Original Article

Dietary Patterns among Urban and Rural School Teachers in Guntur District of Andhra Pradesh

G. Mohan Chandrasekhar[1], Samson Sanjeeva Rao Nallapu[2]

[1]Assistant Professor, [2] Professor & HOD, Dept. of Community Medicine, NRI Medical College, Guntur District, Andhra Pradesh

How to cite this article: G. Mohan Chandrasekhar, Samson Sanjeeva Rao Nallapu. Dietary Patterns among Urban and Rural School Teachers in Guntur District of Andhra Pradesh. Indian Journal of Public Health Research and Development/Vol. 17 No. 3, July-September 2026.

Abstract

Introduction: Urban and rural diets in India are subject to influences like income, food availability, and life styles. As school teachers are also health promoters and role models for their students and communities, this study was set to identify the dietary patterns of urban and rural school teachers in Guntur district of Andhra Pradesh, India along with comparison of anthropometrics and Diet Related Non-Communicable Disease (DRNCDs).

Methods: This descriptive study involved all teachers of five schools each from rural and urban mandals of Guntur district selected by simple random sampling. A predetermined questionnaire covering various aspects of diet, socio – demographic variables and anthropometric measurements like height, weight, BMI and waist hip-ratio were administered to each teacher after taking an informed consent. Data was entered in MS excel and presented in tables and graphs. Important findings were subjected to tests of significance like Chi square test at 5 % Level of Significance.

Results: Chronic non communicable illnesses were present in 27.6% of the rural teachers and 66.0% of urban teachers (Chi square 16.5%, p value < .0001, OR 5.1, 95% CI 2.1 to 12.5). DRNCDs were present in 27 (46.6%) rural teachers and 24 (45.3%) urban teachers.86.8% of the male teachers and 43.1% of the female teachers were obese according to their BMI (Chi Square 22.93, p value <0.0001). Normal BMI was not seen in any of them. Urban teachers and families were indulging more in junk foods probably due to more access (Chi Sq 5.9, p 0.01). 66.7% of all the teachers were unsure if their diets were complete or healthy.

Discussion: Significant gender differences were found in the anthropometric measurements which were more adverse in the males. Important dietary patterns based on intake of breakfast daily, beverages, spicy foods, junk foods, fresh fruits and vegetables, nutritional, ayurvedic and homeopathic supplements.

Conclusion: Knowledge of dietary patterns enables identification of unhealthy practices prevalent in the community. There is a need for educating the communities about balanced and healthy diets.

Keywords: Dietary patterns**,** Diet Related **–** Non communicable diseases (DR-NCDs), teachers, urban, rural

Corresponding Author: G. Mohan Chandrasekhar, Assistant Professor, Dept. of Community Medicine, NRI Medical College, Guntur District, Andhra Pradesh.

E-mail: mohanchandrasekhar1171@gmail.com

Submission date: November 4, 2025 **Revision date:** February 24, 2026 **Published date: June 29,2026**

This is an Open Access journal, and articles are distributed under a Creative Commons license- CC BY-NC 4.0 DEED. This license permits the use, distribution, and reproduction of the work in any medium, provided that proper citation is given to the original work and its source. It allows for attribution, non-commercial use, and the creation of derivative work.

Introduction

Diet Related Non-Communicable Diseases (DR-NCDs) are increasing significantly in India both in urban and rural areas. Dietary changes include intake of refined cereals, decreased pulses, fruits and vegetables and increased intake of meat products. An increased purchasing power and availability of high fat, energy-dense foods have led to a rapid increase in the prevalence of obesity in India along with an increased prevalence of metabolic syndrome and type 2 diabetes mellitus (T2DM)[1,2].

With an average consumption of 11 grams per day, Indians have a high salt intake as against the WHO recommended limit of less than 6 grams per day[3]. Podder V et al looking at physical activity patterns in India found that 77% of the respondents were physically inactive or mildly active. Individuals living in urban localities were proportionately more inactive[4].

Traditional Indian food practices have evolved over the centuries and provide wholesome, balanced, nourishing meals. The traditional “Thali” (meaning plate) concept emphasizes that all of the necessary food groups are provided in the right proportions on par with current dietary recommendations[5]. Green R et al identified Indian traditional dietary patterns made up of cereals (rice), pulses, meat, vegetables, fruit and also dietary patterns high in sweets and snacks[6].

