Trends in The Intake oF Food Groups Among Different Age Groups

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Abstract

Although there has been a vast increase in nutritional knowledge, a healthy dietary pattern is still established due to a lack of knowledge, availability, and accessibility. Even if vegetables are consumed higher percentage of starchy vegetables is consumed hence a balanced and adequate diet is still not followed. This research collected data from different cities of Pakistan via a questionnaire which was filled both face to face as well as online. The sample size was 60 with 10 people from each group. Data was collected majorly in form of a food frequency questionnaire and then percentages and frequencies were calculated for all food groups. In age groups 3-12 years there was a higher consumption of beverages both hot and sweet and nuts and seeds were consumed in higher amounts. On the other hand, the age group 13-18 consumed more fruits and vegetables. Similarly, when moving to age 19-25 and 26-40 there is a higher consumption of milk and milk products. Cereals are consumed most by adults of age 41-60 years and 60+ leaned more towards sweets and snacks. Women tend to consume a more calorie-dense diet than men. Also, children and older adults rely more on sweets and snacks rather than fruits, vegetables, and other nutrient-dense foods.

Keywords: Diet; Food groups; Gender; Age groups; Food Frequency Questionnaire

1. Introduction

Although in the past century there has been increased knowledge of diet and its effects on our body still there is lacking regarding an adequate intake of all food groups in a balanced manner. The patterns of intake of all food groups are not established well enough all around the world, especially in developing countries. This could be due to many factors like unavailability, un accessibility, and food insecurity. Lack of knowledge is also a major factor that contributes to the malpractice of food intake. A balanced diet must contain all major food groups consumed according to the set standards i.e.:

- Dairy 1-2 portions
- Fruits 2-4
- Vegetables 5-6 portions or ad libitum
- Whole grains 6-11 portions
- Meat and meat products 2-4 portions
- Fats and oils 1-2 portions

If we look around, we see a very common practice that people on daily basis stick to certain food groups that they consume religiously like cereals, fats, few types of vegetables and beverages while overlook the others like meat and meat products, dairy, fruits, nuts and seeds which can result in many non-communicable diseases like obesity, heart diseases, cancer etc.

During the past two decades there has been a drastic increase in the production of food using complex technologies, but people still lack knowledge of optimal intake. More than 50% of vegetable consumption is in the form of white potato. Similarly, if fruit consumption is concerned dry fruits are consumed very less.

A very few studies are present on the pattern of food group intake which shows that minimum research is done in this field of diet and nutrition. In the past few years, the availability of processed and energy dense foods has increased to 400% while availability of foods like rice and beans has decreased. These changes have made people to lean more towards energy dense foods and a balanced diet is compromised in the process

If we generally look around us, we can see that different age groups have different approaches towards intake of food groups. Children have a comparatively better intake of a balanced diet while adolescents have the worst pattern of consuming food groups. Similarly, the adults and older adults have a compromised intake due to their routine, limited access, and limited knowledge.

This study focuses on the comparison of intake of major food groups among different age groups:

- 3-12 years
- 12-18 years
- 19-25 years
- 26-40 years
- 41-60 years
- Above 60 years

These food groups are further categorized on basis of gender i.e., male and female to compare gender-based differences of food patterns. [1] formulated that on the comparison of dietary intake between US and Brazil it was found that for food groups like meat, rice, beans, legumes, coffee, tea etc. there was a higher frequency of intake in US while in Brazil there was a higher intake of rice and rice products, meat, beans, legumes, tea coffee. The younger adults consumed more poultry, fish, sweets, pizza, pasta, soft drinks etc. Results concluded that although old adults of both countries consumed high calorie and non-nutrient food, but younger adults consumed different patterns.

[5] discussed that upon cross- sectional study of 8 countries of LA it was found that only 7.2% of population consumed fruits and vegetables as per recommendations of WHO. <3% of population had an optimal intake according to the guidelines. But overall intake of fruits and legumes was somewhat near to the recommendations. There was a huge difference in intakes of sugar-sweetened beverages among the countries. [9] put forward that cross- sectional study of 444 adults of Beirut, it was found that there was high consumption of fat 38.9% of total calories while 73.6% consumed fish less than recommended. There was also a low consumption of fruits and vegetables which resulted in higher risk of non-communicable diseases like CVDs and obesity. [2] suggested that from the year 1965 to 1996 there was a significant decline in the total energy intake as well as total fat which decreased from 39% to 32% and saturated fat which decreased from 15% to 12%.

