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## Obesity is a Threat to Our School Going Children

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**Abstract:** Obesity is an increased and undesirable fat accumulated in a body. Overweight is high body weight in comparison with height while keeping in mind the desirable weight as per age. The study was conducted in two districts of Punjab namely Faisalabad and Rawalpindi. Total 12 schools were selected, randomly, from each district considering the area i.e. Posh Private, Public and Rural schools. Thus total 24 schools were considered for the study. Respondents were male students from grade 5 to 9 in each school. Total sample size was 600 children, 300 respondents from Faisalabad and 300 respondents from Rawalpindi district. A sample of 25 respondents was carefully selected from each school to make a total sample size of 600. The data was collected through a well-structured and pre-tested interviewing schedule. The height and weight of each respondent was measured using calibrated scales. Body Mass Index (BMI = weight [(kg)/height<sup>2</sup> (m<sup>2</sup>)] was calculated for each student. The obtained data then was analyzed by using descriptive statistics, bivariate analysis and multivariate to find the relative significance of independent variables in explaining dependent variable. Results show that obesity of the children was significantly affected by family types, family size, family history, TV watching, internet use, sports and exercise hours, use mutton and beef, junk food, mother's education, family size, weekly time spent in walking and playing facility at school in Punjab. Obesity affects respondents' academic performance, physical health and psychological health, both in rural and urban areas.

**Key words:** Children obesity, overweight, BMI, junk food, CVD, beverages, life style, family history, family income, urban areas, rural areas, Pakistan

### INTRODUCTION

Obesity is linked with morbidity and decreased life expectancy. It can lead to a number of other health related problems like hypertension, hyperlipidemia, type II diabetes and CVD. Children obesity is either inherited or developed due to eating patterns and sedentary life styles. It can be treated by applying changes in behaviors and attitudes, change in life styles and regular physical activities. Obesity is accumulation of undesirable fat in the tender body. Overweight is an increase in body weight in comparison of age and height. BMI is used as the scale for the achievement of acceptable and desirable weight bench marks throughout the world. Body Max Index is derived when a person' weight in pounds is divided by square of person' height in inches and multiplied by a factor of 703 (Centers for Disease Control and Prevention, 2009).

Obesity is a real threat to our school going children. A study indicated that 58 students which constitute 12 percent had body mass index  $\geq 95$ th percentile, 40 student which were 8% had BMI <85th percentile and rest of 403 students which were 80 percent were having BMI <85th percentile. The results further show that the existence of obesity epidemic was higher in male

student by 15% than the female students having 8%, respectively. Results of multivariate regression analysis show that dominant risk factors for obesity and overweight in school children in urban area of Hyderabad were male sex, middle socioeconomic status, weak self-rated athletic ability, struggle for weight loss, eating fruit <4 times per week. Home, schools and society is responsible for childhood obesity in Pakistan and these are determinants of childhood obesity (Ahmed *et al.*, 2013).

The health and economic implications of overweight and obesity are not only found in adults but these are also prevailing in children and adolescents. The number of overweight people is increasing day by day across the world. The problem exists not only in underdeveloped countries but also in developed countries of the world. A study reveals that between 1982 and 1997, the epidemic of children obesity increased by 1.8 to 2.8% in preschoolers in Germany (Kalies *et al.*, 2002; Lissau *et al.*, 2004).

Children' health greatly suffers when they are obese. Preventive measures are required to address the epidemic of obesity in children. The epidemic will not go overnight; gradual efforts are required for its eradication.

Children spend most of their time in schools. Policy makers need to work on implementing interventional programs in schools with the coordination of school administrations to overcome the epidemic in future. School policies should be constant and must prevail at gross roots levels in the countries (Thomas, 2011).

A study indicated that in rural areas of Pakistan, 26% of the children were wasted, another significant ratio of 55% was stunted and combination of wasted and stunted children was 15%. These results indicate that how bad would be the future health conditions of Pakistani children if the problem of obesity continues. Proper health strategies are required to address the epidemic (Shah, 2003).

