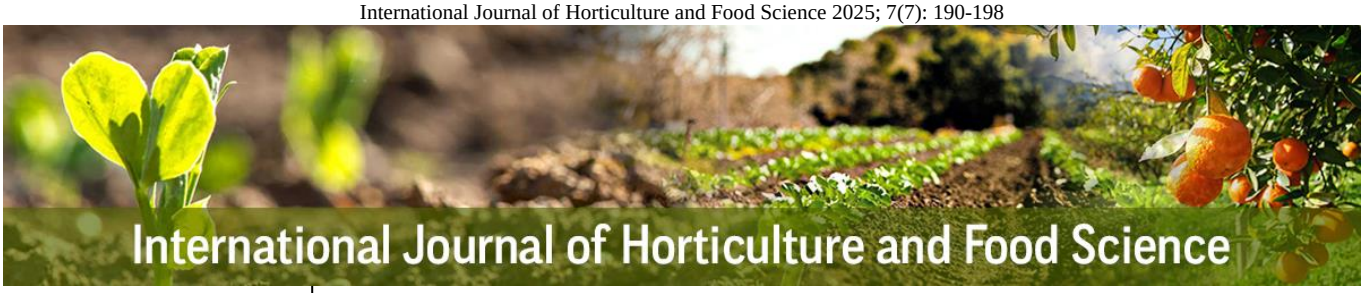

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Dietary habits and ultra-processed food intake in hospital-based healthcare professionals: A pilot analysis

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Abstract
This pilot study explores the dietary patterns and ultra-processed food (UPF) consumption among healthcare workers within a tertiary care hospital in India. Using a structured, self-administered questionnaire, data were collected from 20 healthcare professionals of varying roles and shift schedules. Results indicate that 60% of participants frequently skip meals, and a majority rely on vending machines and local stores as their main food sources during shifts. Biscuits, chips, and sugary beverages emerged as the most consumed UPFs. Although 75% of respondents demonstrated awareness of the adverse health effects associated with UPFs, nearly half continued to consume these foods under stress or time constraints. Notably, 60% reported reading nutrition labels, reflecting moderate nutritional literacy, yet practical barriers such as long working hours, inadequate meal planning, and limited healthy options often dictated food choices. The data reveal a persistent gap between knowledge and actual behavior, driven by occupational demands and environmental limitations. These findings underscore the urgent need for institutional policies that improve access to nutritious foods, provide protected meal breaks, and incorporate workplace wellness initiatives tailored for healthcare settings. Expanding research with larger samples is warranted to inform effective, sustainable interventions targeting dietary behaviors among healthcare professionals.

Keywords: Healthcare workers, dietary practices, ultra-processed foods, nutrition awareness, food behaviour, occupational stress

Introduction
Healthcare professionals play a pivotal role in the promotion and protection of public health. However, their own health practices, particularly in the context of diet and nutrition, are often overlooked. The demanding nature of healthcare professions-marked by long shifts, night duties, high patient loads, and time scarcity-frequently compromises their dietary behaviours. As a result, many healthcare workers (HCWs) turn to convenient and readily available food options, which are often high in calories but low in nutritional value (Rao *et al*., 2017) [8]. Recent literature has identified a disturbing trend of increasing ultra-processed food (UPF) consumption across various population groups, including healthcare workers. UPFs are industrial formulations typically comprising ingredients not used in culinary preparations, such as preservatives, colorants, flavour enhancers, and artificial sweeteners (Monteiro *et al*., 2018) [5]. These foods are characterized by high energy density, elevated levels of saturated fat, sugar, and sodium, and minimal essential nutrients or dietary fibre, leading to increased risks of obesity, metabolic syndrome, and other non-communicable diseases (Gupta & Sachdev, 2022) [1]. The healthcare sector is paradoxically vulnerable. Although HCWs possess extensive medical knowledge, the work environment often limits their ability to make healthy food choices. Studies conducted in India have found that healthcare professionals commonly skip meals, consume food at irregular hours, and have limited access to healthy food options within hospital settings (Sethy *et al*., 2022) [9]. For instance, a study conducted among nurses in Puducherry highlighted that though awareness of dietary practices was moderate, unhealthy eating patterns were still prevalent (Rani *et al*., 2017) [7]. Another study reported that Indian nurses frequently consumed high-fat and sugary foods, largely due to the unavailability of wholesome meals during odd working hours (Rao

