

## HEALTH, FITNESS AND ECONOMIC STATUS: A COMPARATIVE STUDY

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### ABSTRACT

#### Objectives

Evaluation of body composition has become an important aspect of adult fitness and medically supervised rehabilitation programme. Suitable body composition is important for general health and appearance for maximizing athletic performance. The purpose of study was to prepare the estimates for the body fat for college youth. Another purpose of the study was to compare body composition of adult men of Delhi on the basis of economic status of living.

#### Methods and Procedures

For the purpose of present study five thousand adult males of Delhi State were selected randomly as the subjects for the study. The age of the subjects were ranging from 18-25 years. Subjects were from various colleges of Delhi State. On the basis of family income, subjects were divided into three different age groups namely: low income group, middle income group and high income group. Following variables were selected for the purpose of present study: Body Density, Body Fat Percentage, Body Mass Index, Fat Mass and Skin folds thickness (Chest, Triceps, Sub scapular and Sum of three skin folds), Height, Weight and Activity. The scores for each variable were gathered for all the subjects separately and then pooled age wise. Analysis of variance was employed to compare the subjects belonging to different age groups, on different variables. The level of significance was set at 0.05

#### Results and Discussions

Analysis of results in relation to various income groups revealed significant differences between three income groups namely low income group, medium income group and high-income group on all the selected variables. Body Composition may be influenced by a number of factors such as age, sex, diet, and exercise. Height is genetically determined but its growth is also affected by the nutritional status, economic conditions and lifestyle of family. Height shows significant differences among three groups. It was low in low income group and highest in high-income group. Weight also tends to be more in high-income group because of increase fat percent and fat mass in high-income group. Aging is often associated with a gain in weight, an accumulation of body fat, a loss of lean tissue, demineralization of bone and decrement in aerobic power (Astrand, Astrand and Asa, 1973; Baur, 1960, Forber & Reina 1970, Malina 1969, Smith 1982). Both motor fitness variables sit-up and sit & reach showed decreasing trend. Activity level was also reduced. It was least in high income group and highest in low-income group. Both body fat percent and fat mass showed linear increase with increase in family income of subjects. This clearly indicates that economic status of an individual affects the body composition of the youth. Mean scores of all the body components were higher in high-income group than low and medium income group. Subjects belonging to high-income group have to lose maximum percentage of fat than other groups. In relation to lean body mass mean scores of medium income group was lower than the low-income group. Lack of exercise is the prime cause of obesity in all age groups. Obesity is defined as the condition of excess body fat. From the above discussion on the analysis of present study it can be concluded that reduced level of physical activity (as also indicated by reduced performance in two motor fitness variables) and increased family income at higher age may be attributed to the higher body fat percent, fat mass and body weight with the progression of age.

**Key Words:** body composition, economic status, body fat.

### Introduction & Research Objective

Body composition is considered to be an important measure of health fitness. A high percentage of body fat relative to bone and muscle has been shown repeatedly to be predictor of wide range of degenerative diseases. Body composition is much better measure of health fitness. Suitable body composition is important for general health and appearance for maximizing athletic performance. For these reasons accurate measurements of body components are needed to develop sound preventive health and athletic programme. With growing supply of literature supporting the value of regular physical activity for health and fitness, the evaluation of body composition has become an important aspect of adult

fitness and medically supervised rehabilitation programme. Body composition is a primary component of health related fitness. Exercise specialist typically assumes responsibility for evaluating the body composition of adults. Evaluation of body composition permits quantification of major structural components of body – muscle, bone, and fat. The accurate calculation of percent body fat is the true definition of fitness and obesity. The accurate measurement of lean body mass is now the most rational basis for nutritional and exercise prescriptions. The purpose of study was to compare body composition of adult men of Delhi on the basis of economic status of living. Another purpose of the study was to prepare the body fat estimates for college youth on the basis of their age.

### Methods & Procedures

For the purpose of present study five thousand adult males of Delhi State were selected randomly as the subjects for the study. The age of the subjects were ranging from 18-25years. Subjects were from various colleges of Delhi State. On the basis of family income, subjects were divided into three different age groups namely: low income group, middle income group and high income group. Following variables were selected for the purpose of present study: Body Density, Body Fat Percentage, Body Mass Index, Fat Mass and Skin

fold thickness (Chest, Triceps, Sub scapular and Sum of three skin folds), Height, Weight and Activity. The scores for each variable were gathered for all the subjects separately and then pooled age wise. Analysis of variance was employed to compare the subjects belonging to different age groups, on different variables. The level of significance was set at 0.05 For the purpose of analysis of data, Software SPSS for Windows (11.0 version) and Microsoft Excel 2000 were used to compare different groups on selected variables.

