

A COMPARATIVE ANALYSIS OF ANTHROPOMETRIC ATTRIBUTES IN GOVERNMENT AND PRIVATE SCHOOLS

Yasir Iqbal Waraich¹, Prof. Dr. Yasmeen Iqbal²,
and Dr. Shahzaman Khan³

ABSTRACT:

School-age children are one of the most active segments of any society. The diet/food and environment, as well as the routines of school-aged children, have a significant impact on their development, body weight, and Body Mass Index (BMI), and hence on the overall general well-being status of the school-aged children. The present study was conducted with an aim to compare the anthropometric attributes in government and private school going children. Analytical and cross-sectional study design was used. The study was conducted on male children from private and government schools, located within of the main city of Sargodha, Pakistan. Five each from private and government sector, total ten schools were selected in this study. Convenience sampling technique was used. Children between the ages of 9-11 years, Children in primary level of education and children which are the residents of Sargodha were included in the study. On the basis of statistical results, the weight and BMI level of private school children is significantly higher as compare to government school children. No statistically significant difference was found between height in Private and government school's students.

Keywords: Anthropometric Attributes, Government Schools, Private Schools, BMI, Children

INTRODUCTION:

The surveillance reports, up till 2009, have reported that about 31% of global population does not attain adequate PA and the prevalence of inactivity is 17% (Hallal et al., 2012). Latest researchers, however, claim that owing to globalization, industrialization, mushrooming media, social computer apps and enhanced home-based activities have lessened the PA even further. Physical inactivity is the one of the biggest and fourth leading risk factor for global mortality and estimated to cause 6% of deaths

¹ Department of Sport Sciences, University of Sargodha, Sargodha, Pakistan

² Department of Sport Sciences & Physical Education, Faculty of Allied Sciences, University of Lahore

³ Department of Sport Sciences & Physical Education, Sukkur IBA University, Sukkur

worldwide (Ng, Norton, & Popkin, 2009). It has led to increased risks of cardio-vascular disorders, obesity, diabetes mellitus, hypertension, heart stroke and allied psycho-physical disturbances (Ahmed et al., 2016; Feroze, 2016). Considering various age groups, it has been shown that the rates of PA decrease steadily with age and adults seem to have lesser interests of any kind in PA. It seems worthwhile to assess various correlates and potential determinants of PA (such as motivation, passion, awareness, *etc.*) in order to attain adequate level of PA amongst human populations.

Considering the status of PE and PA in school-going children and teens, it has been reported that globally only 1/3rd of the children have appropriate PA with mostly spending a sedentary lifestyle (Tremblay et al., 2018). Resultantly, the rates of childhood overweight and obesity, poor health and various diseases have escalated. This decrease in PA and increase in sedentary lifestyle of the children and adolescents has raised obvious concerns throughout the world. As an appropriate level of PA and fitness is strongly correlated with academic achievements, hence sedentary lifestyle has diminished academic zeal and resulted in a downfall of academic results (Hassaan, Abdel-Fattah, Elsalmony, & Hassan, 2009; Lutosławska & Fornal-Urban, 2009).

The school-going children are one of the vibrant sections of any society. The diet/food and atmosphere along with the routines of school-going children, reality, have a great impact on their development, weight of body and Body Mass Index (BMI), thus, overall general well-being status of the school going children (Das & Dhundasi, 2001; Farholm & Sørensen, 2016). They require maximum level of PA and decisive physical aptness due to their increasing stage of life, improved learning, academic and perception-based experiences and grade/position grounded on educational arrangements. It is well clarified that the increased PA in children results in better physical fitness, enhanced cognitive responses and thus, appropriate achievement levels in terms of academic attainments. The link between bodily activity, corporeal

fitness and cognitive rejoinders in school-going children is broadly being investigated in the advanced nations (Ezzati, Lopez, Rodgers, & Murray, 2004; Farholm & Sørensen, 2016; Shaukat, Ahmad, & Zehra, 2013). Still, there still is a scarcity of research and works on this feature in rising and the under-developed countries.

Though it has been well perceived and established through research (as well as aforementioned review on PA) that PA has a direct and strong relationship with an adequate level of health status. Yet, a negative trend has started prevailing globally and a massive population does not involve in suitable PA to attain the sustained and healthier lives (Fuezeki, Engeroff, & Banzer, 2017). This soaring trend in physical inactivity has not only caused enhanced disease prevalence amongst humans but has also levied substantial economic burden, globally (Lee et al., 2012). In order to reduce this pandemic, WHO has commenced a worldwide action plan to decrease the physical sedentariness by 10% in 2025, and 15% by 2030. The implementation policies have hence been initiated (Organization, 2019).