Also, high fat potatoes, mixed dishes like pizza and high fat milk consumption were increased but total milk consumption decreased to 36%. All this led to an increase in soft- drinks and citrus juice consumption. Intake of vegetables increased but total fruits and vegetables still do not meet daily intake criteria (5 times/day). All these factors contribute to low iron, folate, and calcium in girls. These trends may compromise the overall health of future US adults. [3] proposed that after examining the trends in food intakes from different surveys like Continuing Survey of Food Intakes by Individuals (CSFII) 1994-96, 1998; the CSFII 1989-91 and the Nationwide Food Consumption Survey 1977-78 it was

concluded that intake of soft drinks, grain products, crackers, popcorns, fried foods, skimmed milk, cheese, candies, juices etc. has been increased in children of age 6-11 years.

On the other hand, there was a decrease in consumption of high fat milk, beans, eggs, pork, peas etc. This resulted in lower levels of B12 and higher of iron and thiamin. When matched from food guide pyramid only half of the children consumed servings according to the guide. Efforts should be made to encourage healthy eating among children. [4] suggested that snack foods provide empty calories that give high energy without providing adequate nutrients. People who eat more snacks are proven to eat more food but there is a difference in the meaning of meals and snacks. Hence a more detailed interpretation is required regarding meal and snack frequency. [10] advocated that in the past three decades the overweight and obesity has increased by double and triple figures. This is due to poor eating habits like too much high calorie snacks and low intake of fruits, vegetables and milk etc. the percentages of different foods from daily caloric intake are 31% from grains and 27% from snacks.

In Canada approximately 41% of calories are from snacks like chips, chocolates, soft drinks, sugars, syrups etc. family, caregivers etc. play an important role in maintaining health of children and preventing obesity and can promote habits like eating fruits and vegetables, increasing physical activity and spending family time. Proper interventions should be made in this regard. [7] concluded that a cross-sectional study of 639 Japanese adults (20-81 years) through 4-d weight dietary record suggested that 1 meal increase per day increased HEI-2015 total score by 3.6 and 1.3 points. Higher meal frequency was also also related to higher component score irrespective of the meal definition. Similarly, one additional participant increased the total score by 0.7. similar results were obtained from NRF 9.3. Hence higher meal frequency showed high diet quality. Diet quality and snack were related based on the type of snack eaten.

[8] put forward that higher meal frequency in both adolescents and children increased the HEI- 2010 score by 1·45-3·59 points. On the other hand, snack frequency was inconsistent with HEI- 2010. A positive score was shown in relation to energy contribution. This signifies the importance of different definitions of meals and snacks in assessing different impacts of dietary patterns. Renata, M. et al. (2015) advocated that on a worldwide survey from 113 countries among 16 age and sex groups it was concluded that in 2010, worldwide organic product admission was 81.3 g/day (95% vulnerability stretch 78.9-83.7), with country-explicit admissions going from 19.2-325.1g/day. Admissions of fortifying food varieties were higher and of less refreshing food varieties for the most part lower at more seasoned ages.

The Objectives of this study are to measure and assess food consumption patterns in different age groups. Then Asses these patterns on a gender basis and compare the data of all age groups and genders and provide a proper tabulated and graphical representation to check the prevalence of biases towards certain foods. The rest of the paper is organized as follows, in section 2, the methodology is discussed. In section 3, data analysis is carried out using SPSS software. Discussion of the output is considered in section 4. Finally, our conclusion and remarks are presented in Section 5.

2. Methodology:

A random data collection was done from cities all over Pakistan, majorly Islamabad, Rawalpindi, and Lahore. The population size was labeled as a population of the whole country i.e., Pakistan. 60 samples were collected from six age groups. Each group had2. 10 samples 5 from each gender in order to evaluate data on both age and gender basis. The method of collecting data via questionnaires that were filled online and also some was filled out after interviews specially for older age groups and children.

2.1 Dietary Data Collection:

The dietary data were collected using the food frequency questionnaires and some other random questions regarding sugar, salt, and supplement intake. All these FFQs were filled via online method.