et al., 2017) [8]. Rotational shift work exacerbates these dietary challenges. Disruptions to circadian rhythm caused by night shifts affect hunger and satiety hormones, leading to increased snacking and a preference for energy-dense UPFs (Konieczna *et al*., 2023) [3]. A cross-sectional study on dietary patterns and shift work revealed that night shift workers were more likely to consume pre-packaged foods and beverages than their day shift counterparts (Kumar *et al*., 2020) [4]. In the Indian context, ultra-processed food consumption has seen a steady rise in both urban and semi-urban regions. An analysis by Jain and Mathur (2021) [2] revealed that between 2013 and 2016, the purchase of UPFs in urban India significantly increased, reflecting the changing dietary landscape. The shift from traditional diets towards industrially processed foods is partly driven by aggressive marketing, urban lifestyles, and time constraints (Nutrition Advocacy in Public Interest [NAPi] & Breastfeeding Promotion Network of India [BPNI], 2023) [6]. While this trend is well documented in the general population, limited data is available on the specific patterns and health implications of UPF consumption among healthcare professionals. Globally, UPFs now make up more than 50% of daily caloric intake in some populations, contributing to a rise in obesity and related comorbidities (Monteiro *et al*., 2018) [5]. In India, although data on UPF intake is growing, there is a dearth of literature that specifically addresses UPF consumption among HCWs. Given the crucial position healthcare workers occupy within the healthcare delivery system, it is vital to assess their own health behaviours-both for their personal well-being and their role as role models in the community. Healthcare workers often influence dietary decisions among patients. Their dietary behaviour can affect how they counsel and model healthy habits to the wider public (Rao *et al*., 2017) [8]. Thus, identifying poor dietary practices among HCWs can offer an opportunity for systemic reform within the hospital food environment and for targeted health promotion efforts.

Objectives

1. To assess the frequency of ultra-processed food consumption among healthcare workers.
2. To evaluate the dietary habits and meal patterns of healthcare workers.
3. To analyse the relationship between work shift timings and food choices.

Review of Literature

1. Dietary Patterns among Healthcare Workers

Healthcare professionals often experience erratic work schedules, night shifts, and high-pressure environments, all of which can disrupt regular eating habits. Studies have shown that such job-related stress and time constraints often lead healthcare workers to skip meals, consume food at irregular intervals, or rely heavily on quick and convenient food options, including ultra-processed foods (UPFs). These dietary behaviours can negatively impact their overall health and well-being, particularly given their role in modelling healthy behaviours for patients and the broader public.

2. Rise of Ultra-Processed Food Consumption in India

India is currently undergoing a nutritional transition, with a rapid increase in the consumption of UPFs across both urban and semi-urban populations. This rise is attributed to lifestyle changes, increased urbanization, aggressive marketing by food corporations, and a growing preference for convenience over nutritional quality (Rathi *et al*., 2024). These UPFs are often high in refined sugars, saturated fats, and sodium while being low in essential nutrients, thus contributing to a decline in overall diet quality (Mediratta *et al*., 2023) [16]. Among working professionals, including healthcare workers, this trend is exacerbated by time constraints and inadequate access to wholesome meals during long shifts (Jain & Mathur, 2020) [15].

3. Health Implications of Ultra-Processed Foods

A growing body of evidence links the regular intake of UPFs to an increased risk of obesity, type 2 diabetes, cardiovascular diseases, metabolic syndrome, and even certain cancers (Lane *et al*., 2021; Blanco-Rojo *et al*., 2020) [11]. The overconsumption of these energy-dense, nutrient-poor foods disrupts metabolic balance and contributes to chronic inflammation. In the Indian context, UPF consumption has also been associated with nutritional inadequacies such as reduced dietary diversity and micronutrient deficiencies (Mediratta *et al*., 2023) [16]. This is particularly concerning for healthcare workers who are often at risk of neglecting their own health while prioritizing their professional responsibilities.

4. Gaps in Current Indian Literature

Despite the increasing prevalence of UPF consumption and associated health risks, there is limited research specifically focusing on dietary practices among Indian healthcare workers. Most available studies centre on general populations or adolescents, with very few evaluating the dietary intake and UPF consumption of professionals in high-stress healthcare environments (Jain & Mathur, 2020) [15]. Given the essential role healthcare workers play in patient counselling and health promotion, studying their own dietary behaviour can offer critical insights. Identifying gaps and unhealthy trends can also provide a foundation for designing targeted workplace nutrition programs and policies.

S. No.	Upsides	References
1.	Adolescents in Delhi derive 16.2% of energy from UPFs	Jain, A., & Mathur, P. (2020) [15]. Intake of ultra-processed foods among adolescents from low- and middle-income families in Delhi. Indian Pediatrics
2.	UPFs contribute to 17% of energy intake among Indian adults	Mediratta, S., Ghosh, S., & Mathur, P. (2023). Intake of ultra-processed food, dietary diversity and the risk of nutritional inadequacy among adults in India. Public Health Nutrition
3.	High UPF consumption linked to increased risk of obesity and metabolic syndrome	Lane, M. M., *et al*. (2021) [11]. Consumption of ultra-processed foods and health status: a systematic review and meta-analysis. British Journal of Nutrition
4.	UPF consumption in India rose from USD 0.9 billion in 2006 to USD 37.9 billion in 2019	Rathi, N., *et al*. (2024). Mapping ultra-processed foods (UPFs) in India: a formative research study. BMC Public Health
5.	UPFs contribute to 33% of sodium intake	Mediratta, S., Ghosh, S., & Mathur, P. (2023). Intake of ultra-processed food, dietary

