Impact of dietary habits on overweight / obesity among school going children in Lucknow

ANNABEL AKHLAQ
Research Scholar, Sri Venkateshwara University, India
Prof. (Dr.) B. D. HARPALANI
Supervisor, Sri Venkateshwara University, India

Abstract:

   Background: *India is witnessing the increasing cases of childhood obesity and overweight which is leading to various diseases later in life. The aim of the present research study was to determine the prevalence of overweight/obesity among school going children aged between 5 to18 in Lucknow and assess its association with dietary habits related behavioral factors. World Health Organization refers obesity as a global epidemic including children and adults. Unhealthy food habits as well as improper dietary pattern are risk factors for overweight and obesity in children.*

   Objective: *To study the association between dietary habits and the risk of overweight and obesity in school going children in Lucknow (**Universe** / population area), U.P., India.*

   Research Methodology: 510 *school going children (**sample size**) of the age group 5-18 years from government and private schools of the region were selected by purposive sampling method. Pre-designed and pre-tested questionnaire was used to elicit the dietary history. Height and weight were measured and BMI was calculated. Overweight and obesity were determined. Students who had BMI for age between 85^{Th} and 95^{Th} percentile of reference population were considered as overweight and BMI for age $>95^{Th}$ percentile of reference population were considered as obese.*

   Results: *There is an association between overweight & obesity and dietary habits. Prevalence of obesity is found to be 18.6% and that of overweight is 18.4% in the study group.*

Conclusion: *The prevalence of obesity and overweight (BMI>85th Percentile) is significantly higher in school going children. Physical inactivity and increased intake of high calorie foods, junk foods, fast food and aerated drinks are the main causes for high prevalence of overweight and obesity.*

Key words: Obesity; Overweight, Dietary Habits, Risk factors, Children.

1. INTRODUCTION

Unhealthy and Poor dietary habits and practices contribute to the development of chronic non-communicable diseases (Schmidt M.I., et al., 2011) (WHO Technical Report Series, 2003). Most of the chronic diseases in adulthood originate from poor dietary practices which are largely formed during childhood (Abdollahi M., 2008). In order to promote healthier and better eating habits, nutrition knowledge is believed to be important aspect (Triches R.M., 2005). However, nutrition knowledge alone may not be adequate to change dietary habits hence in addition there is great need to promote a positive attitude toward healthy eating habits early in childhood (Brown R., 2004) (Kim K.H., 2003) (Mirmiran P., Azadbakht L., Azizia F., 2007).

In India, there is a rapid change in dietary habits, and companied are advertising their junk food on a very large scale targeting especially to the children that is leading to the increasing influence of western diet. Thus, there is even greater need to empower children with the proper knowledge of nutrition and attitudes for making proper food choices (Coon K.A., 2001). School age children spend more time away from their parents thus, influence from friends and media further affect the formation and stabilization of their dietary practices (Mbithe D.D., 2008) (Juan P.M.F.S., 2006). There is growing evidence suggesting that young children from developing

countries are increasingly making unhealthy food choices especially due to lack of knowledge and wrong perception towards healthy foods (Zaborskis A., 2010). This is mainly because presently the concept of 'food' has changed from a means of nourishment to a marker of lifestyle and a source of pleasure as portrayed by electronic media (Dehghan M., 2005;8).

Juan P.M.F.S.,(2006) found in his research study that a large proportion of televised food advertisements are of highly processed foods/convenient foods with, high caloric content, large amounts of fat and sugar, and with little or no micronutrient content. Therefore, to be able to overcome the emerging issue of obesity and overweight among children and related health risks, school children have to be empowered to make the right food choices by providing them with nutrition knowledge and changing their attitudes towards healthy eating.

The issue of Obesity is considered to be one of the major complications affecting children and adolescents and is a worldwide nutritional concern. Obesity is found in several nations where the major nutritional disorder was malnutrition (De Onis M, Blössner M., 2000). A drastic increase in the prevalence of childhood obesity is associated with many impending medical complications in adulthood like hypertension, atherosclerosis, diabetes mellitus, dyslipidemia, sleep apnoea, and osteoarthritis. (Sharma A, Sharma K, Mathur KP., 2007) In the last twenty years, the prevalence of obesity grown twice in children and tripled in adolescents.

Recent studies have shown that obesity is less prominently associated with morbidity in adolescence but is a strong precursor for obesity and related morbidity in adulthood, with 50 to 80 % of obese adolescents becoming obese adults (Berenson G.S., 1998).

Genetic factors, absence of breastfeeding, inappropriate eating habits in the early years of life (Mindru D.E., 2013),

consumption of large quantities of beverages rich in sugar, breakfast skipping, high energy, high fat and low fiber food (Ambrosini G.L., 2014), insufficient physical activity, and shortened night time sleep duration (Brug J., 2012) were shown to be related with overweight and obesity in children and adolescents. Studies addressing the issue of obesity among children and adolescents in Lucknow are scarce; To our knowledge, no study investigating the prevalence of obesity among children has been carried out in Lucknow.

