Original Research Article

Nutritional assessment of school going children in district Abbottabad, K.P. Pakistan

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ABSTRACT

Background: To assess the nutritional assessment of the primary school children in Abbottabad.
Methods: A descriptive cross-sectional study, conducted among children of private and public sectors primary schools of Abbottabad from January - September 2018 by simple random sampling. 200 students from each school (7 and 13 years), present on the day of data collection were included in this study and those who were absent, sick or not willing, were excluded. The data was collected on a pre-tested questionnaire.
Results: Total 200 students, males 49.5% (n=99) and females 50.5% (n=101) were interviewed and assessed for their nutritional assessment. Their mean age was 11.67±1.66years, height was 144.93±12.34 cms and weight was 37.69±12.96 kgs. Male students (n=67) 67.7% and from private schools (n=67) 65.7% were healthier then female (n=55) 55.4% and government schools (57.1%), P valve 0.085 and 0.026. Most of the students with grade C in last year school performance were underweight (100%). Raven Test for both types of school gave 0.012 P value which indicated more intelligent students resides in private schools. Furthermore, children of well-serviced fathers and qualified mothers were healthy, more intelligent and practiced good hygiene. Also, children of a private school who has better nutritional status scored more than Public school children.
Conclusions: Nutritional status of children have a direct effect on their cognitive abilities. Private school children who have scored better in the intelligence test, have better nutritional status. Socioeconomic status and mother qualification have a direct effect on children's nutrition, health status, school performance and hygiene.

Keywords: Nutrition Assessment, School Going, Children, Cognition, Association

INTRODUCTION

Nutrition is the science of food and its relationship to health. Among the basic requirements of the human body, nutrition is the most important. The word "nutrition" is derived from a Latin "nutritionem" means "to nourish, suckle".[1] In history, man has struggled a lot to obtain food. They used to hunt animals and ate them. Stone Age people use to consume more proteins than carbohydrate and fats. Until the 19th century, the science of nutrition was limited, and importance was given to only protein, carbohydrate and fats metabolism. However, the science of nutrition was revived with the discovery of vitamins and minerals between world war one and two. World Health Organization (WHO) defines Malnutrition as "The cellular imbalance between the supply of nutrients and

energy and the body's demand for them to ensure growth, maintenance, and specific functions. "Both undernutrition and overnutrition are considered as malnutrition.[2] Healthy nutrition is key for a productive life and, presently, malnutrition is a Public Health problem worldwide. At the end of 2020, chronic non-communicable diseases, caused by malnutrition, will be responsible for two-thirds of the global burden of disease.[3]

A regular exercise and balanced diet is the cornerstone of good health. Nutrients play an essential role in body growth, development, and maintenance. [4] Proper diets, both quantitative and qualitative, is an integral part of primary health care (PHC). Nutritional status is considered a significant and positive health indicator. It determines anthropometric measurements of preschool children, the height of children at the time of school entry and prevalence of low birth weight. [5] In the past, the need of study of nutritional status occurred after study of diseases due to inadequate diet. In developing countries, most of the population is affected by both macro and micronutrient deficiencies.[6] Nutrition is one of Millennium Development Goals (MDGs) and a simple measurement of the Socio-Economic Status (SES) of Pakistan.[7]

Food provides energy, and healthy meals provide the capability to prevent and guard against illnesses which are being diagnosed.[8] Worldwide, about 20 million severely malnourished children are reported in South Asia and Sub-Saharan Africa out of which one million die each year. Nutritional popularity demands careful monitoring as nutrient adequacy is challenging to fulfill and the right remedy is required to the children who are already affected by severe malnutrition.[9] Youngsters acquire their habits for consuming and workout during school going age which tends to stick with them entirely in their lives. If they adopt healthful habits, they are much less susceptible to illnesses and acquire good cognitive abilities.[10]

According to Waterlow, the cause of stunting and wasting is multifactorial, but the three primary reasons are poor nutrition, repeated infectious diseases, and poor infant-mother interaction.[11] Malnourished children are more prone to infectious illnesses due to low resistance, mostly being diarrhoeal and respiration illnesses.[12] At full term birth, the infant's brain is 25 percent of its weight, at age two it will be 75 percent, during these year's children also go through cognitive development, so intake of a healthy diet is vital for proper cognitive development. Cognition includes perception, learning, memory, thinking, and understanding.[13] In Pakistan, about 740,000 children die every year because of extreme, malnutrition, and the child malnutrition degree raised abruptly in regions stricken by 2005 Earthquake.[14] Growth evaluation is the best indicator of health and nutritional status of children. There's a particular relationship among child's age, weight, and height; any deviation reflects inadequate nutrition.[15] Nutrition is an extensive subject, but our

concern is a nutritional assessment of school going children because the nutritional assessment of every member of the community is not necessary.

