

Dietary Patterns and Eating Outside Home Behaviour among Urban Households: A Cluster-Based Analysis from Hyderabad, India

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Abstract:

Urbanisation and changing lifestyles in India have caused substantial changes in eating habits, where people are now increasingly relying on outside food and prepared meals. In this research, dietary behaviour patterns of 396 urban households from Izzat Nagar, Khana Metta, Hyderabad have been investigated using structured face-to-face interview techniques. Exploratory factor analysis has revealed six dietary behaviour factors accounting for 62.16% variance, including outside food consumption, health awareness, staple foods consumption, fresh foods consumption, supplements consumption, and unhealthy diets. Using K-means clustering, these households were classified into four categories, namely Balanced Traditional Dieters, Health-Conscious Traditional Consumers, Mindful Modern Dieters, and Unhealthy Fast-Food Consumers. Differences across clusters were found to be significant using one-way ANOVA with large effect sizes (η^2) for food quality ($\eta^2=0.225$), health concern ($\eta^2=0.219$), and food knowledge ($\eta^2=0.171$). Age, educational level, and income level were among the demographic factors found to be significantly correlated with diet clusters based on chi-squared analyses. The Unhealthy Fast-Food Consumers appeared to be the least healthy cluster due to low health consciousness, strong affinity towards fried foods, and comprised mostly of older and less educated people. Importantly, consumers' choice for outside food that is fried leads FBOs to reuse oils, thereby creating waste cooking oils (WCO), which pose significant risks to the environment and people's health if disposed of improperly. These results highlight the urgent need for public health programs aimed at increasing people's dietary awareness and the importance of future longitudinal studies focusing on cultural and psychosocial factors affecting urban diet behaviour.

Keywords: Dietary patterns; Eating Outside Home (EOH); Urban households; Food habits; Health consciousness; Waste cooking oil (WCO)

Implications And Contributions

This research work presents valuable empirical insights regarding the dietary segmentation of households residing in a residential area in Hyderabad, India, which has been a largely understudied region in the existing food consumption research landscape. Identification of the four dietary clusters offers significant implications for health practitioners, nutritionists, and policy-makers for implementing interventions to improve dietary behaviour. The key insight from this research work is that health-consciousness and quality considerations, rather than demographics or financial variables, are driving dietary behaviour; this insight is critical in providing a theoretical foundation for the implementation of health campaigns. Most importantly, this study draws attention to the often-ignored link between consumer food behaviour and environmental sustainability; the prevalent preference of urban consumers for fried outside foods contributes significantly to the reuse of cooking oils by FBOs and, ultimately, the production of WCO.

1. Introduction

There have been tremendous changes in the eating practices of India, especially those that occur in urban centres. The rapid pace of urbanisation, globalisation, technology adoption, and lifestyle changes has brought new ways of consuming food into being. The food processing industry has become one of the leading employers in the organised manufacturing industry, providing employment for about 12.41% of all the recorded employment in 2022-23 as per the ASI report (Annual Survey of Industries, 2023).

Homemade dishes are being slowly replaced with restaurant visits, ready-to-eat food items, processed food, and online food ordering services. However, increasing awareness among consumers regarding the importance of health has started driving demand for healthy, organic food, fitness food, and vegan food. These changes have started bringing an effect on various aspects such as the economy, society, culture, and lifestyles of individuals.

However, an important yet less-discussed effect of the transition to external food consumption has been that of consumers' strong inclination towards fried food when eating out. Consumers in urban areas tend to select fried food products such as snacks, fast food, and street food without much regard to the quality of oil used, hygienic conditions, or the frequency of recycling of the oil used. The consumer preference for fried food has motivated FBOs to recycle cooking oils several times during cooking processes, more than three times to be specific, to minimise cost (Savitha T & Keerthana Thangavel, 2022). Continuous heating of cooking oils produces many harmful compounds, such as polyunsaturated fatty acids, malondialdehyde, free fatty acids, and PAHs, which are very dangerous for the health of consumers (J.H. Potgieter et al., 2004; Mishra et al., 2023). Additionally, inappropriate disposal of the generated WCO leads to the pollution of drainage systems, aquatic ecosystems, and soil (A et al., 2022; Balaria et al., 2021).

Despite being concerned about obesity, digestive system issues, and various health problems caused by the intake of food fried in reused oils, individuals still tend to opt for outside food as a result of lack of time, diversity of taste buds, media influence, and availability. The issue of food safety has become very important now. It should be noted that all food outlets have to meet hygiene standards established by the Food Safety and Standards Act 2006 (Ruchika Sharma, 2018). However, not all establishments follow the mentioned guidelines, especially small food outlet owners.