1.1. Research Objective & Hypotheses

The present study was designed to investigate the association between dietary Habits and nutritional status among school going children in Lucknow.

Following research objectives and research hypotheses were formulated to address the aforementioned research problem-

Research Objective-1: To find out the association between the **Nutritional status** of the children and '**Dietary Habits'** of the respondents.

Null Hypotheses

1. There is no association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **Type of food-vegetarian & non vegetarian** (independent variables).
2. There is no association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **Type of food-fast food** (independent variables).
3. There is no association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **Frequency of fast food consumption** (independent variables).
4. There is no association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)**

and **Frequency of eating outside per week** (independent variables).

5. There is no association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **How many times per week do you eat junk food** (independent variables).

6. There is no association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **Frequency of snacks outside per week** (independent variables).

7. There is no association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **How often per week do you take fruits or juice** (independent variables).

8. There is no association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **How often per week do you take Aerated drinks** (independent variables).

Research Objective-9: To find out the difference between the Dietary Habits of the Boys and Girls.

Alternate Hypothesis (H1)-9: The difference between the two (Boys & Girls) population means is equal to 0.

Null Hypothesis (H0)-9: The difference between the two (Boys & Girls) population means is not equal to 0.

2. RESEARCH METHODOLOGY

The present study was a cross - sectional research conducted in government and private schools of Lucknow city, capital of U.P., India. These schools were selected by using purposive sampling method. The sample size was 510 school going children of both boys and girls between the age group of 5-18 years.

Inclusion criteria:

All students from selected schools in the specific age group, who are willing to participate in the study.

Exclusion criteria

1. Those children who were absent and whose parents were not willing to give consent.
2. Children on chronic steroid therapy.
3. Children had any chronic disease

Study variables

1. Socio-demographic variables- age, sex, family history of obesity or any medical illness in the child, food habits and type of food consumption.
2. Anthropometric measurements –
• Weight - The body weight was measured to a nearest 0.1kg using a weighing scale (Libra weighing machine).
• Height - The height was measured to nearest 0.1 cm by using a non-stretchable measuring tape, which was fixed to the wall vertically using cellophane tape, and by making the child stand with heels, buttocks, shoulders and occiput in apposition with the wall, taking care that there is no bending of knees.
• Waist circumference - was measured with a non-stretchable tape, at the midpoint between the 12th rib and the iliac crest, to the nearest 0.1cm, in a standing position during end-tidal expiration.

Data Collection Procedure: Consent for data collection and examination were obtained from school authorities (principals) prior to study. Information regarding the study and the consent form was send to school authorities as well as to all parents through school, along with a questionnaire. A structured pre-tested questionnaire was given to each student with the help of teacher and was asked to get filled by respective students.

3. DATA ANALYSIS, INTERPRETATION AND FINDINGS

3.1. Analysis: Cross tabulation: Demographic

Table-1: Gender

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BOYS	300	58.8	58.8	58.8
	GIRLS	210	41.2	41.2	100.0
	Total	510	100.0	100.0	

Interpretation and Findings

From the above frequency table, it can be seen that out of total number of 510 respondents, 58.8% respondents are boys and 41.2% respondents are girls.

3.2. Chi Square Analysis: Analysis of the Association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **Gender of the Respondents** (independent variables- Boys & Girls).

Table- Crosstab: Nutritional Status * Sex Cross tabulation

Nutritional Status * Sex Cross tabulation					
			Sex		Total
			BOYS	GIRLS	
Nutritional Status	Underweight	Count	58	29	87
		% of Total	11.4%	5.7%	17.1%
	Healthy weight	Count	138	96	234
		% of Total	27.1%	18.8%	45.9%
	Overweight	Count	44	50	94
		% of Total	8.6%	9.8%	18.4%
	Obesity	Count	60	35	95
		% of Total	11.8%	6.9%	18.6%
Total		Count	300	210	510
		% of Total	58.8%	41.2%	100.0%

Interpretation & Findings

From the above crosstab, it can be said that out of total 510 respondents, 58.8% respondents were Boys. It can be seen that

11.4% boys are underweight, 27.1% boys are healthy weight, 8.6% boys are overweight & 11.8% boys have obesity.

Out of total 510 respondents, 41.2% respondents were Girls, and it can be seen that 5.7% girls are underweight, 18.8% girls are healthy weight, 9.8% girls are overweight & 6.9% girls have obesity.

H0: The two factors are independent.

H1: The two factors are not independent (associated).

Tool Used: Chi Square Test (Analyze → Descriptive Statistics → Crosstabs)

Table- Chi-Square Tests

| Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.551[a]	3	.036
Likelihood Ratio	8.508	3	.037
Linear-by-Linear Association	.830	1	.362
N of Valid Cases	510		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 35.82.			

