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Assessment of dietary consumption pattern of selected vegetable growers of district Kangra of Himachal Pradesh

[1]Neelam Kumari, [2]Sangita Sood, [3]Prem Chand Sharma and [4]Ranjana Verma

[1, 2, 4]Department of Food Science, Nutrition and Technology, CSK HPKV, Palampur, Himachal Pradesh, India

[3]Department of Entomology, CSK HPKV, Palampur, Himachal Pradesh, India

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Corresponding Author: Neelam Kumari

Abstract

The present study was conducted in district Kangra to analyze the food consumption pattern of vegetable growers. Under this study to evaluate 120 respondents i.e. Small land holder (40), Medium land holder (40) and Large land holder (40) from vegetable grower's families. Surveyed respondents reported that they are consuming on an average cereal (370.14 g/day), pulses (43.00g/day) and leafy vegetable (51.50g/day), highly inadequate in comparison to RDA's. On the contrary the consumption of milk and milk product (369.00g/day) found much higher against RDA's irrespective to pattern of land holding of the growers. The average daily intake of protein, fat and calories also observed deficient. There was an imbalance in the respondents' consumption of various food groups. Therefore, the paper suggests that, in light of the research's findings, extra efforts be made to alter the way that vegetable growers in Kangra consume food and to raise public awareness of the importance of incorporating a range of foods from various food groups into a diet.

Keywords: Food consumption pattern, vegetable growers, food groups, land holder

Introduction

Approximately 40% of the world's workforce, or 1.3 billion people, work in agriculture, with 75% of these jobs being found in low-income nations (Traitler *et al*. 2018) [24]. Small farmers are vital to the world's food supply, and agricultural productivity is necessary to maintain the nutritional and health status of billions of people worldwide (Fanzo 2018) [5]. Brazil's dietary patterns have changed over the past few decades, with a notable shift away from the consumption of legumes, roots, and tubers and towards a higher relative consumption of meat, milk, sugar, soft drinks, and other ultra-processed foods. Eating out has also resulted in higher costs, a continued increase in the purchase of ready-to-eat products, and a significant decrease in the share of food and culinary ingredients. The overall profile of food and nutrient consumption, which is defined by customary eating behaviors, is known as the dietary pattern (DP). A population's eating habits can be better understood through the examination of dietary patterns (NFHS 2000) [14]. Because the joint effect of the various nutrients involved would be better identified, it might be more accurate at predicting the risk of diseases than the analysis of individual nutrients or foods.

Fruits and vegetables are also a rich source of non-starch polysaccharides, which include cellulose, mucilage, hemi-cellulose, gums, pectin, and other soluble and insoluble dietary fibre. These materials help the faecal matter pass easily out of the body by retaining moisture in it and absorbing excess water from the colon. Therefore, eating enough fibre protects against diseases like rectal fissures, colon cancer, haemorrhoids, and chronic constipation. Even though the amount of vegetables consumed in India is far less than what is considered adequate, vegetables are essential to a diet for both taste and nutrition.

Analysing food consumption patterns is essential to comprehending a person's nutritional status and general health. It aids in pinpointing problem areas and creating focused interventions to encourage better eating practices (Krebs-Smith *et al*. 1995) [10]. Precise evaluation of dietary intake habits becomes especially crucial when researching particular populations, like vegetable farmers (Green *et al*. 2016) [6]. Those who cultivate their own vegetables are a distinct group because they have easy access to fresh produce and probably consume more veggies overall. Numerous investigations have examined the dietary habits of vegetable farmers and pinpointed elements influencing their dietary preferences.

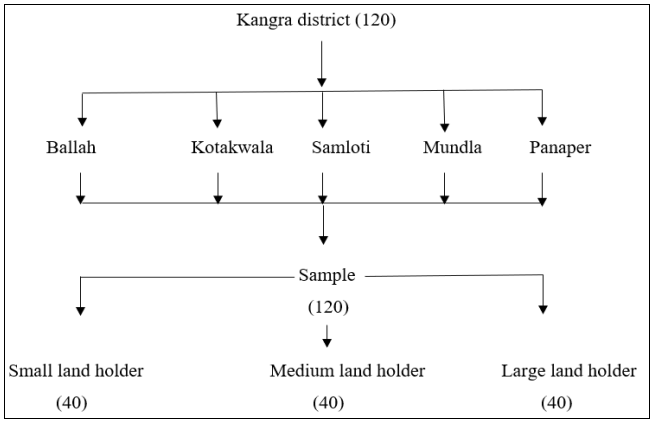
Researchers have evaluated the dietary consumption habits of vegetable growers using a variety of techniques. Food frequency questionnaires have been used in some studies to measure the amount and frequency of vegetables consumed by vegetable growers. Previous research has utilised all-encompassing models grounded in theoretical frameworks, like social cognitive theory, to examine the variables impacting this population's consumption of fruits and vegetables. For instance, a study by Smith *et al*. 1995 [10] tested a comprehensive model based on social cognitive theory to look at the dietary consumption patterns of vegetable growers. In this scenario, the objective of this paper was explore the sociodemographic, occupational and lifestyle factors to the high adherence these dietary patterns.

