



# Use of Statistical Methods for Analyzing Physical Activity

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**Abstract:** Physical exercise is any bodily movement that results in calorie expenditure. One major aspect of physical activity research is the assessment of usual physical activity in the population, in sequence to understand better links between physical activity and health outcomes. Daily or weekly measurements of physical activity taken from a sample of individuals are prone to measurement errors and effects, which can lead to biased estimates of usual physical activity parameters. Fortunately, statistical models can be used to account and adjust for these errors in order to give more accurate estimates of usual physical activity parameters.

In this paper we develop statistical methods for estimating parameters of usual physical activity. This study was carried out on 60 healthy boys ranging in age 18 to 20 years in which 30 boys were from urban areas 30 boys were from rural areas. Body measurements were taken to check present BMI. SPSS-X was used to analyse the data. Result of the study revealed the good cardio respiratory score of urban boys.

**Keywords:-** Anthropometric Measurements, Cardio respiratory Fitness Measurement (CRF), Standard Deviation (S.D.), Test of Significance (t-test)

## I. INTRODUCTION

Body composition is the relationship between fat free mass and fat mass. Fat free mass is the combined weight of bones, muscles and organs. Fat mass is the total weight of fat stored in the body. Healthy body composition involves a high proportion of lean body tissue and an acceptably low level of body fat, adjusted for age and gender. A person with excessive fat is more likely to experience a variety of health problems. The best way to lose fat is through a lifestyle that includes a sensible diet and exercise.

## II. REVIEW OF LITERATURE

Regular participation in moderate and vigorous levels of exercise increases physical fitness, which can lead to many health benefits (Ruiz *et al.*, 2006a).

Dutt (2005) observed a sharp rise in percent body fat from 14-17 yrs boys and a poor level of cardiorespiratory fitness as compared to prudential fitness gram standards.

## III. MATERIALS AND METHODS



The study of comparison of cardiorespiratory fitness in relation to BMI in urban and rural boys was carried out on 60 healthy boys. The subjects were divided into urban and rural groups on the basis of their residence. Each group was comprised of 30 boys. The urban subjects were from District Patiala. The rural group of boys was belonged to the rural area of District Mukatsar. All the subjects were ranging in age 18 to 20 years.

The various parameters measured in Punjabi males have been enlisted under the following heading :-

**I. Anthropometric Measurements**

It includes the following measurements:

1. Height
2. Body weight
3. Skinfolds - Biceps - Triceps  
Subscapular- Suprailliac

**II. Cardiorespiratory Fitness Measurement (CRF)**

Harvard Step test was administration on college men by Brouha to measure their cardiorespiratory fitness. In the present study this test is used to measure CRF of college men of two districts of Punjab.

**STATISTICAL CONSIDERATION**

The following statistical formulas and SPSS2010 were used for computation:

**Mean ( $\bar{X}$ )**

Arithmetic mean is calculated by adding up all the observations and dividing the sum by the number of individuals.

$$\bar{X} = \frac{\sum X}{N}$$

Where  $\bar{X}$  = Mean value

X = Sum of all the individual values of a particular parameter in the total number of subjects observed.

**Standard Deviation (S.D.)**

Standard deviation measures the absolute dispersion or variability of a single observation from the mean value of these whole observation. It is calculated as following:

$$SD = \sqrt{\frac{\sum x^2 - (\sum x)^2}{N - 1}}$$

Where SD = Standard Deviation

$\sum x^2$  = The sum of squares of the individual values.

$(\sum x)^2$  = The square of the sum of individual values.

N = Number of observations.



### Standard Error of Mean (SEM)

Standard error of mean is useful in estimating the average dispersion of the arithmetic mean around the true mean and is calculated as:

$$SEM = \frac{SD}{\sqrt{N}}$$

Where SEM = Standard Error of Mean

SD = Standard Deviation

N = Number of individual scores

### Test of Significance (t-test)

This test is applied to determine whether the observed differences between two sample means  $X_1$  and  $X_2$  are indicative of a real difference or if it is due to the random sampling errors. The formula of t-test is as written below:

$$t = \frac{X_1 - X_2}{\sqrt{(SEM_1)^2 + (SEM_2)^2}}$$

Where t = Test of significance

$X_1$  and  $X_2$  = Sample means in the two groups

$(SEM_1)$  and  $(SEM_2)$  = The standard error of mean of the first and second sample groups

There exist a significant difference in the two groups for a parameter when the value of 't' comes out more than 1.96 for a parameter. If 't' lies

between 1.96 <math>t > 1.96</math>, the decrease or increase was insignificant otherwise significant. The negative sign indicates decrease in 't' values.