Table Symmetric Measures

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.128	.036
N of Valid Cases		510	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

Interpretation & Findings

From the table we find out that asymptotic significance for Pearson Chi Square comes out to be 0.036 (less than 0.05) so we **reject null hypothesis** at 5% level of significance. Hence it can be concluded that **two variables are associated**.
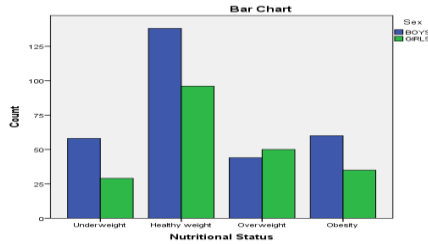
3.3. Chi Square Analysis: Analysis of the Association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **Dietary Habits** (independent variables).

3.3.1 Chi Square Analysis: Analysis of the Association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **Type of food-vegetarian & non vegetarian** (independent variables).

Table Crosstab: Type of food

Crosstab					
			Type of food		Total
			Vegetarian	Non vegetarian	
Nutritional Status	Underweight	Count	44	43	87
		% of Total	8.6%	8.4%	17.1%
	Healthy weight	Count	113	121	234
		% of Total	22.2%	23.7%	45.9%
	Overweight	Count	47	47	94
		% of Total	9.2%	9.2%	18.4%
	Obesity	Count	54	41	95
		% of Total	10.6%	8.0%	18.6%
Total		Count	258	252	510
		% of Total	50.6%	49.4%	100.0%

Interpretation & Findings

From the above crosstab, it can be said that out of total 510 respondents, 50.6% respondents said that they are vegetarians, out of which 8.6% respondents are underweight, 22.2%

respondents are healthy weight, 9.2% respondents are overweight & 10.6% respondents have obesity.

Out of total 510 respondents, 49.4% respondents said that they are non-vegetarians, out of which 8.4% respondents are underweight, 23.7% respondents are healthy weight, 9.2% respondents are overweight & 8.0% respondents have obesity.

H0: The two factors are independent.

H1: The two factors are not independent (associated).

Tool Used: Chi Square Test (Analyze → Descriptive Statistics → Crosstabs)

Table- Chi-Square Tests

| Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.994[a]	3	.574
Likelihood Ratio	1.999	3	.573
Linear-by-Linear Association	1.059	1	.303
N of Valid Cases	510		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 42.99.			

Table Symmetric Measures

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.062	.574
N of Valid Cases		510	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

Interpretation & Findings

From the table we find out that asymptotic significance for Pearson Chi Square comes out to be 0.574 (more than 0.05) so we **accept null hypothesis** at 5% level of significance. Hence it can be concluded that **two variables are not associated**.
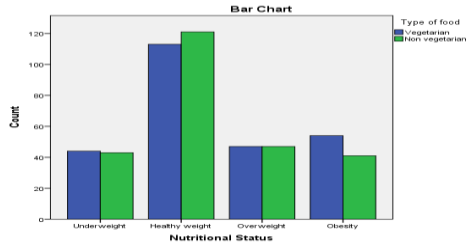
3.3.2 Chi Square Analysis: Analysis of the Association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **Type of food-fast food** (independent variables).

Table- Crosstab: Do you consume fast food

Crosstab			Do you consume fast food		Total
			Yes	No	
Nutritional Status	Underweight	Count	80	7	87
		% of Total	15.7%	1.4%	17.1%
	Healthy weight	Count	222	12	234
		% of Total	43.5%	2.4%	45.9%
	Overweight	Count	88	6	94
		% of Total	17.3%	1.2%	18.4%
	Obesity	Count	91	4	95
		% of Total	17.8%	0.8%	18.6%
Total		Count	481	29	510
		% of Total	94.3%	5.7%	100.0%

Interpretation & Findings

From the above crosstab, it can be said that out of total 510 respondents, 94.3% respondents said that **they consume fast food**, out of which 15.7% respondents are underweight, 43.5% respondents are healthy weight, 17.3% respondents are overweight & 17.8% respondents have obesity.

Out of total 510 respondents, only 5.7% respondents said that **they do not consume fast food**, out of which 1.4% respondents are underweight, 2.4% respondents are healthy weight, 1.2% respondents are overweight & 0.8% respondents have obesity.

H0: The two factors are independent.

H1: The two factors are not independent (associated).

Tool Used: Chi Square Test (Analyze ➔ Descriptive Statistics ➔ Crosstabs)

Table- Chi-Square Tests

| Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.510[a]	3	.680
Likelihood Ratio	1.450	3	.694
Linear-by-Linear Association	.678	1	.410
N of Valid Cases	510		
a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 4.95.			