Indian diets have become unwholesome of late as households are consuming more calories from processed foods. There is also an excess consumption of cereals and not enough proteins, fruits, and vegetables. Compared to the reference diet where 29% calories are to be obtained from proteins, the share from protein sources is only 6–8% in most Indian diets.[7] Micro nutrient deficiencies in terms of minerals and vitamins are present in two-thirds of the people in India [8]. An understanding of the diverse dietary patterns in local populations will provide a better knowledge of what people are eating and the relationship with DR-NCDs [6].

School teachers are also health promoters, gate keepers, educators, and role models for their students and the community they live in. The implication is that they themselves must follow diets that enable the achievement of optimal nutrition-related health and wellbeing[9]. Parker EA et al in their study, found an overall poor diet quality in the teachers they interviewed and also found a high prevalence of overnutrition among them. They suggest that teachers with unhealthy dietary habits can set a poor example to their students in terms of dietary patterns.[10]. Wiradnyani A et al in their study with school teachers in Bandung, West Java, found that nearly half of them expressed their lack of self-confidence in delivering nutrition education showing their lack of knowledge in nutrition[11].

This study is set to identify various dietary patterns among urban and rural school teachers in Guntur district of Andhra Pradesh, India and to compare dietary patterns with anthropometric measurements like height, weight, BMI and waist hip-ratio and also to compare dietary patterns with DR-NCDs.

Methods

This is a descriptive study done between July and August 2025 involving 5 schools from rural mandals and 5 schools from urban mandals of Guntur district selected by simple random sampling. All the teachers included from the above schools (58 from rural schools and 53 from urban schools) were administered a predetermined and tested questionnaire covering various aspects of diet, socio – demographic variables and anthropometric measurements like height, weight, BMI and waist hip-ratio after obtaining IEC clearance and informed consent.

Predefined dietary items included in the proforma were as per standard classification of food groups by ICMR / NIN like fruits, vegetables, dairy, whole grains etc. Face validity of questionnaire was ensured by sharing it with other departmental professors. Pilot testing was done on a few teachers locally. The questionnaire was modified appropriately and administered after taking an informed consent. Anthropometric measurements taken were height, weight, waist and hip circumference. After taking consent and observing gender sensitivity, accurate, reliable data was obtained following standardised measurement techniques and equipment. (stadiometer, digital scale and flexiblenon-stretchable tape)

The collected data was entered in Microsoft Excel 2019 and presented in tables and graphs. Cronbach's alpha of 0.70 and 0.78 were found for scores assigned to good dietary habits and poor dietary habits respectively indicating acceptable internal consistency of data. Important findings were subjected to tests of significance like Chi square test and Z test at 5 %Level of Significance.

Results

A total of 111 teachers (53 men & 58 women) were interviewed of whom 58 were from rural schools and 53 from urban schools. All the teachers, both in urban and rural schools were between 30 to 55 years age. 52.5% of rural and 63.0% of the urban teachers were > 40 years age. 55 were working in Govt Schools while 56 were working in private schools. 43 were in primary schools while 68 were in secondary schools. 93 teachers (83.8%) had an income of between Rs.15000 to Rs. 25000 per month. 63 teachers were educated upto degree and 48 upto to post graduation.

Chronic illness was present in 27.6% of the rural teachers and 66.0% of urban teachers (Chi square 16.5%, p value < .0001, OR 5.1, 95% CI 2.1 to 12.5) The common NCDs seen among the teachers were diabetes, hypertension, diabetes with hypertension, osteoarthritis, gastritis / peptic ulcer and hypothyroidism. Diet Related Non-Communicable diseases (DR NCDs) were present in 27 (46.6%) rural teachers and 24 (45.3%) urban teachers. 86.8% of the male teachers and 43.1% of the female teachers were obese according to their BMI (Chi Square 22.93, p value 0.00002). 33 women and 7 men were overweight. Normal BMI was not seen in any of them. 52.8% of the male teachers and 10.3 % of the female teachers had an increased waist hip ratio (Chi Square 23.53, p value 0.00008). Excess waist hip ratio (WHR) was seen in 28 males and 6 females. 78.8% of them said that they changed their diet after being diagnosed with an NCD. 66.7% of all the teachers were unsure if their diets were complete or healthy.