### A. Anthropometric Measurements

#### (1) Height

Table 1

Mean, S.D., S.E.M. and 't' value of Height of Rural and Urban Boys

Group	Mean	S.D.	S.E.M.	't' value
Rural	173.93	6.43	1.19	2.470*
Urban	169.90	6.10	1.11	

\* Statistically significant at 5% level.

Table 1 and Fig. 1 gives the mean value of height of rural and urban boys ranging in age from 18-20 years of age. It is observed from the table that rural boys possessed a mean value of 173.9 cm height while urban boys had 169.9 cm. Statistically speaking, both the groups shows significant differences in their height, i.e., rural boys are taller than urban boys.

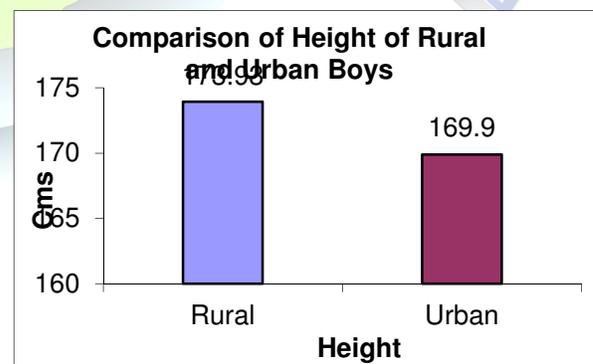


Fig. 1: Comparison of Height of Rural and Urban Boys



(2) *Weight*

Table 2

Mean, S.D., S.E.M. and 't' value of Weight of Rural and Urban Boys

Group	Mean	S.D.	S.E.M.	't' value
Rural	61.31	7.14	1.32	1.16
Urban	59.26	6.43	1.17	

Table 2 and Fig. 2 reveal that rural boys possessed a slightly more mean weight (61.31 kg) as compared to mean body weight of urban boys (59.26 kg). However, this difference is not statistically significant.

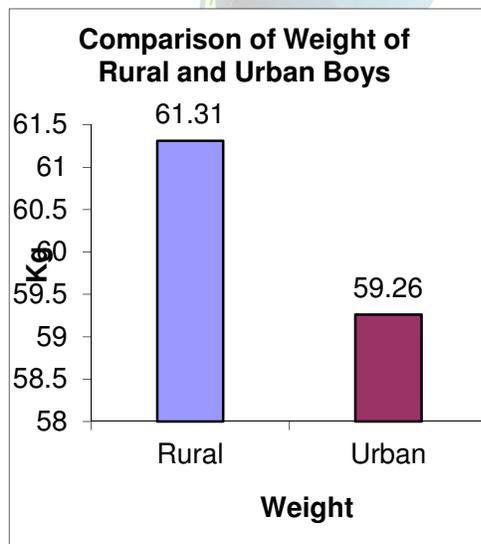


Fig. 2: Comparison of Weight of Rural and Urban Boys

(3) *Body Mass Index*

Table 3

Mean, S.D., S.E.M. and 't' value of BMI of Rural and Urban Boys

Group	Mean	S.D.	S.E.M.	't' value
Rural	20.27	2.29	0.42	0.463
Urban	20.54	2.04	0.37	

An estimation of Body Mass Index provides an information regarding appropriateness of the weight for ones height. Comparison of the mean BMI values of Punjabi rural boys with the urban boys are presented in Table 3 and Fig. 3. On an average Punjabi rural boys are observed to possess lower BMI value (20.27) than the urban boys (20.54). Although the subjects of present study show statistically insignificant difference in BMI, however, both the groups are touching the lower limit of desirable range (21.9-22.4) of BMI.