Table Symmetric Measures

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.054	.680
N of Valid Cases		510	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

Interpretation & Findings

From the table we find out that asymptotic significance for Pearson Chi Square comes out to be 0.680 (more than 0.05) so we **accept null hypothesis** at 5% level of significance. Hence it can be concluded that **two variables are not associated**.
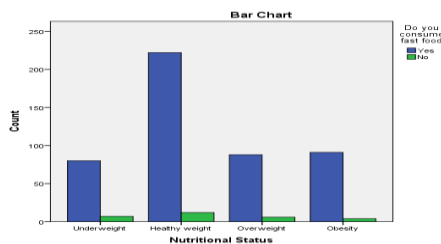
3.3.3 Chi Square Analysis: Analysis of the Association between **Nutritional Status (**Underweight, Healthy weight,

Overweight & Obesity**)** and **Frequency of fast food consumption** (independent variables).

Table- Crosstab: Frequency of fast food consumption

Crosstab			Frequency of fast food consumption					Total
			Once a week	Twice a week	Once on Alternate day	Most days week	Once a every day	
Nutritional Status	Underweight	Count	42	32	5	5	3	87
		% of Total	8.2%	6.3%	1.0%	1.0%	0.6%	17.1%
	Healthy weight	Count	132	65	17	13	7	234
		% of Total	25.9%	12.7%	3.3%	2.5%	1.4%	45.9%
	Overweight	Count	52	26	9	5	2	94
		% of Total	10.2%	5.1%	1.8%	1.0%	0.4%	18.4%
	Obesity	Count	53	29	6	1	6	95
		% of Total	10.4%	5.7%	1.2%	0.2%	1.2%	18.6%
Total		Count	279	152	37	24	18	510
		% of Total	54.7%	29.8%	7.3%	4.7%	3.5%	100.0%

Interpretation & Findings

From the above crosstab, it can be said that out of total 510 respondents, **majority of 54.7%** respondents said that they consume fast food once a week, out of which 8.2% respondents are underweight, 25.9% respondents are healthy weight, 10.2% respondents are overweight & 10.4% respondents have obesity.

Out of total 510 respondents, **29.8% respondents** said that they consume fast food twice a week, out of which 6.3% respondents are underweight, 12.7% respondents are healthy weight, 5.1% respondents are overweight & 5.7% respondents have obesity.

Out of total 510 respondents, 7.3% respondents said that they consume fast food once on alternate day, 4.7% respondents said that they consume fast food on most days a week basis and 3.5% respondents said that they consume fast food once every day.

H0: The two factors are independent.

H1: The two factors are not independent (associated).

Tool Used: Chi Square Test (Analyze ➔ Descriptive Statistics ➔ Crosstabs)

Table- Chi-Square Tests

| Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.935[a]	12	.622
Likelihood Ratio	10.747	12	.551
Linear-by-Linear Association	.156	1	.693
N of Valid Cases	510		
a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is 3.07.			

Table Symmetric Measures

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.138	.622
N of Valid Cases		510	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

Interpretation & Findings

From the table we find out that asymptotic significance for Pearson Chi Square comes out to be 0.622 (more than 0.05) so we **accept null hypothesis** at 5% level of significance. Hence it can be concluded that **two variables are not associated**.
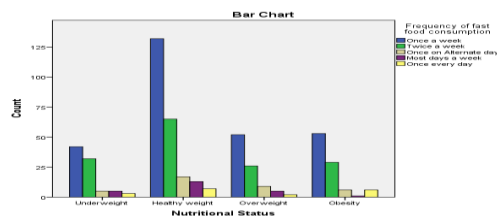
3.3.4 Chi Square Analysis: Analysis of the Association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **Frequency of eating outside per week** (independent variables).

Table- Crosstab: Frequency of eating outside per week

Crosstab					
			Frequency of eating outside per week		Total
			Less than 2 times in a week	More than 2 times in a week	
Nutritional Status	Underweight	Count	69	18	87
		% of Total	13.5%	3.5%	17.1%
	Healthy weight	Count	176	58	234
		% of Total	34.5%	11.4%	45.9%
	Overweight	Count	78	16	94
		% of Total	15.3%	3.1%	18.4%
	Obesity	Count	81	14	95
		% of Total	15.9%	2.7%	18.6%
Total		Count	404	106	510
		% of Total	79.2%	20.8%	100.0%

Interpretation & Findings

From the above crosstab, it can be said that out of total 510 respondents, 79.2% respondents said that they eat outside less than 2 times in a week, out of which 13.5% respondents are underweight, 34.5% respondents are healthy weight, 15.3% respondents are overweight & 15.9% respondents have obesity.

Out of total 510 respondents, 20.8% respondents said that they eat outside more than 2 times in a week, out of which 3.5% respondents are underweight, 11.4% respondents are healthy weight, 93.1% respondents are overweight & 2.7% respondents have obesity.

H0: The two factors are independent.

H1: The two factors are not independent (associated).

