DOI: 10.7860/JCDR/2023/63400.18288

Original Article

Community Section

Quantitative and Qualitative Analysis of Food Consumption in Household Kitchen of Rural Haryana: A Community-based Cross-sectional Study

TANVI GOEL[1], VIJAY KUMAR SILAN[2], SANJAY KUMAR JHA[3], PANKAJ YADAV[4]

ABSTRACT

Introduction: Food availability is essential for addressing malnutrition. However, nutritional adequacy, which includes both the quantity and quality of food, is equally important. In India, the household serves as the fundamental unit of food consumption, and the health of all household members reflects the nutrient adequacy at this level.

Aim: To assess the quantity and quality of food prepared in household kitchens in rural India.

Materials and Methods: A community-based cross-sectional study was conducted from July 2021 to June 2022 in village Juan, Haryana, India. Ninety households were selected using systematic random sampling. A dietary assessment was conducted to evaluate the food consumed at the household level. Additionally, a general physical examination was performed on all household members (n=405). The data were analysed using Statistical Package for Social Sciences (SPSS) version 20.0, and the Chi-square test was applied to identify associations between micronutrients (iron, calcium, and folic acid) and socio-demographic variables (social caste, socio-economic status, and household size).

Results: Out of the 90 households, the majority (52.2%) followed a lacto-vegetarian diet and had adequate calorie intake (more than the Recommended Daily Allowance (RDA)) (80%), protein intake (97.8%), and fat intake (86.7%). However, only 34.4% (n=31) and 20% (n=18) of households had sufficient iron and folic acid intake, respectively, resulting in over half (51.1%) of the household members being clinically anaemic. Approximately one-third (31%) of the household members were found to be overweight.

Conclusion: Despite the majority of households having an adequate quantity of food, there was a high prevalence of anaemia and malnutrition. Therefore, it is not only the quantity of food that is crucial for an individual's health but also the quality and source of food.

Keywords: Anaemia, Malnutrition, Nutrient adequacy, Overweight

INTRODUCTION

Despite economic growth in developing countries, such as India, lack of access to adequate food has been a public health issue, leading to hunger and eventually malnutrition, with serious consequences for individuals, families, societies, and nations as a whole [1,2]. However, food availability is crucial to address malnutrition. Nutritional adequacy is equally important, meaning that food must meet the dietary needs of essential nutrients for individuals, considering many factors like age, gender, body size, and physical activity level, as expressed by the RDA recommended by national and international organisations for healthy growth and development [3,4]. Evidence suggests that 8.9% of the global population suffers from undernourishment in terms of energy intake. In India and other developing countries, approximately 80% of the population consumes dietary intakes below the RDA. India is home to roughly half of the world's malnourished population [4,5]. In India, the household serves as the basic unit of food consumption. If sufficient food is available, individual household members can consume diets with recommended nutrient densities to meet their specific requirements [3].

Household nutrient inadequacy indicates a high vulnerability to various health consequences, including an increased risk of Non Communicable Diseases (NCDs) in adults and transgenerational consequences like adverse birth outcomes (preterm births and low birth weight), growth retardation, and poor cognitive development in children, leading to reduced productivity in adulthood [6-9]. Nutrition inadequacy remains disproportionately concentrated in rural India, especially among poor farmers and agricultural workers, resulting in significant nutritional problems like protein-energy malnutrition and micronutrient deficiencies [5]. People in rural areas consume home-cooked food more frequently than those in urban areas [10]. A household survey in four regions of India revealed that a considerable portion of the population consumes excessive amounts of cereals but inadequate amounts of protective foods such as legumes, milk, nuts, vegetables, and fruits [11]. Dietary calories primarily come from sugar, carbohydrates, and saturated fat, with low micronutrient intake [10,11]. North India reportedly has the highest daily fat intake (67.3 g), leading to a higher prevalence of overweight, obesity, and abdominal obesity compared to other regions [11].

