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NUTRITIONAL STATUS AMONG CHILDREN IN PRIMARY SCHOOLS OF SARGODHA, PAKISTAN

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Abstract:

Background: *World is confronting an issue identified with nourishment and sustenance, this issue is named as Malnutrition. With regard to the cases of malnutrition are concerned, measurements remain extremely poor, for example Nutritional status of respondents with approximately infection remains deprived also. Generally, the main causes of malnutrition are elements like polypharmacy, disease itself, and lack of macro as well as micronutrient.*

Objective: *The major objectives of the current research was to measure the nutritional status of respondents, to assess over-all energy consumption, macro also micro nutrients consumption by considering their 24-hour dietary recall and to determine the usual nutritional consumption of the respondents, the food frequency questionnaire data was taken.*

Methodology: *It was descriptive cross-sectional study of 400 primary school going students of age category between the 6-12 years. Non-probability convenience sampling technique was used. The pre-designed performa was used in order to collect the information regarding demographic information, anthropometric data, food frequency and 24-hour dietary recall.*

Results & Conclusion: *The results of current study revealed that approximately 50% of study participants were malnourished and greater than half of the respondents remained lacking in macronutrients as well as calories also. Nearly more than half of the study participants were suffering calcium deficiency and it was noted that they were also using iron deficient diet as most of the iron was taken from non-hem sources which are only 14—18% bioavailable. The food groups like meat, poultry, milk, dairy, fruits and vegetables their minimum daily intakes were not adequate but the only food group that were sufficiently utilized and meet the criteria recommended by food guide pyramid were only grains and cereals group. Around every one of the students were taking significant suppers however pattern of snaking is by all accounts low particularly mid night snaking. There should be planning of Nutrition education program with respect to achieve the Minimum Daily requirements of various food groups.*

Keywords: *Food, Nutrition, Nutritional Status, Children, Primary Schools, Sargodha.*

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INTRODUCTION:

World is confronting an issue identified with nourishment and sustenance, this issue is named as Malnutrition. With regard to the cases of malnutrition are concerned, measurements remain extremely poor, for example Nutritional status of respondents with approximately infection remains deprived also. Generally, the main causes of malnutrition are elements like polypharmacy, disease itself, and lack of macro as well as micronutrient [1, 2].Both in developing as well of developed countries, the prevalence of malnutrition is very high. It may be estimated that nearly one out of nine individuals were suffering from this long-lasting issue of malnutrition, which indicates that 7.6 billion people who were residing on Earth, 844 million individuals are those who are suffering from malnutrition[3].Globally, the South Asia encountering the largest rate and highest burden of under nutrition among women and children [4]. In spite of constant under nutrition, the prevalence of obesity and under nutrition have been enhanced, producing as it is known as "double burden of disease" of malnutrition [5]. It may be noted that school play an important role to enhance healthy eating attitudes and behaviors among children; though, children of school going age are not generally considered in health and nutrition survey [6].

In Pakistan, statistics associated with malnutrition are also not very acceptable. The prevalence of chronic malnutrition in children under five year of age is 43%, 15% are those who are suffering from acute malnutrition while 6% are suffering from severe acute malnutrition [7].The physical as well as mental development of the children is affected that leads to poor academic performance. The future health and socioeconomic development of the children are affected by the malnutrition [8]. The low birth weight of the newborn, insufficient breast feeding, exclusive breastfeeding, illiteracy of mother, lack of adequate knowledge of nutrition, food insecurities, socio-economic status of the house, poor cleanliness, parity, spacing between children's, vaccination and communicable diseases are few contributing factors that are involved in childhood malnutrition [9,10,11,12].

In Pakistan, the malnutrition is the major cause of child morbidity as well as mortality. The issue of malnutrition in Pakistan has not been the top priority of government. In Pakistan, the lack of adequate studies on child malnutrition has evoked the researcher to search on this topic. Therefore, the main objectives of the present study was to determine the nutritional status, meal skipping practices, dietary habits and consumption among school going students between the ages of 6—12.The present study will provide adequate baseline data for future researchers in order to determine the assess the nutritional status as well as growth and development of children. It will also grab concentration of policy makers to develop a nutrition council to address the nutrition associated issues in young population.

MATERIALS AND METHODS:

We conducted the school based-cross sectional study with quantitative component. The study was conducted in four different government institutes of Sargodha, Lahore. The population of current study was consisting of primary school going children of 6-12 years of age. All the male or female students aged 6-12 years, who were resident of Sargodha and schooled in Government primary school were included in the study. All the participants above age of 6-12 years, who were absent during study and expelled from school due to any reason were not included in the study. By using online reference software, open epi was used to calculate the sample size 400 which was larger than 385. Non-probability convenience sampling technique was used due to time and resource constraint. All four school Government Girls Primary School, Chak No.85NB, Sargodha, Government Girls Junior Model High School near Sargodha-Gujrat Road, Sargodha, Junior Model School, Sargodha , MC Boys Primary School, Sargodha were included in the study after taking permission from the supervisor and the Head Master of the schools and they were educated about the research. A predesigned questionnaire was developed to assess Demographic Data and Anthropometric Data, the questionnaire included both open and closed ended questions. Food frequency questionnaire and 24-hour dietary recall were also the part of the questionnaire (Mahan et al., 2012). Questions associated with frequent consumption of meals, Snacks and 37 Food Frequency Questions were asked. The various anthropometric cut-off values used by researcher are given below.