Tool Used: Chi Square Test (Analyze → Descriptive Statistics → Crosstabs)

Table- Chi-Square Tests

| Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.283[a]	6	.295
Likelihood Ratio	7.853	6	.249
Linear-by-Linear Association	1.666	1	.197
N of Valid Cases	510		
a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .34.			

Table Symmetric Measures

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.119	.295
N of Valid Cases		510	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

Interpretation & Findings

From the table we find out that asymptotic significance for Pearson Chi Square comes out to be 0.295 (more than 0.05) so we **accept null hypothesis** at 5% level of significance. Hence it can be concluded that **two variables are not associated**.
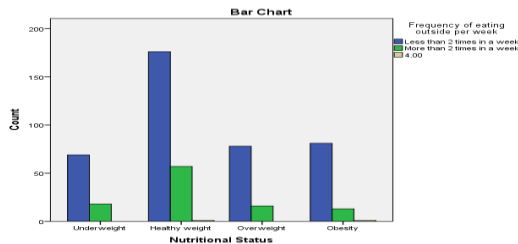
3.3.5 Chi Square Analysis: Analysis of the Association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **How many times per week do you eat junk food** (independent variables).

Table- Crosstab: How many times per week do you eat junk food

Crosstab								
			How many times per week do you eat junk food					Total
			Daily	More than 4 times	3 times	Less than 2 times	No	
Nutritional Status	Underweight	Count	2	10	24	46	5	87
		% of Total	0.4%	2.0%	4.7%	9.0%	1.0%	17.1%
	Healthy weight	Count	12	13	67	124	18	234
		% of Total	2.4%	2.5%	13.1%	24.3%	3.5%	45.9%
	Overweight	Count	3	6	24	57	4	94
		% of Total	0.6%	1.2%	4.7%	11.2%	0.8%	18.4%
	Obesity	Count	5	3	23	63	1	95
		% of Total	1.0%	0.6%	4.5%	12.4%	0.2%	18.6%
Total		Count	22	32	138	290	28	510
		% of Total	4.3%	6.3%	27.1%	56.9%	5.5%	100.0%

Interpretation & Findings

From the above crosstab, it can be said that out of total 510 respondents, **majority of 56.9%** respondents said that they **consume junk food less than 2 times a week**, out of which 9.0% respondents are underweight, 24.3% respondents are healthy weight, 11.2% respondents are overweight & 12.4% respondents have obesity.

Out of total 510 respondents, **27.1% respondents** said that they **consume junk food 3 times a week**, out of which 4.7% respondents are underweight, 13.1% respondents are healthy weight, 4.7% respondents are overweight & 4.5% respondents have obesity.

Out of total 510 respondents, 4.3% respondents said that they consume fast food daily, 6.3% respondents said that they consume fast food more than 4 times a week and 5.5% respondents said that they do not consume fast.

H0: The two factors are independent.

H1: The two factors are not independent (associated).

Tool Used: Chi Square Test (Analyze → Descriptive Statistics → Crosstabs)

Table- Chi-Square Tests

| Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.018[a]	12	.190
Likelihood Ratio	17.225	12	.141
Linear-by-Linear Association	.317	1	.573
N of Valid Cases	510		
a. 4 cells (20.0%) have expected count less than 5. The minimum expected count is 3.75.			

Table Symmetric Measures

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.175	.190
N of Valid Cases		510	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

Interpretation & Findings

From the table we find out that asymptotic significance for Pearson Chi Square comes out to be 0.190 (more than 0.05) so we **accept null hypothesis** at 5% level of significance. Hence it can be concluded that **two variables are not associated**.
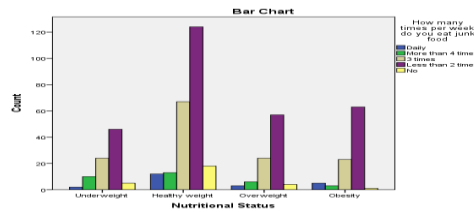
3.3.6 Chi Square Analysis: Analysis of the Association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **Frequency of snacks outside per week** (independent variables).

Table- Crosstab: Frequency of snacks outside per week

Crosstab					
			Frequency of snacks outside per week		Total
			Less than 2 times in a week	More than 3 times in a week	
Nutritional Status	Underweight	Count	65	22	87
		% of Total	12.7%	4.3%	17.1%
	Healthy weight	Count	190	44	234
		% of Total	37.3%	8.6%	45.9%
	Overweight	Count	77	17	94
		% of Total	15.1%	3.3%	18.4%
	Obesity	Count	79	16	95
		% of Total	15.5%	3.1%	18.6%
Total		Count	411	95	510
		% of Total	80.6%	19.4%	100.0%

Interpretation & Findings

From the above crosstab, it can be said that out of total 510 respondents, **majority of 80.6%** respondents said that they consume snacks outside less than 2 times in a week, out of which 12.7% respondents are underweight, 37.3% respondents

are healthy weight, 15.1% respondents are overweight & 15.5% respondents have obesity.