In the rural part of the northern state of Haryana, the reported mean calorie intake per day is higher (2441 Kcal/day) compared to the national average (2233 Kcal/day). However, one-fourth of children under the age of five had one or more anthropometric failures. Furthermore, two-thirds of Women of Reproductive Age group (WRA) suffer from anaemia, and nearly one-third of adults are overweight or obese [11,12]. Therefore, homemade food does not guarantee a healthy diet and can significantly impact the nutritional quality of the food consumed. Consequently, it is important to assess the nutrient adequacy of food at the household level. To the best of our knowledge, there is no reported data on the nutritional quality of food consumed in rural households in North India. Based on this background, present study was conducted to assess the quantity and quality of food cooked in the household kitchens of rural Haryana, India.

MATERIALS AND METHODS

A community-based cross-sectional study was conducted from July 2021 to June 2022 among households in the village of Juan, which is the field practice area of the Department of Community Medicine, Bhagat Phool Singh Government Medical College, Khanpur Kalan, Sonipat, Haryana, India. The village has a population of approximately 6,200 people residing in 1,153 households, as per the records maintained by the Department of Community Medicine.

Based on the guidelines of the Helsinki Declaration of 1973, which was later modified in 2013, ethical approval was obtained from the Institutional Ethics Committee (IEC) of BPS GMC (W), Khanpur Kalan, Sonipat (Reg. no. BPSGMCW/RC 637/IEC/20). The purpose and procedures of the study, as well as the right to withdraw from the study at any point, were explained to the households. No biological samples were collected from the participants. Written informed consent was obtained from the head of the households and household members after they were provided with all necessary information. Strict confidentiality and anonymity of the households were maintained, and access to data was restricted to the investigators of the study.

Inclusion criteria: Households that provided written informed consent were included in the study.

Exclusion criteria: Household members below six months of age, those who were seriously ill (currently or in the past month), or those on a prescribed special diet were excluded from the study.

Study population: The sampling frame included all households in Village Juan. A list of households and their members, who had been residing for atleast six months or more, was obtained from the Department of Community Medicine.

Sample size: Since there was no published data on the nutritional quality of household food in rural northern India, a prevalence of 50% was assumed to yield the maximum sample size. The calculated sample size was 384 participants (using the formula

$$n=Z^2pq/d^2,$$

where Z=1.96 at a 95% confidence interval, p=50%, q=1-p, and absolute precision (d)=5%). On average, it was estimated that one household had five members, so the number of households selected was calculated to be 77 (384/5) [13]. Considering a 10% dropout rate, the total number of households to be selected was 85. Therefore, a nearest round-off value of 90 households was selected for data collection.

Sampling technique: A systematic random sampling technique was used to select the study households. As there were more than 1,150 households and 90 households were chosen, the calculated sampling interval was 12. The first house was selected randomly through a lottery method, and then every 12th household was selected for data collection.

Study tool: An adult female involved in purchasing and cooking food in the household was approached through a house-to-house visit. A predesigned, pretested, semi-structured interview schedule was used to collect socio-demographic information and details about the foods consumed (cooked and raw) in the household.

General physical examinations and anthropometric measurements were conducted for all household members included in the study using a nutrition assessment schedule [14].

Operational Definitions

The quantity of food was assessed using the following technique in the dietary survey: an inventory of total food consumed (cooked and raw, excluding food eaten from outside) was conducted.

Food categorisation: The foods were classified into major food groups, including cereals, millets, pulses, milk and milk products, fruits, green vegetables, roots and tubers, other vegetables, sugar and jaggery, fats and oils, eggs, fish, and meat. Food items were categorised based on their purchasing frequency. The number of food items purchased yearly, such as wheat and rice, was divided by 365 to determine the amount consumed per day. Food items purchased monthly were divided by 30, and those purchased weekly were divided by seven to calculate daily consumption. Highly perishable food items purchased daily were calculated based on daily consumption. The average daily intake of food consumed in a household was calculated and converted into principal food categories, such as grams of cereals per day, grams of pulses per day, and grams of leafy vegetables per day, per household.