Many factors have been attributed towards this physical inactivity with 'industrial revolution' being the major contributor. Emergence of latest technologies through this revolution has decreased the level of PA required by humans, significantly. A study from China (Ng et al., 2009) has quantified the effects of physical inactivity on adults and children and finally reported that increased urbanization and economic development has decreased hours of PA in adults and children, hence increased television viewing by the children.

Physical inactivity is now being recognized as 4th leading cause of non-communicable diseases which needs global addressing at all fronts. Literature review reveals that researches have been, and are being, directed towards surveillance of physical inactivity in terms of morbidity, mortality, health status and economic burden. As per a study in 2012 (Hallal et al., 2012), about

31% of global population does not meet standard PA levels. In another study, 'population attributable fractions' associated with physical inactivity were studied through conservative assumptions of non-communicable diseases. Results showed that worldwide, the physical inactivity caused 6%, 7%, 10% and 10% of coronary heart disease, diabetes, breast cancer and colon cancer, respectively (Lee et al., 2012).

A later study (Ding et al., 2016) addressed the aspects of economic burden levied upon a nation through physical inactivity. Health-care costs, disability adjusted life years and productivity losses attributable to physical inactivity were assessed for 142 countries. Results confirmed that apart from mortality and morbidity, substantial economic losses were incurred through physical inactivity. Similarly, many other studies have emanated from Asian countries which have highlighted that physical inactivity is associated with various diseases as summed up in Table 1. This review on physical inactivity as a global pandemic makes it inevitable that policies and strategies need to be devised by all stakeholders to enhance people engagement in adequate PA.

Objective of the study:

To compare the anthropometric attributes in government and private school going children

Hypotheses of study:

H_a There is a difference in anthropometric attributes of government and private school going children.

H₀ There is no difference in anthropometric attributes of government and private school going children.

MATERIAL AND METHODS:

Analytical and cross-sectional study design was used. The study was conducted at the private and government schools (5 each) located within of the main city of Sargodha, Pakistan. Its coordinates are 32°5'1"N 72°40'16"E. Sargodha occupies the status

of eleventh largest city of Pakistan. The study was conducted in a time span of 18 months. This duration coincides with the opening of all educational institutes of Pakistan after a long COVID-19 lockdown. The study was conducted in collaboration with/and by the consent of Punjab School Education Department and various educationists from private education sector of Sargodha. A total of ten schools (5 each from private and government sector) were earmarked and registered in the study. Male children (n=304, 152 each from private and government schools) from 9-11 years (Late childhood) of age were incorporated in the study apropos to relevant consent from parents and school administrations. Approximately 30 children were taken from each school by using convenience sampling technique. Children between the ages of 9-11 years, Children in primary level of education and children which are the residents of Sargodha were included in the study.

The rules and regulations set by the Ethical Committee of University of Lahore were followed while conducting the research and the rights of the research participants were respected. Apropos to an approval by the Punjab School Education Department, Pakistan and relative administrative units of the schools, a written consent was taken from the parents of the children registered under this study. Furthermore, considering the personal and revealing nature of the research, all the respondents and children were ascertained that the data/results will be kept confidential. The participants were allowed to withdraw from the research at any moment.

Owing to prevailing pandemic of COVID-19, appropriate SOPs were followed as prescribed by the WHO and national government.

DATA ANALYSES AND RESULTS:

Data was analyzed using SPSS version 23.0. The study population (school going children) was grouped as type of institution (private and government school goers). Normality of data was ascertained through Shapiro Wilk Normality Test. To

compare the anthropometric attributes in government and private school going children the difference between private and government school-going children was deduced through Mann Whitney U test. Statistical significance was considered at $P \leq 0.05$. The overall mean ($\pm$ SD) values for anthropometric attributes of private and government school going children incorporated in the study are given in Table 1. Body weight and BMI were significantly ($P \leq 0.05$) higher for private school goers (37.1 ± 7.15 kg and 18.8 ± 2.25) as compared to their government school goer counterparts (34.6 ± 6.03 kg and 17.6 ± 1.82). Height however was found statistically insignificant ($P \geq 0.05$) between these two study groups. On the basis of following statistical results the weight and BMI level of private school children is significantly higher as compare to govt. school children so the alternative hypothesis is accepted and null hypothesis is rejected.