### Results and Discussion

**Table – 1**  
**ANALYSIS OF VARIANCE OF SELCTED BODY COMPOSITION**  
**VARIABLES IN RELATION TO INCOME GROUPS**

Table 1 reveals, all the variables listed above exhibits significant difference in relation to age.

Variable	Source of Variance	Df	Sum of Squares	Mean Square	F Ratio
Body Fat Percentage	Among Groups	2	8766.47	4383.23	329.56*
	Within Groups	4997	66461.44	13.30	
Fat Mass	Among Groups	2	7696.02	3848.01	416.76*
	Within Groups	4997	46137.89	9.23	
Lean Body Mass	Among Groups	2	4069.00	2034.50	82.28*
	Within Groups	4997	123555.03	24.72	
Body Density	Among Groups	2	.045	.02	324.64*
	Within Groups	4997	349	.00	
Body Mass Index	Among Groups	2	584.32	292.16	60.21*
	Within Groups	4997	24244.23	4.85	
Chest Skin Fold	Among Groups	2	9147.66	4573.83	387.66*
	Within Groups	4997	58957.47	11.79	
Triceps Skin Fold	Among Groups	2	6953.83	3476.91	267.89*
	Within Groups	4997	64854.033	12.979	
Sub Scapular Skin Fold	Among Groups	2	6601.240	3300.62	278.87*
	Within Groups	4997	59142.26	11.83	
Sum of Three Skin Fold	Among Groups	2	67058.11	33529.05	381.59*
	Within Groups	4992	439069.93	87.86	
Sit & Reach Test	Among Groups	2	7074.24	3537.12	53.93*
	Within Groups	4997	327703.92	65.58	
Sit Up	Among Groups	2	429.12	214.56	3.19*
	Within Groups	4997	335639.06	67.16	
Height	Among Groups	2	15450.44	7725.22	214.39*
	Within Groups	4997	180054.21	36.03	
Weight	Among Groups	2	22471.18	11235.59	241.85*
	Within Groups	4997	232145.31	46.45	
Activity	Among Groups	2	8863.81	4431.90	8.57*
	Within Groups	4997	583131.86	516.93	

\*The F Ratio significant at the .05 level.

$F_{.05}(2, 4997) = 2.99$

**Table - 48**  
**MEAN AND STANDARD DEVIATION OF SELECTED VARIABLES**  
**FOR DIFFERENT INCOME GROUPS**

Variable	Income Groups					
	Low Income Group		Medium Income Group		High Income Group	
	M	SD	M	SD	M	SD
Height	167.64	5.37	169.29	6.09	173.81	6.23
Weight	64.44	7.6	63.76	6.17	70.01	8.77
Sit Up	37.91	7.76	37.51	8.5	36.84	7
Sit & Reach	23.56	8.59	20.51	8.04	22.44	7.81
Activity	38.18	21.31	36.31	23.11	33.3	22.38
Body Density	1.0702	.0089	1.0689	.0075	1.0605	.0112
Body Fat Percentage	12.58	3.87	13.1	3.28	16.82	4.94
Fat Mass	8.15	3.29	8.27	2.57	11.86	4.59
Lean Body Mass	55.33	5.21	54.32	4.84	56.91	5.34
Body Mass Index	22.93	2.54	22.27	2.15	23.11	2.07
Chest Skin fold	9.74	3.44	9.69	2.78	13.63	5.72
Triceps Skin Fold	11.15	3.40	11.90	3.38	15.11	4.75
Sub Scapular Skin Fold	12.60	3.71	12.93	3.19	16.2	4.25
Sum of Three Skin Fold	33.49	9.64	34.53	8.19	44.94	13.76

In relation to body fat percentage, Fat Mass, Triceps Skin Fold, Sub Scapular Skin fold, Sum of three skin fold the sequence of obtained mean scores among all income groups was Low Income Group < Medium Income Group < High Income Group

In relation to Height, Sit Up, Body Density and activity, the sequence of obtained mean scores

among all income groups was Low Income Group > Medium Income Group > High Income Group.