Regarding intake of proteins of animal origin among the non-vegetarians, there is no significant difference between urban and rural school teachers and their families (7 families, 6 rural and 1 urban, were vegetarians). However, it is seen that only 12.6 % of all families eat mutton regularly, 69.9 % eat fish and 99.0 % eat poultry. Intake of eggs was surprisingly low at 38.8% only. Table 1 gives information about healthy nutritional practices in urban and rural school teachers. Table 2 looks at the dietary patterns identified in school teachers and their families. Table 3 recognizes the distribution of teachers, both urban and rural, according to certain unhealthy dietary practices.

Table 1: Healthy nutritional practices in urban and rural school teachers

S. No.	Healthy nutritional practices (Daily intake)	Urban (n= 53) No. (%)	Rural (n= 58) No. (%)	Total (n= 111) No. (%)	Chi Sq	p
1	Green leafy vegetables	5 (9.4)	11 (19.0)	16 (14.4)	2.04	0.2
2	Green tea	5 (9.4)	5 (8.6)	10 (9.0)	0.02	0.9
3	Nutritional Supplements	16 (30.2)	13 (22.4)	29 (26.1)	0.87	0.4
4	Brown rice	16 (30.2)	23 (39.7)	39 (35.1)	1.10	0.3
5	Millets	11 (20.8)	16 (27.6)	27 (24.3)	0.70	0.4
6	Nuts & Seeds	6 (11.3)	5 (8.6)	11 (9.9)	0.23	0.6
7	Dry fruits	5 (9.4)	5 (8.6)	10 (9.0)	0.02	0.9
8	Spouted grams	8 (15.1)	14 (24.1)	22 (19.8)	1.43	0.2
9	Fresh fruits	10 (18.1)	15 (25.9)	25 (22.5)	0.78	0.4
10	Fresh vegetables	53 (100)	58 (100)	111 (100)		

Table 2: Nutritional patterns identified in school teachers and their families

S.No	Nutritional patterns	Rural n=58 (%)	Urban (%) n=53	Chi Square	p value	Total (%) n=111
1	Daily breakfast consumers	42 (72.4)	40 (75.5)	0.13	0.70	82 (73.9)
2	Regular coffee and tea consumers	17 (29.3)	13 (24.5)	0.32	0.57	30 (27.0)
3	Mutton, Fish, Poultry and Eggs consumers	51 (87.9)	52 (98.1)	2.9 (Yates)	0.09	103 (92.8)
4	Spicy food eaters	15 (25.9)	15 (28.3)	0.08	0.78	30 (27.0)
5	Unhealthy practices - Junk foods, fried foods, salty snacks, eating out etc.	31 (53.4)	29 (54.7)	0.02	0.89	60 (54.1)
6	Fresh vegetables, fruits, dairy products etc.	31 (53.4)	20 (37.7)	2.75	0.09	51 (45.9)
7	Regular users of nutritional supplements	13 (22.4)	16 (30.2)	0.87	0.35	29 (26.1)
8	Ayurveda and Homeopathy supplements	13 (22.4)	6 (11.3)	0.87	0.35	19 (17.1)
9	Brown rice (unpolished / home pounded)	23 (39.7)	16 (30.2)	1.09	0.30	39 (35.1)
10	Daily intake of sprouted grams	14 (24.1)	8 (15.1)	1.40	0.23	22 (19.8)

Table 3: Distribution of teachers according to unhealthy dietary practices

S.No	Unhealthy dietary practices	Urban (%) n=53	Rural (%) n=58	Total (%) n=111	Chi Square	p value
1	Regular use of microwave oven to heat / cook food	17 (32.1)	14 (24.1)	31 (27.9)	0.87	0.35
2	No Breakfast	13 (24.5)	16 (27.6)	29 (26.1)	0.13	0.70
3	Excess sugar intake	20 (37.7)	25 (43.1)	45 (40.5)	0.33	0.57
4	Excess salt intake	30 (56.6)	34 (58.6)	64 (57.7)	0.05	0.83
5	Excess chilly intake	15 (28.3)	15 (25.9)	30 (27.0)	0.08	0.78
6	Regular junk foods intake	20 (37.7)	10 (17.2)	30 (27.0)	5.90	0.01*
7	Regular fried foods intake	12 (22.6)	6 (10.3)	18 (16.2)	3.10	0.08
8	Regular eating out	14 (26.4)	13 (22.4)	27 (24.3)	0.24	0.62
9	Regular intake of prepacked salty snacks	1 (1.9)	5 (8.6)	6 (5.4)	2.46	0.12
10	Daily twice or more snacks intake	12 (22.6)	12 (20.7)	24 (21.6)	0.06	0.80
11	Regular sweets intake	26 (49.1)	35 (60.3)	61 (55.0)	1.43	0.23
12	Regular soft drinks intake	29 (54.7)	27 (46.6)	56 (50.5)	0.74	0.39
13	Regular intake of excess Ghee and Butter	2 (3.8)	10 (17.2)	12 (10.8)	5.20	0.02*
14	Regular intake of pickles	16 (30.2)	28 (48.3)	44 (39.6)	3.80	0.05*