Out of total 510 respondents, **19.4% respondents** said that they consume snacks outside more than 3 times in a week, out of which 4.3% respondents are underweight, 8.6% respondents are healthy weight, 3.3% respondents are overweight & 3.1% respondents have obesity.

H0: The two factors are independent.

H1: The two factors are not independent (associated).

Tool Used: Chi Square Test (Analyze → Descriptive Statistics → Crosstabs)

Table- Chi-Square Tests

| Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.634a	9	.472
Likelihood Ratio	9.443	9	.397
Linear-by-Linear Association	.326	1	.568
N of Valid Cases	510		
a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .34.			

Table Symmetric Measures

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.129	.472
N of Valid Cases		510	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

Interpretation & Findings

From the table we find out that asymptotic significance for Pearson Chi Square comes out to be 0.472 (more than 0.05) so we **accept null hypothesis** at 5% level of significance. Hence it can be concluded that **two variables are not associated**.
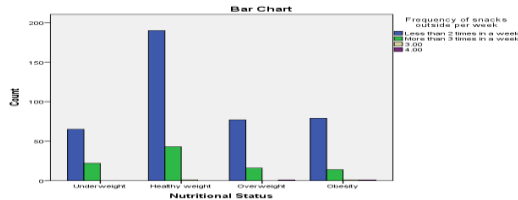
3.3.7 Chi Square Analysis: Analysis of the Association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **How often per week do you take fruits or juice** (independent variables).

Table- Crosstab: How often per week do you take fruits or juice

Crosstab								
			How often per week do you take fruits or juice					Total
			Daily	More than 4 times	3 times	Less than 2 times	No	
Nutritional Status	Underweight	Count	40	6	18	20	3	87
		% of Total	7.8%	1.2%	3.5%	3.9%	0.6%	17.1%
	Healthy weight	Count	108	19	46	57	4	234
		% of Total	21.2%	3.7%	9.0%	11.2%	0.8%	45.9%
	Overweight	Count	39	13	16	20	6	94
		% of Total	7.6%	2.5%	3.1%	3.9%	1.2%	18.4%
	Obesity	Count	38	8	16	29	4	95
		% of Total	7.5%	1.6%	3.1%	5.7%	0.8%	18.6%
Total		Count	225	46	96	126	17	510
		% of Total	44.1%	9.0%	18.8%	24.7%	3.3%	100.0%

Interpretation & Findings

From the above crosstab, it can be said that out of total 510 respondents, **majority of 44.1%** respondents said that they **take fruits or juice daily**, out of which 7.8% respondents are majority in underweight category, 21.2% respondents are majority in healthy weight category, 7.6% respondents are majority in overweight category & 7.5% respondents are majority in obesity category.

Out of total 510 respondents, **24.7% respondents** said that they **take fruits or juice less than 2 times a week**, out of which 3.9% respondents are underweight, 11.2% respondents

are healthy weight, 3.9% respondents are overweight & 5.7% respondents have obesity.

Out of total 510 respondents, 9.0% respondents said that they **take fruits or juice more than 4 times in a week**, 18.8% respondents said that they **take fruits or juice 3 times in a week** and 3.3% respondents said that they do not **take fruits or juice**.

H0: The two factors are independent.

H1: The two factors are not independent (associated).

Tool Used: Chi Square Test (Analyze ➜ Descriptive Statistics ➜ Crosstabs)

Table- Chi-Square Tests

| Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.870[a]	15	.612
Likelihood Ratio	12.959	15	.605
Linear-by-Linear Association	1.716	1	.190
N of Valid Cases	510		
a. 7 cells (29.2%) have expected count less than 5. The minimum expected count is .34.			

Table Symmetric Measures

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.157	.612
N of Valid Cases		510	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

Interpretation & Findings

From the table we find out that asymptotic significance for Pearson Chi Square comes out to be 0.612 (more than 0.05) so we **accept null hypothesis** at 5% level of significance. Hence it can be concluded that **two variables are not associated**.
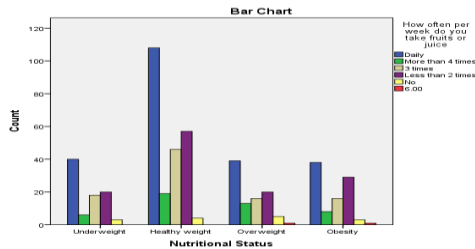
3.3.8 Chi Square Analysis: Analysis of the Association between **Nutritional Status (**Underweight, Healthy weight, Overweight & Obesity**)** and **How often per week do you take Aerated drinks** (independent variables).