In 1956, Gómez and Galvan classified malnutrition as a first, second, and third degree which were grounded on body weight. Each degree was an indicator of fatality due to malnutrition.[16] John Conrad Water low established a new classification for malnutrition which was based on wasting and stunting. Obesity/over nutrition occurs when there is an inequity between calories consumes and calories expended.[17]

In 20, the percentage of obese children (6–11 years) in the United States increased from 7% to 18%.

Similarly, the percentage of 12–19 year's obese adolescents increased to almost 21% from 5%. Childhood obesity has both immediate and long-term effects. Immediate effects are increased risks of cardiovascular diseases, increased chances of diabetes, skeletal problem, Social and psychosocial problems, i.e., poor self-confidence. Long-term effects are increased chances of stroke, osteoarthritis and various types of cancers like breast cancer, Hodgkin lymphoma, colon cancer, and so forth. Obesity can be prevented by adopting healthy lifestyles; healthy eating and physical activities.[18] Insufficient food intake and recurrent infectious diseases cause undernutrition. It includes stunting, wasting, poor cognitive abilities, cardiovascular disease, renal disease, dental problems, cancer, osteoporosis, diarrhea, pneumonia, anemia, neural tube defects, respiratory infection, asthma, eczema and one or more vitamin and mineral deficiency diseases.[19] Cognitive development is profoundly affected by Malnutrition. Anemia due to Iron deficiency in children below two years of age probably affects brain function. Folate inadequacy has been linked to neural tube defects. Universally, Iodine deficiency is a prevalent cause of mental impairment. In pregnant women and infants, even slight deficiency of iodine lowers intelligence by 10 to 15 IQ points.[20]

This study is conducted to determine the nutrition status of school going children. The results of this study will be useful to the policymaker. It can also help to implement meaningful changes and adopt appropriate practices. It will also create awareness among the general public.

The primary objective of this study is to assess the nutritional assessment of the primary school children in district Abbottabad. To determine the association between socio-demographic factors and nutrition, between cognitive abilities and the nutritional status of school children and to compare the nutritional status of the public with private sector Primary School children.

METHODS

This descriptive cross-sectional study was conducted among the children of private and public sectors primary

schools of District Abbottabad (K.P, Pakistan) from January-September 2018. Two hundred school children were selected by simple random sampling (100 students from each type of schools). All students, both gender, who were aged between 7 and 13 years, present on the day of data collection were included in this study. Those who were sick, disable, recently underwent any major surgery, using any food supplement, absent, and were not willing to participate were excluded from the study. BMI was used to access the malnutrition status of children. Socio-demographic, last year academic scores, dietary recall questionnaire and, Ravens IQ Test proforma were assembled in a single questionnaire. Then, data was collected by the principal author. Subject's parents were informed by written consent, and verbal consent from each was taken before data collection. They were assessed for the usual diet, snacks at school and home. The cognitive ability of the students was assessed directly by their last year school scores.

The data after the collection was compiled, organized and, analyzed using SPSS version-21 and locked by principal author. Pearson-chi square test (p<0.004) and correlation tests were used according to the objective of this study. Categorical variables were explained by percentages while numerical variables by graphs.
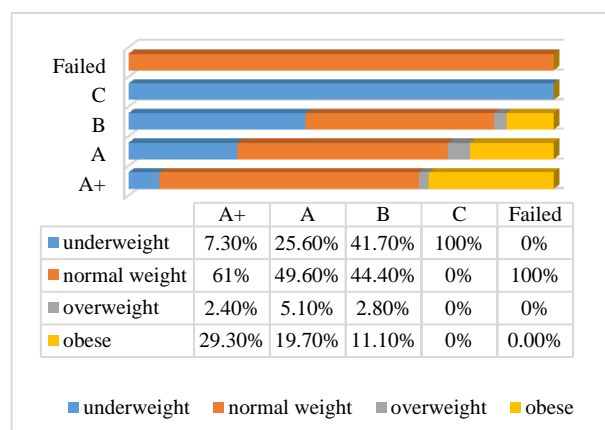
RESULTS

Total 200 students, males 49.5% (n=99) and females 50.5% (n=101) were interviewed and assessed for their nutritional assessment. Their mean age was 11.67±1.66 years, height was 144.93±12.34 cm and weight was 37.69±12.96 kgs.