Table 1 BMI for Age Percentile Cut-off values

Sr	Percentile	Interpretation
1	Less than 5th Percentile	Under-weight
2	5—85th Percentile	Normal
3	85—95th Percentile	Overweight
4	>95th Percentile	Obese

CDC Growth Charts

Table.2 Acceptable Macronutrient Distribution Range (AMDR)

Sr	Macronutrients	Range
1	Carbohydrates	45—65% of total energy intake
2	Proteins	10—30% of total energy intake
3	Fats	25—35% of total energy intake

(Wardlaw & Byrd-Bredbenner, 2013)

Table 3 Standard Values for Energy Intake

Standard values for Energy intakes were calculated using WHO formula for energy calculation

Sr	Age Group	WHO Formula	
1	4—10 Years of Age	**Male**	REE= 22.7 × Weight (Kg) + 495
		Female	REE= 22.4 × Weight (Kg) + 499
2	10—18 Years of Age	**Male**	REE= 12.2 × Weight (Kg) + 746
		Female	REE= 17.5 × Weight (Kg) + 651

Table 4 Recommended Dietary Allowance (RDA)

Sr	Micronutrient	RDA	
		Male	**Female**
1	Iron	8 milligrams	8 milligrams
2	Calcium	1300 milligrams	1300 milligrams

(Escott-Stump, 2008)

Table 5 Servings of Major Food Groups per Day (USDA Food Guide Pyramid)

Sr	Food Group	Adequate Servings per day
1	Bread & Cereals	6—11
2	Milk & Dairy products	2—3
3	Fruits	2—3
4	Vegetable	2—3
5	Meat & Meat Products	2—3

(Wardlaw & Byrd-Bredbenner, 2013)

The data were entered into Microsoft excel and then data were exported to SPSS [version 21] computer software program in order to conduct statistical analysis. To summarize categorical and continuous variables the Descriptive statistics (frequency, percentage, measures of central tendency and dispersion) were used. In order to analyze the Dietary intake data, by using USDA food composition table and macronutrients/ energy intake & micronutrients (Iron/Calcium) were computed and compared to the AMDR and RDA. By using 24-Hours dietary recall, portion from Heam and Non-Heam iron was also calculated in case of iron. By using CDC-growth chart, nutritional status of participants was calculated. By using macro and micro nutrient intake Food Frequency Questionnaire and 24-Hour Dietary Recall and compared to standard values of AMDR's, RDA's and Total Energy Estimation using WHO referenced formula for various age groups with respect to evaluate the total energy.

RESULTS:

Demographic Data:

With respect to Socio-demographic data, the current study shows that out of 400 sample size 74% (294) of the participants were male, most of the age of school going students 53.5%were from age group of six to nine years. With respect to Mothers profession, the study results showed that of 90.5% of population were Housewives. Most of students (51.2%) were from 4 and 5th class, 61.2% (245 participants) of the student were paying fee between **100—1000 RS** and 62% (248) were belong from middle class (Table 6).

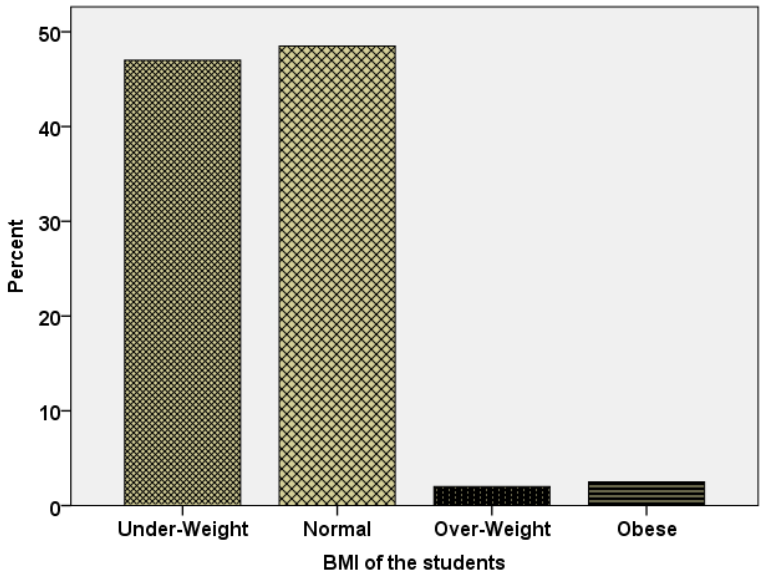
Table 6 Socio-demographic Characteristics of study participants (N=400)

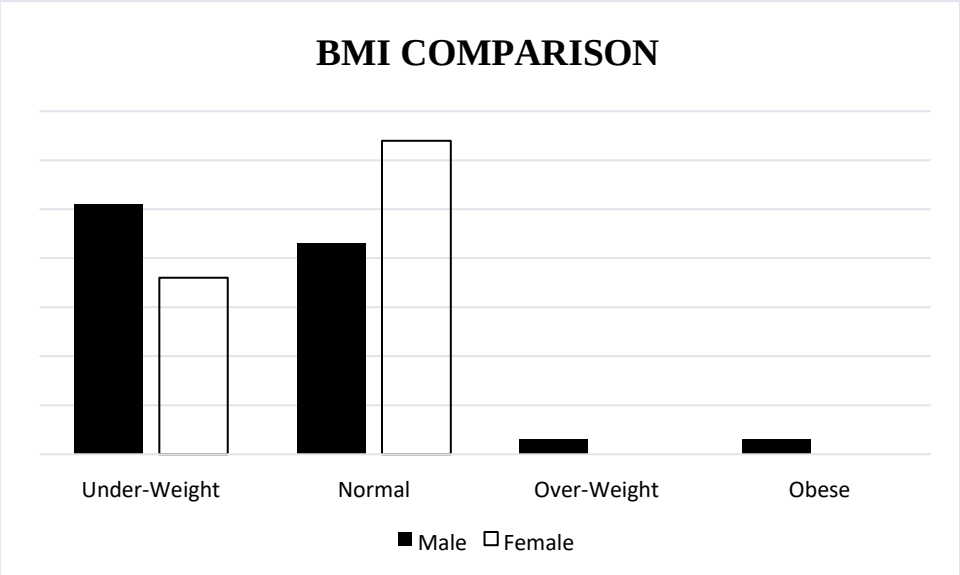
Variables	Frequency	Percentage (%)
Gender		
Male	294	74
Female	104	26
Age		
6-9 years	214	53.5
10-12 years	186	46.5
Mothers profession		
Working	38	9.5
Housewife	362	90.5
Class of the student		
1-3 class	195	48.75
4-5 class	205	51.25
Student fee		
< 100 Rs	155	38.75
100—1000 Rs	245	61.25
Social group		
Lower middle class	152	38
Middle class	248	62

