

Determine Nutritional Indigenous Diet of Uttarakhand

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ABSTRACT

Indigenous food components, including Mandua (finger millet), Jhangora (barnyard millet), Gahat (horse gram), Bhatt (black soybean), Chaulai (amaranth), and wild herbs such as Bichhu Ghas and Lingda, have been the foundation of traditional Uttarakhandi diets for millennia. These elements are esteemed not only for their unique tastes and suitability for mountainous terrain but also for their significant nutritional content and therapeutic benefits. Historically, cuisine in Uttarakhand has been intricately associated with health, sustainability, and seasonal availability, maintaining a balance between nutrition and ecological harmony. The growing prevalence of contemporary and processed foods, along with lifestyle alterations, is leading to a departure from conventional dietary practices. If this tendency persists, it may result in the erosion of invaluable traditional knowledge and adversely affect nutritional health. The research indicates that knowledge of the nutritional advantages of indigenous foods is moderate throughout the public. Although individuals persist in consuming these meals due to habit or custom, there is a paucity of scientific comprehension of their health advantages. Enhancing awareness through education and public health initiatives can play a crucial role in promoting the continued use of these nutrient-rich foods. There is a necessity for strategic interventions, encompassing nutrition education, the promotion of indigenous foods, and their incorporation into government nutrition programs, as advised by organizations such as the Indian Council of Medical Research.

Keywords: Nutritional, Uttarakhand's, Indigenous, Diet

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1. INTRODUCTION

Uttarakhand, referred to as the “Land of the Gods,” is abundant in both natural beauty and cultural and gastronomic legacy. The state's varied topography—from the snow-covered Himalayas to lush valleys—has fostered a distinctive culinary culture intricately linked to the customs, climate, and farming methods of its inhabitants. The cuisine of Uttarakhand, mostly categorized into Garhwali and Kumaoni cuisines, displays the simplicity and ingenuity of the hill inhabitants that depend significantly on locally sourced foods. Indigenous food components, including Mandua (finger millet), Jhangora (barnyard millet), Gahat (horse gram), Bhatt (black soybean), Chaulai (amaranth), and wild herbs such as Bichhu Ghas and Lingda, have been the foundation of traditional Uttarakhandi diets for millennia. These elements are esteemed not only for their unique tastes and suitability for mountainous terrain but also for their

significant nutritional content and therapeutic benefits[14]. Historically, cuisine in Uttarakhand has been intricately associated with health, sustainability, and seasonal availability, maintaining a balance between nutrition and ecological harmony. In recent decades, the swift advancement of modernity, urban migration, and exposure to global culinary trends have resulted in a decrease in the consumption of these indigenous products. Younger generations are progressively gravitating towards packaged and quick foods, resulting in a steady erosion of traditional culinary skills. Simultaneously, there is an increasing recognition among academics, nutritionists, and policymakers about the significance of indigenous foods in enhancing health, reducing lifestyle illnesses, and safeguarding cultural identity.[6]

1.1 Food-Based Approach towards Community Nutrition and Health

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There is currently a heightened worldwide focus on indigenous food sovereignty. The promotion of increased production and consumption of indigenous food is prioritized to ensure that the impoverished have sufficient access to high-quality, nutritious food for a balanced diet. This include not just energy-dense foods but also micronutrients—vitamins, minerals, and other trace elements essential for optimal growth and development. Food-based therapies primarily aim to enhance dietary quality to address and prevent malnutrition and nutritional deficiencies. This approach acknowledges the critical importance of food for optimal nutrition and underscores the responsibility of local governments in the design, implementation, and oversight of adaptable programs aimed at enhancing the production and consumption of indigenous foods, particularly those abundant in micronutrients. Advocating for biodiverse food is seen essential in addressing micronutrient deficiencies via the domestic production and consumption of suitable foods. The FAO is advocating for food-based, community-centered programs using participatory assessment and planning methods that enable and empower impoverished individuals to actively engage in the design and execution of these activities.