Calculation of consumption units: This was done following the practice of nutritional surveys conducted in India by the National Nutrition Monitoring Bureau (NNMB) [15]. After calculating the household's average daily intake, the average amount of each food item was divided by the consumption units to obtain the intake per consumption unit by the household. This intake of each food group per consumption unit was compared against the recommendations of the Indian Council of Medical Research-National Institute of Nutrition (ICMR-NIN) [15].

Quality of food: The quality of food was assessed by calculating the intake of each nutrient per consumption unit under study, including total amount of carbohydrates, proteins, fats, iron, folic acid, calcium, and vitamin A, by the household. This intake was compared against the recommendations of the ICMR-NIN [15].

Overweight: The weight for height Z-score was calculated and compared against the standard value [16].

STATISTICAL ANALYSIS

The data collected from the study households were entered into Microsoft Excel spreadsheet 2019. After data cleaning, it was analysed using SPSS for Windows, Version 20.0, developed by SPSS Inc., Chicago. Quantitative data were expressed as median and Interquartile Range (IQR), while qualitative data were presented as frequency and proportion. The Chi-square test was applied to assess the association between categorical variables such as social caste, household size, and socio-economic status with the consumption of iron, calcium, and folic acid in the diet. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 90 households participated in the study, and among them, 405 household members underwent general physical examination and anthropometric measurements.

The majority of the heads of the households were unemployed 28 (31.1%) and had a literacy rate of 74.4%. Nearly half of the households 44 (48.8%) belonged to the "others" caste category, and one-third 29 (32.2%) had a Class-I and II socio-economic status. A greater proportion of households 55 (61.1%) had a household size of four and above. More than half of the households 47 (52.2%) followed a lacto-vegetarian diet [Table/Fig-1].

Socio-demographic characteristics		n (%)
Occupation of the head of the household	Unemployed	28 (31.1)
	Unskilled	23 (25.6)
	Agriculture	22 (24.4)
	Semi-skilled	17 (18.9)
Education of the head of the household	Illiterate	23 (25.6)
	Literate	67 (74.4)
Social caste	Scheduled caste	23 (25.6)
	Backward caste	23 (25.6)
	Others	44 (48.8)
Household size	Four or less	35 (38.9)
	More than four	55 (61.1)

Social class (according to modified BG Prasad scale)	Class-I, II	29 (32.2)
	Class-III, IV, V	61 (67.8)
Eating pattern	Lacto-vegetarian	47 (52.2)
	Lacto-ovo-vegetarian	21 (23.3)
	Non vegetarian	22 (24.5)

[Table/Fig-1]: Distribution of study households according to their socio-demographic characteristics (n=90).

The study households had a median (IQR) intake of macro and micronutrients per consumption unit above the recommended levels, except for iron and folic acid. Among the surveyed households, 72 (80%) consumed more than the RDA for energy, and almost all of them (88, 97.8%) consumed more than the RDA for proteins. Only one-third of the households had adequate (more than RDA/category I) iron intake, while only 18 (20%) had adequate folic acid intake. However, all households had adequate vitamin A intake [Table/Fig-2].

Nutrients per CU* per day	RDA†	Median (IQR)‡	Households (>RDA) n (%)
Calories (Kcal)	2110	2632.50 (2175.50-3083.25)	72 (80)
Protein (g)	47	74.10 (59.65-91.15)	88 (97.8)
Fat (g)	54	72.60 (51.87-90.70)	78 (86.7)
Carbohydrates (g)	NA	418.50 (343.50-511.90)	88 (97.8)
Iron (mg)	19	16.60 (13.25-20.11)	31 (34.4)
Calcium (mg)	1000	1430 (900.75-1891.25)	64 (71.1)
Folic acid (µg)	300	230.50 (190.75-290.25)	18 (20)
Vitamin A (µg)	1000	2488.50 (1932.25-3059.25)	90 (100)