	among Indian adults	diversity and the risk of nutritional inadequacy among adults in India. Public Health Nutrition
6.	High UPF consumption doubles the risk of subclinical coronary atherosclerosis	Blanco-Rojo, R., *et al*. (2020). High consumption of ultra-processed food may double the risk of subclinical coronary atherosclerosis: the Aragon Workers' Health Study (AWHS). BMC Medicine
7.	UPF consumption among South Indian young adults is 9.3% of total energy intake	Nair, S., *et al*. (2024). Influence of ultra-processed food in the diet of South Indian young adults: an explanatory mixed method study. Public Health Nutrition
8.	UPF consumption linked to increased risk of non-communicable diseases in India	Rathi, N., *et al*. (2024). Mapping ultra-processed foods (UPFs) in India: a formative research study. BMC Public Health
9.	UPF consumption in India is fueling an alarming rise of chronic diseases	Pharmaceutical Technology. (2024). UPFs fueling 'alarming rise of chronic diseases' in India. Pharmaceutical Technology
10.	UPF consumption in India is associated with increased prevalence of obesity	Jain, S., & Mathur, P. (2021) [2]. Processed foods purchase profiles in urban India in 2013 and 2016: a cluster and multivariate analysis. Public Health Nutrition

Methodology

This pilot study employed a cross-sectional descriptive research design to evaluate dietary practices and ultra-processed food (UPF) consumption among healthcare workers (HCWs) at Max Smart Super-Speciality Hospital, Saket, New Delhi. As a tertiary care hospital offering a wide range of clinical services and employing a diverse and dynamic healthcare workforce, the setting provided an ideal environment to explore dietary behaviors in a demanding professional context. The primary objective of this short-term, exploratory investigation was to generate preliminary data that could inform the design and scope of a larger, more comprehensive study in the future. Data collection was conducted over a period of two months, during which participants were approached in a non-intrusive manner in staff lounges, break rooms, and other accessible areas to ensure minimal disruption to their professional duties. The study population included a broad spectrum of healthcare professionals such as doctors, nurses, dietitians, physiotherapists, and laboratory technicians, irrespective of gender, age, or departmental affiliation, to ensure a representative understanding of dietary habits across healthcare roles. Inclusion criteria required participants to be currently employed healthcare professionals aged 18 years or older, who were willing to participate voluntarily. Exclusion criteria comprised individuals on long-term medical or maternity leave during the study period, those unwilling to participate, or those who submitted incomplete responses. A total of 20 HCWs were enrolled in the study using a convenience sampling method, which was chosen due to the unpredictable and busy schedules inherent to hospital operations. The sample size was deliberately kept small to align with the time and logistical constraints of a pilot investigation, yet was deemed adequate to capture observable trends and generate meaningful insights for subsequent research. Verbal informed consent was obtained prior to participation, and respondents were assured of confidentiality and anonymity to encourage honest disclosure. Data was collected using a structured, self-administered questionnaire specifically developed for the study. The questionnaire was designed to be concise, requiring approximately 5-7 minutes to complete, and included close-ended as well as multiple-choice questions. It comprised three primary sections: demographic information (age, gender, designation, shift timing, and average daily working hours), dietary practices (including number of meals consumed per day, frequency of meal skipping, and typical food sources during work hours), and ultra-processed food consumption (frequency and types of UPFs consumed, awareness of associated health risks, and reasons for consumption such as taste, convenience, availability, stress, and time constraints).

The questionnaire was subjected to expert review by professionals in clinical nutrition and hospital administration to ensure content validity, clarity, and contextual relevance. A pilot pre-test was conducted with five HCWs to evaluate the practicality and readability of the tool, after which minor modifications were incorporated based on participant feedback. The final version of the questionnaire was then disseminated in person by the researcher across various hospital departments during non-peak hours, allowing for undisturbed participation.

To streamline data capture and ensure ease of analysis, responses were recorded electronically through a structured Google Form. This methodological framework enabled the systematic and ethical collection of baseline data regarding healthcare workers' nutritional behaviors and UPF intake within a hospital environment, providing an initial yet valuable foundation for broader investigations into occupational health and nutrition among medical professionals.

Ethical Considerations

As the study was observational and did not involve any invasive procedures or sensitive personal data, formal ethical clearance was not required. However, all participants were informed about the voluntary nature of the study and were free to withdraw at any time without any consequences. The principles of confidentiality, anonymity, and informed participation were strictly followed.

Data Analysis

The data collected from the questionnaires was entered into Microsoft Excel and analysed using descriptive statistics. The main statistical measures used included frequencies and percentages, which were presented in tables and charts to summarise the demographic profile, dietary patterns, and UPF consumption trends among the healthcare workers.

No inferential statistics were applied, as this was a pilot study aimed at exploring general patterns and feasibility rather than establishing causality or strong associations.

Result and Discussion

The demographic data revealed that a majority of the participating healthcare workers (HCWs) were female (60%), with males accounting for the remaining 40%. The largest age group represented was 25-35 years (55%), followed by those under 25 (25%). This demographic distribution reflects a young and relatively early-career workforce, which is typical of large tertiary care hospitals. In terms of designation, dietitians formed the largest group (40%), followed by doctors and nurses (20% each), while physiotherapists and administrative staff each constituted