Table No. 1
Comparisons of Anthropometric Attributes of Private & Government School Going Children

	Height of student		Weight of student		Body Mass Index	
	Private	Govt.	Private	Govt.	Private	Govt.
Mean $\pm$ SD	1.4 $\pm$ 0.96	1.4 $\pm$ 0.96	37.1 $\pm$ 7.15	34.6 $\pm$ 6.03	18.8 $\pm$ 2.25	17.6 $\pm$ 1.82
Median $\pm$ IQ Range	1.40 $\pm$ 0.13	1.40 $\pm$ 0.12	35.85 $\pm$ 10.25	34.00 $\pm$ 9.00	18.41 $\pm$ 3.40	17.46 $\pm$ 2.48
Shapiro-Wilk test (p-Value)	<0.001		<0.001		<0.001	
U** - Value	11516.00		9231.00		7874.00	
p - Value	0.963		.002*		.000*	

*Significant ($P \leq 0.05$) (**Mann Whitney value)

Due to the non-normality of the variable, we used a median as a measure of central tendency.

From Table 1. We observed that there were 152 private school students with Mean $\pm$ SD 37.1 ± 7.15 , Inter quartile range 10.25, median of 35.85 for weight, and weight of 152 government school students with Mean $\pm$ SD 34.6 ± 6.03 , Inter

quartile range 9.00, median of 34.00, over all Mann-Whitney U =9231 ,(p <0.05); Body mass index of 152 private school students with Mean $\pm$ SD is 18.8 $\pm$ 2.25, Inter quartile range 3.40, median of 18.41 and BMI of 152 government school students with Mean $\pm$ SD is 17.6 $\pm$ 1.8, Inter quartile range 2.48, median of 17.46, over all Mann-Whitney U =7874.00 ,(p <0.05);

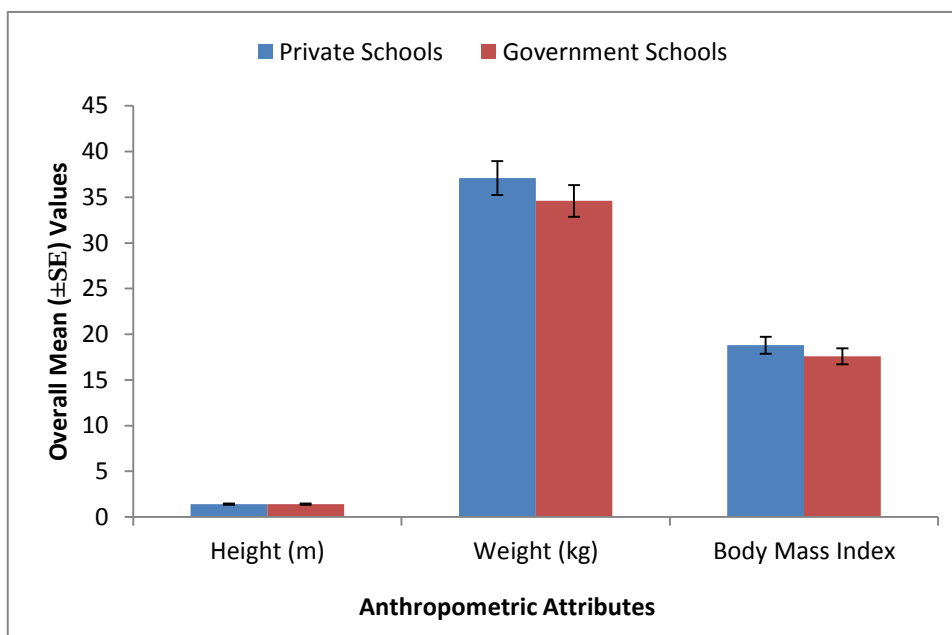
No statistically significant variances were found between height in 152 Private and 152 government school's students with Mean $\pm$ SD is 1.4 $\pm$ 0.965, Inter quartile range 0.13, Median of private students is 1.40, and government school students with Mean $\pm$ SD is 1.4 $\pm$ 0.965, Inter quartile range 0.12, median is 1.40, over all Mann-Whitney U =11516, (p >0.05); Mann Whitney U test was used to compare the Height, Weight and Body Mass Index (BMI) of private and government school going children. However, statistically significant variations were found between the weight of these students and their body mass index. Based on the result the alternative hypothesis regarding height of the students is rejected and null hypothesis is accepted and regarding weight and BMI is alternative hypothesis accepted and null hypothesis is rejected.