Nutrition Related Indicators:

BMI for Age Percentile

The study results showed that 48% of the study participants have a normal BMI while only 2.5% were obese while 51% and 36% of the male and female students were under-weight.

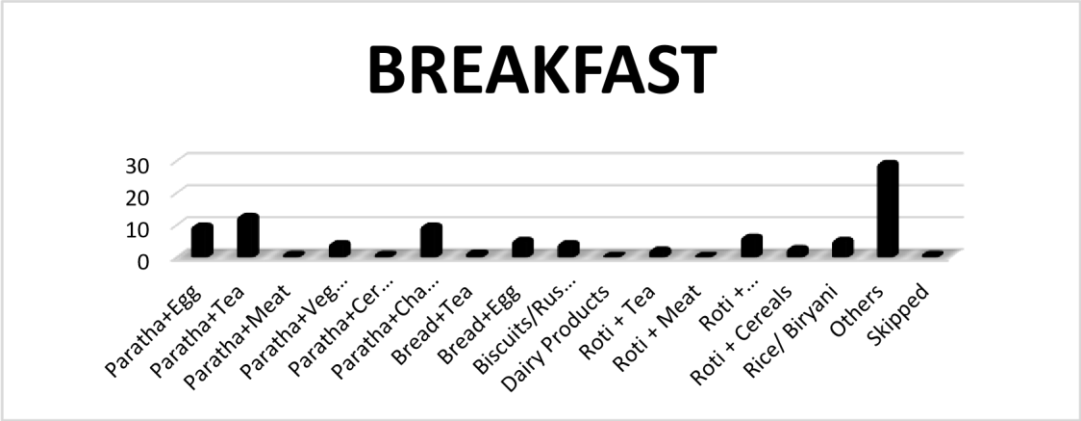


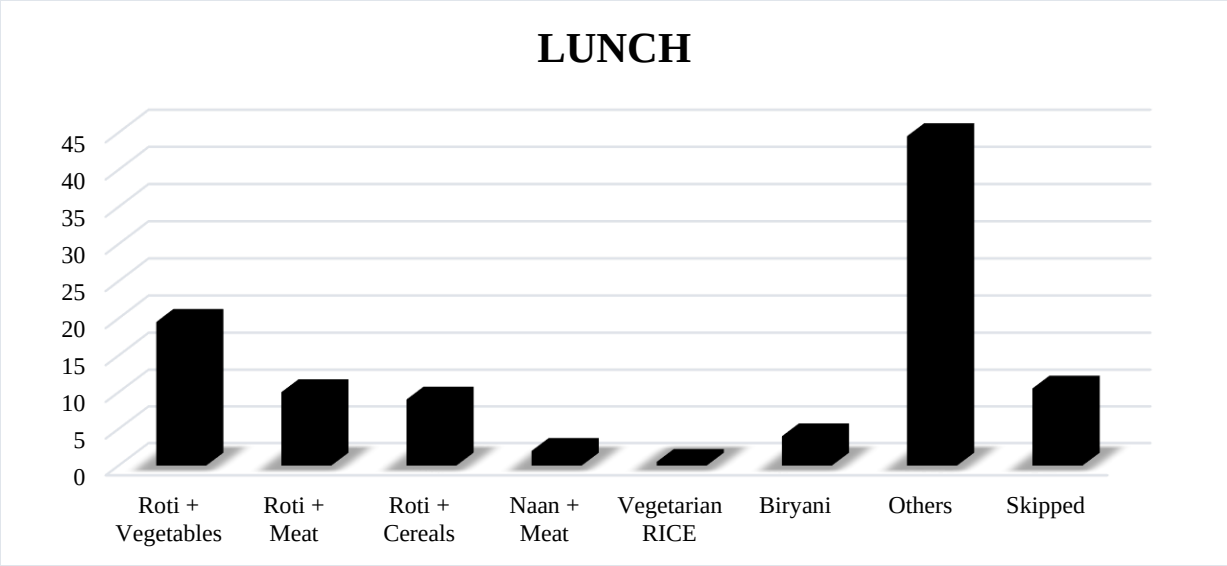


51% and 36% of the male and female students were under-weight. 43% & 64% of the male and female students were having normal BMI. 3% of the male students were overweight as well as obese as well.