Materials and Methods

The present study was conducted in District Kangra by selecting five villages at random under vegetable growing areas namely *Ballah*, *Kotakwala*, *Panaper*, *Samloti*, *Mundla*. For assessing dietary pattern of vegetable growers, suitable representative sample of 120 were selected from these villages. For selection of vegetable growers, land holding was selected as a criterion for the division of the respondents into three income groups. Forty respondents from each income group namely, SLH– Small land holder having less than 10 Kanals; Moderate Land holder (MLH – Land holding 10-20 Kanals) and Large land holder (LLH - Land holding more > 20 Kanals) were randomly selected. Hence, the total number of vegetable growers selected for the study was 120. A questionnaire was structured to get information regarding dietary consumption pattern of the vegetable growers which includes general information, demographic profile, socio-economic profile & dietary consumption pattern. The statistical tests i.e. percentage, frequency, arithmetic mean, analysis of variance (ANOVA) test were used for analyzing the data.

Results and discussion

Demographic characteristics of the sample population are presented in Table 1 which includes age, type of family sex and marital status. Demography refers to the vital and measurable statistics of the population and combined all these variables to define a demographic profile. A demographic profile provides enough information of 120 subjects about details of the typical member of this group to create a mental picture of this hypothetical aggregate. As is evident from the Table 1, the selected respondents lied between the ages of 35 to 55 years.



On the basis of age, the respondents were divided into 4 categories, i.e., less than 35 years, from 35 -45 years, from 45-55 years and more than 55 years. It was observed that 12.50 percent of the total respondents were less than 35 years of age whereas, 22.50, 34.17 and 30.83 percent of the total respondents were in the age group of 35-45, 45-55 and more than 55 years respectively. When the respondents were classified on the basis of income groups, namely Small Land Holder (SLH), Moderate Land Holder (MLH) and Large Land Holder (LLH), it was observed that 10.00, 15.00 and 12.50 percent of the respondents were in the age group of less than 35 years from SLH, MLH and LLH respectively. Similarly, 30.00, 17.50 and 20.00 percent of the SLH, MLH and LLH respondents lied in the age group of 35-45 years. Further, on taking the group in the age ranged between 45-55 years it was found that 25.00 percent of the respondents were from large land holder, 30.00 from the moderate land holder and 47.50 were from the small land holder. The subjects selected from small and large land holders were to the tune of 12.50 and 42.50 percent while the moderate land holders were in between (37.50). Hence, from the data it can be stated that the majority of the respondents were relatively young and were less than 55 Years of age.

Table 1: Demographic profile of vegetable growers

Character	SLH	MLH	LLH	Total(N=120)
Age				
<35	4(10.00)	6(15.00)	5(12.50)	15(12.50)
35-45	12(30.00)	7(17.50)	8(20.00)	27(22.50)
45-55	19(47.50)	12(30.00)	10(25.00)	41(34.16)
>55	5(12.50)	15(37.50)	17(42.50)	37(30.83)
Type of Family				
Nuclear	30(75.00)	32(80.00)	33(82.50)	95(79.17)
Joint	10(25.00)	8(20.00)	7(17.50)	25(20.83)
Sex				
Male	33(82.50)	36(90.00)	39(97.50)	108(90.00)
Female	7(17.50)	4(10.00)	1(2.50)	12(10.00)
Marital status				
Married	40(100.00)	39(97.50)	40(100.00)	119(99.16)
Unmarried	0	1(2.50)	0	1(0.83)

Figures in Parentheses show the percentages of family type and consumption of family of respondents