1.2 Representative Agro-Ecologies of Uttarakhand State of India and Comparative Studies on Household Nutrition and Health

Approximately 86% of Uttarakhand's total geographical area consists of hills, where subsistence agriculture is conducted, sustaining roughly 50% of the state's people directly or indirectly. Conversely, there exists a 14% expanse of arable land where enhanced agricultural practices are used, resulting in the majority of food grain production occurring in this region. This message addresses the home production and dietary variety of the hill region in relation to community nutrition and health. Bisht et al. delineate three representative farming agro-ecologies in the Uttarakhand hills: i) small-scale crop-livestock mixed-farming systems, which account for approximately 70% of the net sown area under rain-fed agriculture; ii) high elevation mountainous valleys adjacent to Tibet, predominantly occupied by nomadic pastoralists and representing about 10% of the net sown area; and iii) several interspersed river valleys with enhanced agriculture supported by assured irrigation, comprising around 10% of the cropped area in the Uttarakhand hills. A

comparative analysis of household production and dietary variety across three sample agricultural contexts was conducted in 2016 at 20 niche locations spanning the aforementioned three agro-ecologies of the Uttarakhand hills[13]. Enhanced household production and dietary variety were observed in traditional rain-fed small-scale crop-livestock mixed-farming systems, succeeded by mountainous valleys inhabited by nomadic pastoralists, and were minimal in river valleys characterized by improved agriculture [7].

1.3 Nutritional Analysis of Uttarakhand's Indigenous Diet

The traditional cuisine of the Kumaon and Garhwal areas is tailored to the Himalayan climate, utilizing whole grains and foraged ingredients.

- **Millets (Mandua/Ragi &Jhangora):** Substantially richer in calcium and iron compared to rice and wheat. They elicit diminished glycemic reactions, rendering them optimal for the management of diabetes and obesity.
- **Pulses (Gahat/Kulath, Bhat):**Gahat is acknowledged for its medicinal effectiveness in alleviating kidney stones and addressing renal disorders.
- **Wild Greens and Spices:**Foods frequently incorporate wild vegetables, herbs, and spices (e.g., Jambu, Timur) abundant in phytochemicals such as polyphenols and flavonoids, which have anti-inflammatory benefits.
- **Cooking Methods:**Typically prepared over low heat, maintaining nutritional integrity and enhancing digestion.

2. LITERATURE REVIEW

Singh et al. (2025) analyzed the traditional food systems of Uttarakhand, emphasizing that indigenous diets are profoundly intertwined with local biodiversity and cultural behaviors. Their research highlighted that millets, legumes, wild vegetables, and fermented goods constitute the foundation of the area cuisine. These foods are abundant in bioactive chemicals and offer functional health advantages, such as enhanced immunity and illness prevention. The authors contended that traditional knowledge systems are essential for preserving dietary variety and nutritional sufficiency. Nevertheless, they emphasized that modernization and evolving dietary practices jeopardize the sustainability of these indigenous diets, underscoring the necessity

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for their scientific documentation and preservation.[1]

Rawat and Gopal (2017) concentrated on mandua (finger millet), a fundamental indigenous grain of Uttarakhand. Their research demonstrated that mandua is exceptionally nutritious, abundant in dietary fiber, minerals, and vital elements. Historically regarded as a "poor man's food," it has recently attained acknowledgment for its health advantages, including its efficacy in diabetes management and enhancement of digestion. The research emphasized its resilience to severe environmental circumstances and its economic significance for local agriculturists. The scientists determined that advocating for mandua intake might markedly enhance nutritional security in mountainous areas.[2]

Downs et al. (2022) Conducted a study on indigenous foods in India, particularly finger millet, to evaluate their contribution to dietary variety and nutrition. The findings, while centered on tribal communities, are pertinent to the traditional cuisine of Uttarakhand. The research indicated that traditional foods are rich in nutrients yet frequently neglected because of socio-economic and infrastructural obstacles. The authors highlighted obstacles such as processing challenges and insufficient awareness through value chain analysis, which restrict consumption. They asserted that augmenting access, storage, and awareness could elevate the significance of indigenous foods in addressing malnutrition.[3]

