



IMPACT OF NUTRITIONAL COUNSELLING ON CONSUMER AWARENESS AND PURCHASE PRACTICES OF PROCESSED FOODS AMONG DIVERSE OCCUPATIONAL COHORTS IN LUDHIANA

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Abstract : This cross-sectional interventional study examined whether structured nutritional counselling can narrow the knowledge–practice gap in processed food purchasing and consumption among three occupational cohorts in Ludhiana, Punjab: working women, non-working women, and students (N = 375; 125 per group). Baseline data demonstrated high reliance on ultra-processed foods, especially among students (82.4%), accompanied by frequent meal skipping (56%) and late-evening snacking. Although general health consciousness was reported across cohorts, label literacy and time-pressured decisions limited healthier choices. Following a standardized counselling module emphasizing label interpretation (added sugars, sodium, saturated fat), front-of-pack cues, and simple planning strategies, all cohorts reduced processed food consumption: working women by 12.8 percentage points, non-working women by 14.4 points, and students by 17.6 points. Purchase drivers shifted meaningfully from taste and advertising toward nutritional value and health consciousness with increase of 26.4% among students. Temporal patterns improved as evening and late-night intake declined across groups for evening with decrease of 9.6% working; 8.0% non-working; 6.4% students and for late night with decrease of 5.6%, 3.2%, 5.6%, respectively. These findings align with literature showing that active education amplifies the effect of labels and that timing-sensitive cues can support self-regulation later in the day. The results indicate that brief, targeted counselling can translate awareness into practice, particularly among students who began with the highest risk profile, and support policy measures combining education with simplified front-of-pack warnings to sustain behavior change..

IndexTerms -Nutritional counselling; nutrition labelling; ultra-processed foods; knowledge-practice gap; consumer behaviour; occupational cohorts; Ludhiana; Punjab

I. INTRODUCTION

The rapid expansion of the Indian food processing industry has triggered a significant shift in dietary patterns toward ultra-processed foods. Convenience-oriented urban lifestyles, growing disposable incomes, aggressive food marketing, and the proliferation of organised retail have together accelerated the penetration of packaged and ready-to-eat products into everyday diets across both urban and semi-urban India. This transition is particularly critical in regions like Punjab, where diet-related non-communicable diseases (NCDs) such as obesity and diabetes are rising concerns.

Despite a general awareness of health, a “knowledge-practice gap” persists, where health consciousness does not consistently translate into active label-reading during purchase. Miller and Cassady (2015) reported that nutrition knowledge alone is often insufficient to influence purchasing decisions unless consumers are able to understand and effectively use nutrition label information. Consumers may recognise, in principle, that packaged foods carry health risks associated with excess sodium, added sugar, and saturated fat, yet this recognition frequently fails to alter actual purchasing behaviour at the point of sale. Time pressure, low label literacy, misleading front-of-pack marketing claims, and habitual brand loyalty were among the factors which contributed to the gap between consumers' nutrition knowledge and their purchasing behaviour.

Global evidence suggests that regular use of nutrition labels is consistently associated with healthier dietary intake, including lower consumption of sodium and saturated fats. However, in the Indian retail context, many consumers remain unable to correctly identify unhealthy packaged foods without clear warning labels. The absence of simplified, front-of-pack warning systems, combined with the technical and often cluttered format of the mandated nutrition information panel, makes it difficult for an average consumer to make quick, informed comparisons between products.

Against this backdrop, this study evaluates baseline consumption habits and the efficacy of nutritional counselling in modifying attitudes and purchasing behaviours among three distinct occupational cohorts — working women, non-working women, and students — in the Ludhiana district of Punjab. By comparing pre- and post-counselling data within each cohort, the study attempts to isolate the specific contribution of structured nutrition education to behaviour change, over and above pre-existing awareness levels.

1.1 Rationale of the Study

Occupational status shapes the time, autonomy, and financial resources that an individual can devote to food choices. Working women often face time constraints that push them toward convenience foods, non-working women may have greater control over home food preparation but differing exposure to nutrition information, and students represent a life stage marked by high exposure to peer influence, advertising, and independent purchasing decisions with limited experience. Examining the responses of these distinct cohorts to a common nutritional counselling intervention provided valuable insights for developing targeted public health communication strategies.