10%. These variations ensured a balanced representation of both clinical and non-clinical HCWs, offering a multidimensional view of workplace dietary patterns. Most participants (60%) worked 8-10 hours daily, indicating a high workload typical of healthcare environments. About 45% were on fixed day shifts, while another 45% reported rotational shifts, pointing to a substantial proportion of HCWs experiencing variable and potentially disruptive circadian patterns. Shift patterns are known to significantly affect dietary rhythms, metabolic health, and stress levels, as supported by previous literature indicating increased metabolic syndrome risk among rotating-shift workers. Dietary patterns revealed that 55% of the participants consumed 3-4 meals daily, while 30% consumed less than three. Alarmingly, 60% of HCWs reported meal skipping, a behavior strongly associated with impaired glucose metabolism, increased appetite dysregulation, and compensatory overeating. The source of food items further highlighted potential nutritional inadequacies. While 50% of participants procured food from vending machines and local stores, only 20% reported bringing meals from home. This trend reflects a heavy dependence on readily available, often ultra-processed, and nutritionally poor food options, exacerbated by time constraints and lack of access to healthier alternatives during work hours.

Tea and coffee consumption was significantly high, with 80% reporting regular intake to combat stress. Caffeine dependence is a known coping mechanism among HCWs due to high occupational demands, though overreliance may further disrupt sleep and exacerbate anxiety, particularly in shift workers. With respect to ultra-processed food (UPF) consumption, a concerning pattern emerged. A majority (70%) consumed UPFs 1-2 times per day, while 15% reported intake 3-4 times daily. Biscuits/cookies were the most consumed UPF (65%), followed by chips/namkeens (55%), and sugary beverages and chocolates (45% each). These patterns align with previous findings linking UPF consumption to both stress-eating and convenience in high-stress work environments. The reasons cited for UPF consumption included taste (50%), stress/craving (40%), and time constraints (35%). Although 75% of respondents were aware of the health risks posed by UPFs, the habitual consumption among 30% of participants underscores the gap between knowledge and behavior.

Interestingly, 60% of HCWs reported reading nutritional labels, which shows a fair level of health literacy. However, this did not translate into lower UPF consumption, possibly due to limited healthier options at the workplace. Furthermore, 45% of participants admitted to depending on UPFs during stress episodes, indicating an emotional and behavioral trigger for unhealthy eating-a critical target for future workplace wellness interventions.

This pilot study demonstrates that despite awareness about the adverse effects of UPFs, practical constraints like long working hours, shift patterns, inadequate meal planning, and workplace food environments drive suboptimal dietary practices among healthcare professionals. These findings emphasize the need for institutional policies promoting healthier food availability, flexible break schedules, and nutrition-focused behavioral interventions tailored for hospital staff. Future studies with a larger sample size and intervention models could validate and expand on these results to create sustainable dietary behavior change in healthcare settings.

Table 1: Demographic Profile of the healthcare workers

Gender	Frequency (n)	Percentage (%)
Female	**12**	**60%**
Male	**8**	**40%**
Age Group		
Less than 25 years	5	25%
25-35 years	11	55%
36-45 years	2	10%
More than 45 years	2	10%
Designation		
Doctor	4	20%
Dietitian	8	40%
Nurse	4	20%
Physiotherapist	2	10%
Administration Staff	2	10%
Working hours		
6-8 hours	**4**	**20%**
8-10 hours	12	60%
10-12 hours	2	10%
More than 12 hours	2	10%
Shift pattern		
Fix Day Shift	9	45%
Fix Night Shift	1	5%
Rotational Shift	9	45%
On-Call only	1	5%

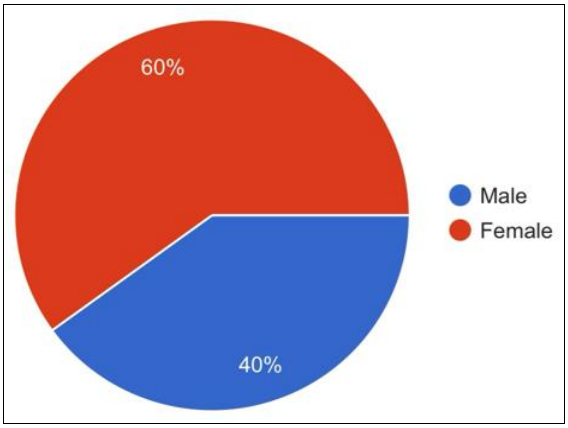

Fig 1: Gender distribution of the Participants

A total of 20 healthcare workers participated in the study. The gender distribution indicated a higher representation of females (60%) compared to males (40%).

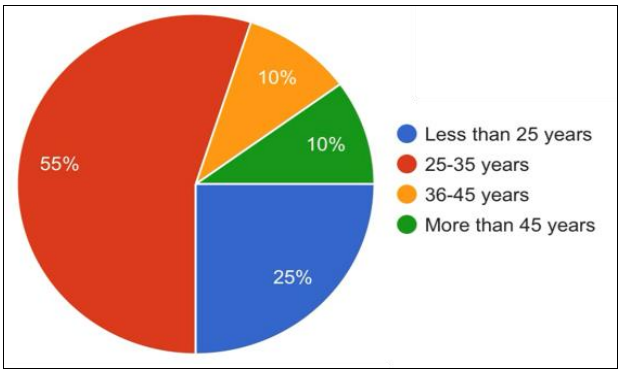

Fig 2: Age group of the Participants

The predominant age group was 25-35 years (55%), followed by 25% below 25 years, indicating a relatively young and early-career workforce. Participants in the age brackets of 36-45 years and above 45 years were equally represented at 10% each.