Against the current backdrop, it is crucial to carry out thorough research into urban food habits. As an objective of the current investigation, one can mention the intention to conduct a thorough analysis of food consumption habits of various demographic segments in Izzat Nagar, Khana Metta, Hyderabad; identify clusters within the studied sample depending on food consumption behaviour; and evaluate the influence of health consciousness on individuals' food preferences. By doing this, the researchers will manage to increase the level of awareness among consumers regarding healthy food and minimise its consumption.

2. Literature Review

Eating Outside Home (EOH) has been gaining popularity worldwide, being different across cultures and countries; however, food preferences continue changing regardless of conventional methods and habits (Gesteiro et al., 2022). In India, as a result of rapid urbanisation and globalisation, the diversity of foods has increased immensely, with most people in cities preferring outside food even knowing about their negative health effects, as purchasing and consumption of outside food is much easier (Havish Madhvapathy & Dasgupta, 2015). Food selection depends on such factors as family background, advertisement, nutritional awareness, food brands, cost of the food, and its appearance (Mediratta & Mathur, 2023).

It has always been proven that EOH correlates with selecting a calorie-dense, low-nutritious diet – high in sugar, salt, saturated fats, and oil, while low in fibre, fresh fruits, and micronutrients (Bargiota et al., 2013). Such food choices are often responsible for rising rates of obesity and metabolic disorders, and cardiovascular problems, especially in people consuming mostly outside food (Gesteiro et al., 2022). Research shows that 66% of customers prefer outside foods, while 36% opt for homemade food despite health risks (Karimikonda, 2020).

The major health problem caused by EOH is the use of cooking oil that has been repeatedly used for frying food. Food Business Operators, especially those who deal with street vending, use the oil to prepare food three times or more to lower production costs, a process which produces some toxic elements, namely malondialdehyde, free fatty acid, polycyclic aromatic hydrocarbon, and reactive oxygen species (J.H. Potgieter et al., 2004; Mishra et al., 2023). The consumption of such food leads to several health issues, which include heart conditions, cancers, liver diseases, heart-related diseases, high blood pressure, diabetes, atherosclerosis, and kidney/liver diseases (Soni et al., 2024). The DNA mutations caused by oil heating lead to the transformation of breast cancer proto-oncogenes to oncogenes (Rajendran et al., 2022), and some toxins accumulated in the liver travel to all parts of

the body, leading to reproductive, neurological, and developmental disorders (A et al., 2022). Several medical doctors have warned about the dangers associated with food made from RHCO to human health (Manikandan et al., 2023).

Aside from health effects, poor handling of waste cooking oil (WCO) from FBOs leads to severe environmental damage. The disposal of WCO in drainage pipes results in obstructions of the drainage network, floods in the urban environment, and the pollution of water sources, forming a layer of oil on the water surface, which interferes with the absorption of oxygen and light rays, thus negatively affecting marine organisms and their ecosystems (Balaria et al., 2021; Soni et al., 2024; Teixeira et al., 2018). Disposing of WCO in soils contributes to the pollution of the soil, reduces soil fertility, emits harmful substances, and pollutes underground water resources (A et al., 2022).

Youths and students are more susceptible to such poor EOH practices because they would rather consume food outside in order to save the time and energy associated with home-cooking, hence giving them a chance to access more varied foods at lower prices (Sogari et al., 2018). The adolescent group suffers a lot in terms of meeting their nutritional demands through their EOH practices, which calls for frequent monitoring and corrections of the diet (Hemamalini et al., 2023). EOH practice exposes adolescents to lifestyle gaps that exist between their eating patterns, exercise, and awareness about diseases, implying a need for health prevention right from childhood.

Concerning health policies, it is essential to mention the regulations set by the FSSAI in regard to how FBOs prepare, store, and handle food (Ruchika Sharma, 2018). Public health policies must emphasise consumer knowledge about good dietary practices, the hazards of indulging in such poor EOH practices, and the eventual impact of their practices on the environment in the form of WCO (Gesteiro et al., 2022; Mediratta & Mathur, 2023).

Even though more studies have been conducted in India on eating out habits in the metropolitan cities, empirical research that is directly related to the phenomenon of dietary segmentation within low-middle-class urban dwellers of Hyderabad is scanty. This paper fills this vacuum by analysing the issues of dietary clustering and EOH habits amongst the inhabitants of Izzat Nagar, Khana Metta, Hyderabad.