From the same table 1 it was observed that out of 120 subjects 79.17 and 20.84 percent were from the nuclear and joint families respectively. It is very apparent that with the change in the social set up as well as the influence of urbanization even in Villages majority of the people preferred nuclear families. When the data is categorized on the basis of income group, it is observed as 75.00, 80.00 and 82.50 percent of the respondents fell in to the nuclear family category while hardly 25.00, 20.00 and 17.50 percent lived in joint families. As per the data given in a table 1, three fourth of the subjects enjoyed the nuclear family system, meaning thereby, that even in rural or semi-rural area most of the people shifted from joint family system to nuclear family system. This may be due to the increased urbanization or stepping out of the houses by family members for the want of jobs. From the same table it is clear that the majority of the subjects selected under study are males comprising 90.00 percent whereas, female subjects were hardly constituted to the 10.00 percent of the total selected strength. When the data is categorized on the basis of land holdings, the male subjects comprised of 82.50, 90.00 and 97.50 percent and females as 17.50 and 10.00 percent respectively under small, moderate and large land holders. It is apparent from the table that though the samples were selected randomly but majority of the subjects were male. From the data it is concluded that still today the vegetable cultivation is performed by male subjects. Under Indian scenario still there is male predominance in cultivation sector.

Socio-economic profile of vegetable growers

Socio-economic environment influences the occupation, life style, and nutrition of social classes which in turn would

influence the overall family set up including nutrition of the family. In the present investigation, wide social and economic disparities were observed due to the low level of education and poor financial status. **S**ocio-economic profile of the subjects has been illustrated in Table 2. The data from the same table reflected the literacy level of the subjects varied from illiterate to graduate. On the basis of their educational qualification, the respondents were divided into five categories. A look at data in Table 2 reflects that 7.50 percent each SLH and MLH of the total 120 rural respondents were illiterate only 5.00 percent of the LLH were illiterate. Out of total 120, 37.50, 32.50 and 35.00 percent of the vegetable growers were primary class passed. Respondents belonging to the category of SLH, MLH and LLH are 37.00, 45.00 and 42.50 percent are matriculate. Amongst selected subjects hardly 6-7 percent are graduate/ under graduate in all categories. It is inferred that due to lack of higher education facilities nearby, the respondents could not go for higher education but even then majority of the subjects from all categories are matriculated. Very low percentages of the subjects were totally illiterate. It is very clear from the same table that 55.00, 30.00 and 15.00 percent of the subjects belong to the category of owner cultivator, land holder and service or business class. Similarly, when the data is scrutinized for the same parameters in other categories i.e. MLH and LLH, 45.00,32.50 and 22.50 and 47.50,25.00 and 27.50 percent subjects were found to be vegetable cultivator land holder and service or business class. It's very clear that majority of the subjects belong to the category of owner cultivator which was the target group followed by land holder and least from the business and service class. Later category opted vegetable cultivation as a side business. On critically looking the data for annual income, from SLH, MLH and LLH, 25.00, 17.50 and 17.50 percent are having <70,000/- annual income. In the same sequence, 52.50, 45.00 and 47.50 percent subjects had annual income in the range of 70,000-1,00,000/ annum. Above 1,00,000/- annum 22.50,37.50 and 35.00 percent of subjects attained. Majority of the subjects belonged to the middle category.

Table 2: Socio-economic profile of vegetable growers

Education	SLH	MLH	LLH	Total(N=120)
Illiterate	3(7.50)	3(7.50)	2(5.00)	8(6.67)
Primary	15(37.50)	13(32.50)	14(35.00)	42(35.00)
High School	15(37.50)	18(45.00)	17(42.50)	50(41.67)
Graduate/Under Graduate	7(17.50)	6(15.00)	7(17.50)	20(13.67)
Occupation				
Owner Cultivator	22(55.00)	18(45.00)	19(47.50)	59(49.17)
Land Lord	12(30.00)	13(32.50)	10(25.00)	49(40.83)
Service/Business	6(15.00)	9(22.50)	11(27.50)	26(21.67)
Annual Income				
<70000	10(25.00)	7(17.50)	7(17.50)	24(20.00)
70000-1,00,000	21(52.50)	18(45.00)	19(47.50)	58(48.33)
>1,00,000	9(22.50)	15(37.50)	14(35.00)	38(31.67)

Figures in Parentheses show the percentages of family type and consumption of family of respondents