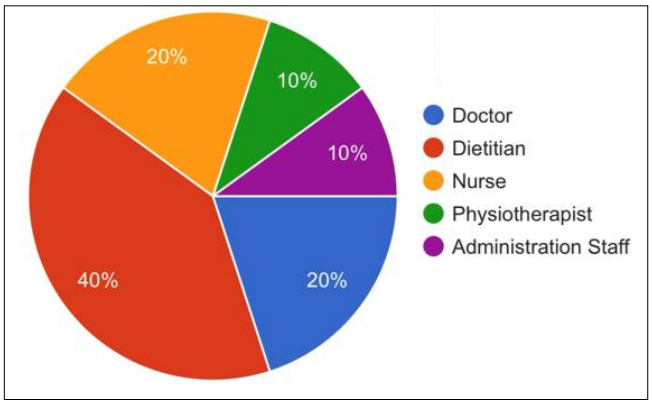

Fig 3: Designation of the Participants

With respect to professional designation, dietitians formed the largest group (40%), while doctors and nurses each accounted for 20%, and physiotherapists and administrative staff comprised 10% each. This multidisciplinary composition reflects a balanced cross-section of healthcare providers, enhancing the relevance of dietary pattern analysis across roles.

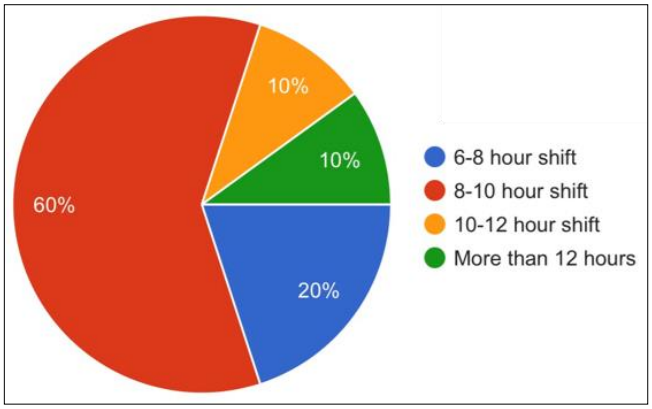

Fig 4: Daily working hours of the Participants

Most respondents (60%) reported working 8-10 hours daily, consistent with standard healthcare shift durations. Meanwhile, 20% worked 6-8 hours, and 10% each reported longer shifts of 10-12 hours or more than 12 hours.

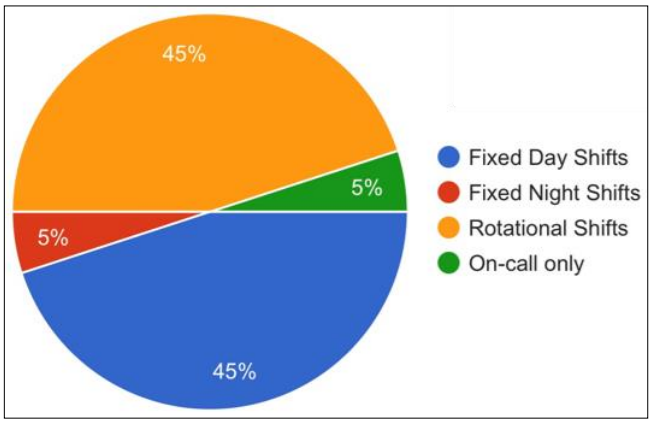

Fig 5: Nature of working shifts of the Participants

In terms of shift pattern, 45% were on fixed day shifts and another 45% on rotational shifts. Only a small proportion worked fixed night shifts (5%) or were on-call only (5%).

Table 2: Dietary Practices of Healthcare Workers

No. of meals per day	Frequency (n)	Percentage (%)
Less than 3	6	30%
3-4 meals	11	55%
More than 4 meals	3	15%
Meals skipping frequency		
Yes	12	60%
No	8	40%
Source of food items		
Canteen	7	35%
Vending Machine	10	50%
Brought from Home	4	20%
Food Delivery App	7	35%
Local Store	10	50%
Consumption of tea/ coffee to combat stress		
Yes	16	80%
No	4	20%

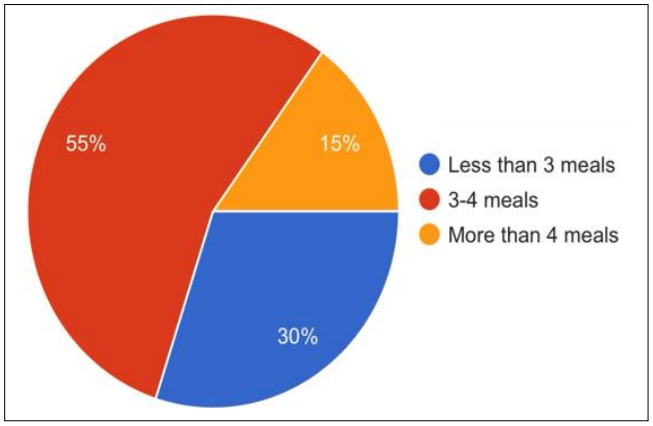

Fig 6: Number of meals consumed by the participants daily

Among the 20 healthcare workers surveyed, the majority (55%) reported consuming 3-4 meals per day, which aligns with standard dietary recommendations. However, 30% consumed fewer than three meals per day, and 15% reported consuming more than four meals.