[Table/Fig-2]: Distribution of the study households according to their daily consumption of nutrients (n=90).
*CU: Consumption unit; †RDA: Recommended daily allowance; ‡IQR: Inter quartile range

A greater proportion of households belonging to the scheduled caste had adequate iron intake, while adequacy of calcium and folic acid was found to be higher in the "others" caste category. There was a statistically significant association between household size (four or less) and nutrient adequacy of calcium and folic acid. Households with a socio-economic status of Class-I and II had higher adequacy of folic acid, which was also statistically significant (p-value <0.05) [Table/Fig-3].

On general physical examination, more than half of the household members had pale conjunctiva, tongue, and nails. A substantial proportion of household members were underweight (68, 16.8%), as well as overweight (125, 31%) [Table/Fig-4].

DISCUSSION

Dietary assessment is a process designed to determine the nutritional adequacy of the foods an individual consumes and the quantity in which they are consumed. The adequacy of nutrients in the household diet reflects the overall health of individuals. Therefore, the current study aimed to assess whether households were meeting their dietary needs both quantitatively and qualitatively and qualitatively. Present study assessed the nutrient intakes per consumption unit and compared them with the RDA standards to determine nutrient adequacy in the diet.

When assessing the adequacy of macronutrients, it was found that the majority of households had sufficient intake of calories (80%), protein (97.8%), and fat (86.7%) compared to the recommended allowances. These values were higher than the average intake reported in studies conducted Haryana, India [15]. Moreover, the nutrient adequacy observed in present study was higher compared to the studies conducted in Sri Lanka, Africa, Ghana, Nepal, Andaman and Nicobar Islands, Southern India, and West Bengal [2,17-22]. This could be attributed to the fact that most of the households in present study had livestock, a quarter of them owned agricultural land, and their per capita income was higher than the national average. This led to better accessibility and availability of protein and fat-rich foods such as pulses, milk or dairy products, meat, and eggs, which are more expensive than cereals [23,24]. In contrast, households with lower incomes rely more on cereals, which are mainly supplied through the Public Distribution System (PDS) [25].

Socio-demographic parameters	Iron			Calcium			Folic acid		
	I n (%)	II n (%)	p-value*	I n (%)	II n (%)	p-value*	I n (%)	II n (%)	p-value*
Social caste									
Scheduled caste	9 (39.1)	14 (60.9)	0.836	11 (47.8)	12 (52.2)	<0.001	4 (17.4)	19 (82.6)	0.819
Backward caste	8 (34.8)	15 (65.2)		13 (56.5)	10 (43.5)		4 (17.4)	19 (82.6)	
Others	14 (31.8)	30 (68.2)		40 (90.9)	4 (9.1)		10 (22.7)	34 (77.2)	
Household size									
Four or less	14 (40)	21 (60)	0.196	29 (82.9)	6 (17.1)	0.020	13 (80)	22 (20)	<0.001
More than four	17 (31.5)	37 (68.5)		35 (63.6)	20 (36.4)		5 (9.1)	50 (90.9)	
Socio-economic status									
Class-I, II	10 (34.5)	19 (65.5)	0.996	24 (82.8)	5 (17.2)	0.093	11 (60)	18 (40)	0.030
Class-III, IV, V	21 (34.4)	40 (65.6)		40 (65.6)	21 (34.4)		7 (11.5)	54 (88.5)	

[Table/Fig-3]: Association of the sociodemographic characteristics with Micronutrient adequacy of the study households (n=90).
I=more than 100% of recommended daily allowance; II=less than 100% of recommended daily allowance; *chi-square test is applied