**Research questions:** This study was conducted to get answers of following research questions:

- 1: What is Children Obesity
- 2: How obesity is measures
- 3: What potential health threats does children obesity cause
- 4: What type of foods children and their families take
- 5: Do children engage themselves in sports and physical activities
- 6: To understand the implications of obesity on children
- 7: To see the extent of obesity in rural and urban school children

## MATERIALS AND METHODS

The study was designed to see causes and consequences of obesity in school going children in a comparative perspective of rural and urban areas of Punjab. A cross sectional research method was adopted to explore the objectives of the study. The study was conducted in two districts of Punjab namely Faisalabad and Rawalpindi. A total 12 schools were selected randomly from each district considering the area i.e. Posh Private, Public and Rural Schools. That constituted a total of 24 schools for the study. Respondents were male students from grade 5 to 8 in each school. Total sample size was 600 respondents-300 from Faisalabad and 300 from Rawalpindi district. A sample of 25 respondents was carefully and randomly selected from each school to make a total sample size of 600 for the study. Rawalpindi and Faisalabad are the two major cities of Punjab in Pakistan. These two cities represent the similar cultural and traditions and represent the typical Punjabi environment. This was the reason that researcher applied the simple random sampling design for the study. This design is more powerful design and has best representation in contrast of other sampling designs such as Systematic, Random Sampling, Stratified and Cluster Sampling. The data was collected through a well-structured (including open

and close ended questions) pre-tested interviewing schedule. Total 25 respondents were interviewed to check the sensitivity and workability of the questionnaire. The other objective of the pre-testing was that respondents should well understand the questions. Some questions were rephrased after pre-testing so that accurate information could be gathered for the study. In addition, the height and weight of each student was measured using calibrated scales. Body Mass Index (BMI = weight (kg)/height<sup>2</sup> (m<sup>2</sup>) was calculated for each student. Precautions were taken to make sure that all recordings were accurate and precise. The obtained data for the study was analyzed by using descriptive statistics such as frequency distribution, mean and standard deviation for summarizing purpose and inferential statistics such as Chi-square, Lambda Statistics and Pearson's Correlation were applied to find the association between independent and dependent variables. The Multivariate analysis was used to find out the relative significance of independent variables in explaining and predicting dependent variable.

**Body mass index (BMI):** Following are the two formulas for measuring obesity:

$$BMI = \frac{\text{Weight (kg)}}{\text{Height (m)}^2} \text{ or } \frac{\text{Weight in pounds} \times 703}{(\text{Height in inches}) \times (\text{Height in inches})}$$

Source: (Disease Control and Prevention, 2009).

## RESULTS AND DISCUSSION

The presentation of data in Table 1 depicts that in case of fathers' education, 100 respondents (16.7%) stated that their father' education was up to 5th class, similarly with regard to mothers' education, 139 (23.2%) told that their mother' education was up to 5th class. Fathers who had years of schooling from 6 years to 10 years were reported 246 (41.0%), mothers were 233 (38.8%) who had years of schooling from 6 to 10 years. Respondents, whose fathers and mothers had 11-14 years of schooling, were 24.8 and 23.2%, respectively. Lastly parents who had years of schooling over 14 were, fathers 105 (17.5%) and mothers 89 (14.8%). Mean years of schooling were 10.37 years and standard deviation was 4.29 years in cases of fathers and mean schooling was 9.63 years and standard deviation 4.52 years in case of mothers of the respondents reflecting gender differentials in education. James *et al.* (1997) studied about the linkage of educational levels of parents especially mothers and food consumption in children and found that maximum use of the milk was the highest in children and families where parents' had a high school degree. In contrast its use was less in the children and the families where parents were having graduation.

Table 1: Distribution of the respondents according to their parents' education

Years of schooling	Father		Mother	
	Frequency	Percentage	Frequency	Percentage
Up to 5	100	16.7	139	23.2
6-10	246	41.0	233	38.8
11-14	149	24.8	139	23.2
Above 14	105	17.5	89	14.8
Total	600	100.0	600	100.0
----- Mean = 10.37, Std. Dev. = 4.29 -----		----- Mean = 9.63, Std. Dev. = 4.52 -----		

Table 2: Distribution of the respondents according to their weight

Weight (kg)	Frequency	Percentage
Up to 40	110	18.3
41-50	143	23.8
51-60	239	39.8
More than 60	108	18.0
Total	600	100.0