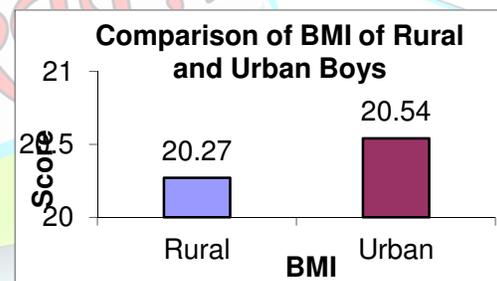


Fig. 3: Comparison of BMI of Rural and Urban Boys

B. *Fitness Measurements*

(1) *Percent Body Fat*

Table 4

Mean, S.D., S.E.M. and 't' value of Percent Body Fat of Rural and Urban Boys



Group	Mean	S.D.	S.E.M.	't' value
Rural	15.39	4.07	0.75	2.80*
Urban	12.38	4.16	0.76	

\* Statistically Significant at 5% level.

Table 4 and Fig. 4 gives the mean values of percent body fat of Punjabi rural and urban boys ranging in age from 18-20 years. On an average, the rural boys possess significantly more percent body fat (15.39) as compared to urban boys (12.38). As per the Fitness Gram Standard (1999) the rural boys are falling in the HFZ with regard to percent body fat while urban boys are touching the lower limit of percent body fat of HFZ.

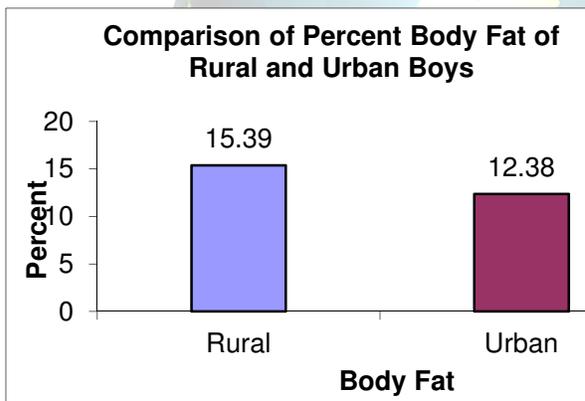


Fig. 4: Comparison of Percent Body Fat of Rural and Urban Boys

(2) *Cardiorespiratory Fitness*

Table 5

Mean, S.D., S.E.M. and 't' value of Cardiorespiratory Fitness of Rural and Urban Boys

Group	Mean	S.D.	S.E.M.	't' value
Rural	40.25	7.91	1.47	16.88*

Urban	83.97	11.56	2.11	
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\* Statistically Significant at 5% level.

Cardiorespiratory fitness assessment through H.S.T. is the most common test of cardiorespiratory endurance in India and worldwide. The mean values of fitness index acquired by rural and urban boys is 40.25 and 83.97, respectively. After evaluation of these fitness scores, it has been found that these scores correspond to poor and good fitness condition in rural and urban boys respectively.

Thus, it is concluded that rural boys possess more percent body fat, less BMI as well as poor cardiorespiratory endurance as compared to their urban counterparts having less percent body fat, more BMI and good score of fitness.

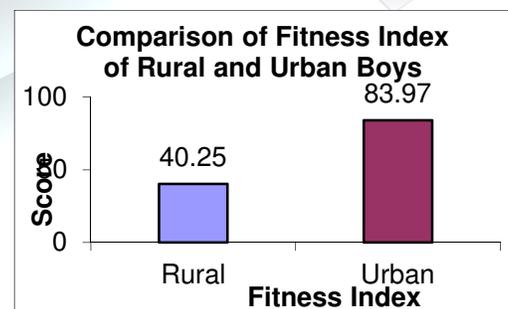


Fig. 5: Comparison of Fitness Index of Rural and Urban Boys



The good cardiorespiratory score of urban boys may be attributed to the fact that almost all of the urban group of boys were involved in planned physical work either in gym or the playfield, while the rural group of boys were not participating in any type of planned exercise. Thus, the improvement of living conditions, the urban influence on the rural areas and degree of urbanisation of the urban settlement are the probable determinants influencing the obtained results.

#### **BIOGRAPHY**

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