Table 2
Comparisons of BMI according to percentile of Private & Government School Going Children

Weight Status Category	Percentile Range	Private	Govt.
Underweight	Less than the 5 th percentile	14 (09%)	35(23%)
Healthy Weight	5 th percentile to less than the 85 th percentile	99 (65%)	81(53%)
Overweight	85 th to less than the 95 th percentile	11 (07%)	15(10%)
Obesity	Equal to or greater than the 95 th percentile	28 (19%)	21(14%)

Table No. 2 Indicates the weight status of private and government school children. There are significant differences in the weight of private and government school children especially in underweight category. Only 9% students are underweighting from private school students as compare to 23% of government school children. 65% of private and 53% of government school students are in healthy weight category. There are also little differences in overweight category. 10% of government school students and 07% of private school students are overweight. Obesity ratio of private school students is little higher as compare to government school students 19% and 14% respectively. Mostly government school students are underweight.

Figure 1
Comparative analysis of anthropometric attributes between private and government school going children



Comparative analysis of anthropometric attributes between private (n=152) and government (n= 152) school going children. Error bars indicate mean ($\pm$ SE) values and different letters on the error bars (a-d) differ significantly ($P \leq 0.05$) between private and government schools

DISCUSSIONS:

For the present study height, weight and BMI were ascertained between private (n= 152) and government (n=152) school-going children. Body weight and BMI were significantly higher for private school-goers ($37.1\pm7.15\text{kg}$ and 18.8 ± 2.25) as compared to their government school-goer counterparts ($34.6\pm6.03\text{kg}$ and 17.6 ± 1.82). Height however was statistically non-significant between the two study groups. Similar results have been reported for a study conducted on comparing bodily fitness among students of rural and urban Lahore, (Mahmood, Mujahid, Mahmood, Tariq, & Salam, 2018). Another study conducted on BMI of medical students in association with gender and academics have also reported the same (Shaukat et al., 2013). It has earlier been documented through another study that 9.8% of urban students are underweight as compared to 54.9% in rural students (Mahmood et al., 2018). A higher BMI associated with increased skin fold thickness has also been reported elsewhere (Shaukat et al., 2013). For similar age group of children of Dera Ismail Khan, KPK Province, Pakistan it has been reported that 13.39%, 72.15%, 8.83% and 5.61% of children were underweight, normal weight, overweight and obese, respectively (Abid, 2014; Khan, Jameel, Khalil, & Gul, 2016). Sluggish lifestyles and poor diet allied with PI were attributed to these results.

In the results of the present study, the mean ($\pm\text{SE}$) value for BMI in private and government school-goers was 18.8 ± 2.25 and 17.6 ± 1.82 , respectively. Though the mean values are within the reference range for the age group prescribed by the WHO (Organization, 2019), however it was noticed that the range of BMI for private school-goers (11.6-30.8) was at higher levels nearing obesity. Furthermore, as per the results of this study conducted on a total of 304 school-going children, 28 (18.4%) from private schools were found to be obese as compared to 11 (7.2%) for government school-goers. This indicates the alarming threat of obesity in private school-going children of Pakistan. The socioeconomic class of the private school-goers (upper-middle class

predominantly) in our study could be attributed to this above optimal BMI. These results are in line with various studies which have reported a pre-obesity range of 25-30 for Pakistani children (Din, 2014). Yet another study on Pakistani teens has reported that eating a wide variety of junk food in daily routine including chips, packed fruit juices, packed flavored milk, ice creams/ frozen yogurts both at home and at school/college were a cause of elevated risks for obesity and hence metabolic disturbances (Khan et al., 2016). The results of the present study on anthropometric will provide an even clear understanding when they will be discussed ahead in correlation/association to various physical fitness levels of the study groups.

CONCLUSION:

The present study was conducted with an aim to compare the anthropometric attributes in government and private school going children. Experimental study design was used. Analytical and cross-sectional study design was used. The study was conducted on male children from private and government schools, located within of the main city of Sargodha, Pakistan. Five each from private and government sector, total ten schools were selected in this study. Convenience sampling technique was used. Children between the ages of 9-11 years, Children in primary level of education and children which are the residents of Sargodha were included in the study. On the basis of statistical results, the weight and BMI level of private school children is significantly higher as compare to government school children. No statistically significant difference was found between height in Private and government school's students.