Pandey et al. (2021) examined the nutritional composition of jhangora (barnyard millet), a significant element of Uttarakhand's traditional diet. Their research revealed that jhangora is abundant in fiber and minerals, and possesses a low glycemic index, rendering it appropriate for the management of lifestyle disorders including diabetes and obesity. It is gluten-free and easily digested, rendering it an optimal nutritional choice for many groups. The authors highlighted its medicinal and nutritional significance, proposing that heightened intake of jhangora may enhance public health outcomes.[4]

Agnihotri et al. (2023) Performed an extensive nutritional evaluation of traditional foods ingested in Uttarakhand, especially within underprivileged populations. The study utilized meal frequency questionnaires to capture dietary habits and assess nutritional consumption. The results demonstrated that indigenous diets offer a well-rounded

combination of macronutrients and micronutrients, although are progressively diminishing owing to evolving lifestyles. The study emphasized the necessity of incorporating traditional foods into contemporary nutrition programs to enhance food security and health outcomes.[5]

2.1 OBJECTIVES OF THE STUDY

1. To study on Food-Based Approach towards Community Nutrition and Health
2. To study on Nutritional Analysis of Uttarakhand's Indigenous Diet

3. RESEARCH METHODS

3.1 Research design

This study used a descriptive and analytical research approach to investigate the nutritional content and consumption patterns of the indigenous cuisine in Uttarakhand. This methodology combines quantitative and qualitative techniques to deliver an extensive comprehension of historic food systems, their nutritional significance, and their pertinence to contemporary dietary habits. This mixed-method strategy facilitates the acquisition of both quantifiable nutritional data and the cultural and behavioral dimensions related to indigenous food use.

3.2 Study area

The research is carried out in designated districts of Uttarakhand, encompassing both the Garhwal and Kumaon areas. Rural and semi-urban regions are predominantly selected due to their greater commitment to traditional food customs. The region's geographical variety is considered to guarantee that variations in dietary practices resulting from altitude, climate, and accessibility are properly reflected.

3.3 Sample size

A multistage sampling method is utilized to pick 120 respondents. Districts are first chosen based on the predominance of traditional food customs. Villages are subsequently selected using random sampling, and houses are then picked using systematic sampling techniques. The research encompasses between 100–150 families, guaranteeing a balanced representation of all socio-economic and demographic categories[15]. Respondents mostly consist of family leaders and principal food preparers who are knowledgeable about daily dietary consumption.[8]

3.4 Sources

Primary data is obtained by structured surveys, 24-hour dietary recalls, and food frequency questionnaires (FFQ). The 24-hour recall approach

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aids in assessing individuals' real nutritional intake, whereas the FFQ offers insights into habitual eating habits of indigenous foods. Semi-structured interviews are undertaken with elderly individuals and local knowledge bearers to record traditional food habits and preparation techniques. Direct observation is employed to document portion sizes and cooking methods, hence improving the precision of the gathered data. Secondary data is obtained from several reputable sources, including academic journals, publications, and papers issued by institutions like the Indian Council of Medical academic and the National Institute of Nutrition. Standard food composition tables and current research are utilized to facilitate the identification and nutritional analysis of indigenous food products.

3.5 Identification of Indigenous Foods

The identification of indigenous foods is conducted by field surveys and literature reviews. Items frequently ingested include millets (mandua), pseudo-cereals (jhangora), pulses (bhatt, gahat), as well as locally sourced vegetables and wild delicacies. These foods are classified into primary categories including grains, pulses, vegetables, and fruits to enable systematic investigation.

3.6 Nutritional analysis

The nutritional analysis of the specified food products is performed utilizing both laboratory and software-based techniques. Laboratory analysis is conducted to quantify macronutrients and specific micronutrients according to defined protocols established by AOAC International. Furthermore, dietary intake data is evaluated utilizing nutritional tools like NutriSurvey and Indian Food Composition Tables to ascertain energy and nutrient consumption levels.