* Statistically significant

Discussion

Urban / Rural differences: All the interviewed teachers in this study, working both in urban and rural schools, were found to have similar income levels. Very few differences were found between the two groups in relation to dietary patterns. Urban teachers and families were indulging more in junk foods compared to their urban counterparts probably due to higher availability. Urbanization does influence food consumption in some ways mainly due to infrastructure, market access, percentage working women in urban areas, norms and institutions etc.[12]

Salt intake: In the current study, 57.7% of the teachers said that their salt intake was higher. Johnson C et al summarized existing data between 1986 and 2014 in India and found that mean salt consumption level per capita was 10.98 g/day with no evidence of a change in intake over time. They concluded that population salt consumption far exceeds the WHO-recommended maximum of 5 g per person per day[13].

The 66th World Health Assembly adopted the goal of a 30% relative reduction in mean population intake of salt for the prevention and control of noncommunicable diseases[14]. Strict monitoring of the nutritional composition of processed foods is necessary to ensure that the food industry is voluntarily compliant with salt reduction [15]. The National Multi-Sectoral Action Plan to reduce premature NCDs in India, if adopted adequately, can enhance, implement and monitor salt reduction efforts [16].

Dietary patterns: In the current study, 10 dietary patterns have been identified (Table 2). Sharma M et al found in their study, twenty-nine dietary patterns based on fruit, vegetables, pulses and rice with additional dairy products, meat and eggs[17]. Green R et al in their systematic review, found eleven separate models of dietary patterns the majority being vegetarian with a predominance of fruit, vegetables, cereals and pulses [6].Satija A et al identified three dietary patterns: 'cereals–savory foods' (cooked grains, rice/rice-based dishes, snacks, condiments, soups, nuts), 'fruit–veg–sweets–snacks' (Western cereals, vegetables, fruit, fruit juices, cooked milk products, snacks, sugars, sweets) and 'animal-food' (red meat, poultry, fish/seafood, eggs). Positive associations were found between the 'animal-food' pattern and anthropometric risk factors while moderate intake of the 'cereals–savory foods' pattern was associated with reduced odds of obesity and central obesity[18].

The Nutritional Intake Survey Series, conducted by the National Sample Survey Organisation (NSSO), found a gradual reduction in the consumption of calories and proteins with a concomitant increase in fat consumption both in rural and urban India[19].Tak M et al found that a majority of Indian households are consuming cereal-focused, dairy-focused heavy diets with a high content of processed food. Consumption of micronutrient-rich food groups such as fruits, vegetables, meat, and eggs is still low. Five predominant dietary types were identified; Cereal based, Processed Foods Heavy, Dairy based, Balanced diet with dairy and Balanced diet with meat[20].

Role of breakfast: Breakfast is often referred to as the most important meal of the day and in recent years has been implicated in weight control, cardio-metabolic risk factors and cognitive performance[21].A noticeable dietary change in recent times has been one of meal skipping, notably the skipping of the breakfast meal[22].

Educating people about the benefits of a healthy breakfast is an important and necessary public healthmessage[23]. Skipping breakfast was associated with a larger waist circumference, cardiometabolic risk factors, poorer diet quality, and unhealthy lifestyle behaviors[24].

Most institutes of nutrition and dietetics recommend eating a healthy breakfast as an integral component of a nutritionally optimal diet. While dietary patterns in school teachers both from urban and rural areas were mostly similar, notable difference is seen in those with NCDs. Public health efforts to control NCDs will be successful when mechanisms to control salt, sugar, and fat consumption are endorsed. Processed and packaged foods are increasingly being consumed by every household across social strata, both rural and urban[25].