3. Methodology

3.1 Research Design This paper adopted the use of a quantitative cross-sectional research design to analyse dietary behaviour among urban dwellers. To obtain the desired data, this study employed the use of a survey questionnaire comprising Likert scale questions, frequency questions, and multiple-choice questions. The questions asked focused on meal frequency, EOH habit, health awareness, and traditional food consumption patterns.

3.2 Data Collection and Sampling Primary data were gathered from 396 participants by carrying out face-to-face interviews from randomly chosen households in Izzat Nagar, Khana Metta, Hyderabad – a low to middle-class neighbourhood. Only one person was interviewed from each household based on the criterion that the minimum age required to take part in the survey was 18 years. The interviewers were instructed about the techniques of carrying out an interview. Most of the participants encountered were housewives, older persons, and people who were not working due to working people being away at that time. A few of the participants thought that we belonged to the government due to our dress code.

3.3 Data Preparation After data collection, the data set was cleaned for any missing values and outliers in the data. All Likert scale questions were checked for reliability using the reliability analysis method with Cronbach's alpha. An exploratory factor analysis with varimax rotation was done to reduce dimensionality and extract underlying variables. Six factors were obtained based on an eigenvalue of 1, out of which only four factors were kept.

3.4 Cluster Analysis Scores obtained through EFA were used as input variables for K-means clustering analysis to form homogenous clusters of respondents according to their dietary behaviours. Two-, three-, and four-cluster solutions were analysed, and four-cluster solutions were selected based on interpretability and clear differences among the formed groups.

3.5 Cluster Profiling Differences in means among clusters were evaluated through one-way ANOVA and Tukey HSD post hoc tests. Effect sizes (η^2) were manually computed to estimate the strength of association. Associations between the formed clusters and demographics were assessed through the chi-square test of independence and Fisher's exact test. The Cramer's V was computed to measure the strength of association.

3.6 Ethical Issues This study was carried out following ethical research procedures. All respondents were told about the aim of the study before data collection, and verbal informed consent was obtained from all respondents. Respondents were assured about the confidentiality of their responses, and their anonymity was fully protected in the process. No sensitive information was collected other than that related to demographics and dietary behaviour.

3.7 Software IBM SPSS Statistics Version 26 was utilised for all statistical analyses.

3.8 Research Framework:

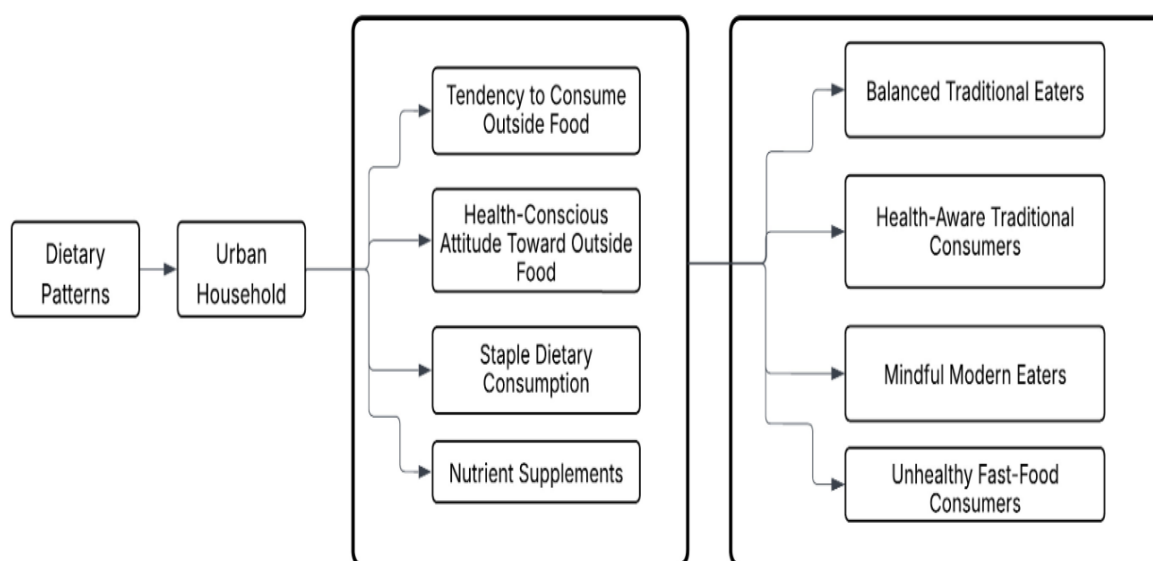


Figure 1: Research framework

(Blank Diagram: Lucidchart, n.d.)