3.7 Statistical analysis

Statistical techniques, like mean, percentage, and standard deviation, are utilized for data analysis to summarize the data. A comparative study is conducted by juxtaposing the observed nutrient consumption with the Recommended Dietary Allowances (RDA) established by the Indian Council of Medical Research. Correlation analysis is employed to investigate the links between food patterns and nutritional outcomes. The findings are displayed using tables and graphs for enhanced comprehension. Ethical issues are meticulously adhered to throughout the investigation. Informed consent is secured from all participants before data collection, and the confidentiality of the

information is preserved. Participation is optional, and respondents may withdraw from the research at any point without repercussions. Notwithstanding meticulous planning, the study had certain constraints. This includes potential recollection bias in dietary data, seasonal fluctuations in food availability, and limitations in doing comprehensive laboratory analyses for all micronutrients. Furthermore, geographical variation within Uttarakhand may restrict the applicability of findings to the overall population.[9]

3.8 Research Instruments

The research instruments undergo pre-testing via a pilot study to guarantee reliability and validity. Data obtained through several approaches, including 24-hour recall and food frequency questionnaires (FFQ), are cross-validated to enhance precision. Standardized methodologies and instruments are employed throughout the investigation to ensure uniformity and scientific rigor.

4. RESULT AND DISCUSSION

Table 1: Demographic Profile of Respondents (n = 120)

Variable	Category	Frequency	Percentage (%)
Gender	Male	52	43.3
	Female	68	56.7
Age Group	18–35 years	30	25.0
	36–55 years	55	45.8
	56+ years	35	29.2
Residence	Rural	85	70.8
	Semi-Urban	35	29.2

The demographic profile reveals that a predominant portion of respondents are female (56.7%), which aligns with the expectation that women generally oversee food preparation and nutritional choices within families. The majority of participants are between the 36–55 age range, indicating that middle-aged persons significantly contribute to the maintenance and practice of traditional dietary customs. The majority of rural respondents (70.8%) indicate a sustained dependence on indigenous cuisine in less urbanized areas.

Table 2: Consumption Frequency of Indigenous Foods

Food Item	Daily	Weekly	Occasionally	Rarely
	y	y (%)	y (%)	y (%)

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	(%)			
Mandua (Ragi)	48	30	15	7
Jhangora	35	40	18	7
Bhatt (Black Soybean)	42	33	15	10
Gahat (Horse Gram)	38	36	16	10

The consumption pattern shows that traditional foods such as mandua, jhangora, bhatt, and gahat are still widely consumed, with a significant proportion of respondents reporting daily or weekly intake. Mandua and Bhatt emerge as staple foods, indicating their importance in the local diet. A significant proportion of respondents consume traditional foods seldom, indicating a steady transition toward contemporary or processed cuisine.

Table 3: Average Daily Nutrient Intake Compared to RDA

Nutrient	Mean Intake	Standard Deviation (SD)	Minimum	Maximum
Energy (kcal)	2050	180	1650	2400
Protein (g)	58	6.5	45	72
Fat (g)	45	7.2	30	60
Iron (mg)	19	3.1	13	25
Calcium (mg)	780	95	600	980

The average calorie intake of 2050 kcal, with a standard deviation of 180, signifies substantial heterogeneity among participants. The majority of individuals exhibit energy consumption levels near the norm, however some deviate markedly, indicating variations in dietary intake and lifestyle choices. The average protein intake is 58 g, accompanied by a low standard deviation of 6.5, indicating a consistent level of protein consumption among households. This regularity might be ascribed to the frequent incorporation of protein-dense indigenous foods like pulses and beans. The mean fat consumption is 45 g, with a standard deviation of 7.2, signifying substantial variability. This may result from variations in culinary

traditions, such as the utilization of oil or ghee, among households. Iron consumption averages 19 mg with a standard deviation of 3.1, indicating some variability but typically reflecting sufficient amounts. This illustrates the significance of iron-rich traditional foods such as millets and pulses. The mean calcium consumption is 780 mg, with a standard deviation of 95, indicating more variability relative to other nutrients. This indicates a lack of consistency in the intake of calcium-rich foods, perhaps resulting in nutritional deficiencies among specific demographic groups.[10]