Dietary supplements: A nutritional supplement is an external food product supplied to a person as per physician or dietician's recommendation. In this study 26.1% of the teachers (more among urban

based teachers) were taking nutritional supplements. Nutraceuticals are a growing market in India and are made available in all super markets and online shopping apps. However, consumers must be concerned about the proper quality and safety of these foods[26]. As these items can be freely purchased in stores without a prescription, people do not seek professional advice regarding their safety and use.

Millets: Millets or Nutri-cereals are considered as super foods as they are a rich source of nutrients like carbohydrate, protein, dietary fibre, minerals like calcium, potassium, magnesium, iron, manganese, zinc and vitamin B complex and antioxidants. As millets have a low glycemic index, they are good for diabetic patients [27]. In the current study, 20.8% of urban and 27.6% rural teachers said that they ate millets on a regular basis.

Beverage consumption: The commonly consumed sources of caffeine all over the world are coffee and tea. Caffeine has both positive and negative effects on one's psychological health. Individual differences in caffeine metabolism, genetic factors, and other lifestyle factors may influence the effects of tea, coffee, and green tea on cognitive function and mental health[28].A systematic review by Mancini et al, informs that green tea influences psychopathological symptoms (*e.g.* reduction of anxiety), cognition (*e.g.*benefits in memory and attention) and brain function (*e.g.* activation of working memory)[29].

Spicy foods: No statistically significant relation was found between frequency of spicy food intake and health effects except for loss of appetite. When combined with other poor dietary habits, smoking and excessive consumption of beverages and alcohol, spicy foods can cause adverse health effects[30]. Increased consumption of spicy foods and frequency of spicyfood intake were independently associated with general obesity. It was seen that spicy flavor and spicy food frequency were positively associated with general obesity in Chinese rural populations[31].

Dietary supplements from indigenous health systems: India has various indigenous health systems like Ayurveda, Yoga, Naturopathy, Siddha, Unani, and Homeopathywhich are widely accepted and practiced parallel to allopathy. The Ayurvedic system of medicine has its own advantages and also fulfills social health demands. Ayurveda emphasizes two points, i.e., how to promote and maintain good health and how to prevent illness[32]. However, it is likely that an ayurvedic preparation may cause adverse events due to adulteration or the presence of inherent constituents like alkaloids, and hence may not always be completely safe[33].

Conclusion

Identifying dietary patterns gives a better idea of the shift towards healthy eating habits of people. Improving dietary knowledge, a highly feasible policy measure, has the potential to prevent obesity and overweight if effectively implemented[34]. Development of 'nutrient-dense' breakfast foods that can be prepared easily, school breakfast programmes and education on the importance of breakfast are the needs of the hour[22].

Limitations of the study: As we limited the number of schools to 5 each in urban and rural areas, the resulting sample of teachers was small. The study relies on self-reported information on dietary practices.

No Funding sources were availed for this research. Ethical clearance was obtained from the institution (NRI Medical college & General Hospital), with reference number IEC 2025 F013, dated (11 th February 2025). We solemnly state that there is no conflict of interest with regard to this article.

References

1. Misra A, Singhal N, Sivakumar B, Bhagat N, Jaiswal A, Khurana L. Nutrition transition in India: secular trends in dietary intake and their relationship to diet-related non-communicable diseases. J Diabetes. 2011 Dec;3(4):278-92. Doi: 10.1111/j.1753-0407.2011.00139.x. PMID: 21649865.
2. Gulati S, Misra A, Sugar Intake, Obesity, and Diabetes in India, Nutrients 2014, 6, 5955-5974; doi:10.3390/nu6125955
3. George AS, George ASH, High Salt Intake in India: Health and Economic Impacts, Partners Universal International Innovation Journal, 2023; 1 (6). DOI:10.5281/zenodo.10297864
4. Podder V, Nagarathna R, Anand A, Patil SS, Singh AK, Nagendra HR. Physical Activity Patterns in

India Stratified by Zones, Age, Region, BMI and Implications for COVID-19: A Nationwide Study. Annals of Neurosciences. 2021;27(3-4):193-203. doi:10.1177/0972753121998507

5. Salis S, Virmani A, Priyambada L, Mohan M, Hansda K, Beaufort C. 'Old Is Gold': How Traditional Indian Dietary Practices Can Support Pediatric Diabetes Management. Nutrients. 2021 Dec 10;13(12):4427. Doi: 10.3390/nu13124427. PMID: 34959978; PMCID: PMC8707693.