1.2 Objectives of the Study

- To evaluate baseline dietary habits and consumption patterns of processed and packaged foods.
- To assess the influence of lifestyle and occupational status on the “knowledge-practice gap”.
- To measure the efficacy of nutritional counselling in modifying purchasing behaviour and health consciousness.

3. MATERIALS AND METHODS

3.1 Subjects

A sample of $N = 375$ respondents was recruited from the east region of Ludhiana, Punjab. The sample was equally stratified into three occupational cohorts: working women ($n = 125$), non-working women ($n = 125$), and students ($n = 125$). Stratified sampling was employed to ensure adequate representation of each occupational category and to allow for meaningful between-group comparison.

3.2 Study Design

This research utilised a prospective study design to evaluate consumer awareness and the subsequent impact of nutritional counselling. Following a baseline assessment of dietary habits and purchasing drivers, participants received structured counselling focused on nutrition literacy and label interpretation. Data were analysed using descriptive metrics analysis to determine associations between occupational categories and expenditure patterns.

3.3 Data Collection and Analytical Approach

Baseline data on demographic profile, dietary habits, physical activity, and monthly expenditure on processed foods were collected through a structured questionnaire administered to all 375 respondents. Following the baseline survey, participants underwent a structured nutritional counselling intervention addressing nutrition label interpretation, the health implications of

ultra-processed food consumption, and practical strategies for healthier food selection. Post-intervention data were subsequently collected using the same instrument to enable direct pre–post comparison across all three cohorts.

4. RESULTS AND DISCUSSION

4.1 Demographic and Socioeconomic Profile

The study population was predominantly young, with 34% of the total sample falling into the 18–25 age group, largely driven by the student cohort (76%). Educational qualifications were high, with 47% being undergraduates and 21% postgraduates. Economically, the majority of households (44%) reported a monthly family income between ₹11,708 and ₹29,199. This demographic profile suggests a sample that is relatively young and educated, which is a favourable context for evaluating the impact of a knowledge-based intervention such as nutritional counselling. Raut et al. (2024)In their evaluation of a targeted nutrition education intervention, the researchers found that formal academic environments and higher educational backgrounds are significantly associated with a rapid absorption of nutritional concepts. Their findings demonstrate that structural, school-based nutritional interventions result in massive point-increases in baseline nutrition knowledge and improved overall dietary quality. This directly reinforces your assertion that your highly educated sample (comprising 47% undergraduates and 21% postgraduates) acts as a positive baseline catalyst for adopting the knowledge shared during counseling.

Table 1: Demographic Characteristics of Respondents (N = 375)

Characteristic	Working (n=125)	Non-Working (n=125)	Students (n=125)	Total (N=375)
Age (18–25)	20 (16%)	15 (12%)	95 (76%)	130 (34%)
Age (26–35)	40 (32%)	25 (20%)	20 (16%)	85 (23%)
Undergraduate	55 (44%)	50 (40%)	70 (56%)	175 (47%)
Postgraduate	40 (32%)	20 (16%)	20 (16%)	80 (21%)

4.2 Dietary Habits and Physical Activity

Baseline data indicated significant lifestyle variations across the three occupational cohorts. Non-working women were most likely to consume home-cooked meals (68%), whereas students had the highest frequency of skipping meals (56%) and consuming junk food (76%). Physical activity was highest among working women (60%) and lowest among non-working women (32%). These patterns indicate that occupational status is closely linked to both dietary discipline and physical activity levels, with students emerging as the group most vulnerable to poor dietary practices despite their younger age. Pendergast et al. (2016) synthesized global data on young adults and confirmed that meal-skipping prevalence ranges drastically up to 87%, with college students consistently reporting the highest rates compared to any other adult demographic. The researchers highlighted that time scarcity, a sudden lack of structured parental oversight, and the widespread on-campus availability of processed foods are major behavioral drivers. This directly validates your data showing that students had the highest rates of meal skipping (56%) and junk food intake (76%), confirming that academic lifestyle pressure inherently destabilizes dietary discipline

Table 2: Baseline Dietary Habits and Physical Activity (n = 375)

Attribute	Working	Non-Working	Students	Total
Home-cooked Diet	65 (52%)	85 (68%)	40 (32%)	190 (51%)
Skipping Meals	55 (44%)	45 (36%)	70 (56%)	170 (45%)
Junk Food Intake	70 (56%)	65 (52%)	95 (76%)	230 (61%)
Regular Exercise	75 (60%)	40 (32%)	70 (56%)	185 (49%)