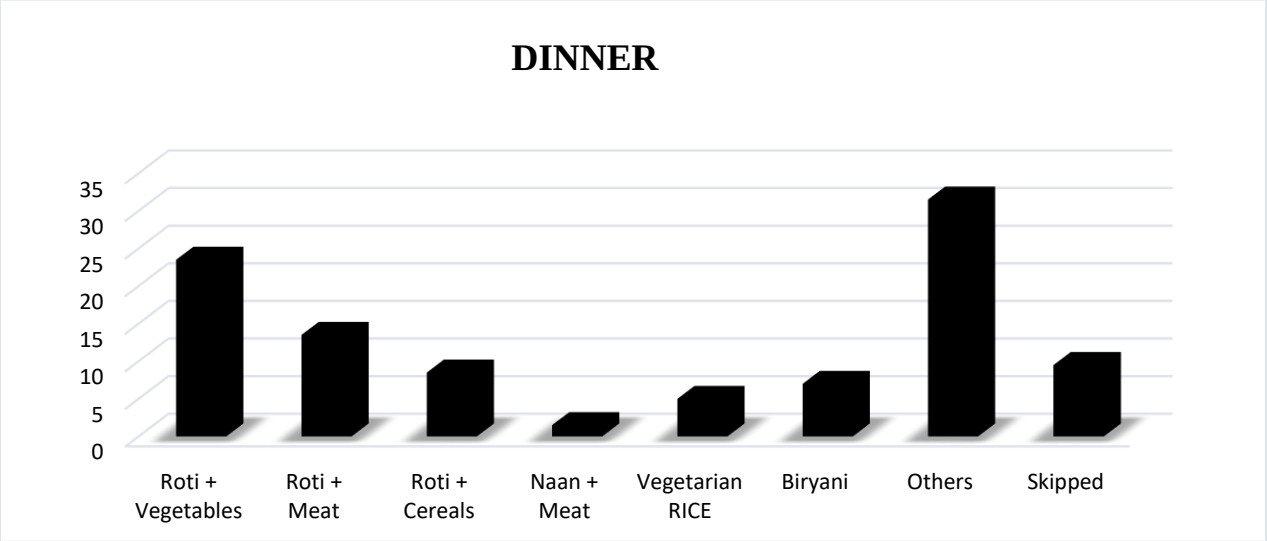
24 Hours Dietary Recall:

Food Items Consumed During Major Meals





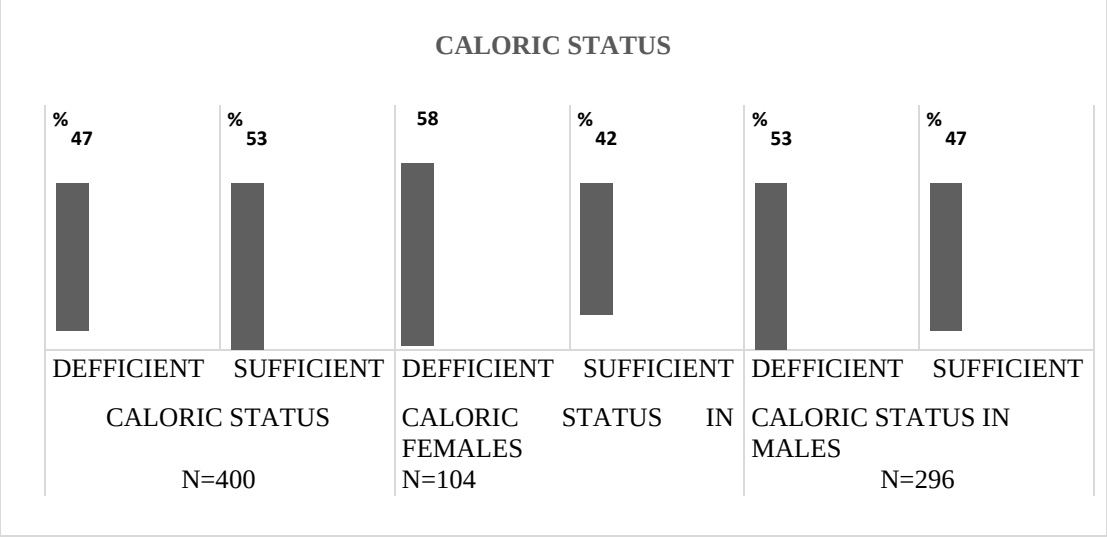
44.5% of the population was consuming other food items which mainly includes Roti + Meat + Vegetables.



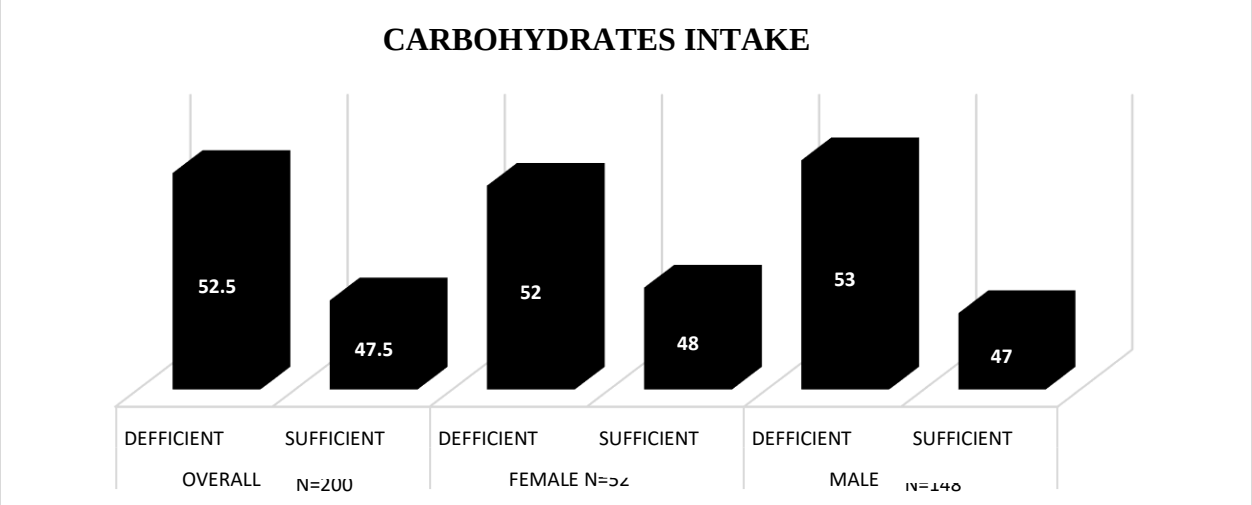
The study results showed that 23.5%, 13.5% and 8.5% of the population was consuming Roti + Vegetables, Roti + Meat and Roti + Cereals respectively.