Mean = 51.70, Std. Dev. = 11.33

Table 3: Distribution of the respondents according to their BMI

BMI	Frequency	Percentage
Normal (Less than 25)	233	38.8
Over weight (25.1 to 30)	99	16.5
Obese (More than 30)	268	44.7
Total	600	100.0

Mean = 29.60, Std. Dev. = 10.16

Table 2 indicates that respondents whose weight was in the category of up to 40 kg were 110 in numbers and they were 18.3%. Children respondents whose weight came in the range of 41-50 kg were 143 and were 23.8%. Respondents who were having weight in the range of 51-60 kg were in vast majority of 239 and were 39.8%. Last category was more than 60 kg weight and 108 respondents were falling in this category whose percentage of presence in sample population was 18.0%. Mean weight came as 51.70 kg which is an indicator of average weight of the respondents included in sample population and there could be variation of 11.33 kg as per as standard deviation calculated in this table. Results show that respondents who were obese had weight range of 51-60 kg with 39.8% of the sample population their strength was 239.

Data presented in Table 4 display the BMI of the children respondents. Results show that 38.8% respondents' BMI was in normal range of  $\leq 25$ ; 16.5% of the respondents' BMI was  $\geq 25$  but  $\geq 30$ , these were overweight children; 44.7% children were obese as their BMI was  $\geq 30$ . CDC (2009) reported that BMI score greater than 30 is obesity for all age group. Walker (2001) revealed that the prevalence of obesity in adolescents in Pakistan was quite significant and this travel through the childhood period to adolescents and up to adulthood. The ratio was at its increase and might reach at some alarming figures in future if preventive measures were not taken timely. He related his study with some other study which depicted that prevalence of obesity in adolescents with a BMI greater than 25 was around at 18% in Pakistan was similar with figures prevailing in Western world.

Table 4: Distribution of the respondents according to intake of junk food items

Junk food taken	Frequency	Percentage
Burger	227	37.8
Pizza	118	19.7
Noodles	68	11.3
Fried vegetable rolls (Pakorras)	76	12.7
Fried patties (Samosas)	69	11.5
Not taking	42	7.07
Total	600	100.0

Table indicates that a large proportion of 227 respondents which were 37.8%, were using burgers as fast food. 118 respondents who were 19.7% of the total sample size were taking pizza as their preferred junk food items. 68 respondents were taking noodles in their food and were 11.3%. The respondents who were 12.7% in the sample scheme used to take fried vegetable rolls (pakoras) as the junk food. Fried patties (Samosas) were taken as junk food by 11.5% children respondents. Respondents who were not taking any junk food items 7.07. By going through the above distribution, it has been explored that majority of the respondents from sample population of 600 were using junk food items in one way or the others and Burgers were found to be highly taken junk food at 37.8%.

Analysis in the table indicates positive and significant relationship between family income and children obesity as the values of Chi-Square, Gamma and Pearson's Correlation come 18.01\*\*, 0.0139\* and 0.093\*; all are significant at one percent level of significance. Dennison *et al.* (2001) had the similar finding; they depicted that children having low socioeconomic bearing due to limited financial resources of their parents take higher quantities of meat products, fats related foods, white sugar or sugars ingredient sweets, preserved foods, potatoes and its products and various cereals and take less fruits, vegetables and wheat breads.

In the study mothers education levels were checked with the obesity (BMI) of the children. After applying Chi-square, Gamma test and Pearson's Correlation Coefficient values came 68.70\*\*, -0.336\*\* and -0.264\*\*, respectively which show significant at one percent level of significance. This depicts a positive and inverse relationship between mother's education and children obesity (BMI). Negative Gamma and Pearson's Correlation value depicts the inverse relationship; higher the education level of mothers, lower the obesity (BMI) of the children and vice versa. Similar inference was drawn

Table 5: Values of chi-square, gamma and pearson's correlation coefficient of different independent variables with dependent variable (BMI) for both rural and urban areas