4. DATA ANALYSIS AND FINDINGS

4.1 Exploratory Factor Analysis

Before extracting factors, the Kaiser-Meyer-Olkin (KMO) statistic and Bartlett's test of sphericity were carried out to ascertain whether the data were suitable for factor analysis. The results are shown in Table 1.

Table 1: KMO and Bartlett's Test

Test	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.731
Bartlett's Test — Approx. Chi-Square	1436.351
Bartlett's Test — Degrees of Freedom (df)	136
Bartlett's Test — Significance (Sig.)	0.000

As indicated in Table 1 below, the KMO of 0.731 represents a reasonable measure of sampling adequacy and exceeds the benchmark of 0.60. The Bartlett's test of sphericity is also significant ($\chi^2(136) = 1436.351, p < .001$). Therefore, the correlation matrix was appropriate for performing the factor analysis.

Factor analysis through principal component analysis with varimax rotation was done using 17 food habits and eating patterns. Total variance explained results are provided in Table 2.

Table 2: Total Variance Explained

Component	Eigenvalue	% of Variance	Cumulative %
1	3.199	18.82%	18.82%
2	2.341	13.77%	32.59%
3	1.587	9.34%	41.92%
4	1.274	7.50%	49.42%
5	1.100	6.47%	55.89%
6	1.066	6.27%	62.16%

It can be seen from Table 2 that six components with eigenvalues greater than 1 were obtained, explaining 62.16% of the variance. The most prominent among these components is the first component, which explained 18.82% of the variance before rotation and 17.25% post rotation using Varimax rotation. The scree plot validated this six-component solution.

The rotated component matrix is provided in Table 3 below.

Table 3: Rotated Component Matrix (Loadings ≥ 0.5)

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Frequency of street food consumption	0.852					
Frequency of outside food consumption	0.826					
Frequency of restaurant food consumption	0.820					
Eating outside food	0.761					
Quality consideration for outside food		0.714				
Efforts to minimise outside food		0.698				
Health consideration for outside food		0.675				
Knowledge of the effects of outside food		0.652				
Lentils in the diet			0.851			
Cereals in the diet			0.759			
Legumes in the diet			0.582		0.574	

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Fruits in the diet				0.765		
Raw vegetables/salad in the diet				0.633		
Eating healthy food	-0.359			0.567		
Nutrient supplements					0.863	
Skip meals						0.713
Preference for fried over non-fried food						0.661

As seen from Table 3, there were six dimensions identified through the rotated component matrix. Factor 1 (Consuming Outside Food) had high loadings on street food (0.852), outside food (0.826), restaurant food (0.820), and overall eating outside (0.761). It is worthy of mention that "eating healthy food" received a negative loading of -0.359, which proves the existence of an inverse relation between consuming outside food and healthy food. Factor 2 (Attitude towards Health) included quality considerations (0.714), efforts to minimise EOH (0.698), health considerations (0.675), and knowledge of effect (0.652). Factor 3 (Consumption of Staple Foods) consisted of lentils (0.851), cereals (0.759), and legumes (0.582), which represent staple foods consumed in India. Factor 4 (Preferential Eating of Fresh Foods) involved fruits (0.765), raw vegetables (0.633), and healthy eating (0.567). Factor 5 (Consumption of Nutrient Supplements) had only one item: supplement consumption (0.863) and legumes (0.574). Finally, Factor 6 (Unhealthy Behaviours) consisted of meal skipping (0.713) and frying food preference (0.661), a factor directly associated with consumers' demand for reused cooking oil by FBOs.

4.2 Reliability Analysis

A reliability analysis was performed for all six extracted factors. The results are provided below.

Factor	Label	Cronbach's Alpha	No. of Items
1	Tendency to Consume Outside Food	0.845	3
2	Health-Conscious Attitude Toward Outside Food	0.644	4
3	Staple Dietary Consumption	0.626	3
4	Nutrient Supplements	0.520	6

As can be seen from Table 4, four factors were retained for further clustering. In Factor 1, high internal consistency was reached ($\alpha = 0.845$), except for "eating healthy food," as it exhibited negative item-total correlation ($r = -0.288$). Internal consistency of Factor 2 proved to be acceptable ($\alpha = 0.644$) as all the items were retained for their importance in the conceptual framework. Factor 3 was retained with lower loadings ($r = 0.357$) as it was conceptually consistent ($\alpha = 0.626$). Internal consistency of Factor 4 was moderately acceptable ($\alpha = 0.520$), while it was retained due to its conceptual importance. Factors 5 and 6 were not used for cluster analysis because they had low internal consistency.