Table 1 shows the frequency, percentage and dietary habits of all participants. BMI was compared with gender and type of school. The P value of BMI with gender and type of school is 0.085 and 0.026 respectively. It shows a statistically significant difference in BMI concerning gender and type of school. Male students were found to be healthier then female students as shown in Table 2. Comparison of students of government and private sector for hygiene is shown in Table 3. Ravens-a non-verbal 60 items test, was administered to both groups, to estimate the intelligence. Table 4 shows the cognition comparison among private and government schools, and it was found that children of private schools were more intelligent (p=0.012).
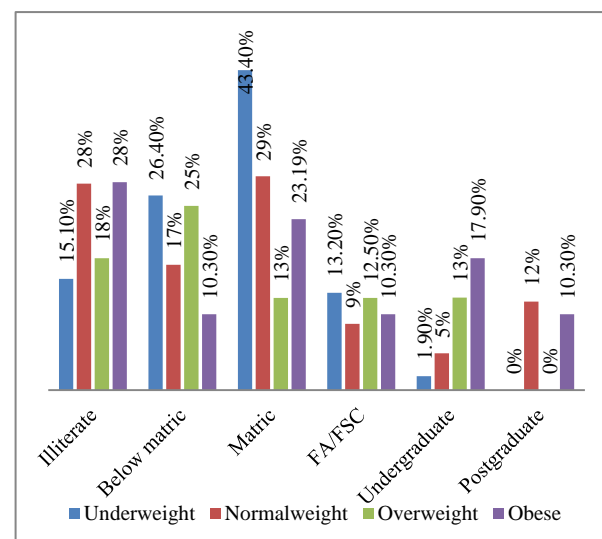
Table 1: Dietary habits.

	Yes (%)	No (%)
Breakfast	193 (96.5)	7 (3.5)
Lunch	192 (96)	8 (4)
Dinner	194 (97)	6 (3)
Snacks before sleep	54 (27)	146 (73)

Similarly, when BMI was compared with last year school performance of the children, statistically significant difference was found (p=0.012) Figure 1. Most of the students with grade C in last year school performance were underweight (100%). Likewise, mother qualification and Father's occupation also showed a positive association with BMI of children (p=0.019, p=0.027 respectively). Majority of obese and underweight children were found with matriculated mothers (29%, 43.40%). Father's occupation was an important factor for chronic malnutrition. The men in Services have good resources and better buying power to purchase necessary food items for their children. Government employee had chances to have children with low nutritional status compared to children of high-income parents. 37.70% children of unemployed and 40.90% of government employees were underweight while weightage of normal, overweight and obese were highest for doctor's children (Figure 2 and 3).

	A+	A	B	C	Failed
underweight	7.30%	25.60%	41.70%	100%	0%
normal weight	61%	49.60%	44.40%	0%	100%
overweight	2.40%	5.10%	2.80%	0%	0%
obese	29.30%	19.70%	11.10%	0%	0.00%