N=400		**N=104**		**N=296**	
Caloric Status		Caloric Status in Females		Caloric Status in Males	
Deficient	Sufficient	Deficient	Sufficient	Deficient	Sufficient
188	212	60	44	157	139

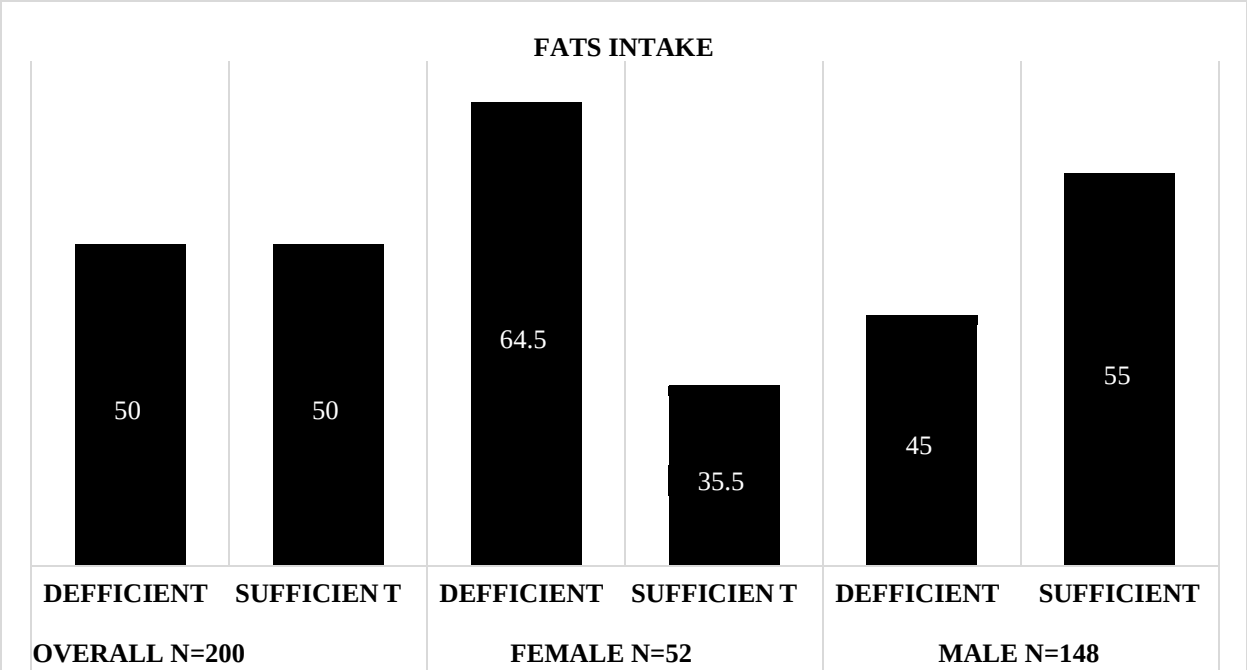
Study showed that overall intake of Calories was sufficient among 47% of the population. Deficient Calories intake was prevalent in 53% of the population.



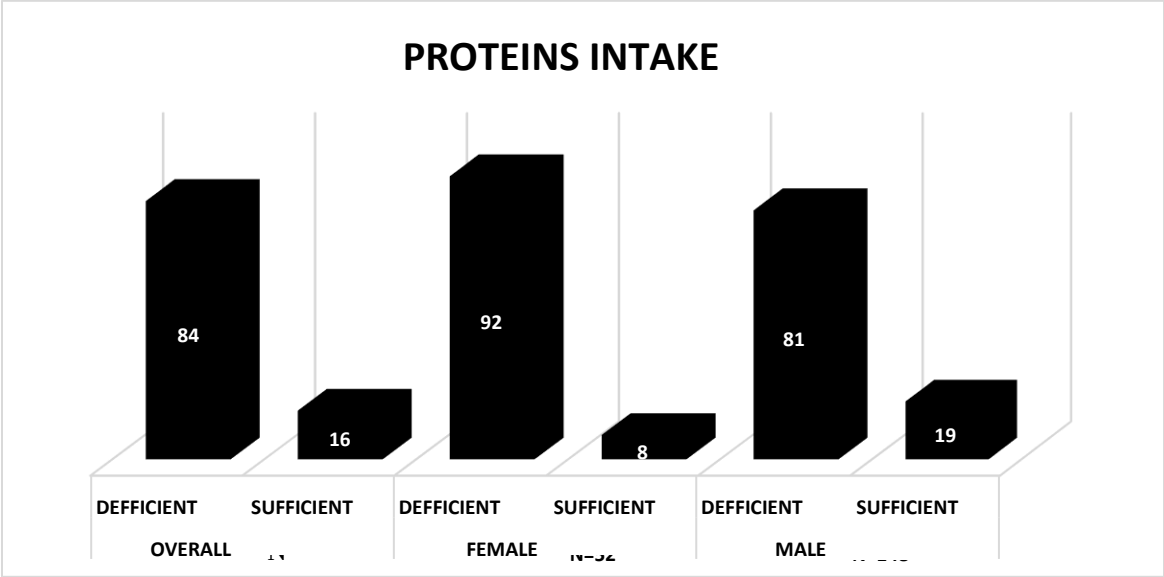
Macronutrients Intake



The study results revealed that overall intake of Carbohydrates was sufficient among 47.5% of the population.