In relation to lean body mass, Body mass index, chest skin fold, sit & reach and weight the sequence of obtained mean scores among all income groups was Low Income Group > Medium Income Group < High Income Group.

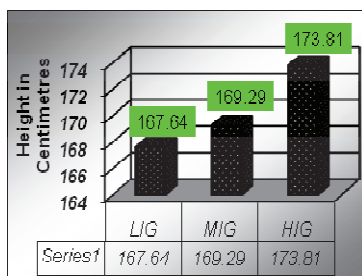


Fig. 1: Mean Height

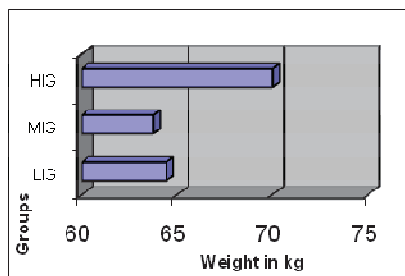


Fig. 2: Mean Weight

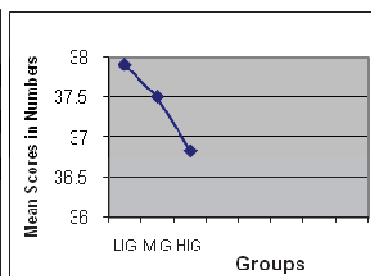


Fig. 3: Mean Sit Ups

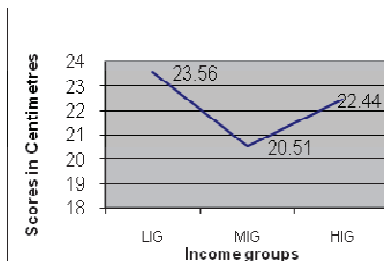


Fig. 4: Mean Sit & Reach Scores

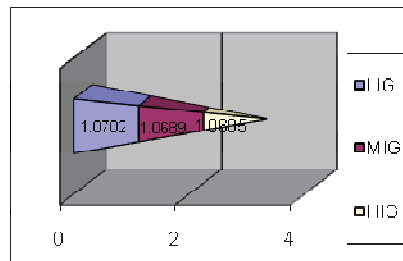


Fig. 5: Mean Body Density

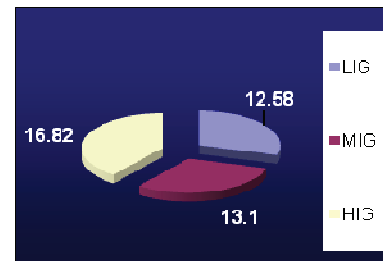


Fig. 6: Mean Body Fat Percent

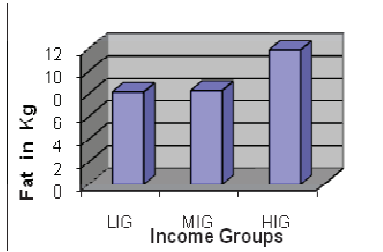


Fig. 7: Mean Fat Mass

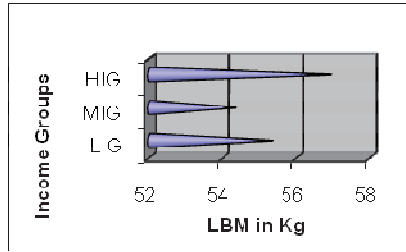


Fig. 8: Mean Lean Body Mass

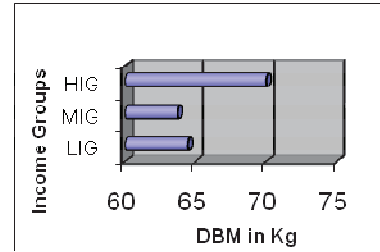


Fig. 9: Mean Desired Body Mass

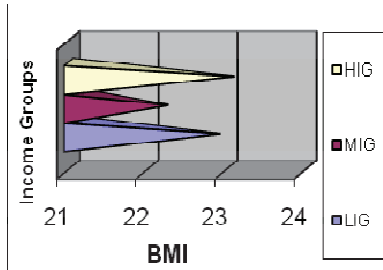


Fig. 10: Mean Body Mass Index

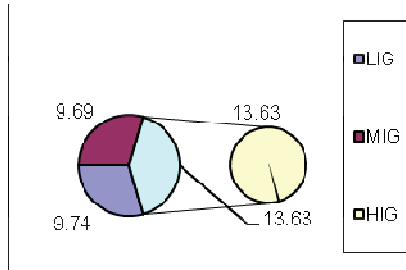


Fig. 11: Mean Chest Skin fold

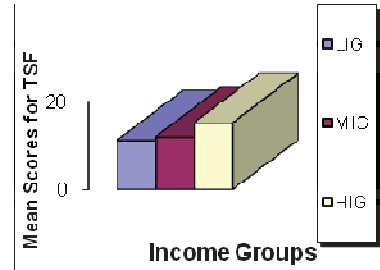


Fig. 12: Mean Triceps Skin fold

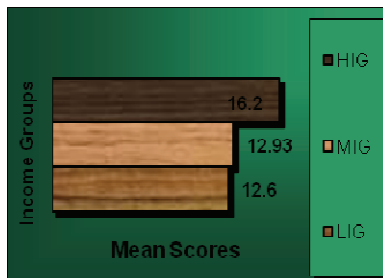


Fig. 13: Mean Sub Scapular Skin fold

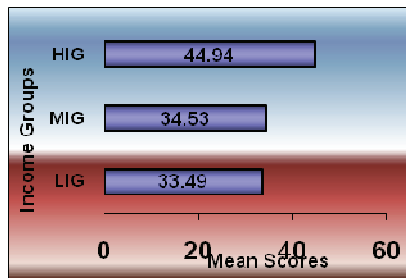


Fig. 14: Mean Sum of Three Skin fold

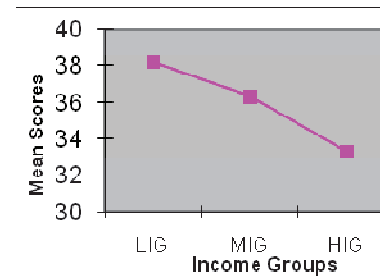


Fig. 15: Mean Activity Score

Table – 2  
PERCENTAGE OF FAT ESTIMATED FOR COLLEGE YOUTH  
(Sum of Chest, Triceps and Sub Scapular Skin Folds)

Sum of Three Skin.Folds	Age Groups (in years)								