P=0.012

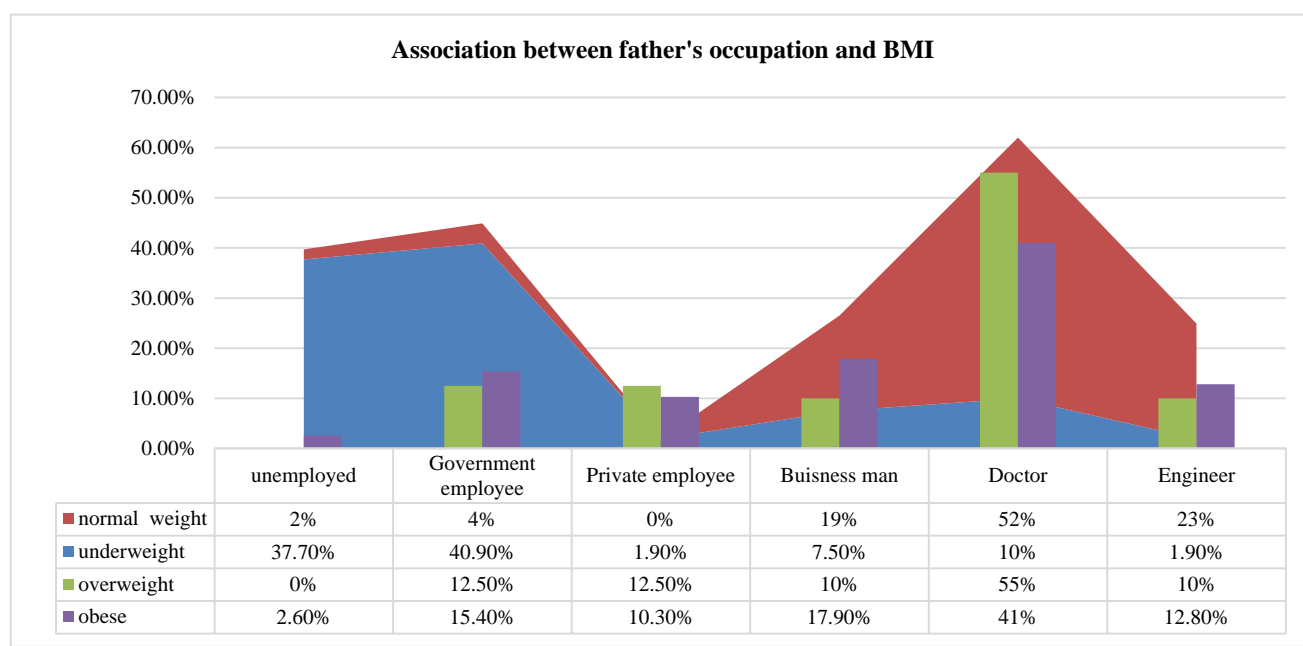**Figure 1: Association between BMI and last year school score.**

P=0.019

Figure 2: Association between mother's qualification and BMI.

In this study, mother's qualification was focused, and comparison with other parameters was made. Statistically, the difference was observed between mother qualification and clothes cleanness (p=0.039), teeth hygiene (p=0.004) and hair cutting (p=0.00) whereas, no significant difference was noted for trimming of nails (p=0.436) Table 5.

Association between father's occupation and BMI

	unemployed	Government employee	Private employee	Buisness man	Doctor	Engineer
normal weight	2%	4%	0%	19%	52%	23%
underweight	37.70%	40.90%	1.90%	7.50%	10%	1.90%
overweight	0%	12.50%	12.50%	10%	55%	10%
obese	2.60%	15.40%	10.30%	17.90%	41%	12.80%

P=0.027

Figure 3: Association between father's occupation and BMI.

Table 2: BMI comparison among gender and type of schools.

Count	Male N (%)	Female N (%)	Government N (%)	Private N (%)	Total N (%)
Under weight	22 (22.2)	32 (31.7)	35 (35.7)	19 (18.6)	54 (22)
Healthy weight	67 (67.7)	56 (55.4)	56 (57.1)	67 (65.7)	123 (55)
Over weight	7 (7.1)	4 (4.0)	3 (3.1)	8 (7.8)	11 (4)
Obese	3 (3)	9 (8.9)	4 (4.1)	8 (7.8)	12 (19)
P value	0.085		0.026		200 (100)

Table 3: Hygiene comparison among government and private schools.

Schools	Clothes		Teeth		Nails		Hair	
	Clean N (%)	Not Clean N (%)	Brushed N (%)	Not Brushed N (%)	Cut N (%)	Not cut N (%)	Trimmed N (%)	Not trimmed N (%)
Government	85 (86.7)	13 (13.3)	76 (77.6)	22 (22.4)	89 (90.8)	9 (9.2)	98 (100)	0 (0)
Private	94 (92.2)	8 (7.8)	92 (90.2)	10 (9.8)	88 (86.3)	14 (13.7)	94 (92.2)	8 (7.8)

Table 4: Raven test score comparison among government and private schools.

Raven test score	Type of school	
	Government N (%)	Private N (%)
30-39	0 (0.0)	4 (2.0)
20-29	18 (18.4)	60 (58.8)
Below 20	80 (81.6)	38 (37.3)
P=0.012		

Table 5: Association between mother's qualification and cloth cleanness.