Variables	Chi-square value	Gamma	Pearson's correlation coefficient value
Income	18.01**	0.139*	0.093*
Mother's education	68.70**	-0.336**	-0.264**
Family type	9.62**	0.217**	0.192**
Age	17.83**	0.023	-0.034
Family size	14.74**	0.222**	0.162**
Mode of traveling	39.79**	0.420**	0.198**
Waist	65.99**	0.359**	0.675**
School distance	23.46**	-0.261**	-0.173**
Playing facility in school	19.94**	-0.305**	-0.262**
Exercise habits	177.82**	-0.670**	-0.828**
Eating pattern	15.66**	0.203**	0.106**
TV and Internet	57.51**	0.390**	0.316**
Junk food	179.62**	0.847**	0.435**
Mutton and beef	27.15**	0.371**	0.128**
Weekly time spent in sports	23.10**	-0.228**	-0.099*
Weekly time spent in walking	74.46**	-0.337**	-0.174**
Family history	65.21**	0.508**	0.300**
Residence type	17.73**	0.220**	0.162**

Dependent variable: BMI

\*\* : Significant at 1% level of significance

\*: Significant at 5% level of significance

NS: Non-significant

by Nazarov and Rendall (2011), who depicted that those children in the group of 2-18 years whose mothers' education was up to 14 years of schooling had a 1.3-1.8% less risk of being obese. Thus, education levels of mothers were found to be linked with children' obesity.

With regards to family type, Chi-square value was 9.62\*\*, Gamma value come to 0.217\*\* and Pearson's Correlation Coefficient 0.192\*\* which is significant at one percent level of significance, indicating a positive linkage between family type and children' obesity.

Fatima *et al.* (2010) also explored a positive linkage between family structure and children obesity. Kids living in single-parent families used to take more caloric foods than from those living in dual-parent families and they were obese. The study further explored that single-parent family culture was at its rise in all societies and it had association with childhood obesity. The bivariate analysis shows that chi-square value is 14.74\*\*, Gamma value is 0.222\*\* and Pearson's Correlation Coefficient 0.162\*\* which is highly significant at one percent level of significance. It reveals that the there was a positive relationship between family size and children obesity.

Chi-square, Gamma and Pearson's Correlation values of modes of traveling come as 39.79\*\*, 0.420\*\* and 0.198\*\*. It indicates that the association was of highly significant at one percent level of significant. This result has similarity with Wen *et al.* (2010) findings, who studied to explore an association between weight of the children and modes of travel to school and screen time on 10 to 13 years school children. The study concluded that 21% school children 36% who used car were obese. Children who used to go to school on foot were less overweight; their adjusted odds ratio (AOR) was 0.20%. It was also concluded that the children who used

to take more than two hours to reach school had the chances of being obese than those who used to reach in less than an hour. The study explored, there was an association between of daily and longer screen time with obesity of the children.

With reference to waist, Bivariate analysis reveals the value of chi-square as 65.99\*\*, Gamma value 0.359\*\* and Pearson's Correlation Coefficient 0.675\*\* which is highly significant at one percent level of significant indicating that higher the waist of the children, higher will be the BMI score.

With regard to school distance, Chi-square value is 23.46\*\*, Gamma value is -2.61\*\* and Pearson's Correlation Coefficient value is -0.173\*\* which depicts highly significant at one percent of level of significance, indicating that there is a relationship between school distance and children' obesity. The negative value of Gamma test and Pearson's Correlation shows an inverse relationship, higher the distance lower the BMI score and vice versa.

With regard to playing facility at school, the values of chi-square, Gamma Test and Pearson's Correlation Coefficient are 19.94\*\*, -0.305\*\* and -0.262\*\*, which depicts a highly significant at one percent level of significance. It shows that there is a strong relationship between playing facilities at schools and BMI of the children. Akodu *et al.* (2012) conducted a study on 400 school children with good health which included 200 boys and 200 girls in the age band of 7 to 11 years; studying in public schools of Surulere. These schools had recreational physical activities. It was explored that 66.7% of the public schools had grounds for recreational physical activities of the children. It was also noticed that 83.33% of the private schools were having reasonable grounds and well managed RPA facilities for children.