2.2 Food grouping:

10 major food groups were made which further contained separate food items. The food groups are shown in Table 1. each food group consumption was assessed as:

- 1-2 Times/Day
- 2-3 Times / Day
- 4-5 Times / Day

- 1-2 Times / Week
- 2-3 Times / Week
- 4-5 Times / Week
- Occasionally
- Never

Table 1: Description of food categories

Food Group	Types Of Food In Each Category
Cereals	Chapatti Paratha Bread Porridge Rice Corn Others (noodles, pasta).
Meat and Meat products	Beef, Mutton, Poultry, Eggs, Fish, Beans, Legumes, Cheese.
Fats and Oils	Vegetable oil, Banaspati ghee, Animal fat, Desi ghee, Butter, Others (margarine).
Vegetables	Green leafy vegetables, non-stachy vegetables, Starchy vegetables (potato, peas).
Fruits	Red color fruits, Yellow/Orange color fruits, Berries, Dry fruits.
Milk and Milk products	Milk, Yoghurt, Lassi, Flavored milk.
Sweets and Snacks	Hot chocolate, Brownies, Cake, Cookies, Pie, Pudding (kheer, custard), Condiments and sauces, Ice cream, Pizza, Burger, Sandwiches, Fries, Mayonnaise and other salad dressings.
Hot Beverages	Tea, Coffee.
Sweetened Beverages	Carbonated drinks, Fruit drink, Concentrated syrups (jam-Shireen).
Nuts and Seeds	Flaxseeds, Pumpkin, Sunflower, Sesame, Chia, Basil Seeds etc. Almonds, Cashews, Peanuts, Pistachios, Walnuts etc.

3. Data analyses:

Result analyses was done using the Statistical Package for Social Sciences (SPSS) software. The results were obtained separately for age and sex of the whole sample after obtaining the mean of all food categories in each group. The percentages of food group consumption were calculated for each gender and age group separately. For food frequency questionnaire one-way ANOVA analysis was done while in case of other entries chi-square analysis was performed.

The population characteristics are described in Table 2. The characteristics discussed are mean± standard deviation for age, gender, city, food groups (cereals, meat and meat products, fats and oils, vegetables, fruits, milk and milk products, sweets and snacks, hot beverages, sweet beverages, nuts and seeds).

Table 2: Sample population characteristics- mean±std.dev.

Age Group (years)	3-12	13-18	19-25	26-40	41-60	Above 60
N	10	10	10	10	10	10
Gender	1.50±0.527	1.50±0.527	1.50±0.527	1.50±0.527	1.50±0.527	1.50±0.527
Cereals	4.29±1.309	4.21±1.161	4.66±1.466	4.47±1.395	4.84±1.517	4.81±0.680
Meat and Meat Products	5.29±1.667	5.40±1.077	4.93±1.376	4.65±1.456	5.25±1.449	5.04±0.659
Fats and Oils	4.98±1.697	5.12±1.618	4.70±1.874	5.15±2.072	4.82±1.562	4.80±1.033
Vegetables	4.87±1.694	5.07±1.294	4.37±1.435	4.23±1.918	4.37±1.392	4.97±1.105
Fruits	4.38±1.959	5.55±1.723	4.60±1.709	4.58±2.131	4.73±1.938	4.38±1.887
Milk and Milk Products	4.40±1.692	4.18±1.822	4.48±2.178	4.65±2.271	3.80±1.442	4.55±1.301
Sweets and Snacks	6.12±1.837	6.04±1.571	6.06±1.837	5.75±2.103	6.41±1.975	7.16±0.396
Hot Beverages	5.35±2.298	3.80±1.814	3.90±1.883	4.05±2.862	4.30±1.567	4.60±0.394
Sweet	5.93±1.999	5.13±1.983	5.33±2.211	5.07±2.276	5.40±1.891	5.57±1.524

Beverages						
Nuts and Seeds	6.75±2.045	6.45±1.657	5.95±2.047	5.75±2.138	5.55±2.061	5.65±1.617

Dietary intakes showed higher consumption of cereals, meat and meat products, fats and oils, vegetables, fruits, milk and milk products, sweets and snacks, hot beverages, nuts and seeds in males while there was a higher intake of sweet beverages in females. When we look at the age groups and food categories in age 41-60 years there was a higher intake of cereals while for meat, fruits, and vegetables it was higher in adolescents i.e., 13-18 years. In the age group 26-40, there is higher consumption of fats and oils and milk and milk products. The highest consumption of hot beverages like tea and coffee, sweetened beverages, and nuts and snacks is in 3-12 years and 60+ adults. Figure 1 illustrates that clustered boxplot of different food groups by age.