Table- Crosstab: How often per week do you take Aerated drinks

Crosstab								
			How often per week do you take Aerated drinks					Total
			Daily	More than 4 times	3 times	Less than 2 times	No	
Nutritional Status	Underweight	Count	5	5	21	37	19	87
		% of Total	1.0%	1.0%	4.1%	7.3%	3.7%	17.1%
	Healthy weight	Count	7	14	51	109	53	234
		% of Total	1.4%	2.7%	10.0%	21.4%	10.4%	45.9%
	Overweight	Count	3	5	25	40	21	94
		% of Total	0.6%	1.0%	4.9%	7.8%	4.1%	18.4%
	Obesity	Count	4	5	18	53	15	95
		% of Total	0.8%	1.0%	3.5%	10.4%	2.9%	18.6%
Total		Count	19	29	115	239	108	510
		% of Total	3.7%	5.7%	22.5%	46.9%	21.2%	100.0%

Interpretation & Findings

From the above crosstab, it can be said that out of total 510 respondents, **majority of 46.9%** respondents said that they **take Aerated drinks less than 2 times in a week**, out of which 7.3% respondents are majority in underweight category, 21.4% respondents are majority in healthy weight category, 7.8% respondents are majority in overweight category & **10.4% respondents are majority in obesity category**.

Out of total 510 respondents, **22.5% respondents** said that they **take Aerated drinks 3 times in a week**, out of which 4.1% respondents are underweight, 10.0% respondents

are healthy weight, 4.9% respondents are overweight & 3.5% respondents have obesity.

Out of total 510 respondents, 21.2% respondents said that they **do not take Aerated drinks and majority is from healthy weight category.**

Out of total 510 respondents, 3.7% respondents said that they take Aerated drinks daily and 5.7% respondents said that they take Aerated drinks more than 4 times in a week.

> H0: The two factors are independent.
>
> H1: The two factors are not independent (associated).
>
> Tool Used: Chi Square Test (Analyze → Descriptive Statistics → Crosstabs)

Table- Chi-Square Tests

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.860[a]	12	.867
Likelihood Ratio	6.792	12	.871
Linear-by-Linear Association	.003	1	.958
N of Valid Cases	510		
a. 4 cells (20.0%) have expected count less than 5. The minimum expected count is 3.24.			

Table Symmetric Measures

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.115	.867
N of Valid Cases		510	
a. Not assuming the null hypothesis.			
b. Using the asymptotic standard error assuming the null hypothesis.			

Interpretation & Findings

From the table we find out that asymptotic significance for Pearson Chi Square comes out to be 0.867 (more than 0.05) so we **accept null hypothesis** at 5% level of significance. Hence it can be concluded that **two variables are not associated**.

Hence, it can be said that our **all the 8 Null Hypotheses** were **accepted** and **all the 8 Alternate Hypotheses-2** was **rejectedted,** thus our **Research Objective-1** was **fulfilled.**

3.4 Analysis: T-Test: Difference between the Dietary Habits of Boys & Girls

The Independent T Test compares the means of two variables. It computes the difference between the two variables for each case, and tests to see if the average difference is significantly different from zero.

Following is sample output of a T test. Researcher compared the mean test scores of **the factors of Dietary Habits of Boys and Girls** in order to see whether there is any significant difference between the dietary habits of boys and girls or not.

Group Statistics						
	Sex	N	Mean	Std. Deviation	Std. Error Mean	
Type of food	BOYS	300	1.5133	.50066	.02891	
	GIRLS	210	1.4667	.50008	.03451	
Do you consume fast food	BOYS	300	1.0600	.23788	.01373	
	GIRLS	210	1.0524	.22333	.01541	
Frequency of fast food consumption	BOYS	300	1.7700	1.02008	.05889	
	GIRLS	210	1.6619	1.03294	.07128	
Frequency of eating outside per week	BOYS	300	1.2600	.48288	.02788	
	GIRLS	210	1.1524	.36025	.02486	
How many times per week do you eat junk food	BOYS	300	3.5367	.81087	.04682	
	GIRLS	210	3.5190	.93426	.06447	
Frequency of snacks outside per week	BOYS	300	1.2100	.46182	.02666	
	GIRLS	210	1.2000	.41272	.02848	
How often per week do you take fruits or juice	BOYS	300	2.5833	1.34004	.07737	
	GIRLS	210	2.0048	1.29960	.08968	

Independent Samples Test		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Type of food	Equal variances assumed	.766	.382	1.036	508	.300	.04667	.04502	-.04179	.13512
	Equal variances not assumed			1.037	450.237	.300	.04667	.04502	-.04180	.13513