Table 6: Results of regression analysis: un-standardized, standardized regression coefficient values of independent variables regressed on BMI of the children for both rural and urban areas

	SC		UC		
	B	Std. Error	Beta	T	Sig.
Monthly income	-6.620E-6	0.000	-0.055	-1.540	0.124
Father's education level	0.034	0.087	0.015	0.396	0.692
Mother's education level	-1.892	0.369	-0.183	-5.133	0.000
Age of respondent	0.708	0.523	0.055	1.353	0.176
Family type	2.775	0.716	0.131	3.875	0.000
Weight of respondents	1.637	0.298	0.173	5.485	0.000
School distance	-1.122	0.390	-0.089	-2.873	0.004
Playing facility at school	-3.921	0.854	-0.190	-4.591	0.000
TV and Internet	1.977	0.334	0.219	5.913	0.000
Weekly time spent in sports	-0.924	0.286	-0.107	-3.233	0.001
Weekly time spent in walking	-0.929	0.307	-0.100	-3.028	0.003
Mode of traveling	2.714	0.642	0.134	4.227	0.000
Junk food	6.722	0.727	0.302	9.248	0.000
Mutton and beef taken	1.143	0.856	0.048	1.335	0.182
Family history	2.219	0.653	0.109	3.397	0.001

Dependent Variable: BMI, SC: Standardized coefficients, UC: Unstandardized coefficients

Table 7: Pearson correlation values of BMI with academic, physical and psychological implications both in rural and urban areas N = 600

Variables	Pearson correlation coefficient values
Academic	-0.185**
Physical	-0.038
Psychological	0.221**

As far as the exercise hours are concerned, the values of Chi-square, Gamma and Pearson's Correlation Coefficient are 177.82\*\*, -0.670\*\* and -0.828\*\*, respectively, all are significant at one percent level of significance, indicating that there is a strong relationship between exercise hours and children obesity. For walking hours the values of chi-square, Gamma and Pearson's Correlation come as 74.46\*\*, -0.337\*\* and -0.174\*\*, which is significant at one percent level of significance indicating that there is strong association between walking hours and children BMI. Wang and Lobstein (2006) had the similar findings. The study depicted that decrease in physical activities was the main cause of children obesity across the world. Children obesity was now the global epidemic, their study further revealed.

With regard to eating pattern, the values of Chi-square, Gamma test and Pearson's Correlation Coefficient come as 15.66\*\*, 0.203\*\* and 0.106\*\* which is significant at one percent level of significance indicating that there is a strong positive relationship between the variables; more taking of fast foods, carbohydrates, cold drinks etc higher will be the BMI of the children. This finding has similarity with Cutting *et al.* (1997) who indicated that children' eating habits are influenced by those of their parents, like what parents daily eat, which diets they avoid and so on and so forth.

The Chi-square, Gamma and Pearson's Correlation values of 57.51\*\*, 0.390\*\* and 0.316\*\* depict a highly significant relationship at one percent of the level of

significance between TV and Internet and obesity of the children. It shows that more the TV watching, playing video games and time spent on Internet will make the children more obese and their BMIs will be higher as well. This result has similarity with Gormaker and Dietz (1983) who found that an additional hour of watching by children TV could increase prevalence of obesity in them by 2%. They suggested that environment such as proximity to school and recreational activities should be introduced in societies which will be conducive for control on obesity.

To find the relationship of type of food with obesity, Chi-square, Gamma and Pearson's Correlation Coefficient were applied and their values came as 179.62\*\*, 0.847\*\* and 0.435\*\*, respectively. It shows the highly significant relationship at the one percent level of significance; depicting that higher consumption of type of food is positively associated with obesity of the children. Lin *et al.* (1999); Prentice and Jebb (2003) found that the foods which people buy from supermarkets or take away outlets or counters are rich in dense calories and bear high level of fat ingredients as compare to those food which are prepared at homes. In the study, Chi-square, Gamma and Pearson's Correlation Coefficient were applied to explore the relationship between mutton and beef taking and obesity of the children. Chi-square value was 27.15\*\*, Gamma value 0.371\*\* and Pearson's Correlation Coefficient values came as 0.128\*\* which shows the highly significant at the one percent level of significance; revealing that higher the use of mutton and beef, higher will be BMI score. Aeberli *et al.* (2007) found that meat intake was seen very high in Switzerland. Meat consumption was higher in the children with high socioeconomic status and well being.