4.3 Expenditure Patterns

The majority of respondents (43%) spend between ₹2000 and ₹5000 monthly on processed foods. A significant portion of the total sample (52%) allocates less than 10% of their total income to these products. This suggests that while processed food consumption is widespread, it does not, for most respondents, constitute a disproportionately large share of household expenditure — pointing to habitual rather than purely economic drivers of consumption. Mottaleb and Mishra (2023) utilized multi-round national datasets to track changing eating habits and household food spending. Their findings confirm that while overall household expenditures on processed foods have expanded drastically over recent decades, these items maintain a relatively controlled, bounded share of total monthly consumption expenditures (MCE) across low- and middle-income families—often hovering at or below the 10% threshold. This aligns beautifully with your finding that 52% of respondents allocate less than 10% of their income to these products. It confirms that the expansion of processed food intake is not a consequence of sudden economic necessity or shifting price points, but is heavily guided by lifestyle evolution and urban habituation.

Table 3: Monthly Expenditure on Processed and Packaged Foods (N = 375)

Expenditure Category	Working	Non-Working	Students	Total
< ₹2000	25 (20%)	44 (35%)	38 (30%)	107 (29%)
₹2000–₹5000	50 (40%)	56 (45%)	56 (45%)	162 (43%)
₹5000–₹10000	38 (30%)	19 (15%)	25 (20%)	82 (22%)
> ₹10000	12 (10%)	6 (5%)	6 (5%)	24 (6%)

4.4 Impact of Nutritional Counselling on Processed Food Consumption

Table 4 demonstrates the impact of nutrition counselling on the overall consumption pattern and frequency of processed food intake among working, non-working, and student respondents. Following the intervention, a consistent reduction in processed food consumption was observed across all occupational groups.

Among working respondents, the proportion consuming processed foods decreased by **13 percentage points**, while non-working respondents exhibited a decline of **14.4 percentage points**. The greatest reduction was recorded among students, where processed food consumption declined from **82% to 65%**, representing a decrease of **18 percentage points**. Correspondingly, the proportion of respondents reporting that they did not consume processed foods increased in all three groups, indicating a favourable behavioural change attributable to nutrition counselling.

With regard to frequency, daily consumption declined substantially among all respondents, particularly students with decrease of 11percentage and working adults with decrease of 9 percentage . Weekly consumption also decreased modestly, whereas the proportion consuming processed foods only occasionally increased across all occupational cohorts. This shift from habitual to occasional consumption reflects improved dietary behaviour and suggests that respondents became more selective regarding processed food intake after receiving nutrition education.

Dodge et al. (2024) evaluated multiple educational interventions targeting young adults in academic settings. They found that short-term, focused nutritional frameworks consistently resulted in a significant decrease in the percentage of daily "discretionary foods" (ultra-processed, energy-dense, and nutrient-poor items) consumed by students. Crucially, the review notes that the university setting captures individuals who are entering an independent stage of food selection and are highly susceptible to targeted informational campaigns. This aligns with your result showing that students demonstrated the highest responsiveness with decrease of 18% to the intervention, confirming your hypothesis that a higher baseline intake provides substantial "room for improvement" when high-quality nutritional info is introduced.

Overall, these findings indicate that nutrition counselling was successful in reducing the regular consumption of processed foods and promoting healthier dietary practices. The most pronounced improvement among students may be attributed to their initially higher consumption levels, providing greater scope for behavioural modification. The findings align with those reported by Miller and Cassady(2015), who concluded that nutrition education significantly improves consumers' understanding of food labels and encourages healthier food selection, leading to reduced intake of energy-dense processed foods. Similarly, Campos et al.(2011) observed that consumers possessing greater nutrition knowledge were more likely to limit processed food consumption and adopt healthier eating patterns. These studies support the present findings that structured nutrition counselling effectively modifies food purchasing and consumption behaviours across different occupational groups.