Dietary consumption pattern of vegetable growers

An effort was made to collect information on the average intake of different food groups by the subjects belonging to three different categories *viz*. SLH, MLH and LLH of selected farm families by using ''24 Hour Recall Method' for three consecutive days. The figures obtained were compared with standard values established by NIN (2023). The information given in Table 3 shows the average intake of Cereals and cereal products, Pulses and legumes, Milk and milk products, Leafy vegetables, Roots and tubers, Other vegetables, Fats and edible oils and Sugar. As is evident from the table, the daily intake of cereals was highest by LLH (383.28g/day) followed by MLH (367.20g/day) and SLH (359.94g/day) though all these groups differed non -significantly amongst each other. There was no significant difference observed amongst the three groups in cereal intake. Income does not influence their cereal intake because their dietary pattern is such that they take only two meals in a day. Singh *et al*. 2020 reported that vegetable growers across all districts in both states Haryana and Gujrat consumed main staples, while pulses and vegetables were consumed by all farmer households in Karnal and Mewat districts of Haryana. Kaur (2012) [9] also revealed that cereal intake of farm women was 259g/day which was also inadequate. In another study, Bains *et al*. (2006) [3] reported an average daily per capita consumption of cereals among the farm families belonging to three agro climatic zones of Punjab as 360 g which is pretty close to the present results. In another study, Sharma (2005) [19] reported that the consumption of the cereals was 377g/day in Kangra district. These support the present findings. Sangeetha *et al*. (2018) [18] who reported that cereals and cereal products were consumed frequently by a considerable large segment of children.

Table 3: Food consumption pattern of vegetable growers

Food Groups(g/day)	Suggested intake	SLH	MLH	LLH	CD (5%)
Cereals and Cereal products	390	359.94	367.20	383.28	NS
Pulses and legumes	130	44.25	44.35	43.37	NS
Milk and Milk products	300	361.00	379.62	366.50	NS
Leafy vegetables	100	89.87	34.37	30.25	19.79
Roots and Tubers	100	79.10	70.62	79.87	NS
Other vegetables	200	39.87	66.12	71.50	20.67
Fats and Edible oils	30	23.00	21.00	21.75	NS
Sugar	25	19.37	19.50	20.75	NS

Data is represented as Mean±SD
Mean values are in terms of g/day
Suggested intake for moderately active men (NIN 2023)

The data revealed that the daily intake of pulses was found to be much below (44.25g/day) the recommended levels of 90g for pulses and legumes by NIN (2023) for moderately active man belong to SLH category. The intake of protein in rest of two categories was also much low as MLH and LLH took hardly 44.35 and 43.37 g/day. There was no significance difference found between the pulse and legumes intake of three land holding groups. Bains *et al*. (2006) [3] also reported an average daily per capita consumption of pulse among the farm families belonging to three agro-climate zones of Punjab as 23.1 g which was even lesser than the values obtained in the present study. Kaur (2012) [9] reported that the daily average consumption of pulses by the farm women was 32.6g. However, in present studies still the protein intake was better though it was low in comparison to RDAs. Probably this could be due soaring prices of pulses and non-affordability of the respondents. Moreover, the production of pulses is very low in areas under study. Sharma (2005) [19] already reported the low intake of pulses in District Kangra. The findings are in contrary to Singh *et al*. (2019) [22] who studied that the pulses consumption was higher in farming respondents.

Interestingly from the close scrutiny of data from the Table (3) shows that the intake of milk and milk products is much higher in comparison to RDAs. The respondents who belonged to SLH had lowest intake (361.00 ml/day) followed MLH (379.62ml/day) LLH (366.50ml/day). For this particular parameter all the groups differed non – significantly. Probably this could be due to that fact that they had their own milking animals at home which increased their consumption of milk and milk products. Earlier Goyal (2003) [6] and Chandla (2006) [4] also reported higher consumption of milk and milk products in farm families. All districts in both states had a majority of farmer households (97–100%) that consumed milk, sugar, oil, and condiments. The findings are in contrary to that of Singh *et al*., (2015) [21] who found that half of the respondents had low consumption of milk and milk products. The food group that was consumed by the fewest households (13%) was meat and fish, but Haryana (21%) had a relatively higher consumption of this group due to the district's Muslim predominance and lower vegetarianism (Singh *et al*. 2020).