Mother qualification	Clothes		Teeth cleanness		Nail trimming		Hair cutting	
	Cleaned	Not cleaned	Brushed	Not brushed	Trimmed	Not trimmed	Trimmed	Not trimmed
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Illiterate	39 (21.8)	11 (52.4)	34 (20.2)	16 (50)	41 (23.2)	9 (39.1)	49 (25.5)	1 (12.5)
Below matric	34 (19)	3 (14.3)	34 (20.2)	3 (9.4)	32 (18.1)	5 (21.7)	37 (19.3)	0 (0)
Matric	56 (31.3)	6 (28.6)	51 (30.4)	11 (34.4)	58 (32.8)	4 (17.4)	61 (31.8)	1 (12.5)
FA/FSC	21 (11.7)	0 (0)	20 (11.9)	1 (3.1)	20 (11.3)	1 (4.3)	21 (10.9)	0 (0)
Graduation	14 (7.8)	0 (0)	13 (7.7)	1 (3.1)	12 (6.8)	2 (8.7)	10 (5.2)	4 (50)
Post-graduation	15 (8.4)	1 (4.8)	16 (9.5)	0 (0)	14 (7.9)	2 (8.7)	14 (7.3)	2 (25)
	P=0.039		P=0.004		P=0.436		P=0.002	

DISCUSSION

Pakistan has one of the highest prevalence of child malnutrition as compared to other developing countries. Here, the malnutrition in children is a public health concern, and a large proportion of the population has got a higher amount of malnourished children.[21] Nowadays, it has resulted in a substantial increase rate in mortality and overall disease burden. 20 percent of the developing countries are facing malnutrition, and about 50 percent of children die worldwide.

There is always a part of school in helping to modify cultural attitudes and behaviors. Similarly, it also plays a vital role in modifying the society's awareness about the food. Schools are also helpful because it contains fast growing age groups and obesity and underweight are found in these age groups. School going age group comprises children of age 5 to 12 years, during these years of life they physically grow continually at a constant speed over a sequence of uneven developmental bursts.[22]

Undernutrition can occur from infancy due to inadequate breastfeeding, which accounts for almost one million deaths per year. In 1981 WHO International Code of Marketing Breast Milk Substitutes banned illegal advertising of breast milk substitutes.[23]

According to University of Arkansas, USA, on school children (5-11 years of age), the socioeconomic (SES) status has an essential role in a school going children health, cognition and emotional sequels hence it is an essential topic for the people who study about childhood development. The interest is because of the fact the high SES families give their children a range of facilities, goods, parental action and social environment that is beneficial for children while low-income families cannot afford such facilities and children acquire developmental and cognitive abnormalities.[24]

A cross-sectional study (2009-2010) among school children and adolescents-n 595 (6-19years) in Rome, Italy was performed. In this, 438 children (73.6%) had a conventional BMI, and 92 (15.5%) were overweight (57 cases, 9.6%) or obese (35 cases, 5.9%), correspondingly. The occurrence of leanness was 10.9% (65 cases): grade 1 was noticed in 29 cases (4.9%) and grade 2 in 36 (6%), correspondingly. The occurrence of obesity and leanness grades 1 and 2 were not dissimilar considerably in males and females (6.2% versus 5.6%, 4.8% versus 4.9%, and 5.6% versus 6.5%, resp.). The occurrence of overweight was statistically noteworthy between genders (13.1% males versus 6.2% females).[25]

In a cross-section study, 5692 school children from India and Vietnam were surveyed, was found that father's mother's education is directly linked to the child nutrition. In Vietnam, child nutrition is associated with the education of mother mainly.[26]

In Pakistan, a study was done in the schools including private schools, semi-government organizations and welfare foundations including children of all socioeconomic statuses of Dera Ismail Khan district. Among, 1338 children of 6–11years, 13.39% were found to be underweight, 72.15% to be healthy weight, 8.83% to be overweight and 5.61% to be obese. Percentage of underweight was higher in girls (25%) than boys (13.22%). Percentage of obesity was more significant (5.17%) in boys than girls (1.39%).[27]