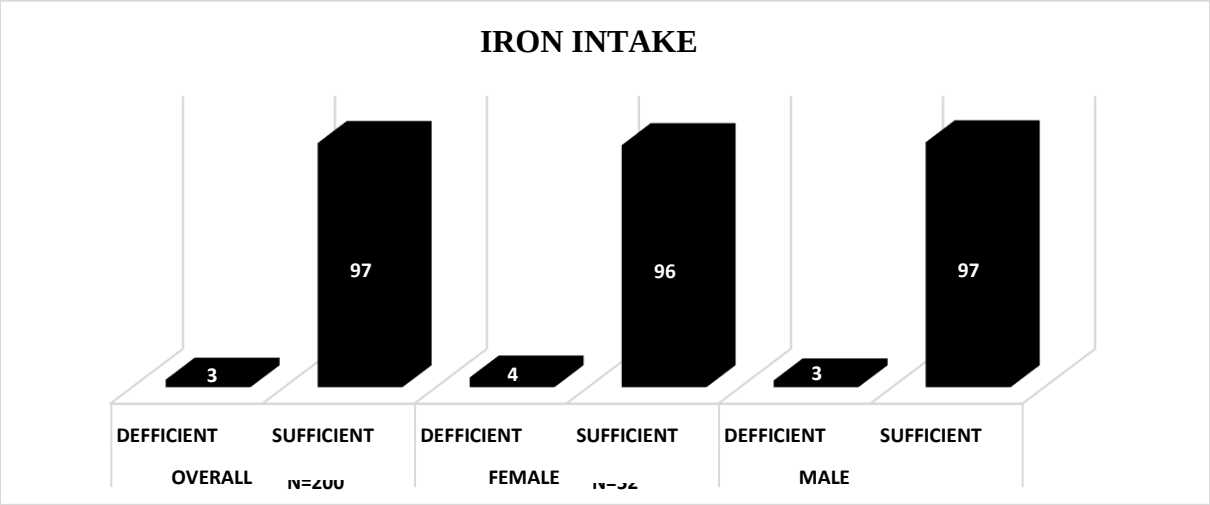


Study showed that overall intake of Fats was sufficient among 50% of the population.

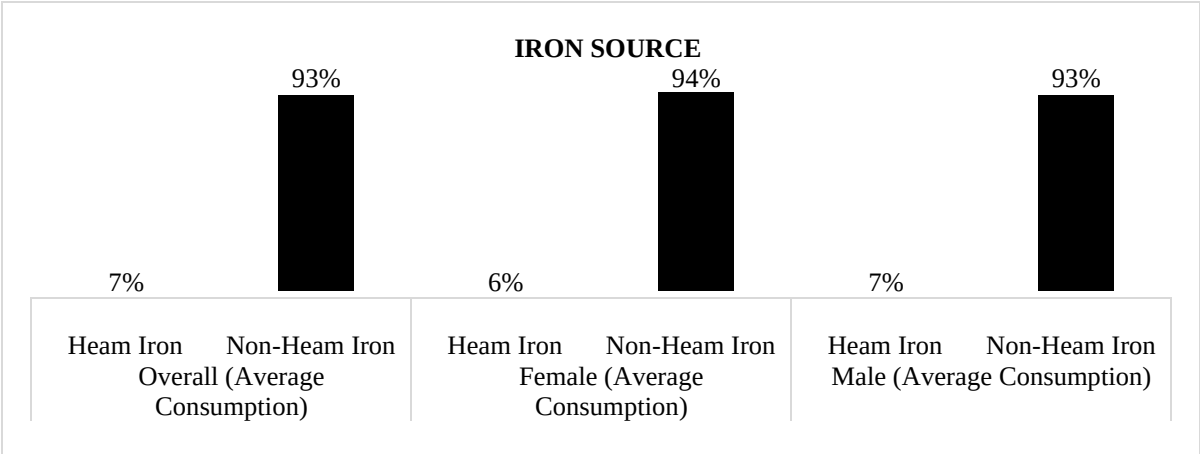


The study results revealed that overall intake of Proteins among was sufficient16% of study participants. The prevalence of deficient proteins intake was 84% of the study participants. The prevalence of sufficient and deficient Proteins intakes among females were 8% & 92% respectively.

Micronutrients Intake



The study results revealed that overall intake of iron was sufficient among 97% of the population. The prevalence of deficient iron intake was 3% of the population. 96% & 4% females and 97% & 3% males have sufficient and deficient iron intakes respectively. Vegetable, cereals and grains were the major source of iron which comes under the category of Non-Hem Iron and the bioavailability of non-hem iron is only 14—18%.



Major source of iron was Vegetable, cereals and grains which comes under the category of NonHem Iron and the bioavailability of non-hem iron is only 14—18%. On an average 7% iron was consumed by using Hem Iron sources and 93% from the Non-Hem Iron Sources. Same was the case with male students. 6% iron was consumed by using Hem Iron sources and 94% from the Non-Hem Iron Sources in case of female students. Average bioavailable iron intake was 5mg.