4.3 Cluster Analysis

A four-factor solution was used in the k-means cluster analysis. A four-cluster solution was chosen to present the results. See results in Table 5.

Table 5: Means of Clusters' Centres ($\pm$ SD)

Variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4	p-value	η^2
Eating healthy food	2.43 $\pm$ 1.16a	2.15 $\pm$ 1.00ab	2.20 $\pm$ 0.84ab	1.77 $\pm$ 0.81b	0.000	0.064
Income	2.95 $\pm$ 1.49a	2.32 $\pm$ 1.23b	2.24 $\pm$ 1.36b	2.34 $\pm$ 1.44b	0.000	0.045
Age	2.49 $\pm$ 0.84b	2.85 $\pm$ 0.99ab	3.12 $\pm$ 0.91a	3.00 $\pm$ 1.01a	0.000	0.069
Quality consideration	2.43 $\pm$ 0.98b	2.57 $\pm$ 1.16b	3.26 $\pm$ 1.13a	1.72 $\pm$ 0.82c	0.000	0.225
Health consideration	2.52 $\pm$ 0.86b	2.33 $\pm$ 1.11bc	3.26 $\pm$ 1.07a	1.81 $\pm$ 0.90c	0.000	0.219
Preference for fried food	2.50 $\pm$ 0.87b	3.08 $\pm$ 1.20a	2.90 $\pm$ 1.10ab	3.09 $\pm$ 1.37a	0.000	0.049
Knowledge of effects	2.28 $\pm$ 0.84b	2.24 $\pm$ 0.94bc	2.98 $\pm$ 1.20a	1.72 $\pm$ 0.94c	0.000	0.171

Note: Clusters sharing the same letter are not significantly different at $\alpha = 0.05$ (Tukey HSD)

As seen in Table 5, ANOVA with Tukey HSD post-hoc analysis found highly significant differences in all four clusters in relation to all variables tested ($p < 0.001$). The strongest differentiating variables were quality considerations ($\eta^2 = 0.225$) and health considerations ($\eta^2 = 0.219$), followed by the variable indicating knowledge about effects of food from outside sources ($\eta^2 = 0.171$). Income and preference for fried foods had weaker effects, which shows that health and quality considerations drive food preferences more than economic considerations.

Clusters are characterised as follows:

Cluster 1 – Balanced Traditional Consumers: Health awareness is moderate; food staples consumption is balanced; preference for food from outside sources is low; high income levels. Cluster 1 can be characterised as nutritionally stable traditional consumers.

Cluster 2 – Health-aware Transitional Consumers: High consumption of food from outside sources with a strong preference for food staples and vegetable products.

Cluster 3 – Health-Conscious Modern Eaters: The highest level of health awareness (mean = 3.26), quality consideration (mean = 3.26), and awareness of food's effect on the body (mean = 2.98), representing the most nutritionally conscious consumers with selective eating habits. However, despite the high frequency of EOH behaviour, they adopt mindful health-oriented food decisions.

Cluster 4 – Unhealthy Fast-Food Consumers: The highest fried food preference (mean = 3.09), lowest health awareness (mean = 1.81), quality consideration (mean = 1.72), and unhealthy eating behaviour. This cluster represents the nutritionally most vulnerable population that has direct linkage with consumer demand for repeatedly fried food items, resulting in WCO generation and management problems (Balaria et al., 2021; Mishra et al., 2023).

4.4 Relationship Between Cluster Membership and Demographics

To determine the relationship between cluster membership and demographics, chi-square and Fisher's exact test were conducted, and the results are shown in Table 6.