Table3: Frequency percentages of reporting foods:

Gender	Males	Females	p-value
Cereals	50.9%	49.1%	.621
Meat and Meat Products	50.1%	49.9%	.941
Fats and Oils	51.7%	48.3%	.412
Vegetables	53.7%	46.3%	.069
Fruits	54.6%	45.4%	.071
Milk and Milk Products	51.1%	48.9%	.691
Sweets and Snacks	51.8%	48.2%	.313
Hot Beverages	50.2%	49.8%	.948
Sweet Beverages	49.1%	50.9%	.708
Nuts and Seeds	51.2%	48.8%	.547

Table 3: Percentage Frequency of food categories by different age groups

Age Group (years)	3-12	13-18	19-25	26-40	41-60	Above 60
Cereals	15.7%	15.4%	17.1%	16.4%	17.7%	17.6%
Meat and Meat Products	17.3%	17.7%	16.1%	15.2%	17.2%	16.5%
Fats and Oils	16.9%	17.3%	15.9%	17.4%	16.3%	16.2%
Vegetables	17.5%	18.2%	15.7%	15.2%	15.7%	17.8%
Fruits	15.5%	19.7%	16.3%	16.2%	16.8%	15.5%
Milk and Milk Products	16.9%	16.0%	17.2%	17.9%	14.6%	17.5%
Sweets and Snacks	16.3%	16.1%	16.1%	15.3%	17.1%	19.1%
Hot Beverages	20.6%	14.6%	15.0%	15.6%	16.5%	17.7%
Sweet Beverages	18.3%	15.8%	16.4%	15.6%	16.6%	17.2%
Nuts and Seeds	18.7%	17.9%	16.5%	15.9%	15.4%	15.7%

Table 4: Percentage Frequency and p-values of miscellaneous questions gender wise

Gender	Male	Female	p- value
How often did you eat food that was fried at home?	51.9%	48.1%	.234
How often did you eat fried food away from home?	50.6%	49.4%	.975
What kind of fat did you most often use for frying, roasting, grilling etc.?	48.7%	51.3%	.373
How often do you add salt while cooking?	52.9%	47.1%	.503
How often did you add salt to any food at the table?	48.2%	51.8%	.758

How often do you add sugar at table?	48.1%	51.9%	.697
Amount of sugar you add in tea, coffee?	47.5%	52.5%	.356
Did you have anything to eat or drink between midnight last night and before waking up today?	50.4%	49.6%	.554
Do you take vitamin or mineral supplements?	51.5%	48.5%	.426
How could you describe your current dietary intake?	50.0%	50.0%	.309
Do you have any knowledge regarding optimal and healthy dietary habits?	53.3%	46.7%	.432
Do you think your daily dietary intake is according to requirements?	53.1%	46.9%	.144
Are you willing to improve your dietary habits in future?	49.5%	50.5%	.904

Other than the food frequency questionnaire some miscellaneous questions were asked about intake of salt, sugar, fried food, supplements, dietary habits etc. The frequencies with respect to gender are shown in Table 5 whereas table 6 shows age distributions. Males had a higher consumption of fried food either at home or away from home. Similarly, salt and sugar intake were highest in women. Consumption of dietary supplements was also higher in male. Around 50% of both male and female were having no special diet and rest were either vegetarian or were on any other special diet. When talking about knowledge regarding optimal dietary habits more males showed positive response than females but willingness to improve was more leaned towards females as they were more interested in changing their dietary habits in a positive way.

When considering age groups 19-25 and 41-60 years of aged people consumed more fried foods. The intake of salt and sugar was also higher in these age groups. Dietary supplement consumption was higher in adolescents. Optimal dietary intake was highest in children aged 3-13 while willingness to improve was highest in older adults from 41-60+ age. Midnight snacking was highest in males and in age groups 13-18, 19-25, 26-40 and 60+ years of age.