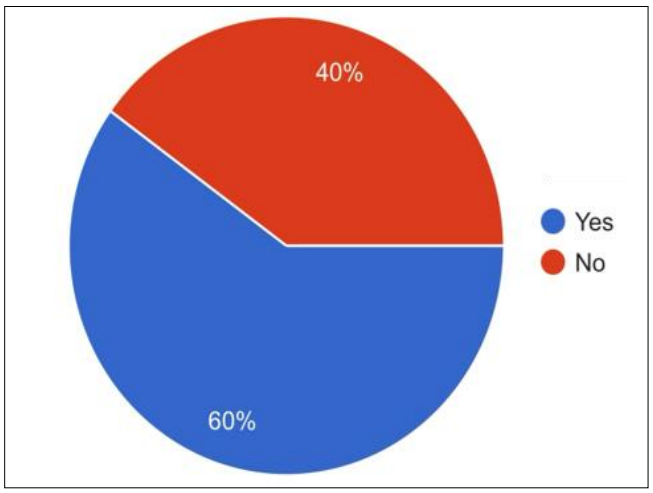

Fig 7: Participants skipping meals due to stress

Meal skipping was notably prevalent, with 60% of participants acknowledging that they skip meals, indicating a possible disruption in routine eating patterns. Conversely, 40% maintained regular meal habits.

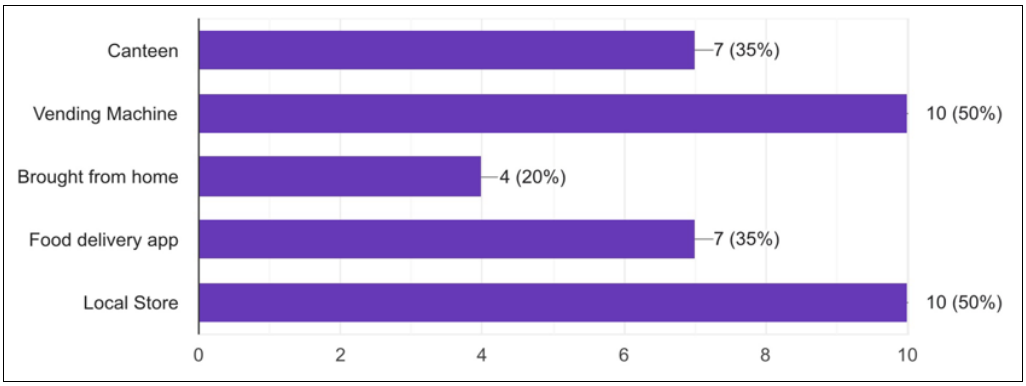

Fig 8: Sources of foods consumed by healthcare workers during their shifts

Food sourcing patterns showed significant reliance on convenience-based options. Half of the participants (50%) reported using vending machines, and 50% also sourced food from local stores. Food delivery apps and the hospital canteen were each used by 35% of respondents. Only 20% brought meals from home, suggesting a relatively lower preference for home-cooked food, potentially due to time constraints or work-related fatigue.

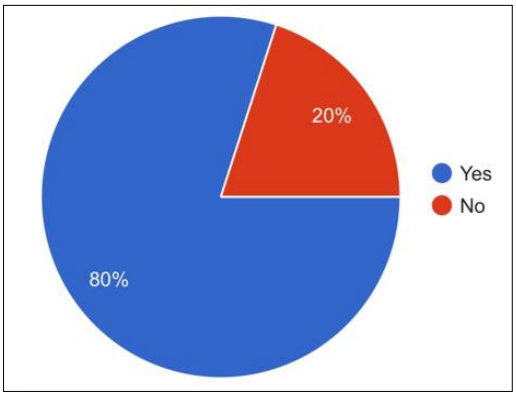

Fig 9: Consumption of Tea/Coffee by HCWs during stress

Regarding beverage consumption, a high proportion (80%) reported consuming tea or coffee specifically to combat work-related stress, reflecting a dependency on stimulants as a coping mechanism.

Table 2: Ultra-Processed foods consumption by healthcare workers

Types of Upfs consumed	Frequency (n)	Percentage (%)
Biscuits/Cookies	13	65%
Packaged Chips/Namkeens	11	55%
Instant Noodles/Soups	5	25%
Soft Drinks/Packaged Juices	9	45%
Chocolates/Candies	9	45%
Packaged Bakery (Cakes, Buns)	6	30%
Frozen Ready-To-Eat Meals	3	15%
Frequency of eating UPFs per day		
0	1	5%
1-2 times	14	70%
3-4 times	3	15%
More than 4 times	2	10%
Reason for choosing UPFs		
Convenience	7	35%
Taste	10	50%
Time Constraints	7	35%
Craving/Stress	8	40%
Habit	6	30%
Awareness of adverse effects of UPFs		
Yes	15	75%
No	5	25%
Reading nutrition labels before buying		
Yes	12	60%
No	8	40%
Dependency on UPFs during stress		
Yes	9	45%
No	11	55%