With regard to weekly time spent in sports, Chi-square, Gamma test and Pearson's Correlation values came as

Table 8: Results of Regression Analysis: un-standardized, standardized regression coefficient and level of significance of the academic consequences for rural and urban areas

	----- UC -----		SC		
	B	Std. Error	Beta	T	Sig.
Academic	0.575	0.125	0.185	4.611	0.000
Independent Variable: BMI	R <sup>2</sup> = 0.033, F-value = 21.262**				
UC: Unstandardized Coefficients	SC: Standardized Coefficients				

Table 9: Results of Regression Analysis: un-standardized, standardized regression coefficient and level of significance of the psychological consequences for rural and urban areas

	----- UC -----		SC		
	B	Std. Error	Beta	T	Sig.
Psychological	0.376	0.068	0.221	5.530	0.000
Independent Variable: BMI	R <sup>2</sup> = 0.047 F-value = 30.582**				
UC: Unstandardized Coefficients	SC: Standardized Coefficients				

23.10\*\*, -0.228\*\* and -0.099\*, respectively which predicts a positive significant at the one percent of the level of significance. It indicates that there was a positive relationship between sports activities and children BMI. Negative sign of Gamma value shows that there was an inverse relationship between the variables. Similar results were drawn by Hills (2009) who found that concept of habitual physical activities and exercise was at the decline in young population and consequently there was huge reduction in energy expenses. The study further reveals that low level of physical activity is becoming a new norm for young generation which is causing overweight and obesity.

Chi-square, Gamma test and Pearson's Correlation Coefficient values of family history came as 65.21\*\*, 0.508\*\* and 0.300\*\*, respectively. It indicates the highly significant at the one percent of the level of significance; stating that there was a positive relationship between the family history and obesity of the children. Higher the obesity in family, higher will be the obesity in children. This finding has similarity what Robert *et al.* (1997) found; they indicated that overweight children in less than three years of age will have less chances of becoming obese if their parents are normal. They also concluded that obesity of parents increases the chances of obesity in two times in obese and normal weight kids who are under 10 years.

With regard to residence type, the values of Chi-square, Gamma test and Pearson's Correlation came as 17.73\*\*, 0.220\*\* and 0.162\*\* which is highly significant at the one percent level of significance, revealing that there was a positive strong relationship between the variables. Living in rural areas tends to find lower levels of obesity as compare to urban areas where children were obese. This finding has similarity with Mushtaq *et al.* (2011) findings who explored that 17% (95% CI 15.4-18.8) school children had overweight problem and 7.5% (95% CI 6.5-8.7) epidemic of obesity in Pakistan. Boys were more obese than girls. It was further explored that children residing in the urban set up who had high SES were more prone towards overweight and obesity

than to those residing in the urban area with lower SES and rural areas. There was a speedy increase of obesity in school children in primary levels in urban residences in Pakistan than rural areas.

In Table 7 un-standardized and standardized regression coefficients of each independent variable are represented accordingly for both rural and urban areas. Besides these calculations, standard errors and significant levels of the predictor variables have also been presented and shown in the table.

**Regression coefficients of socio-economic and demographic characteristics:** Monthly income and mother's education were found to be significant at 5 and 1% levels as the Beta values came to -0.055 and -0.183, respectively which indicates that these two variables were relatively important in explaining the obesity and BMI of the children. Higher income levels were associated with higher obesities and higher education levels of mother's were associated with lower levels of obesities of the children in both rural and urban areas. Similarly family type (nuclear/joint), age of the respondents was significant at 5% level, weight of the respondents was significant at one percent level and father's education levels also had the significant relationship with BMI of the children at 5% level of significant.

**Regression coefficients of physical characteristics:** Beta values of school distance, playing facility at school, TV watching and internet use, weekly time spent in sports, weekly time spent in walking and mode of traveling were calculated as -0.089, -190, 0.219, -0.107, -0.100 and 0.134 which showed a positive and inverse relationship with obesity of the children in both rural and urban areas and were significant at one percent level of significant except school distance which was significant at 5% level.

**Regression coefficients of eating characteristics:** Eating characteristics which were converted into independent variables to check the association of these variables with obesity of the children were Junk food and mutton and beef taken by the respondents. Beta values of use of Junk food and mutton and beef taken by the respondents are calculated in Table 8 which are 0.302 and 0.048 indicating that both in rural and urban areas eating habits had significance on BMI of the children at one percent level of significant and 5% level, respectively.