Table 5: Percentage Frequencies of miscellaneous questions based on age groups

Age	3-12	13-18	19-25	26-40	41-60	Above 60
How often did you eat food that was fried at home?	15.4%	15.4%	19.1%	17.9%	18.5%	13.6%
How often did you eat fried food away from home?	14.6%	16.3%	16.7%	16.3%	19.3%	16.7%
What kind of fat did you most often use for frying, roasting, grilling etc.?	17.9%	17.0%	15.6%	17.0%	15.6%	17.0%
How often do you add salt while cooking?	14.7%	16.2%	14.7%	16.2%	22.1%	16.2%
How often did you add salt to any food at the table?	18.2%	15.5%	18.2%	17.3%	14.5%	16.4%
How often do you add sugar at table?	19.0%	15.3%	14.3%	13.2%	18.5%	19.6%
Amount of sugar you add in tea, coffee?	20.8%	12.9%	18.8%	14.9%	15.8%	16.8%
Did you have anything to eat or drink between midnight last night and before waking up today?	16.2%	17.1%	16.2%	17.1%	17.1%	16.2%
Do you take vitamin or mineral supplements?	18.6%	19.6%	18.6%	15.5%	13.4%	14.4%
How could you describe your current dietary intake?	17.6%	14.7%	14.7%	14.7%	19.1%	19.1%
Do you have any knowledge regarding optimal and healthy dietary habits?	17.1%	19.0%	13.3%	15.2%	15.2%	20.0%
IDo you think your daily dietary	18.8%	16.4%	15.6%	17.2%	15.6%	16.4%

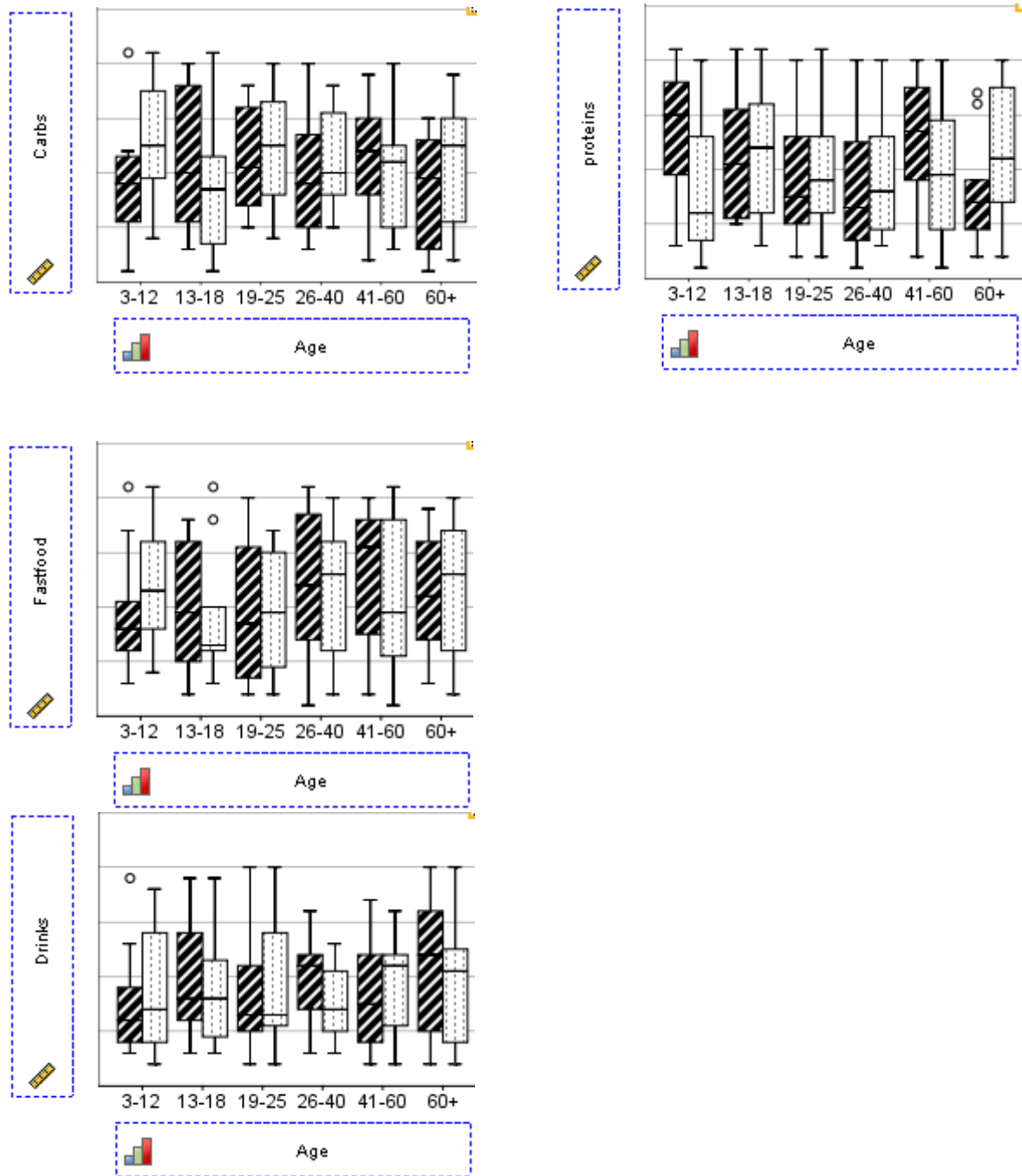| intake is according to requirements?						
Are you willing to improve your dietary habits in future?	14.3%	16.5%	15.4%	16.5%	18.7%	18.7%