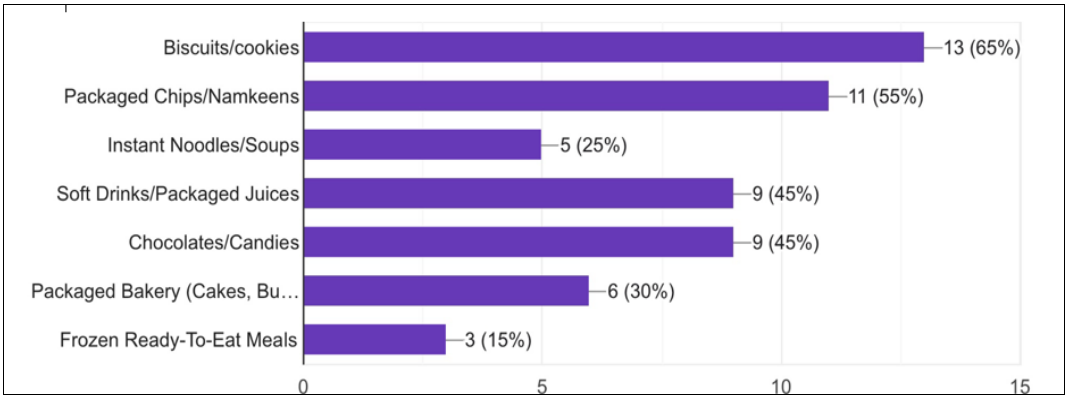

Fig 10: Types of Ultra-Processed foods consumed by healthcare workers

The data reveals that biscuits and cookies (65%) were the most frequently consumed UPFs, followed by packaged chips/namkeen (55%), soft drinks and packaged juices (45%), and chocolates or candies (45%). Around 30% of healthcare workers consumed packaged bakery items like cakes and buns, and 15% reported intake of frozen ready-to-eat meals and instant noodles.

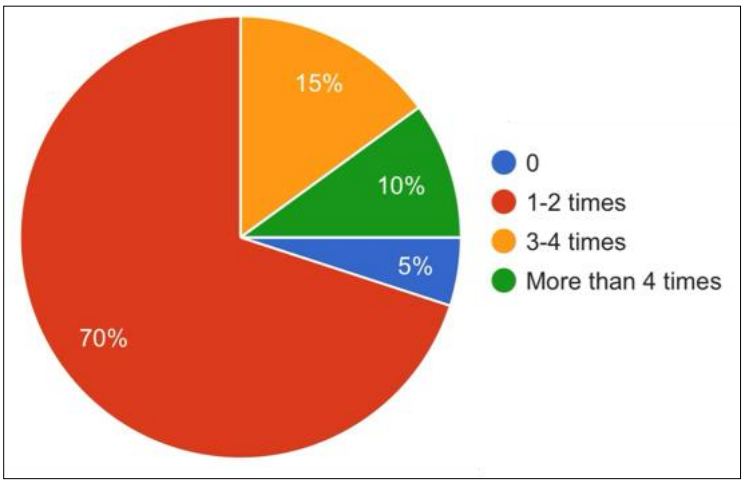

Fig 11: Frequency of UPF consumption in a day

When examining the frequency of UPF intake per day, the majority (70%) consumed them 1-2 times daily, while 15% reported consuming them 3-4 times daily, and 10% had more than 4 instances of UPF intake. Only 5% reported no daily intake, indicating widespread incorporation of UPFs into daily routines.

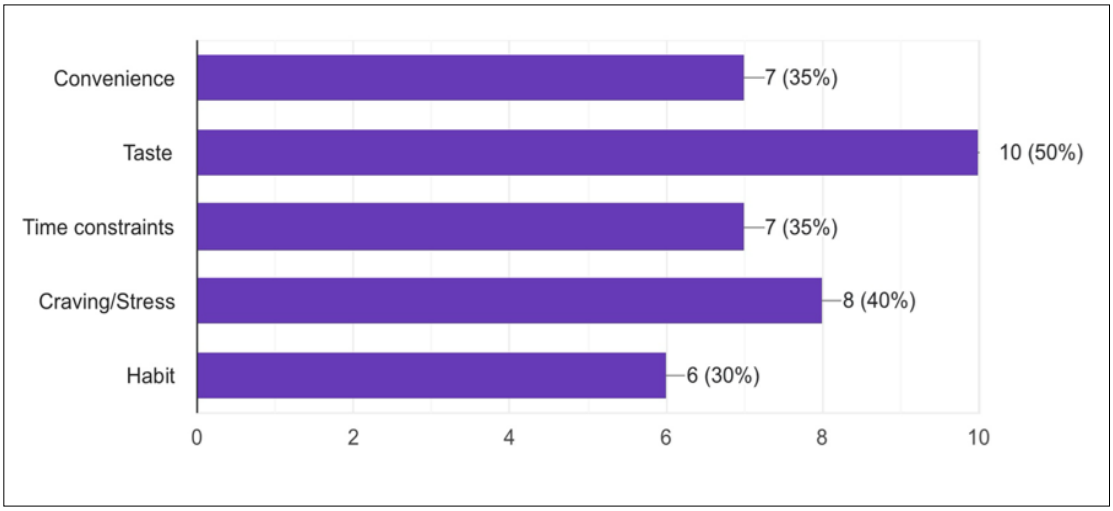

Fig 12: Reasons for UPF consumption

Regarding motivators for consumption, taste (50%) was the most cited reason, followed by craving/stress (40%), convenience and time constraints (35% each), and habit (30%). This suggests both physiological (cravings) and situational (work demands) drivers of UPF intake.