Table 6: Results of Chi-Square and Fisher's Exact Test

Variable	Pearson Chi-Square	Fisher's Exact	p-value
Age Group and Cluster Membership	36.279	36.343	0.000

Variable	Pearson Chi-Square	Fisher's Exact	p-value
Gender and Cluster 4 Membership	20.569	20.969	0.000
Marital Status and Cluster 4 Membership	67.230	68.155	0.000
Education and Cluster 4 Membership	65.772	67.711	0.000
Income and Cluster 4 Membership	30.931	30.376	0.002

Note: Monte Carlo significance based on 10,000 sampled tables. No cells had expected counts less than 5. N = 396

However, according to Table 6, all demographic variables were statistically significant ($p \leq 0.002$). Age was most significant in relation to overall cluster affiliation ($\chi^2 = 36.279$, $p = 0.000$). Specifically, those aged 18–30 years were mainly found in Cluster 1, whereas respondents above 60 years of age were mostly represented in Cluster 4. Similarly, education was most significantly associated with Cluster 4 affiliation ($\chi^2 = 65.772$, $p = 0.000$). This finding proves once again that lower educational levels are strongly related to poor dietary habits. At the same time, gender and marital status were also significantly associated with Cluster 4 affiliation. As for income, the significance level was moderate ($p = 0.002$).

5. Discussion

The results of the study show that there is dietary diversity in urban households in Izzat Nagar, Hyderabad, driven predominantly by health awareness and awareness of food quality rather than socioeconomic characteristics of the population.

The significance of quality considerations ($\eta^2 = 0.225$) and health considerations ($\eta^2 = 0.219$) as the leading cluster differentiators is consistent with the prior literature, which shows that the health orientation of individuals is one of the main determinants of their eating habits (Gesteiro et al., 2022; Mediratta & Mathur, 2023). At the same time, the fact that knowledge about external food effects ($\eta^2 = 0.171$) also differentiates clusters indicates that knowledge interventions may help shift dietary practices, especially among vulnerable groups.

Cluster 4 – Unhealthy Fast-Food Consumers – proved to be the group of consumers facing the greatest nutritional risks. It was defined by its high preference for fried food, poor health awareness, and a higher number of respondents with age and education characteristics, making them more vulnerable. Such an outcome brings to mind the significant public health challenge linked to consumers' constant demand for fried outside food because it ensures continuous reuse of oil among FBOs. By purchasing fried food regardless of oil quality and the number of reuse cycles, consumers create incentives for FBOs to save costs by reusing cooking oil well beyond any safe limits (Savitha T & Keerthana Thangavel, 2022). The health hazards arising due to repeated reheating of the oil – namely malondialdehyde, PAHs, and free fatty acids – are highly problematic because they affect consumers directly, making them even more prone to indulging in harmful diets and preparing unhealthy foods (J.H. Potgieter et al., 2004; Mishra et al., 2023).

In addition to affecting consumer diet and health, WCO from repeated oil heating and reusing practices ends up being disposed of poorly in drainage systems and garbage sites, blocking drainage, polluting water, and destroying nature (A et al., 2022; Balaria et al., 2021). In conclusion, addressing dietary behaviours of consumers would not only improve public health but would also reduce WCO production.

As predicted and supported by the literature, age emerges as a highly relevant variable when explaining the clustering pattern since older consumers were found to be more nutritionally vulnerable (Kumar et al., 2017). It was demonstrated once again that having higher levels of education provides protection against belonging to Cluster 4.

6. Recommendations

With the knowledge obtained, recommendations can be made for interventions tailored to each cluster based on its dietary pattern. Balanced Traditional Eaters should be encouraged by health awareness campaigns to make better health-oriented dietary choices and increase consumption of more fresh and raw foods. Recommendations can be made to educate Health-Aware Traditional Consumers on the need for moderation regarding the consumption of outside food while emphasising plant-based food. Mindful Modern Eaters require interventions through the provision of healthy and affordable outside foods for consumers with selective eating behaviours.

In the case of Unhealthy Fast-Food Consumers, who comprise the most vulnerable group, intervention is crucial. Awareness campaigns should be initiated among other activities, such as employee welfare programs, to help reduce reliance on fried food. Most importantly, raising consumer awareness on the health hazards of consuming food cooked using repeatedly used oil, which include cardiovascular diseases, cancers, liver ailments, and gastrointestinal disorders (Mishra et al., 2023; Soni et al., 2024), will help boost consumer health and reduce consumption of repeatedly fried foods, hence reduced usage of cooking oil among FBOs and increased WCO collection and recycling (Balaria et al., 2021).

Recommendations would suggest increasing FSSAI regulation amongst FBOs practising small-scale operations in addition to developing consumer-based awareness campaigns about safe oil usage guidelines, RHCO, and improper WCO disposal.

7. Limitations

Some limitations that should be noted include Firstly, the study was conducted only in the area of Izzat Nagar, Khana Metta, Hyderabad; Secondly, since the study utilised self-report methodology, there could have been an occurrence of response bias, particularly under-reporting of bad dietary practices. Thirdly, one factor had low reliability ($\alpha = 0.520$); nevertheless, this may be acceptable given its theoretical foundation. Lastly, only seven extraneous factors were considered within ANOVA, although others, like health, psychological well-being, stress, and peer pressure, can also have effects on the dependent variable.