General physical examination	6-59 months n=20	6-9 years n=26	10-19 years n=84	>19 years n=275	Total n=405
Clinical signs	n (%)	n (%)	n (%)	n (%)	n (%)
Pale conjunctiva	3 (15)	9 (34.6)	43 (51.2)	152 (55.3)	207 (51.1)
Bleeding gums	NA	NA	1 (1.19)	43 (15.6)	44 (10.9)
Caries	NA	13 (50)	14 (16.7)	55 (20)	82 (20.2)
Pale tongue	3 (15)	9 (34.6)	43 (51.2)	152 (55.3)	207 (51.1)
Pale nails	3 (15)	9 (34.6)	43 (51.2)	152 (55.3)	207 (51.1)
Dry and scaly skin	1 (5)	NA	2 (2.4)	84 (31)	87 (21.4)
Anthropometric examination					
Underweight	5 (25)	9 (34.6)	17 (20.5)	37 (13.6)	68 (16.8)
Overweight	2 (10)	1 (3.8)	2 (2.4)	120 (44.3)	125 (31)

[Table/Fig-4]: Distribution of household members according to clinical signs and anthropometric measurements on general physical examination.

However, the prevalence of overweight and obesity among the study households is concerning, as nearly one-third (31%) of household members were found to be overweight or obese. This could be due to the high intake of fat (72 g/CU, i.e., 1.4 times the RDA).

While assessing the nutrient adequacy of micronutrients, it was revealed that the median intake of iron per Consumption Unit (CU) per day was lower than the recommended values (87.7% of RDA), and only one-third of households had adequate iron intake. The main source of iron in their diet was wheat, which is a plant-based rich source of iron and is the staple food in northern India [25]. Additionally, the intake of folic acid in their diet was also found to be insufficient (76.6% of RDA), and only one-fifth of the households had adequate folic acid intake. On general physical examination, more than half of the study participants were found to be anaemic. The high prevalence of anaemia could be attributed to the lower bioavailability of iron and folic acid, as the main sources of these nutrients were plant-based [25]. These findings are comparable to the study conducted in Sri Lanka but not with the studies conducted in Ghana and the Andaman and Nicobar Islands [2,19,21]. Present study reports a median intake of calcium higher than the recommended values. This could be due to the better socio-economic status of the households and the availability of cattle in most rural households, leading to a higher consumption of milk and dairy products produced at home.

In the present study, the availability of nutrients under study was higher for household members in smaller household sizes. This was because the amount spent on food would be sufficient to meet the food requirements of all household members [3,7]. These findings were in line with a study conducted by Sarkar S [23]. The current study reveals that higher socio-economic status (in terms of per capita income) was associated with a higher adequacy of calcium. This was because as household incomes improve, absolute food spending is likely to increase, leading to improvements in both food quantity and quality. These findings are supported by a study conducted by Bhattacharjee S et al., which found that socio-economic status was a major predictor of micronutrient deficiencies [3]. An adequate diet is also determined by social caste, as income and resources are unequally distributed [26]. In present study, iron adequacy was higher among households belonging to the scheduled caste. This could be justified by the inclusion of animal-based foods in their diet compared to the other two social castes.

Based on the findings, several recommendations can be made. Firstly, targeted interventions should be implemented to address the issue of overweight and obesity among the study population. This could involve promoting healthier eating habits, increasing physical activity levels, and providing education on the importance of maintaining a healthy weight. Secondly, there is a need to promote the consumption of nutrient-dense and affordable foods among households. This could be achieved through various strategies such as promoting the cultivation of nutritious crops, providing subsidies for nutrient-rich foods, and educating households on the importance of a balanced diet. Furthermore, it is recommended to incorporate iron and folic acid-fortified items in the PDS. This would help to ensure that households have access to these essential nutrients, especially those that are at risk of deficiency. Lastly, further research is needed to assess the long-term impact of interventions on the nutritional status and health outcomes of the rural population. This would help to determine the effectiveness of different strategies and provide insights for future interventions.

The present study had several strengths. It was a community-based study with a high participation rate, which enhances the generalisability of the findings. The use of systematic random sampling reduced the chances of selection bias. Additionally, a validated and pretested questionnaire was used, and data collection was conducted by a single trained investigator, reducing the potential for inter-observer bias.