**Regression coefficients of health characteristics:** Beta value of family history came as 0.109 for both urban and rural areas indicating its impact on dependent variable-BMI of the children. It shows a positive relationship with BMI at one percent level of significance.

**Dependent variable (BMI):** The statistical analysis shows that obesity has bearing upon children's academic performance, physical health and psychological health. The Pearson's Correlation Coefficient values of academic, physical and psychological variables in overall model are -0.185\*\*, -0.038 and 0.221\*\* which depicts an inverse but high level relationship between academic performance and obesity and physical health and obesity. This is a significance relationship at one percent level of significant. Higher obesity will result in low academic performance and vice versa. High levels of obesity result in bad physical health of the children. With regard to psychological health, the relationship is highly significant at one percent level of significant; high obesity more psychological issues and less obesity will mean less psychological issues in children in the rural and urban areas.

**Findings and recommendations:** Obesity in school children is a real potential threat for Pakistan. Urban school going children are more obese than rural school going children but obesity is affecting children in both rural and urban areas. Children studying in posh schools were more obese as compared to children studying in government and rural school. Children living in urban areas and studying in posh schools were more prone toward junk food and cold drinks. Most of the posh private schools do not have the playing facilities in their schools and children use to pass their leisure time in using Internet or playing video games. Children having obesity history in the families were found to be more obese than to those who did not have the obesity history in the family. Children were not doing weekly walking and exercise, they were also not habitual of playing sports. They were more interested in playing video games, watching TV and using Internet. These sedentary habits were making them more obese and they were not feeling the obesity, though they were having symptoms of fatigue due to obesity. Families with higher SES were having obese children than to those having low SES. Children from rich families were obese as they used to bring pocket money and used to go junk food outlets with their parents.

Children whose mothers had high level of education were less obese in comparison with those whose mothers' education levels were low. Fathers' education was found to be non significant with obesity epidemic in children. Family eating pattern, frequent use of mutton and beef, taking soft drinks, sleeping late, watching TV for long hours, using Internet for late hours, awakening late in the morning and doing no physical activities were also found to be the reasons of obesity in the children. It was also explored that obesity had social and psychological effects on children. Obese children used

give low performance in academics due to laziness. Their physical health was also getting disturbed due to obesity. They felt fatigue and were less prone towards playing, walking and doing exercise. They were also not active mentally, they used to think being isolated, being ignored from fellow mates and teacher, used to get sarcastic comments in the society, were facing lack of confidence, were less interactive with guests and friends, were more shy and so on.

In light of the findings of the present study, followings are the recommendations for future policy makers:

- 1: Government should start National Childhood Obesity Prevention Program and cascade it all Provinces, Divisions, Districts, Teshsils and Union Councils
- 2: Schools and other educational institutions should come forward and start intervention programs and should invite experts and consultants to teach children about healthy eating habits and physical activities
- 3: Media' role could be very pivotal for prevention of obesity in school going children. Children adapt the things and habits which they see on media. Media could restrain children from unhealthy foods. Media should organize period talk shows in which doctors and experts should come and tell the public about healthy life styles and eating habits
- 4: Maintaining strong physical education (PE) programs that engage students in moderate to vigorous physical activity for at least 50% of PE class time