6. Green R, Milner J, Joy EJ, Agrawal S, Dangour AD. Dietary patterns in India: a systematic review. Br J Nutr. 2016 Jul;116(1):142-8. doi: 10.1017/S0007114516001598. Epub 2016 May 5. PMID: 27146890; PMCID: PMC4890343.

7. Sharma, M., Kishore, A., Roy, D.et al.A comparison of the Indian diet with the EAT-Lancet reference diet. BMC Public Health**20**, 812 (2020). https://doi.org/10.1186/s12889-020-08951-8

8. Rao ND, Min J, DeFries R, Ghosh-Jerath S, Valin H, Fanzo J, Healthy, affordable and climate-friendly diets in India, Global Environmental Change, 2018; 49: 154-165, doi.org/10.1016/ j. gloenvcha.2018.02.013.

9. Jakstas T, Follong B, Bucher T, Miller A, Shrewsbury VA, Collins CE. Addressing schoolteacher food and nutrition-related health and wellbeing: a scoping review of the food and nutrition constructs used across current research. Int J Behav Nutr Phys Act. 2023 Sep 12;20(1):108. doi: 10.1186/s12966-023-01502-5. PMID: 37700281; PMCID: PMC10498614.

10. Parker EA, Feinberg TM, Lane HG,Deitch R, Zemanick A, Saksvig BI,Turner L,Hager ER, Diet quality of elementary and middle school teachers is associated with healthier nutrition-related classroom practices, Preventive Medicine Reports, 2020; 18, https://doi.org/10.1016/j.pmedr.2020.101087

11. Wiradnyani A, Kekalih A, Anggraini R, Februhartanty J, Teachers' Experiences with Nutrition Education Activities and their Perceived Key Factors to an Effective Nutrition Education. The Southeast Asian journal of tropical medicine and public health, 2021; 52(Supplement 1).

12. Pandey B, Reba M, Joshi PK, Seto KC. Urbanization and food consumption in India. Sci Rep. 2020 Oct 14;10(1):17241. doi: 10.1038/s41598-020-73313-8. PMID: 33057014; PMCID: PMC7560883.

13. Johnson C, Praveen D, Pope A, Raj TS, Pillai RN, Land MA, Neal B. Mean population salt consumption in India: a systematic review. J Hypertens. 2017 Jan;35(1):3-9. doi: 10.1097/HJH.0000000000001141. PMID: 27755388.

14. WHO, Noncommunicable Diseases Global Monitoring Framework: Indicator Definitions and Specifications. https://cdn.who.int/media/docs/default-source/ncds/ncd-surveillance/who-gmf-targets-and-indicators-list.pdf?sfvrsn=4dcf2a55_3&download=true

15. Webster J, Trieu K, Dunford E, Hawkes C. Target salt 2025: a global overview of national programs to encourage the food industry to reduce salt in foods. Nutrients. 2014 Aug 21;6(8):3274-87. doi: 10.3390/nu6083274. PMID: 25195640; PMCID: PMC4145308.

16. Gupta P, Mohan S, Johnson C, Garg V, Thout SR, Shivashankar R, Krishnan A, Neal B, Prabhakaran D. Stakeholders' perceptions regarding a salt reduction strategy for India: Findings from qualitative research. PLoS One. 2018 Aug 6;13(8): e0201707. doi: 10.1371/journal.pone.0201707. PMID: 30080888; PMCID: PMC6078292.

17. Sharma, M., Kishore, A., Roy, D.*et al.*A comparison of the Indian diet with the EAT-Lancet reference diet.*BMC Public Health***20**, 812 (2020). https://doi.org/10.1186/s12889-020-08951-8

18. Satija A, Hu FB, Bowen L, Bharathi AV, Vaz M, Prabhakaran D, Reddy KS, Ben-Shlomo Y, Davey Smith G, Kinra S, Ebrahim S. Dietary patterns in India and their association with obesity and central obesity. Public Health Nutr. 2015 Nov;18(16):3031-41. doi: 10.1017/S1368980015000312. Epub 2015 Feb 20. PMID: 25697609; PMCID: PMC4831640.