	18	19	20	21	22	23	24	25	
10 – 12	2.33								
13 – 15	3.79								
16 – 18	5.22	5.56	5.42						
19 – 21	6.62	6.72	6.82	6.92	7.26	7.36			
22 – 24	7.98	8.08	8.19	8.29	8.39	8.5	8.6	8.93	
25 – 27	9.31	9.41	9.52	9.62	9.73	9.83	9.93	10	
28 – 30	10.6	10.7	10.8	10.9	11	11.1	11.2	11.3	
31 – 33	11.9	12	12.1	12.2	12.3	12.4	12.5	12.6	
34 – 36	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	
37 – 39	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15	
40 – 42	15.4	15.5	15.6	15.7	15.9	16	16.1	16.2	
43 – 45	16.5	16.6	16.8	16.9	17	17.1	17.2	17.3	
46 – 48	17.6	17.7	17.8	17.9	18	18.1	18.3	18.4	
49 – 51	18.6	18.8	18.9	19	19.1	19.2	19.3	19.4	
52 – 54	19.6	19.7	19.9	20	20.1	20.2	20.3	20.4	
55 – 57	20.6	20.7	20.8	20.9	21	21.1	21.3	21.4	
58 – 60	21.5	21.6	21.7	21.8	21.9	22.1	22.2	22.3	
61 – 63	22.4	22.5	22.6	22.7	22.8	22.9	23	23.2	
64 – 66	23.2	23.3	23.4	23.5	23.7	23.8	23.9	24	
67 – 69		24.1	24.2	24.3	24.4	24.6	24.7	24.8	
70 – 72		24.6	25	25.1	25.2	25.3	25.4	25.5	
73 – 75			25.7	25.7	25.7	26	26.1	26.2	
76 – 78				26.3		26.5	26.3	26.9	

Table – 5

**Range of selected body composition components  
for college youth**

Age in Years	Body Fat Percent	Fat Mass
18	7.8 – 15.5	4.4 – 10
19	8.7 – 16	5 – 11
20	9.4 – 16.7	5.3 – 11.7
21	9.9 – 17.1	5.7 – 12
22	10.3 – 18	5.9 – 12.5
23	11 – 18.2	6.2 – 12.6
24	11.2 – 18.5	6.25 – 13
25	12.4 – 19.4	7 – 13.6

The range for body composition components is  $\pm$  SD from reported mean value.