Figure 1: Clustered Box plot of different food groups by age

4. Discussion:

Although all age groups and genders are consuming nearly all food groups there is a huge difference in intake frequency, the younger adults have reported having a higher intake of meat and meat products, fruits, and vegetables while older seem to have a higher intake of sweets and beverages. There was a

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lower intake of sweetened beverages in males as compared to females meaning women tend to consume more carbonated drinks, fruit juices, and syrups compared to men. On the other hand, women consumed a lesser number of cereals, meat, fruits, vegetables, etc in their diet compared to men.

In age groups 3-12 years there was a higher consumption of beverages both hot and sweet and nuts and seeds were consumed in higher amounts. On the other hand, the age group 13-18 consumed more fruits and vegetables. Similarly, when moving to age 19-25 and 26-40 there is a higher consumption of milk and milk products. Cereals are consumed most by adults of age 41-60 years and 60+ leaned more towards sweets and snacks.

These differences in percentage show a very alarming situation that children are consuming more beverages than fruits and vegetables which is an unhealthy food choice. Similarly, older adults who need more nutrient-dense foods are consuming calorie-dense snacks and sweets. This unusual dietary choice may impact health negatively in the long run and may cause many non-communicable diseases like obesity, CVDS, Hypertension, and cancer. Because higher intake of fried food and calorie-dense snacks like cakes, fries, pies, and puddings can result in fat deposition in your adipose tissues and cause obesity which can lead to other diseases.

Higher consumption of fried food is also a major contributor in causing cancer. Keeping in mind the following stats we can see that a slight change in your dietary habit can help prevent many non-communicable diseases. Still this study does not provide a thorough data of individual dietary intake to assess the problems and prevalence at individual levels.

The limitations of this study are that different methods are used to collect data which increase chance of errors. Similarly, in case of FFQ people tend to hesitate to share their authentic data regarding their food intake because they may feel insecure about others judging their dietary habits which can cause a major discrepancy. Another major problem is that people may not remember accurately about their frequency of food intake and may write wrong information.

While collecting data of children less than 10 years and older adults >60 years a major problem that occurs is indirect collection of data because both these age groups are mostly unable to respond and fill the questionnaires and when some other person fills chances of error are increased. The validation of this study is that all the questions were counter checked and face-to-face data collection was ensured in case of missing answers. This study is the first survey done in Pakistan to check the trends in consumption of food groups among different age groups and genders. This study may help in future surveys and recommendations regarding dietary intakes and may help to promote healthy eating to prevent non-communicable diseases.

5. Conclusions:

The diet of men is very different from that of women because women tend to consume more sweetened beverages that include carbonated drinks, fruit drinks and syrups etc. and higher intake of table sugar and salt in found in women resulting in higher risks of diseases like obesity, hypertension, diabetes due to calorie dense diet. Children also tend to consume more calorie dense diet and less nutrient dense diet which can cause childhood obesity, juvenile diabetes etc. It is still possible to overcome the problem by initiating proper dietary interventions among all age groups. For an in-depth analysis further, longitudinal studies can be done for better interpretation.

Conflicts of Interest: The author declares that they have no conflicts of interest to report regarding the present study.

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