Limitation(s)

However, there were some limitations to this study. The information on monthly family income and food intake was self-reported, which may be subject to bias due to social desirability. Additionally, the presence of bleeding gums and caries observed during the general physical examination may be indicative of nutritional deficiencies or poor oral hygiene, but the assessment of these specific nutrients was not conducted in this study.

CONCLUSION(S)

The study revealed that the majority of rural households had adequate intake of the macronutrients, but there were deficiencies in micronutrients, specifically iron and folic acid, leading to a high prevalence of anaemia. Socio-economic factors such as household size, socio-economic status, and caste had a significant impact on nutrient adequacy.

Acknowledgement

The authors would like to express their gratitude to all the participants for their valuable participation and support.

REFERENCES

[1] Agho KE, Mukabutera C, Mukazi M, Ntambara M, Mbugua I, Dowling M, et al. Moderate and severe household food insecurity predicts stunting and severe stunting among Rwanda children aged 6-59 months residing in Gicumbi district. Matern Child Nutr. 2019;15(3):e12767.
[2] Manimunda SP, Sugunan AP. Nutritional status of preschool children in Andaman and Nicobar Islands and food insecurity, food groups, and nutrient consumption among population. Indian J Community Med. 2017;42(2):88-93.
[3] Bhattacherjee S, Datta S, Ray K, Mukhopadhyay DK. Nutrient adequacy and its correlation in a sub-Himalayan region of West Bengal, India. J Family Med Prim Care. 2016;5(2):314-19.
[4] Lakshmi AJ, Khyrunnisa B, Saraswathi G, Jamuna P. Dietary adequacy of Indian rural preschool children-influencing factors. J Trop Pediatr. 2005;51(1):39-44.
[5] The state of food security and nutrition in the world, FAO 2021. Available at https://www.fao.org/sustainable-development-goals/overview/fao-and-the-2030-agenda-for-sustainable-development/food-security-and-the-right-to-food/en/. Accessed on 25 October 2022.
[6] Rani P, Sangwan V. Nutrient adequacy and clinical assessment of rural school children (10-12 years) of Haryana. J Pharmacogn Phytochem. 2019;8(1):2284-88.
[7] Chinnakali P, Upadhyay RP, Shokeen D, Singh K, Kaur M, Singh AK, et al. Prevalence of household-level food insecurity and its determinants in an urban resettlement colony in north India. J Health Popul Nutr. 2014;32(2):227-36.
[8] Kumar P, Chauhan S, Patel R, Srivastava S, Bansod DW. Prevalence and factors associated with triple burden of malnutrition among mother-child pairs in India: A study based on National Family Health Survey 2015-16. BMC Public Health. 2021;21(1):01-02.
[9] Sims A, van der Pligt P, John P, Kaushal J, Kaur G, McKay FH. Food insecurity and dietary intake among rural Indian women: An exploratory study. Int J Environ Res Public Health. 2021;18(9):4851.
[10] What India eats. Hyderabad (India): ICMR National Institute of Nutrition; 2020. Available at https://www.nin.res.in/nutrition2020/what_india_eats.pdf. Accessed on 25 October 2022.
[11] India health report: Nutrition 2015. New Delhi (India): Public health foundation of India. 2015. Available at: INDIA-HEALTH-REPORT-NUTRITION_2015_for-Web.pdf. Accessed on 25 October 2022.
[12] International Institute for Population Sciences (IIPS) and MoHFW. National Family Health Survey-5, 2019-20. Available at: http://rchiips.org/nfhs/index.shtml. Accessed on 25 October 2022.
[13] International Institute for Population Sciences (IIPS) and ICF. National Family Health Survey 3, 2005-06. Mumbai (India): IIPS. 2007. Available at: http://rchiips.org/nfhs/NFHS-3%20Data/NFHS-3%20NKF/Report.pdf. Accessed on 25 October 2022.
[14] Park K. Park's Textbook of Preventive and Social Medicine. 25th ed. Jabalpur (India): Banarsidas Bhanot; 2019:708-9, 719.
[15] National sample survey office. Nutritional Intake in India, 2011-2012. 560(68/1.0/3). New Delhi (India). 2014. Available from: https://cndsr.org/img/reportFiles/1622388028nss_report_560_19dec14.pdf. Accessed on 25 October 2022.
[16] World Health Organization. BMI for age. (Cited 2022 Oct 25). Available from: https://www.who.int/tools/growth-reference-data-for-5to19-years/indicators/bmi-for-age.
[17] Mitra S, Mukhopadhyay DK, Sarkar AP, Saha I. Are household food security, nutrient adequacy, and childhood nutrition clustered together? A cross-sectional study in Bankura, West Bengal. Indian J Public Health. 2019;63(3):203.
[18] Ghimire M, Ghimire M. Prevalence of low-calorie intake by rural families in Palpa district of Nepal. J Lumbini Med Coll. 2013;1(2):60-63.
[19] Thamilini J, Wekumbura C, Mohotti AJ, Kumara AP, Kudagammana ST, Silva KR, et al. Organized home gardens contribute to micronutrient intakes and dietary diversity of rural households in Sri Lanka. Front Sustain Food Syst. 2019;3:94.