19. Jignesh Shah J, Ayush Kumar A, Datta TN, Trends and Patterns in Nutritional Intake in India, Journal of Rural Development, 2017; 36 (3): 311 - 332

20. Tak M, Shankar B, Kadiyala S. Dietary Transition in India: Temporal and Regional Trends, 1993 to 2012. *Food and Nutrition Bulletin*. 2019; 40 (2): 254-270. doi:10.1177/0379572119833856

21. Gibney MJ, Barr SI, Bellisle F, Drewnowski A, Fagt S, Livingstone B et al. Breakfast in Human Nutrition: The International Breakfast Research Initiative. Nutrients. 2018 May 1;10(5):559. Doi: 10.3390/nu10050559. PMID: 29723985; PMCID: PMC5986439.

22. Sivaramakrishnan M, Kamath V. A typical working-day breakfast among children, adolescents and adults belonging to the middle and upper socio-economic classes in Mumbai, India - challenges and implications for dietary change. Public Health Nutr. 2012 Nov;15(11):2040-6. Doi: 10.1017/S1368980012002777.

23. Smith KJ, Gall SL, McNaughton SA, Blizzard L,

Dwyer T, Venn AJ, Skipping breakfast: longitudinal associations with cardiometabolic risk factors in the Childhood Determinants of Adult Health Study123, The American Journal of Clinical Nutrition, 2010; 92 (6): 1316-1325. https://doi.org/10.3945/ajcn.2010.30101.

24. Smith KJ, Gall SL, McNaughton SA, Blizzard L, Dwyer T, Venn AJ, Skipping breakfast: longitudinal associations with cardiometabolic risk factors in the Childhood Determinants of Adult Health Study123, The American Journal of Clinical Nutrition, 2010; 92 (6): 1316-1325. https://doi.org/10.3945/ajcn.2010.30101.

25. Dasgupta R, Pillai R, Kumar R, Arora NK. Sugar, salt, fat, and chronic disease epidemic in India: is there need for policy interventions? Indian J Community Med. 2015 Apr-Jun;40(2):71-4. doi: 10.4103/0970-0218.153858. PMID: 25861165; PMCID: PMC4389505.

26. Swapan Banerjee, Dietary supplements market in India is rapidly growing– An overview, MS Management Journal, 2018; 10 (1): ISSN No.0975-0800

27. Rajib Kumar Sen; Hemant Kumar Meena and Vedeika Shekhar, Promoting Millets in Diets: Best Practices Across States/UTs of India, Report-on-Promoting-Best-practices-on-Millet-26_4_23 Publishing Agency: NITI Aayog, 2023

28. Ikar M, Sable S, Tea, coffee and green tea consumption and mental health outcomes: A systematic review and meta-analysis of observational and intervention studies on stress and related conditions Journal of Pharmacognosy and Phytochemistry 2023; 12(2): 209-221 DOI: https://doi.org/10.22271/phyto.2023.v12.i2c.14660

29. Mancini E, Beglinger C, Drewe J, Zanchi D, Lang UE, Borgwardt S, Green tea effects on cognition, mood and human brain function: A systematic review, Phytomedicine,2017; 34: 26-37, https://doi.org/10.1016/j.phymed.2017.07.008.

30. Rajkotiya NH, Sawant SU, Deepak S. Effect of Spicy Diet on Health: A Comprehensive Study. Indian J Nutri. 2023;10(1): 272. https://www.opensciencepublications.com/ fulltextarticles/IJN-2395-2326-10-269.html

31. K. Yang, Y. Li, Z. Mao, X. Liu, H. Zhang, R. Liu, Y. Xue, R. Tu, X. Liu, X. Zhang, W. Li, C. Wang, Relationship between spicy flavor, spicy food intake frequency, and general obesity in a rural adult Chinese population: The RuralDiab study, Nutrition, Metabolism and Cardiovascular Diseases, 2018; 28 (3): 252-261. https://doi.org/ 10.1016/j.numecd.2017.10.021.

32. Jha M, Sah MK, Singh PK, Kumar A. Role of Ayurveda in Public Health: A Critical Review. IJRAPS [Internet], 2022; 5(12):595-9. https://ijraps.in/index.php/ijraps/article/view/123

33. Paudyal B, Thapa A, Sigdel KR, Adhikari S, Basnyat B. Adverse events with ayurvedic medicines-possible adulteration and some inherent toxicities. Wellcome Open Res. 2019; 4:23. doi: 10.12688/wellcomeopenres.15096.3.

34. Shimokawa S, When Does Dietary Knowledge Matter to Obesity and Overweight Prevention? Food Policy, 2013; 38 (1): 35–46. DOI: 10.1016/j.foodpol.2012.09.001.