8. Conclusion

The present study offers an in-depth investigation of dietary behaviour patterns in urban communities of Izzat Nagar, Khana Metta, Hyderabad, incorporating various aspects of psychometrics and attitudes, as well as Demographic viewpoints. The presence of four distinctive dietary clusters underlines food consumption pattern diversity, which goes from nutritionally balanced traditional eaters to unhealthy fast-food consumers. Health and quality consciousness, together with the knowledge about the impact of outside food on consumers' wellbeing, were determined as the leading forces behind dietary segmentation, whereas demographic aspects were the second ones.

Cluster 4 — Unhealthy Fast-Food Consumers — turned out to be the least healthy group, consisting of older and uneducated people showing a strong preference for fried food and a low level of health awareness. Apart from personal consequences, it is important to underline the connection that this research reveals between consumer food-related habits and the sustainable development of the environment. The popularity of fried outside food among consumers has become the cause of continuous reuse of cooking oil in FBOs producing WCO. Improper disposal of the latter results in drainage blockages, pollution of waters and soils, as well as environmental damage (A et al., 2022; Balaria et al., 2021). Improving consumer dietary awareness appears to be crucial both for better consumer health and the support of WCO recycling.

A longitudinal approach could be considered for future research to look into how dietary patterns change over time and what cultural, psychosocial, and environmental factors contribute towards these patterns. Future research conducted across several cities and different economic groups will help in improving the generalisability of this research.

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References:

- [1] REVIEW ON ENVIRONMENTAL IMPACT AND VALOURIZATION OF WASTE COOKING OIL. In /LAUTECH Journal of Engineering and Technology (Vol. 16, Number 1,2022).
- [2] Annual Survey of Industries. (2023). Data Catalog. Government of India, Ministry of Statistics and Program Implementation. https://doi.org/https://microdata.gov.in/NADA/index.php/catalog/ASI/?page=1&sort_order=desc&ps=15&repo=ASI
- [3] Balaria, F. E., Pascual, M. P., Crisostomo, V. S., Reyes, C. J., & Cawagas, G. D. (2021). Disposal of Waste Cooking Oil of Restaurants and Eateries: A Potential Hazard to the Environment. *International Journal of Advanced Engineering, Management and Science (IJAEMS)*, 7(1), 2454–1311. <https://doi.org/10.22161/ijaems>
- [4] Bargiota, A., Delizona, M., Tsitouras, A., Koukoulis, G. N., & Bargiota, A. (2013). Eating habits and factors affecting food choice of adolescents living in rural areas. In *HORMONES* (Vol. 2013, Number 2).
- [5] Blank diagram: Lucidchart. (n.d.). Retrieved August 22, 2025, from https://lucid.app/lucidchart/6fed2c4c-2e3c-4431-8f81-eb30d85e6f72/edit?invitationId=inv_1e047c1d-738d-4917-8e11-255a7deec002&page=0_0#
- [6] Gesteiro, E., García-Carro, A., Aparicio-Ugarriza, R., & González-Gross, M. (2022). Eating out of Home: Influence on Nutrition, Health, and Policies: A Scoping Review. In *Nutrients* (Vol. 14, Number 6). MDPI. <https://doi.org/10.3390/nu14061265>
- [7] Havish Madhvapathy, M., & Dasgupta, M. A. (2015). Study of Lifestyle Trends on Changing Food Habits of Indian Consumers. *IOSR Journal of Environmental Science*, 9(1), 16–22. <https://doi.org/10.9790/2402-09121622>
- [8] Hemamalini, K., Babitha, B., & Lalitha Kumari, B. (2023). Quantitative Analysis of Food Habits and Nutrient Intake of Adolescents in Two Different States in South India. *Current Trends in Biotechnology and Pharmacy*, 17(3), 985–996. <https://doi.org/10.5530/ctbp.2023.3.36>
- [9] J.H. Potgieter, S.S. Potgieter, D. D. Tona, L. Anelich, M. P. Roux, & W. Delport. (2004). A PROPOSED ALTERNATIVE SUGGESTIONS FOR THE DISPOSAL OF USED COOKING OIL. *Journal of Applied Sciences*, (4), 313–316.
- [10] Karimikonda, H. (2020). Factors Impacting Eating Out: A Demographical Analysis on Young Adults of Hyderabad Region. *International Journal of Research and Analytical Reviews (IJRAR)* www.Ijrar.Org, 7(1). [https://doi.org/https://www.researchgate.net/profile/Harinadh-](https://doi.org/https://www.researchgate.net/profile/Harinadh-Karimikonda/publication/339553206_Factors_affecting_Eating_Out_A_Demographical_Analysis_on_Young_Adults_of_Hyderabad_Region/links/5e58efba299bfb1bdb8411e5f/Factors-affecting-Eating-Out-A-Demographical-Analysis-on-Young-Adults-of-Hyderabad-Region.pdf)
- [11] [Karimikonda/publication/339553206_Factors_affecting_Eating_Out_A_Demographical_Analysis_on_Young_Adults_of_Hyderabad_Region/links/5e58efba299bfb1bdb8411e5f/Factors-affecting-Eating-Out-A-Demographical-Analysis-on-Young-Adults-of-Hyderabad-Region.pdf](https://doi.org/https://www.researchgate.net/profile/Harinadh-Karimikonda/publication/339553206_Factors_affecting_Eating_Out_A_Demographical_Analysis_on_Young_Adults_of_Hyderabad_Region/links/5e58efba299bfb1bdb8411e5f/Factors-affecting-Eating-Out-A-Demographical-Analysis-on-Young-Adults-of-Hyderabad-Region.pdf)
- [12] Kumar, S., Ray, S., Roy, D., Ganguly, K., Dutta, S., Mahapatra, T., Mahapatra, S., Gupta, K., Chakraborty, K., Das, M. K., Guha, S., Deb, P. K., & Banerjee, A. K. (2017). Exercise and eating habits among urban adolescents: a cross-sectional study in Kolkata, India. *BMC Public Health*, 17(1). <https://doi.org/10.1186/s12889-017-4390-9>
- [13] Manikandan, G., Kanna, P. R., Taler, D., & Sobota, T. (2023). Review of Waste Cooking Oil (WCO) as a Feedstock for Biofuel—Indian Perspective. In *Energies* (Vol. 16, Number 4). MDPI. <https://doi.org/10.3390/en16041739>
- [14] Mediratta, S., & Mathur, P. (2023). Determinants of Food Choices among Adults (20–40 Years Old) Residing in Delhi, India. *Current Developments in Nutrition*, 7(2). <https://doi.org/10.1016/j.cdnut.2023.100029>