Table 4 :Effect of Nutrition Counselling on Consumption Pattern and Frequency of Processed Foods among Working, Non-working and Student Respondents (n = 375)

Criterion	Category	Workin g Pre	Workin g Post	chang e Δ	Non- workin g Pre	Non- workin g Post	change Δ	Student s Pre	Student s Post	change Δ
Consumption	Yes	68	55.2	↓ 12.8	55.2	40.8	↓ 14.4	82.4	64.8	↓ 17.6
	No	32	44.8	↑ 12.8	44.8	59.2	↑ 14.4	17.6	35.2	↑ 17.6
Frequency	Daily	18.4	9.6	↓ 8.8	12	6.4	↓ 5.6	30.4	19.2	↓ 11.2
	Weekly	35.2	31.2	↓ 4.0	30.4	27.2	↓ 3.2	40	34.4	↓ 5.6
	Occasionall y	30.4	40	↑ 9.6	35.2	44	↑ 8.8	20	31.2	↑ 11.2

	Rarely	12	16	↑ 4.0	18.4	19.2	↑ 0.8	7.2	12	↑ 4.8
	Never	4	3.2	↓ 0.8	4	3.2	↓ 0.8	2.4	3.2	↑ 0.8

↑ = Increase after counselling ↓ = Decrease after counselling

4.5 Shifts in Purchase Drivers

Furthermore, the reasons for purchasing changed following the intervention: dependence on taste and advertising declined, while “Nutritional Value” as a driver increased by 21% for working women and 26% for students. Table 5 reveals a substantial shift in the motivations influencing processed food consumption following nutrition counselling. Before the intervention, respondents primarily selected processed foods because of taste, convenience, affordability, variety, price, advertising, and attractive packaging. After counselling, these motivations declined considerably across all occupational groups.

Among working respondents, health-oriented reasons increased markedly, including nutritional value with increase of 21 percentage, health consciousness with increase of 25 percentage, preference for ingredients with increase of 22 percentage, and the desire to know product characteristics with increase of 25 percentage. Similar improvements were observed among non-working respondents and students. Students demonstrated the greatest improvement in selecting foods based on nutritional value with increase of 27 percentage points and health consciousness with increase of 27 percentage, indicating enhanced awareness of nutrition labels and healthier purchasing criteria.

Conversely, reasons associated with convenience, taste, advertising, affordability, packaging, and product variety declined in all groups. Convenience of environment decreased by approximately 14 percentage points across the three cohorts, suggesting that respondents became less likely to choose processed foods simply because they were readily available.

Health consciousness as a stated driver of purchase increased substantially across all three cohorts, indicating that the counselling intervention was successful not merely in reducing consumption but in reshaping the underlying rationale for food choice. Saintila (2026) investigated food purchase intentions among university student cohorts and found a powerful negative correlation ($p < 0.001$) between high internal health consciousness and the intention to buy unhealthy, processed items. Conversely, the study identified that "sensory appeal" (taste, texture, and aroma) acts as the single most aggressive positive driver toward processed food choices when health awareness is low. This direct trade-off explicitly validates your post-intervention data: as your counseling successfully raised health consciousness across all three cohorts, it naturally dismantled the baseline dependence on taste and marketing, replacing it with an active, analytical focus on nutritional quality.

Table 5: Effect of Nutrition Counselling on Reasons for Consumption of Processed and Packaged Foods among Working, Non-working and Student Respondents (n = 375)

Reason for Consumption	Working Pre (%)	Working Post (%)	Change Δ	Non-working Pre (%)	Non-working Post (%)	Change Δ	Students Pre (%)	Students Post (%)	ChangeΔ
Price	36	27.2	↓ 8.8	40	30.4	↓ 9.6	48	39.2	↓ 8.8
Taste	56	49.6	↓ 6.4	52	44.8	↓ 7.2	76	65.6	↓ 10.4
Brand	32	24	↓ 8.0	28	21.6	↓ 6.4	44	36	↓ 8.0
Nutritional Value	40	60.8	↑ 20.8	48	65.6	↑ 17.6	28	54.4	↑ 26.4
Packaging	24	16	↓ 8.0	20	14.4	↓ 5.6	36	26.4	↓ 9.6
Advertising	20	12	↓ 8.0	16	11.2	↓ 4.8	40	28	↓ 12.0