Do you consume fast food	Equal variances assumed	.535	.465	.365	508	.715	.00762	.02087	-.03339	.04863
	Equal variances not assumed			.369	466.939	.712	.00762	.02064	-.03295	.04818
Frequency of fast food consumption	Equal variances assumed	.120	.730	1.172	508	.242	.10810	.09226	-.07316	.28935
	Equal variances not assumed			1.169	446.357	.243	.10810	.09246	-.07362	.28981
Frequency of eating outside per week	Equal variances assumed	30.356	.000	2.739	508	**.006**	.10762	.03928	.03044	.18480
	Equal variances not assumed			2.881	505.926	**.004**	.10762	.03735	.03423	.18101
How many times per week do you eat junk food	Equal variances assumed	2.966	.086	.227	508	.821	.01762	.07772	-.13507	.17030
	Equal variances not assumed			.221	408.193	.825	.01762	.07967	-.13901	.17424
Frequency of snacks outside per week	Equal variances assumed	.415	.520	.251	508	.802	.01000	.03979	-.06818	.08818
	Equal variances not assumed			.256	478.812	.798	.01000	.03901	-.06666	.08666
How often per week do you take fruits or juice	Equal variances assumed	.215	.643	4.858	508	**.000**	.57857	.11908	.34461	.81253
	Equal variances not assumed			4.885	458.383	**.000**	.57857	.11844	.34582	.81133

Interpretation:

Finally, we see the results of the T Test. We should keep in mind that, this test is based on the difference between the two variables. To the right of the T- Test, Differences, we see the T, degrees of freedom, and significance.

If the significance value is less than .05, there is a significant difference.

If the significance value is greater than .05, there is no significant difference.

Interpretation:

❖ As the significance value in case of following **five** factors, is **more than 0.05**., when **Equal variances**

are assumed & even when **Equal variances are not assumed**.

- Type of food
- Do you consume fast food
- Frequency of fast food consumption
- How many times per week do you eat junk food
- Frequency of snacks outside per week

It can be seen that there is **no significant difference** between the **Boys' dietary habits and Girls' dietary habits**.

Hence, it can be concluded that the dietary habits of Boys and Girls for the aforementioned factors are nearly similar and **gender plays no role.**

- ❖ It can be seen from the above table that only **two factors** have **significant value less than .05,** when **Equal variances are assumed** & even when **Equal variances are not assumed**.

So, it can be concluded that **there is significant difference between the Boys' dietary habits and Girls' dietary habits for the following two factors.**

- Frequency of eating outside per week
- How often per week do you take fruits or juice

Hence, it can be concluded that the dietary habits of Boys and Girls for the aforementioned two factors are different, thus, **gender plays a major role.**

Hence, it can be said that our **Null Hypothesis-9** was **rejected** and **Alternate Hypothesis-9** was **accepted,** thus our **Research Objective-9** was **fulfilled.**

CONCLUSION AND DISCUSSION

The aim of this study was to analyse and establish the association between the nutritional status and dietary habits of

school going children. Overall, children (respondents) in this study had nearly similar dietary preferences and habits. This was the reason that all the eight null hypotheses were accepted. This result is surprising and unexpected. It might be due to the similar influence of environment and due to the concept of 'food' has changed from a means of nourishment to a marker of lifestyle and a source of pleasure as portrayed by electronic media (Dehghan M., 2005;8).

Nutritional Status (BMI) had no significant association with dietary Habits and practices in this study. This implies that even though children are healthy but their dietary habits are the cause of concern because sooner or later such poor dietary habits will ultimately result in various metabolic diseases, overweight and obesity among pediatric population in Lucknow and India.

This lack of knowledge of nutrition and recklessness on the part of parents will have the effect of unhealthy diet on their health of the children.

Children consume unhealthy diets and this finding is similar to that of another study which found poor dietary practices even among children with good nutrition knowledge. However, knowledge alone may not be sufficient to have proper dietary habits. Attitude and behavioural change toward healthy food early in childhood contributes immensely in adopting healthy dietary habits.

Dietary habits among school going children were characterized by excess consumption of fast foods, junk food, aerated drinks and sweetened beverages, a sign of unhealthy food choices and the main reason for consumption of these foods being easily accessible. Availability of cheap snacks in and around the school encourages consumption of the junk foods by the children and adolescents. Other researchers support that easy access to soft drinks from local vendors contribute to their increased consumption. Research has also demonstrated the importance of not only food availability but also accessibility of

healthier foods as a measure to promote good dietary practices among children. This is because whichever foods are easily accessible and ready to be eaten, children are more likely to eat them [35]. Children had money and are free to make decisions on what to buy while away from home. Availability of unhealthy snacks contributed to their high consumption. This current finding could be attributed to the fact that at present health lessons are needed to be offered in school as well as at home. There must be awareness programmes for children, parents and community as well.

RECOMMENDATION

- There should be supervision at home or at school while children ate food.
- Awareness programmes on the effect of poor dietary habits on overweight and obesity
- Health risk associated with poor dietary habits
- We should aim at improving nutrition knowledge, positive attitudes and appropriate dietary practices.
- Parents must monitor their children's food choices and expenditure of pocket money.

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