### Discussion of Findings

Body Composition may be influenced by a number of factors such as age, sex, diet, and exercise. It was evident from the analysis that various age groups considered in this study showed significant differences on body composition components. The difference existed may be due to combination of various factors. Aging is often associated with a gain in weight, an accumulation of body fat, a loss of lean tissue, demineralization of bone and decrement in aerobic power (Astrand, Astrand and Asa, 1973; Baur, 1960, Forber & Reina 1970, Malina 1969, Smith 1982). Analysis of results in relation to various income groups revealed significant differences between three income groups namely low income group, medium income group and high-income group on all the selected variables. Height is genetically determined but its growth is also affected by the nutritional status, economic conditions and lifestyle of family. Height shows significant differences among three groups. It was low in low income group and highest in high-income group. Weight also tends to be more in high-income group because of increase fat percent and fat mass in high-income group. Both motor fitness variables sit-up and sit & reach showed decreasing trend. Activity level was also reduced. It was least in high income group and highest in low-income group. Both body fat percent and fat mass showed linear increase with increase in family income of subjects. This clearly indicates that economic status of an individual affects the body composition of the youth. Mean scores of all the body composition components were higher in high-income group than low and medium income group. Subjects belonging to high-income group have to lose maximum percentage of fat than other groups. In relation to lean body mass mean scores of medium income group was lower than the low-income group. Since analysis of variance was found significant in all the variables Scheffe's post hoc test was applied to test the inter group variability. Post hoc test revealed that variability does exist between the groups on body fat percent, body density and height. But variability does not exist between Low income group and Medium income group on fat mass, lean

body mass, weight, chest skin fold, triceps skin fold, sub scapular skin fold and sum of three-skin fold. Two motor fitness variables sit up and sit and reach does not exhibits variability.

From the above discussion on the analysis of present study it can be concluded that reduced level of physical activity (as also indicated by reduced performance in two motor fitness variables) and increased family income at higher age may be attributed to the higher body fat percent, fat mass and body weight with the progression of age.

### Conclusions

1. In body composition components significant difference was found among all income groups in relation to body density, body fat percent, fat mass, lean body mass, chest skin fold, triceps skin fold, sub scapular skin fold and sum of three skin folds.

2. In subject's characteristics significant difference was found among all income groups in relation to height and weight.

3. All the income groups showed significant difference in relation to activity level.

4. In relation to body fat percentage the sequence of obtained mean scores among all income groups was Low Income Group < Medium Income Group < High Income Group.

5. In relation to fat mass the sequence of obtained mean scores among all income groups was Low Income Group < Medium Income Group < High Income Group.

6. In relation to lean body mass the sequence of obtained mean scores among all income groups was Low Income Group > Medium Income Group < High Income Group.

7. In relation to weight the sequence of obtained mean scores among all income groups was Low Income Group > Medium Income Group < High Income Group.

8. In relation to body mass index the sequence of obtained mean scores among all income groups was Low Income Group > Medium Income Group < High Income Group.

9. In relation to body density the sequence of obtained mean scores among all income groups was

Low Income Group > Medium Income Group > High Income Group.

10. In relation to chest skin fold the sequence of obtained mean scores among all income groups was Low Income Group > Medium Income Group < High Income Group.

11. In relation to triceps skin fold the sequence of obtained mean scores among all income groups was Low Income Group < Medium Income Group < High Income Group.

12. In relation to sub scapular skin fold the sequence of obtained mean scores among all income groups was Low Income Group < Medium Income Group < High Income Group.

13. In relation to sum of three-skin fold the sequence of obtained mean scores among all income groups was Low Income Group < Medium Income Group < High Income Group.

14. In relation to sit & reach the sequence of obtained mean scores among all income groups was Low Income Group > Medium Income Group < High Income Group.

15. In relation to sit up the sequence of obtained mean scores among all income groups was Low Income Group > Medium Income Group > High Income Group.

16. In relation to height the sequence of obtained mean scores among all income groups was Low Income Group < Medium Income Group < High Income Group.

17. In relation to activity the sequence of obtained mean scores among all income groups was Low Income Group > Medium Income Group > High Income Group.

#### **Acknowledgement**

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