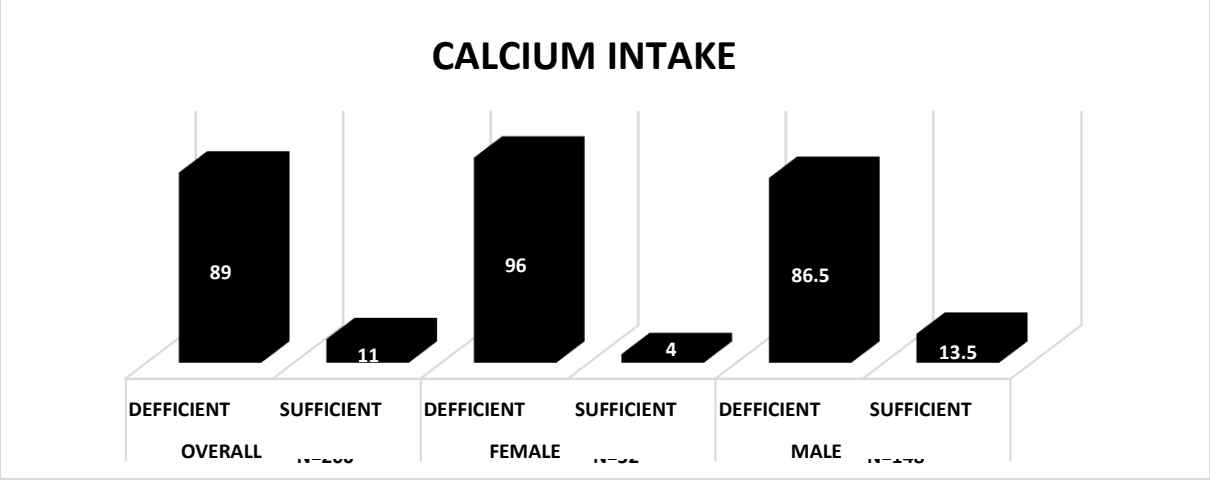


Table 7 daily consumption of food groups & compliance with recommendation bread & cereals milk & dairy

Daily Consumption	**Overall**				**Overall**			
	<6Serv		**≥6Serv**		**<2Serv**		**≥2Serv**	
	10%		90%		71%		21%	
	Female		Male		Female		Male	
	<6Serv	**≥6Serv**	**<6Serv**	**≥6Serv**	**<2Serv**	**≥2Serv**	**<2Serv**	**≥2Serv**
	13.5%	86.5%	9%	91%	84%	15%	66%	34%

Bread & cereals 6—11 Serving/day (USDA Food Guide Pyramid) **Milk & dairy 2—3 Servings/day (USDA Food Guide Pyramid)**

Table 8

Daily Consumption	**Meat and Poultry**							
	Overall							
	<2Serv		**≥2Serv**					
	40%		60%					
	Female		Male					
	<2Serv	**≥2Serv**	**<2Serv**	**≥2Serv**				
	60%	40%	33%	77%				
Daily Consumption	**Fruits**				**Vegetables**			
	Overall				**Overall**			
	<2Serv		**≥2Serv**		**<2Serv**		**≥2Serv**	
	87.5%		12.5%		88%		12%	
	Female		Male		Female		Male	
	<2Serv	**≥2Serv**	**<2Serv**	**≥2Serv**	**<2Serv**	**≥2Serv**	**<2Serv**	**≥2Serv**
	86.5%	13.5%	88%	12%	85%	15%	89%	11%

Fruits 2—3 Servings/day (USDA Food Guide Pyramid) Vegetables 2—3 Servings/day (USDA Food Guide Pyramid)

The food items that were meeting the recommendations of food guide pyramid were overall daily consumption of the breads & cereals group and 60% of the population was consuming meat & poultry group. The food items like consumption of milk & dairy, fruits and vegetables was not in accordance with the recommendations of food guide pyramid. The study result revealed that overall intake of calcium was sufficient among 11% while the prevalence of deficient calcium intake was 89% of the study population. The present data recommends that in the meat and poultry group, beef/mutton and fish are the such foods items which were least utilized while the largest part frequently utilized food item was chicken and egg. The present data showed that milk and yogurt was mostly consumed item in the milk and dairy products. The fresh fruits were mostly utilized food item by most of the population in the fruit group and was noted to be used-up by greater than 1/4th of the respondents once a week. The collected data recommends that the overall intake of vegetables was relatively fine while the use of beverages was relatively high generally approximately half of the study participants uses tea on the everyday while the carbonated and non-carbonated drinks was used on weekly basis or after every one day. The fast foods such as milk shake, french fries and dahi bhallay were used on greatest rate on daily basis. In accordance with the data collected the main food which was used at the maximum rate **(95.5% daily)** was dinner. On daily basis, breakfast and the lunch were utilized by **90%** and **83%** participant's respectively while mid-morning snack and bed-time snack was mainly common in the study participants than the mid-evening snack.

Table 9 Consumption Frequencies of Different Food Items

ms and groups	Weekly consumption (%)							Monthly consumption (%)			
	Never	1 times	2 times	3 times	4 times	5 times	6 times	Daily	1 times	2 times	3 times
Bread and Cereal Products											
Roti	2	1	0	1.5	0	0.5	0.5	93	1.5	0	0
Naan	6.5	48	17	10	6	2	0	9	1.5	0	0
Paratha	8	11.5	7	7	2	2.5	0	60	1.5	0.5	0
Biscuits	6.5	24.5	17	15.5	4.5	2.5	0	29	0.5	0	0
Rusk/Pappy	30	30	19	5	2	0.5	0.5	10.5	2.5	0	0
Rice	3	29.5	34	12.5	5	4	0.5	8.5	1.0	0.5	1.5
Porridge	74.5	12.5	3	1.5	1.5	0.5	0.5	0	3.5	2	0.5
Noodle	51	23.5	10	6	0	1	0.5	5	1	1	1
Legumes/lentils	6	30	30	16.5	7.5	2.5	0.5	5	0	1.5	0.5
Meat and Meat Products											
Egg	9	35.5	18	13	5	2.5	1	14.5	1	0	0.5
Chicken	7.5	43	18	10	4	3	1.5	5.5	2	2	3.5
Beef/Mutton	74	6.5	7	0.5	0.5	0	0	0.5	5.5	4	1.5
Fish	80	5.5	2	1	0	0	0	0.5	8	2	1
Milk and Dairy products											