The average intake of leafy vegetables was calculated to be 30.25g/day in small land holding which is much lower than the suggested intake. The intake of green leafy vegetables was slightly higher in SLH that is 89.87g/day than MLH and LLH whose intake was 34.37 and 30.25g/day respectively. All the respondents differed significantly on this parameter though the intake is low in comparison to RDAs. This might be due to the fact that the District Kangra people belonging to lower income groups are in a habit of consuming green leafy vegetables daily as these are grown in their courtyards. The findings of the low consumption of green leafy vegetables are in conformity with the finding of Abudayya *et al*. 2009 & Kumari *et al*. 2019. Bains *et al*. (2006) [3] reported an average daily per capita consumption of green leafy vegetables as 85.6 g among farm families belonging to three agro-climatic zones of Punjab. Kaur (2012) [9] reported that the daily average consumption of green leafy vegetables by the farm women was 65.4g. Similarly, Sharma (2005) [19] also reported that consumption of leafy vegetables as 89.22g/day which support the present findings.

The intake of root and tubers was 79.10, 70.62 and 79.87g/day by respondents belonging to SLH, MLH and LLH respectively. Comparatively subjects from MLH category consumed lesser quantity of roots and tuber than SLH and LLH though the difference was non – significant. The highest intake of roots and tubers was in LLH.

It is clear from the same table that the mean consumption of other vegetables was highly inadequate (39.87g/day) in SLH against the suggested intake of 200g/day. Daily consumption of other vegetables was quite higher (71.50g/day) in LLH than their counterpart i.e MLH (66.12g/day). A significant difference was observed between groups under study. This might be due to the fact that all the respondents were vegetable growers and subject to their growing land holding they cultivated more unconventional vegetables and consumed accordingly. The findings of the data are in conformity with Leal *et al* (2010) [12]. NNMB survey (1975-2005) reported that the intake of other vegetables was below the suggested levels in almost all the states (except Kerala and Orissa), with intake in Karnataka and Andhra Pradesh being less than half the suggested level (NNMB 2006). India Nutrition Profile (INP) survey (1995-1996) reported that the intake of other vegetables was adequate in most of the states except in Haryana, Himachal Pradesh, Punjab, Rajasthan and Nagaland.

Daily intake of fat and edible oils was below the RDA (30g/day). The average intake was higher in SLH (23.00g/day) as compared to LLH and MLH (21.75 and 21.00g/day, respectively). Mozaffarian *et al*. (2004) [13] also reported the consumption of higher fats and oils intake among farm families. The findings are in conformity with Arlappa (2016) [2] who found that majority of the respondents were consuming a high proportion of fats & oils

than recommended.

As seen in Table 3, the average intake of sugar was calculated to be 19.87g/day in all the groups which is much lower than the suggested intake. It was found that the intake of the SLH, MLH and LLH with regard to sugar varied non-significantly. All the group differed non-significantly. This might be due to the fact that these people are not accustomed to purchase sugar from the market due to high cost. They depend generally what they got in ration depot. Vegetables growers was consuming staples, milk, sugar, oil, and condiments nearly every day of the week, taking into account the weekly consumption frequency for each of the nine food groups (Singh *et al.* 2020) [20]. However, consumption frequencies were lower for fruit, and meat and fish, although they were comparable across all districts in Haryana and Gujrat. The findings are in contrary with Arlappa (2016) [2] who revealed that the majority of the respondents consumed a high frequency of sweet items.

Nutrient intake

The data pertaining to average nutrient intake of the subjects under study are explained in Table 4. The average daily intake of the subjects belonging to different categories were found to be 2027, 2075 and 2148 Kcals respectively in a declining order in SLH, MLH and LLH respectively. The energy intake is much lower in comparison to the RDA 2640 Kcals (NIN 2023) due to low intake of cereals, fat and protein which are concentrated source of energy. On this parameter all the groups differed significantly.

Table 4: Average daily intake of nutrients (g/day) of vegetable growers

Nutrient content	RDA	SLH	MLH	LLH	CD (5%)
Energy (kcal)	2640	2027	2075	2148	101
Carbohydrates(g)	385	225	235	237	NS
Protein (g)	54	47	47	47	NS
Fat (g)	30	30	30	31	NS
Calcium(mg)	1000	639	772	711	76
Phosphorous(mg)	600	818	869	879	NS
Iron (mg)	19	10	11	12	NS
Niacin (mg)	18	9	10	11	NS

Data is represented as Mean±SD
Mean values are in terms of g/day
Suggested intake for moderately active men (NIN 2023)