[20] Van Wesenbeeck CF, Keyzer MA, Nubé M. Estimation of undernutrition and mean calorie intake in Africa: Methodology, findings and implications. Int J Health Geogr. 2009;8(1):01-08.
[21] Nti CA. Household dietary practices and family nutritional status in rural Ghana. Nutr Res Pract. 2008;2(1):35-40.
[22] Narasimhan S, Nagarajan L, Vaidya R, Gunasekaran G, Rajagopal G, Parthasarathy V, et al. Dietary fat intake and its association with risk of selected components of the metabolic syndrome among rural South Indians. Indian J Endocrinol Metab. 2016;20(1):47-54.
[23] Sarkar S. Consumption pattern and determinants of nutritional intake among rural households of West Bengal, India. J Settl Spat Plan. 2015;6(2):85-94.
[24] GDP per capita of India. 2021. Available at: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?end=2021&locations=IN&start=2019&view=map. Accessed on 25 October 2022.
[25] Harinarayan CV, Akhila H, Shanthisree E. Modern India and dietary calcium deficiency-half a century nutrition data-retrospect-introspect and the road ahead. Front Endocrinol. 2021;12:583654.
[26] Prinja S, Sharma A, Tripathy JP, Rana SK, Aggarwal AK, Dalpath SK. Inequalities in nutritional status among under-five children in Haryana state, India: Role of social determinants. Indian J Community Health. 2017;29(1):81-88.

PARTICULARS OF CONTRIBUTORS:
1. Postgraduate, Department of Community Medicine, BPS Government Medical College for Women, Khanpur Kalan, Sonepat, Haryana, India.
2. Associate Professor, Department of Community Medicine, BPS Government Medical College for Women, Khanpur Kalan, Sonepat, Haryana, India.
3. Professor, Department of Community Medicine, BPS Government Medical College for Women, Khanpur Kalan, Sonepat, Haryana, India.
4. Postgraduate, Department of Community Medicine, BPS Government Medical College for Women, Khanpur Kalan, Sonepat, Haryana, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Tanvi Goel,
Postgraduate, Department of Community Medicine, BPS Government Medical College for Women, Khanpur Kalan, Sonepat-131305, Haryana, India.
E-mail: tanniaa205.tg@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Feb 22, 2023
- Manual Googling: Apr 19, 2023
- iThenticate Software: May 06, 2023 (12%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Feb 18, 2023**
Date of Peer Review: **Mar 18, 2023**
Date of Acceptance: **May 09, 2023**
Date of Publishing: **Aug 01, 2023**