Table 4: Awareness of Nutritional Benefits of Indigenous Foods

Awareness Level	Frequency	Percentage (%)
High	40	33.3
Moderate	55	45.8
Low	25	20.9

The awareness data indicates that the majority of respondents possess a moderate understanding of the nutritional advantages of indigenous foods. Nonetheless, hardly one-third exhibit substantial understanding, underscoring the necessity for nutritional education and awareness initiatives to advocate the significance of traditional diets.[11]

4.1 Discussion

The results emphasize that Uttarakhand's traditional food remains essential for maintaining nutritional intake, especially in rural regions. Consistent eating of nutrient-rich foods like millets and pulses enhances protein and micronutrient intake. These findings corroborate earlier research highlighting the nutritional advantages of traditional diets compared to highly processed contemporary meals. Notwithstanding the nutritional benefits, the study reveals a progressive decrease in the habitual intake of indigenous foods. This transition can be ascribed to urbanization, evolving lifestyle habits, and enhanced accessibility of processed food items. The diminished consumption among specific demographics indicates a transitional period in which conventional diets are being largely supplanted. The disparity between actual nutrient consumption and recommended dietary requirements, especially for calcium and iron, suggests that although indigenous foods are advantageous, they may not be ingested in sufficient amounts or combinations. This necessitates the advancement of balanced eating habits that amalgamate traditional foods with enhanced nutritional planning. A significant factor

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is the moderate degree of awareness among responders. Despite the existence of traditional wisdom, it may not consistently manifest in deliberate eating decisions. Enhancing awareness via community-based interventions, educational initiatives, and the incorporation of indigenous foods into public nutrition programs might improve their acceptance and consumption[16]. The study emphasizes the significance of conserving and advocating for Uttarakhand's indigenous cuisine as a sustainable and nutritionally beneficial food system. Simultaneously, it underscores the necessity for proactive initiatives to mitigate nutritional deficiencies and avert the decline of traditional dietary patterns.[12]

5. CONCLUSION

The research suggests that the traditional cuisine of Uttarakhand is both nutritionally valuable and culturally significant, especially in rural and semi-urban regions. Traditional foods, such as millets, pulses, and locally sourced vegetables, remain integral to everyday meals, enhancing overall nutritional quality. These foods are inherently abundant in proteins, fiber, and vital micronutrients, rendering them exceptionally advantageous for health maintenance and the prevention of lifestyle-related diseases. The assessment of nutrient consumption reveals that although the indigenous diet is fairly balanced, specific nutritional deficiencies persist. Despite protein consumption nearing suggested levels, shortages in energy, calcium, and iron indicate a necessity for enhanced dietary diversification and sufficient intake. This underscores that the nutritious potential of traditional foods remains underexploited, either due to portion sizes, cooking techniques, or evolving eating preferences. A significant result is that indigenous eating patterns are progressively diminishing, particularly among younger generations and semi-urban demographics. The growing prevalence of contemporary and processed foods, along with lifestyle alterations, is leading to a departure from traditional dietary practices. Should this tendency persist, it might result in the erosion of invaluable traditional knowledge and adversely affect nutritional health. The research indicates that knowledge of the nutritional advantages of indigenous foods is moderate throughout the public. Although individuals persist in consuming these meals due to habit or custom, there is a paucity of scientific comprehension of their health advantages.

Increasing awareness via education and public health campaigns is essential for fostering the sustained consumption of these nutrient-dense foods. In conclusion, Uttarakhand's native cuisine possesses significant potential to enhance sustainable nutrition and food security. Nonetheless, strategic interventions are necessary, encompassing nutrition education, the promotion of traditional foods, and their incorporation into government nutrition programs, as advised by organizations such as the Indian Council of Medical Research. Maintaining and rejuvenating these eating patterns can substantially enhance public health while preserving cultural history.

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