The average intake of protein in SLH, MLH and LLH groups was found as 47 g/day respectively. The protein intake was found to be lower when compared with RDA's i.e. 54 g/day (NIN 2023). Though all the groups differed non-significantly. This is because of the fact that the intake of pulses and other sources of proteins of the respondents are very less. Other reason could be the non- affordability because of the soaring prices of the pulses. Moreover, pulses are very rarely produced in the areas under reference. It is clear from the same table that the values regarding the consumption of fat in all the groups i.e. SLH, MLH and LLH bagged as 30, 30 and 31 g/day which is same as RDAs. Though the values amongst the groups differed non-significantly. The intake of calcium was much higher to that of recommended (600mg/day). There was a significant difference observed between the different groups under study. Daily intake of calcium was found highest in MLH (772 g/day) and least in SLH group i.e. 639 g/day whereas, LLH group attained the in between value i.e.711 g/day. This is because of the excessive consumption of milk and milk products. On the other hand, the daily intake of phosphorous was also higher as compared to the RDA value (600mg/day). With regard to this parameter all the groups differed non-significantly. The daily consumption of iron by SLH, MLH and LLH was calculated as 10, 11 and 12 mg/day which were much less in comparison of the RDAs i.e. 17 mg/day (NIN 2023). For this particular parameter the subjects non significantly. This is because of the poor diet consumption especially low intake of iron rich foods. There was non-significant difference observed between the land holding groups (Table 3) for this constituent. The daily intake of niacin was very poor in SLH and MLH (9 and 10 mg/day) than LLH (11 mg/day).

Vegetable consumption pattern of vegetable growers

After the information about the intake of different food groups, the respondents were asked about their monthly consumption pattern of different vegetables. The consumption pattern was judged by calculating the consumption frequency score (CFS) and is expressed as percentage. The vegetable consumption pattern of the respondents is depicted in Table 5. As is evident from the table that all the respondents consumed maximally onions and tomatoes with respect to categorization based on their landholdings. A critical look at data reveals that the respondents coming from SLH group consumed maximally to the extent of 72.61, 55.54 and 59.19 percent the green leafy vegetables *viz.* mustard leaves, radish leaves and spinach. As is seen from table, peas were the most highly consumed vegetable by SLH (64.38 percent) than MLH and LLH (31.09 and 20.81 percent). Okra was the most consumed vegetable after peas (Table 4). The consumption of spinach highest in SLH (59.19 percent) than MLH and LLH (35.98 and 20.82 percent). Monthly consumption of capsicum was higher in SLH (60.65 percent) and least consumed by LLH (20.83).

Table 5: Vegetable consumption pattern of respondents

Vegetables	SLH (%)	MLH (%)	LLH (%)	CD (5%)
Cauliflower	28.51	36.57	53.23	5.02
Cabbage	19.86	21.53	28.79	3.92
Mustard leaves	72.61	32.89	19.46	5.28
Radish leaves	55.54	32.09	20.76	4.37
Spinach	59.19	35.98	20.82	7.98
Onion	100.00	100.00	100.00	NS
Peas	64.38	31.09	20.81	5.16
Potato	86.38	68.89	83.43	5.66
Tomato	100.00	100.00	100.00	NS
Okra	63.38	31.09	20.81	5.14
Capsicum	60.65	39.74	20.83	5.84

The consumption of cauliflower was quite high in LLH (53.23 percent) in comparison to MLH and SLH (36.57 and 28.51 percent respectively). Lowest consumption frequency score of cabbage 19.86 percent of SLH then followed by MLH and SLH (21.53 and 19.86 percent). There was a significant difference observed between the SLH, MLH and LLH for all the monthly consumption pattern of vegetables in growers. Tomer *et al.* (2013) [23] reported that the monthly vegetable consumption score for all the vegetables was found to be higher for rural families than their urban

families. The only vegetable that was consumed by more than half of the population (64.9%) and 88.6% of farmers was the tomato. Other veggies that were eaten included carrots, cucumbers, cabbage, lettuce, and green vegetables. Only 48.9% of farmers reported consuming any fruit at all. This indicates even lower fruit consumption. Bananas were the most popular fruit to eat, followed by watermelon, peaches, lemons, apples, guavas, mangoes, and grapes.

Conclusion

The results of this study suggest that there was no variation in the respondents' consumption of the various food groups. It was found that the food consumption pattern of the LLH was better than that of MLH and SLH as they consumed more balanced and diverse food as compared to their counterpart. It is therefore advised that eating habits be adjusted in accordance with the seasonality of food items in a given area, as the environment develops various food varieties according to the area and the needs of the people living in a particular region. This practice will naturally lead to a change in diet and balance the consumption of specific foods and products.

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