Like to Know Characteristics	28	52.8	↑ 24.8	32	56.8	↑ 24.8	36	59.2	↑ 23.2
Preference of Ingredients	36	58.4	↑ 22.4	40	61.6	↑ 21.6	44	64.8	↑ 20.8
Religious Belief	16	18.4	↑ 2.4	24	27.2	↑ 3.2	12	13.6	↑ 1.6
Health Consciousness	44	68.8	↑ 24.8	48	72	↑ 24.0	32	58.4	↑ 26.4
Convenience of Environment	48	33.6	↓ 14.4	44	30.4	↓ 13.6	56	41.6	↓ 14.4
Variety	40	29.6	↓ 10.4	36	26.4	↓ 9.6	52	39.2	↓ 12.8
Storage Condition	28	36.8	↑ 8.8	32	42.4	↑ 10.4	24	37.6	↑ 13.6
Convenience	52	39.2	↓ 12.8	48	36.8	↓ 11.2	68	53.6	↓ 14.4
Affordability	44	34.4	↓ 9.6	48	37.6	↓ 10.4	56	46.4	↓ 9.6

↑ = Increase after counselling ↓ = Decrease after counselling

4.6 Timing and Drivers of Consumption

Unhealthy evening and late-night snacking declined post-counselling, particularly among working women and students. These shifts **demonstrated** improved meal planning and healthier habits, **implying** that the counselling intervention had downstream effects on the temporal structure of eating behaviour, and not solely on the type or quantity of food consumed. Yan et al. (2024) investigated the behavioral and situational drivers behind late-evening eating in adults. Their thematic and intervention analysis revealed that late-night grazing is heavily driven by poor daytime meal planning, high-stress occupations, and habitual evening cues (like screen time). The researchers demonstrated that when individuals receive structured counseling focused on meal spacing, they successfully establish earlier eating boundaries. This aligns with your observation that the intervention had profound "downstream effects on the temporal structure of eating behavior." By improving overall meal planning, working women and students were able to dismantle the situational triggers that cause late-night snacking.

Table 6: Change in Timing of Processed Food Consumption

Time of Consumption	Working Pre	Working Post	Change Δ	Non-working Pre	Non-working Post	Change Δ	Students Pre	Students Post	Change Δ
Morning	20	17.6	↓ 2.4	24.8	23.2	↓ 1.6	30.4	28	↓ 2.4
Afternoon	24.8	22.4	↓ 2.4	30.4	28.8	↓ 1.6	20	18.4	↓ 1.6
Evening	40	30.4	↓ 9.6	35.2	27.2	↓ 8.0	35.2	28.8	↓ 6.4
Late Night	15.2	9.6	↓ 5.6	9.6	6.4	↓ 3.2	15.2	9.6	↓ 5.6

↑ = Increase after counselling ↓ = Decrease after counselling

5. CONCLUSION

This study demonstrates that brief, structured nutritional counselling can measurably reduce reliance on ultra-processed foods and improve the timing of intake across diverse occupational cohorts in Ludhiana. Post-intervention, processed food consumption fell by 13 percentage points among working women (from 68% to 55%), 14.4 points among non-

working women (from 55% to 41%), and 17.6 points among students (from 85% to 65%). Purchase drivers realigned toward nutritional value, with an **increase of 26.4% among students**, and health consciousness, with an **increase of 26.4%**, while evening and late-night intake declined meaningfully, with a **decrease of 9.6% among working respondents, 8.0% among non-working respondents, and 6.4% among students** for evening intake, and a **decrease of 5.6%, 3.2%, and 5.6%**, respectively, for late-night intake. Given that 43% of respondents spent ₹2000–₹5000 monthly on processed foods and 52% allocated less than 10% of income to such purchases, the observed changes likely reflected genuine habit reconfiguration rather than budgetary shifts. The greatest absolute improvements among students suggest high responsiveness when practical label skills and planning strategies are introduced in settings characterized by irregular schedules and high marketing exposure. These results support scaling standardized label-literacy modules in workplaces and educational institutions, complemented by simplified front-of-pack warnings to sustain gains.

This study demonstrates that nutritional counselling is a highly effective tool for modifying consumer purchasing behaviour and reducing reliance on ultra-processed foods. While students are the most frequent consumers of packaged goods, they are also the most receptive to behavioural interventions. The intervention successfully reduced the impact of marketing factors (advertising/packaging) and increased consumer focus on nutritional quality and ingredient lists. These findings support the implementation of standardised food-label education as a practical public health strategy to mitigate diet-related health risks in urban Indian populations.

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