REFERENCES:

- Abid, R. (2014). Association of low physical activity with high body mass index in both genders. *Khyber Medical University Journal*, 6(3).
- Ahmed, J., Mehraj, V., Jeswani, G. K., Rehman, S. U., Shah, S. M., & Hamadeh, R. (2016). Parental and school influences on physical activity levels of high school students in Hyderabad, Pakistan. *Journal of Ayub Medical College Abbottabad*, 28(1), 110-115.
- Das, K. K., & Dhundasi, S. A. (2001). Physical fitness: a longitudinal study among Muslim children of Bijapur (Karnataka). *Indian J Physiol Pharmacol*, 45(4), 457-462.
- Din, I. (2014). *Health Outcomes and the Pakistani Population*: Cambridge Scholars Publishing.
- Ding, D., Lawson, K. D., Kolbe-Alexander, T. L., Finkelstein, E. A., Katzmarzyk, P. T., Van Mechelen, W., . . . Committee, L. P. A. S. E. (2016). The economic burden of physical inactivity: a global analysis of major non-communicable diseases. *The Lancet*, 388(10051), 1311-1324.
- Ezzati, M., Lopez, A. D., Rodgers, A. A., & Murray, C. J. (2004). *Comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors*: World Health Organization.
- Farholm, A., & Sørensen, M. (2016). Motivation for physical activity and exercise in severe mental illness: A systematic review of intervention studies. *International journal of mental health nursing*, 25(3), 194-205.
- Feroze, F. (2016). Perceptions about physical activity and its associated benefits among employees: case study in 12 Multinational Companies in Pakistan.
- Fuezeki, E., Engeroff, T., & Banzer, W. (2017). Health benefits of light-intensity physical activity: a systematic review of accelerometer data of the National Health and Nutrition Examination Survey (NHANES). *Sports medicine*, 47(9), 1769-1793.
- Hallal, P. C., Andersen, L. B., Bull, F. C., Guthold, R., Haskell, W., Ekelund, U., & Group, L. P. A. S. W. (2012). Global physical activity levels: surveillance progress, pitfalls, and prospects. *The Lancet*, 380(9838), 247-257.

- Hassaan, S., Abdel-Fattah, S., Elsalmony, A., & Hassan, M. (2009). Relationship between some serum enzyme activities, liver functions and body weight in growing local chickens. *International Journal of Poultry Science*, 8(7), 700-705.
- Khan, K., Jameel, N., Khalil, R., & Gul, S. (2016). Exploring nutritional status, physical activity and body mass index of Pakistani teens. *Int Journal Res Med Sci*, 4, 3563-3569.
- Lee, I.-M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., Katzmarzyk, P. T., & Group, L. P. A. S. W. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *The Lancet*, 380(9838), 219-229.
- Lutosławska, G., & Fornal-Urban, A. (2009). Zinc contribution to the regulation of glucose disposal, lipid metabolism and striated muscle contractions. *Medicina Sportiva Med Sport* 2009; 13: 28-34. 185 Queiroz de M AC, Almeida MG, Teixeira de Lima V, Azevedo D, Costa Lima K, dos Santos TL, de Fátima Campos L. Alteraciones En El Metabolismo Del Zinc Relacionadas A La Edad. 2008 [editorial].
- Mahmood, T., Mujahid, Z., Mahmood, W., Tariq, K., & Salam, A. (2018). Comparison of Physical Fitness Between Rural and Urban Physical Therapy Students Studying in Lahore, Pakistan. *Annals of Punjab Medical College*, 12(2), 112-116.
- Ng, S. W., Norton, E. C., & Popkin, B. M. (2009). Why have physical activity levels declined among Chinese adults? Findings from the 1991-2006 China Health and Nutrition Surveys. *Soc Sci Med*, 68(7), 1305-1314.
- Organization, W. H. (2019). *Global action plan on physical activity 2018-2030: more active people for a healthier world*: World Health Organization.
- Shaukat, F., Ahmad, F., & Zehra, N. (2013). ASSOCIATION OF BMI AND LIFE STYLE: A COMPARATIVE STUDY ON SCHOOL GOING CHILDREN (AGED 6-16 YEARS) OF LAHORE. *Annals of King Edward Medical University*, 19(4), 297-297.
- Tremblay, M. S., Longmuir, P. E., Barnes, J. D., Belanger, K., Anderson, K. D., Bruner, B., . . . Hall, N. (2018). Physical literacy levels of Canadian children aged 8-12 years: descriptive and normative results from the RBC Learn to Play-CAPL project. *BMC public health*, 18(2), 1036.