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## REFERENCES

- Aeberli, I., M. Kaspar and M.B. Zimmermann, 2007. Dietary intake and physical activity of normal weight and overweight 6 to 14 year old Swiss children. *Swiss Med. Wkly*, 137: 424-430.
- Ahmed, J., A. Laghari, M. Naseer and V. Mehraj, 2013. Prevalence of and factors associated with obesity among Pakistani schoolchildren: a school-based, cross-sectional study. *Eastern Mediterranean Health J.*, 19: 242-247.
- Akodu, A., N. Ibeabuchi, Ogunmuyiwa Oluwakemi and D.S. Akinbo, 2012. Comparative Study of the Effect of Recreational Physical Activities on Body Composition among Pupils of Public and Private Primary Schools. *Int. J. Public Health*, 2012 Volume 2 Number 1.
- Centers for Disease Control and Prevention, 2009. BMI for children and teens Retrieved August 10, 2009, from [http://www.cdc.gov/healthyweight/assessing/bmi/childrens\\_bmi/about\\_childrens\\_bmi.html](http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html).
- Centers for Disease Control and Prevention, 2009. National Center for Health Statistics (NCHS). Health, United States, online resource <http://cdc.gov/>.
- Centers for Disease Control and Prevention (CDC), 2004. Defining Overweight and Obesity Page. 22 Mar. 2004 <<http://www.cdc.gov/nccdphp/dnpa/obesity/defining.htm>>.
- Cutting, T.M., G.K. Thomas and L.L. Birch, 1997. Is maternal disinhibition associated with children's overeating? *J. FASEB*, 11: 174.
- Dennison, B.A., T.A. Erb and P.L. Jenkins, 2001. Television Viewing and Television in Bedroom Associated with Overweight Risk Among Low-Income Preschool Children. *Preventive medicine* 33: 536-42.
- Dietz, W.H., 1983. Childhood obesity: susceptibility, cause and management. *J. Pediat.*, 103: 676-686
- Fatima, G.H, S. Kanikereddy and M. Patel, 2010. Parenthood - A Contributing Factor to Childhood Obesity *Int. J. Environ. Res. Public Health*, 7: 2800-2810.
- Hills, A.P., 2009. It's Time to be More Serious about Activating Youngsters: Lessons for Childhood Obesity. *J. Exer. Sci. and Fitness*, 7: 28-33.
- James, W.P.T., M. Nelson, A. Ralph and S. Leather, 1997. Socioeconomic determinants of health: The contribution of nutrition to inequalities in health. *Br. Med. J.*, 314: 1545.
- Kalies, H., J. Lenz and R.V. Kries, 2002. Prevalence of Overweight and Obesity and Trends in Body Mass Index in German Pre-School Children, 1982-997. *Int. J. Obesity*, 26: 1211-1217.
- Lin, B.H., J. Guthrie and E. Frazao, 1999. Nutrient contribution of food away from home. In: *America's Eating Habits: Changes and Consequences* (Frazao, E., *et al.*), (1999) pp. 213-242. AIB No. 750. U.S. Department of Agriculture, Economics Research Service, Washington, D.C.
- Lissau, I., M.D. Overpeck, W.J. Ruan, P. Due, Holstein, Be and M.L. Hediger, 2004. Body Mass Index and Overweight in Adolescents in 13 European Countries, Israel and The United States. *Arch. Pediatrics and Adolescent Med.*, 158: 27-33.
- Mushtaq, U.M., S. Gull, M.H. Abdullah, U. Shahid, A.M. Shad and J. Akram, 2011. Prevalence and socioeconomic correlates of overweight and obesity among Pakistani primary school children. *BMC Public Health* 2011, 11: 724.
- Nazarov, Z. and S. Michael Rendall, 2011. Differences by Mother's Education in the Effect of Childcare on Child Obesity. WR-890 November 2011. This paper series made possible by the NIA funded RAND Center for the Study of Aging (P30AG012815) and the NICHD funded RAND Population Research Center (R24HD050906).
- Prentice, A.M. and S.A. Jebb, 2003. Fast foods, energy density and obesity: a possible mechanistic link. *Obesity Rev.*, 4: 187-94.
- Robert, C., A. Whitaker, D. Jeffrey, Kristy and H.D. Williams, 1997. Predicting Obesity in Young Adulthood from Childhood and Parental Obesity. *N. Eng. J. Med.*, 337: 869-873.
- Shah, S.M., B.J. Selwyn, S. Luby, A. Merchant and R. Bano, 2003. Prevalence and correlates of stunting among children in rural Pakistan. *Pediat. Int.*, 45: 49-53.
- Thomas Patrick King, 2011. School Policies Impacting Childhood Obesity. School of Public and Environment Affairs Indiana University. April 9, 2011.
- Walker, L., 2001. Obesity. *Pediat. Rev.*, 22: 250-251.
- Wang, Y. and T. Lobstein, 2006. Worldwide trends in childhood overweight and obesity. (Article). *Int. J. Pediat. Obesity*, 1: 11-25.
- Wen, L.M., D. Merom, C. Rissel and J.M. Simpson, 2010. Weight status, modes of travel to school and screen time: a cross-sectional survey of children aged 10-13 years in Sydney. *Health Promot J. Aust.*, 21: 57-63.