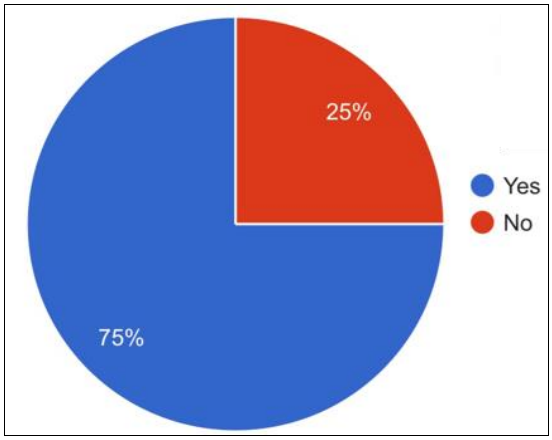

Fig 13: Awareness regarding the adverse effects of UPFs consumption

75% of the healthcare workers were aware of the harmful effects of UPFs, indicating good nutritional literacy despite high-stress occupational environments.

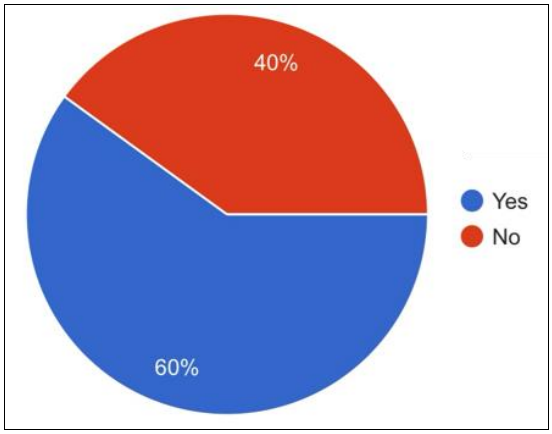

Fig 14: Practice of reading Nutritional Labels on packaged foods

60% reported reading nutrition labels, reflecting a positive behaviour towards informed dietary choices amidst widespread UPF availability.

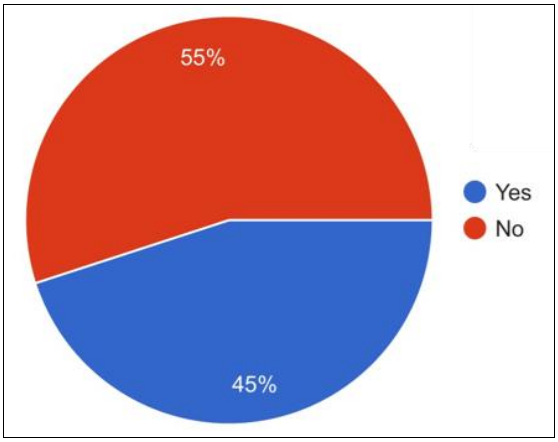

Fig 15: Relying on UPFs during stress conditions

Despite awareness, 45% admitted relying on UPFs during stress, highlighting a behavioural gap likely driven by emotional or occupational factors.

Conclusion

This pilot study highlights the complex dietary behaviors and ultra-processed food (UPF) consumption patterns among healthcare workers in a tertiary care setting, emphasizing the notable gap between nutritional awareness and actual practice. Despite a high degree of understanding regarding the health risks associated with UPFs such as increased susceptibility to chronic diseases, metabolic disruptions, and poor nutritional adequacy-a significant proportion of healthcare professionals continue to rely on these foods due to occupational demands, erratic shifts, and limited access to wholesome alternatives. These findings illustrate the entrenched influence of institutional and environmental barriers over individual intention, with workplace infrastructure, time constraints, and stress acting as primary drivers of suboptimal dietary choices. Furthermore, the results reveal that while many healthcare workers demonstrate positive habits such as meal planning and label reading, these practices are frequently undermined by systemic issues like the prevalence of vending machines, lack of designated breaks, and fatigue. The tendency to consume packaged snacks and caffeinated beverages is a direct reflection of these challenges, raising broader concerns about the sustainability of such patterns in a workforce already exposed to high stress and demanding schedules.

Crucially, the paradox remains that healthcare professionals, who play a vital role in promoting public health, struggle to prioritize their own well-being, often resorting to convenience foods that contradict their knowledge and the advice they provide to patients. To address this knowledge-behavior gap and foster healthier work environments, systemic reforms-ranging from policy-driven improvements in food availability and break scheduling to robust workplace wellness programs are essential.While the study's single-center, small-sample design limits generalizability, it provides valuable baseline insights and highlights the urgent need for larger, multicenter research and targeted interventions. By prioritizing the nutritional health of healthcare workers, institutions can improve both staff well-being and the integrity of public health advocacy.

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