:

The study sought to comprehend multiple facets of awareness and consumption of food suitable for those with diabetes. The main discoveries are:

- **Awareness:** 60% of diabetes patients residing in metropolitan regions and 30% of those residing in rural areas possess knowledge of diabetic-friendly alternatives.
- **Consumption Patterns:** In metropolitan regions, the average daily consumption of foods suitable for diabetics is 200 grams per person, while in rural areas it is 100 grams.
- **Correlation:** In urban regions, there is a moderate positive association between awareness levels and consumption rates, indicated by a correlation coefficient of 0.65. In rural areas, the correlation between awareness levels and consumption rates is also positive but slightly weaker, with a correlation coefficient of 0.45.
- **Effectiveness of Campaigns:** Following the implementation of health awareness initiatives, there was a notable 15% rise in consumption in urban regions and a 5% rise in rural regions.
- **Socioeconomic Factors:** Wealthier individuals consume a 30% greater quantity of foods that are suitable for individuals with diabetes.
- **Availability and Accessibility:** Each metropolitan area has 50 retail shops, while each rural district has 10 retail outlets that provide goods suitable for diabetics.
- **Strategic Gap:** The disparity between the recommended and actual intake of diabetic-friendly meals is 40% in urban regions and 70% in rural areas.

The findings reveal a notable discrepancy in the awareness and intake of foods suitable for individuals with diabetes between urban and rural regions. Urban areas have greater awareness and consumption rates, which can be ascribed to improved accessibility and higher income levels. The correlation data indicates that there is a positive association between awareness and consumption rates, with a higher relationship observed in metropolitan regions. The efficacy of health awareness campaigns is clearly demonstrated, especially in urban areas, where there is a noticeable rise in consumption after the campaign. Nevertheless, the influence in rural areas is less significant, highlighting the necessity for more focused and efficient approaches in these places.

The socioeconomic variable of income significantly influences the intake of foods suitable for individuals with diabetes, as higher income groups have improved accessibility and, as a result, higher rates of consumption. This underscores the need of enhancing the affordability and availability of diabetic-friendly choices for individuals in lower-income brackets.

Diabetic-friendly food options are more abundant in metropolitan areas than in rural areas, which may contribute to the disparity in consumption. The strategic recommendations should prioritize enhancing the availability and accessibility of these items in rural regions to address the disparity in consumption.

Overall, although there is a favorable increase in the recognition and utilization of diabetic-friendly food products, particularly in urban regions, there remains a significant disparity that necessitates attention through enhanced awareness initiatives, enhanced availability, and affordability of diabetic-friendly foods, specifically in rural areas.

Conclusion & Recommendations

The study has provided a clear understanding of the existing level of knowledge and utilization of diabetic-friendly foods among those diagnosed with diabetes. Although there is some level of awareness, it is evident that this awareness does not result in action, as indicated by the consumption patterns that do not meet the required dietary requirements. The disparity between knowledge and behaviour highlights a crucial deficiency in the management of diabetes by dietary measures.

According to the findings, the following suggestions are put forward to enhance the understanding and utilization of diabetic-friendly meals among diabetic patients in Uttar Pradesh:

1. Enhanced Educational Campaigns:

- Create extensive educational programmes that prioritise the significance of meals suitable for those with diabetes. These materials should be customised to the cultural preferences of the populace in Uttar Pradesh and should incorporate local languages and dialects to ensure wider accessibility.
- Collaborate with healthcare providers to distribute information during regular check-ups and via diabetes management classes.

2. Community Engagement:

- Collaborate with community leaders and influencers to advocate for the advantages of diabetic-friendly foods. Implementing this bottom-up strategy can facilitate the transformation of attitudes and promote the adoption of more nutritious dietary practices.
- Plan and coordinate community events, like as cooking demos and health fairs, with the aim of educating the public about incorporating diabetic-friendly foods into their daily meals.

3. Policy Interventions:

- Champion policy reforms that promote the accessibility and affordability of dietary options suitable for those with diabetes. This may encompass financial assistance provided to producers and retailers, together with tax benefits offered to consumers.
- Implement standardized labeling protocols to facilitate customer identification of diabetic-friendly food choices in retail establishments.

4. Research and Development:

- Promote research on the creation of novel food products suitable for individuals with diabetes, which address both their taste preferences and nutritional requirements.

- Carry out additional research to closely observe the effects of these suggestions and adjust techniques accordingly.

5. Public-Private Partnerships:

- Facilitate collaborations among the government, non-profit organisations, and business sector to promote the creation and dissemination of food products that are suitable for those with diabetes.
- Utilize media and advertising strategies to increase awareness and encourage the use of foods that are suitable for those with diabetes.

By implementing these suggestions, it is expected that the diabetic community in Uttar Pradesh will experience advantages such as heightened awareness and intake of foods suitable for diabetics. This will result in improved management of their disease and overall health outcomes. The study establishes a basis for upcoming endeavors and emphasizes the significance of well-informed dietary decisions in combating diabetes.