Milk	14	21	8.5	9	2	0.5	0.5	42	2	0	0.5
Yogurt	16	28	16	12.5	1	1	.5	23.5	1.5	0	0
Cheese	92.5	2	1.5	3.5	0	0	0	0	0.5	0	0
Ice-Cream	16.5	36.5	11.5	9	5	1	1	14.5	4.5	0.5	0
Fruits											
Dry Fruits	59	11.5	4	3.5	0.5	0	0.5	7.5	11	1	1.5
Fresh Fruits	4	34.5	16	14.5	4	0	0.5	25	1	0.5	0
Fresh Fruits Juice	30.5	34	15	4	4	0	0	9.5	2	0.5	0.5
Vegetables											
Green Leafy Vegetable	18.5	32.5	19.5	9.5	3.5	0.5	0	6	8.5	1	0.5
Roots & Tubers	14.5	34.5	15.5	15	4	1.5	0.5	13	1	0	0.5
Cooked Vegetable	2	5.5	12	14	7	3.5	1	52.5	2.5	0	0
Raw Vegetable/ Salads	31.5	29	13	5	3	1.5	0.5	14	1	1.5	0
Sweets & Confectionary											
Chocolate/Toffee/Candies	8	3.5	5	5.5	3	1.5	0.5	70	3	0	0
Beverage											
Coca-Cola, pepsi etc.	8.5	20	16.5	7.5	4	0.5	1	17	24	0	1
Tea	25	12.5	10	7	2	0.5	1	40	2	0	0
Cold Drinks(Non-Carbonated)	17.5	27	16.5	7	1.5	2	0	15	13.5	0	0
Miscellaneous & Fast Food											
Pakoray/Samosa	21	19	14.5	8.5	3	1	0	6.5	25.5	1	0
Goool Guppy/Chana Chat	32	18.5	6.5	3.5	1.5	0.5	0	9	25.5	2	1
Dahi Bhalay	23.5	14.5	12.5	6	2	0.5	0.5	11	26	2.5	1
Shawarma	36	13.5	6	5	3.5	1.5	0.5	4	25.5	3.5	1
French Fries	18	22.5	11	11.5	2.5	1.5	0.5	11.5	19.5	1	0.5
Pizza	51.5	10.5	2.5	2	1.5	0.5	0	3	26.5	1.5	0.5
Burger	28	17.5	7	4	2	1.5	1	4.5	27.5	4	3
Milk shake	18	23.5	9.5	5.5	2	1	0.5	12.5	24.5	2	1
Others	96.5	1	1	0	0.5	0	0	0	0	0	1

Table 10 Weekly consumption of Major Meals and Snacks Weekly Consumption (%)

Meals	Never	1 Time	2Times	3Times	4Times	5Times	6Times	Daily
Breakfast	0	0	1.5	4.5	1	2	1	90
Mid-Morning Snack	8.5	5.5	8.5	8	4.5	5	1.5	58.5
Lunch	1	1.5	1	6	4	2.5	1	83
Mid-Evening Snack	29	9.5	15.5	6	4.5	2	0.5	33
Dinner	0	0	0.5	1	0.5	1.5	1	95.5
Bed-Time Snack	27.5	8.5	11	5.5	3	0.5	0	44

DISCUSSIONS AND CONCLUSION:

The present study was carried out in at very small level in Sargodha, Pakistan and among children of six to twelve years. Malnutrition is the very serious problem facing the world now days. The statistics related nutritional status of the school going children was very poor. The result of the present study revealed that majority of the study population were deficient in all calories and micronutrient while approximately more than half of the study population was underweight and the prevalence of Anemia was very high. The Anthropometric measures showed that 51% and 36% of the male and female students were under-weight while 43% & 64% of the male and female students were having normal BMI. 3% of the male students were overweight as well as obese as well. The findings of the present studies was quite similar to the similar to the of the findings of PMRC National health survey of Pakistan NNS 2011 which showed that during last 10 years, indicators of stunting and wasting were deteriorating and underweight rates has remained constant [13].Now moving towards micronutrients deficiencies, the current study results showed that majority of the study population was calcium deficient. It was noted that dietary consumption of iron among study participant was normal but the main source of taking iron was non-hem which are only 14—18% bioavailable that is why they were iron deficient also. It was noted that he only food group which was sufficiently used and meeting the criteria recommended by food guide pyramid was grains and cereals while daily intakes of meat & poultry, milk and dairy, fruits and vegetables food groups were not adequately utilized. It may be noted that overall dietary habit and frequency of fast foods, fruits, beef, mutton, egg and chicken consumption was very low among these students. The findings of the present studies were quite similar to the findings of the study conducted in Venezuela [14].

Due to all of these above factors, a study suggests that balanced diet is the major key for optimal health. There was a study carried on dietary and nutritional assessment and study suggests that more than half of the children were stunted and more than half of the children were underweight and which is due to the reason of unbalanced diet consumption in school going children. The most effective policies to fight nutritional deficiencies were food fortification and supplementation programs, though it is usually known that nutritional education ought to constantly come with those actions and in addition that education is the major essential and everlasting plan to attain modification in food patterns and to get a balanced diet that comprise all the necessary nutrients throughout the various life stages of life [15]. The study recommends that need to put into action evidence-based child health plan and policy preferring the underprivileged and socially destitute people.

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