According to a study, In Abbottabad with the massive poverty affected the countryside commonly and the literacy rate. 80% of primary schools meet the huge arrival of students. In June 2009 a "descriptive and cross-sectional" study was carried out from arbitrary three primary schools on 400 children of 5-10 years of age. The nutritional status was found ideal, and 90% children had normal BMI where the father was graduate and a good earner.[7]

In a study done in Kolkata, India, regarding personal hygiene and mother's qualification showed that the percentage of children with poor hygiene whose mother as illiterate, Primary and Middle and above was 25.35%, 5.55%, and 0 respectively. While the percentage of children with good hygiene whose mother was Illiterate,

Primary and Middle and above was 15.50%, 26.67%, 66.67% respectively.[28]

In our study, the percentage of underweight and normal weight was found to be 26.5%, 50% respectively. While in a study done in, In the government and private schools, semi-government organizations and welfare foundations of Dera Ismail Khan including children of all socioeconomic statuses, 13.39% were found to be underweight, 72.15% to be normal weight, which shows a relative increase in the number of underweight than normal weight children in Abbottabad and worsening of health status of these children.[27]

In our study as shown in Table. 2, the percentage of underweight and obesity was more in girls (31.7%) and 8.9% respectively, then in boys, 22.2% and 3%. Ramzan M, from Dera Ismail Khan district, conducted the study with same variables and concluded with more underweight girls (25%) than boys (13.22) but obesity was found to be higher in boys (5.17%) then girls (1.39%).[27]

According to our study as shown in Figure 4 the percentage of underweight among the children of government and private sector employee, businessman, doctor, and engineer is 40%, 1.9%, 7.5%, 10%, 1.9% respectively. Siddique S, in 2009, conducted a similar study in Abbottabad district. There, the nutritional status was found ideal and 90% of children had normal BMI among the graduated and good earner fathers. This is true because the men in Services have enough resources for nourishing their children upto the WHO standards. Government employee had chances to have children with low nutritional status compared to children of high-income parents.[7]

Mother's education has a strong independent effect on a child's nutritional status. In our study (Figure. 3), the percentage of underweight children of mothers with the qualification of metric/below, FA/FSC, Graduate and Postgraduate is 43.4%, 13.2%, 1.9%, and 0% respectively. This is similar to a study done in 2008 in Indian army schools. This study resulted in the highest prevalence of underweight (33.89%) among matriculated children' mothers, while the lowest prevalence of underweight (3.43 %) was seen in children of graduated/higher education mothers.[6] These results show that there is a strong relationship between mother's qualification and children health because an educated mother knows the balanced dietary requirements according to age.

In our study, when raven's test score was compared among government and private schools, the percentage of private schools' children who were scoring 30-39 (Intelligent) was 3.9% while the percentage of government schools children with the same scoring was 0%. Similarly, the percentage of private school children who were scoring 20-29 (Average) was 58.8% while the percentage of government school children with similar scoring was 18.5%. In a study done in 2013 in Abbottabad, there were 34% private schools children who were scoring maximum while 61% of government schools children were scoring maximum. These results show that the students of private schools are more intelligent and creative than the government ones which can be because private schools' children to good socioeconomic families who provide them more creational facilities, healthy food, and healthy social environment.[7]

In our study Table 3 shows the proportion of primary school's students including both government and private who were having proper practices regarding clean clothes, brushed teeth, trimmed nails and cut hairs. Out of 200 students, 89.5% were wearing clean clothes, 84% were brushing their teeth daily, 88.5% had trimmed nails, and 96% had accurately cut hairs. While in a study done in primary schools of Kolkata, India in 2013, the proportion of students who were having clean clothes, brushed teeth, trimmed nails and cut hairs was 50%,52%,80%, and 13% respectively.[28] This shows better hygiene in primary schools of Abbottabad than in India which is due to more poverty and population in India.

CONCLUSION

Children are the hope of the future. Malnutrition remains an overwhelming problem to child survival, growth, and development in Abbottabad District. Malnourished children are intellectually less productive as compared to healthy children.

Nutritional status of children has a direct effect on the cognitive abilities of Primary school children. Private school children who have scored better in intelligence test have better nutritional status than children who study in Public schools. Secondly, Socioeconomics has a direct effect on children's nutrition, BMI, Health status and Hygiene. Moreover, it is due to good Socioeconomics status among private schools' children that they are good both in Health and Studies.

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