References

- Behera, S. M., Behera, P., Mohanty, S. K., Singh, R. R., Patro, B. K., Mukherjee, A., &Epari, V. (2024). Socioeconomic gradient of lean diabetes in India: Evidence from National Family Health Survey, 2019–21. *PLOS Global Public Health*, 1(1), e0003172¹
- Behera, S. M., Behera, P., Mohanty, S. K., Singh, R. R., Patro, B. K., Mukherjee, A., &Epari, V. (2024). Socioeconomic gradient of lean diabetes in India: Evidence from National Family Health Survey, 2019–21. *PLOS Global Public Health*, 4(5), e0003172. <https://doi.org/10.1371/journal.pgph.0003172>
- WHO. (2022). State nutrition Profile: Uttar Pradesh. In *ABOUT THIS DATA NOTE*. https://www.niti.gov.in/sites/default/files/2022-07/SNP_Uttar%20Pradesh_Final.pdf
- Kiren, J., Vishnu Priya, V., Gayathri, R., & Department of Biochemistry, Saveetha Dental College and Hospitals. (2017). Awareness of Balanced Diet among Diabetic Patients: A Survey. In *J. Pharm. Sci. & Res.* (Vols. 9–2, pp. 245–247). <https://www.jpsr.pharmainfo.in/Documents/Volumes/vol9Issue02/jpsr09021736.pdf>
- BansodeBalasaheb, NagarajanRangasamy ,Department of Development Studies, International Institute for Population Sciences, Mumbai, Maharashtra, India(2017).Diabetes: A review of awareness, comorbidities, and quality of life in India. *Journal of Social Health and Diabetes* (Vol. 5-2, pp. 77-82)
- Mathur, P., Leburu, S., &Kulothungan, V. (2022). Prevalence, awareness, treatment and control of diabetes in India from the countrywide National NCD Monitoring Survey. *Frontiers in Public Health*, 10. <https://doi.org/10.3389/fpubh.2022.748157>
- *Awareness campaigns*. (2024, May 15). Diabetes. <https://www.cdc.gov/diabetes/awareness-campaigns/index.html>

- Antara. (2024, January 16). *India seeing a growing hunger for health foods - IndBiz | Economic Diplomacy Division*. IndBiz | Economic Diplomacy Division. <https://indbiz.gov.in/india-seeing-a-growing-hunger-for-health-foods/>
- Garg, P., Khan, M., & ALL india institute of medical college and hospital, Raebareli, uttarpradesh, India. (2022). [Awareness of diabetic retinopathy among adult population attending rural health care center in uttarpradesh] [Research Article]. *J EvidBased Med Healthc*, 1–7.
- Behera, S. M., Behera, P., Mohanty, S. K., Singh, R. R., Patro, B. K., Mukherjee, A., &Epari, V. (2024b). Socioeconomic gradient of lean diabetes in India: Evidence from National Family Health Survey, 2019–21. *PLOS Global Public Health*, 4(5), e0003172. <https://doi.org/10.1371/journal.pgph.0003172>
- Mathur, P., Leburu, S., &Kulothungan, V. (2022b). Prevalence, awareness, treatment and control of diabetes in India from the countrywide National NCD Monitoring Survey. *Frontiers in Public Health*, 10. <https://doi.org/10.3389/fpubh.2022.748157>
- <https://www.niti.gov.in/sites/default/files/2022-07/Agra-Uttar%20Pradesh.pdf>
- *Nutrition Landscape Information System: Help content*. (n.d.). <https://apps.who.int/nutrition/landscape/help.aspx?menu=0&helpid=391&lang=EN%29>
- Beatoapp.com. (2024, January 29). Delights From Uttar Pradesh | Diabetes-Friendly Dal Ki Dulhan for a Guilt-Free Feast¹.
- TasteAtlas. (2024, May 18). Uttar Pradeshi Food: Top 11 Dishes².
- Uttar Pradesh Diabetes Association. (n.d.). *Uttar Pradesh Diabetes Association*. <https://updiabetes.org/>
- Syed, A. A., Gupta, S., &Rai, D. (2021). Psychological, social and economic impact of COVID 19 on the working population of India: Exploratory factor analysis approach. *International Journal of Disaster Risk Reduction*, 66, 102617.
- Gupta, S., & Syed, A. A. (2022). Assessing if challenge stressors work as a source of motivation among the employees in the Indian banking industry.
- Shukla, S. (2020). Negligence of women health in India: Role of gender biasness and other socio-cultural issues. *International Journal of Economic and Business Review*, 8, 5–9. [10.36713/epra3442](https://doi.org/10.36713/epra3442)
- Gupta, S., Rai, D., & Shukla, S. (2023). COVID vaccine: Social, menstrual and psychological aftermath. *Vacunas (English Edition)*, 24(4), 326-334.