- [15] Mishra, S., Firdaus, M. A., Patel, M., & Pandey, G. (2023). A study on the effect of repeated heating on the physicochemical and antioxidant properties of cooking oils used by fried food vendors of Lucknow city. *Discover Food*, 3(1). <https://doi.org/10.1007/s44187-023-00046-8>
- [16] Rajendran, P., Alzahrani, A. M., Rengarajan, T., Veeraraghavan, V. P., & Krishna Mohan, S. (2022). Consumption of reused vegetable oil intensifies BRCA1 mutations. In *Critical Reviews in Food Science and Nutrition* (Vol. 62, Number 5, pp. 1222–1229). Taylor and Francis Ltd. <https://doi.org/10.1080/10408398.2020.1837725>
- [17] Ruchika Sharma. (2018). FSSAI launches RUCO Takes a Leap Forward towards Green, Clean and Healthy India. Food Safety and Standards Authority of India https://www.fssai.gov.in/upload/press_release/2018/08/5b72549ab2cebPress_Release_RUCO_10_08_2018.pdf?utm_source=chatgpt.com
- [18] Savitha T, & Keerthana Thangavel. (2022). THE REUSE OF COOKING OIL IN STREET FOOD VENDING A study on the usage, consumption, and awareness of reused cooking oils among street vendors in Tamil Nadu.
- [19] Sogari, G., Velez-Argumedo, C., Gómez, M. I., & Mora, C. (2018). College students and eating habits: A study using an ecological model for healthy behavior. *Nutrients*, 10(12). <https://doi.org/10.3390/nu10121823>
- [20] Soni, H., Kaur, M., & Verma, M. (2024). Recent advances in the production of soap from used cooking oil for environment remediation. *E3S Web of Conferences*, 509. <https://doi.org/10.1051/e3sconf/202450903014>
- [21] Teixeira, M. R., Nogueira, R., & Nunes, L. M. (2018). Quantitative assessment of the valorisation of used cooking oils in 23 countries. *Waste Management*, 78, 611–620. <https://doi.org/10.1016/j.wasman.2018.06.039>