Chapter II

REVIEW OF RELATED LITERATURE

A study of the relevant literature is an essential step to get a full picture of what has been done and said with regard to the problem, under study, collection of relevant literature provides the basic understanding of the problem and its depth. Such a review brings about a deep insight and a clear perspective of the overall field. It is a key to thinking of the investigator the following related relevant literature there as follows. Anthropometric measurements-Weight, Height, Body Mass Index, and Percent of Body Fat. Physical variables of Muscular Strength and Endurance, Abdominal Muscular Strength and Endurance, Agility, Explosive Leg Power, Speed, and Cardio Respiratory Endurance. Physiological variables such as Peak Expiratory Flow Rate, Resting Pulse Rate, and Breath Holding Time, and Socio Economic Status. In this chapter the investigator has reviewed in detail the summary of research work from various types of references like abstracts form dissertations, thesis, journals and magazines related to this study.

The review of the literatures has been classified under the following headings.

- Studies on anthropometric Variables.
- Studies on Physical Variables.
- Studies on Physiological Variables.
- Studies on Socio Economic Status.

STUDIES OF ANTHROPOMETRIC VARIABLES

**Bogin and Vean, (1981).** Conducted a study on Body composition and nutritional status of urban Guatemalan children of high and low socioeconomic class. To achieve the purpose of the study 981 school students were selected random from Guatemala City their average age were 7.00 to 13.99 years old. Of high and low socioeconomic status (SES). High SES children have larger median values for triceps skinfold, subscapular skinfold, arm circumference, and estimated mid-arm muscle and fat areas than low SES children. Compared with children of a US reference sample,
the high SES children generally have larger values for all variables and the low SES children have smaller values. However, the differences between the low SES children and the children of the other two samples are greater for arm fat area than for arm muscle area. The analysis suggests that low SES Guatemalan children suffer to a greater extent from chronic energy, rather than protein, undernutrition. A similar pattern of energy malnutrition has been observed for rural Guatemalan children. These combined data suggest that estimates of fat reserves of the arm provide a useful indication of nutritional status for Third-World children. Results from rural Costa Rican and Honduran studies have been taken to mean that muscle reserves are better than fat reserves as indicators of nutritional status in developing countries. But, those studies did not estimate cross-sectional muscle and fat areas and only considered the extremes of the population distribution for muscle and fat.

**Bandyopadhyay and Chattopadhyay, (1981)** In their study on Body fat in urban and rural male college students of eastern India. Male college students (N = 381) residing in several districts of Eastern India, classified into two groups, urban (N = 193) and rural (N = 188), were studied by anthropometric measurements of skinfold thicknesses in several sites of the body to determine their body fat content. The mean value of percentage of body fat was found to be significantly higher (P less than 0.001) in the urban group of students (12.07 +/- 3.04) than in the rurals (11.04 +/- 2.63). The mean values of skinfold thicknesses of the biceps, triceps, and subscapular regions were also found to be higher in urbans (P less than 0.01), but no such significant differences in mean values of supra-iliac and abdominal skinfolds were found between the two groups of students. Most of the subjects of both the groups had a greater thickness of the abdominal skinfold compared to thickness of the biceps, triceps, and suprailiac skinfolds. It was found that the college students of Eastern India were leaner than the youths of North America, Europe, Japan, and Northern India.

**Aberle, et al. (2009)** In their study employed the comparison of anthropometrical parameters of the four-year-old children in the urban and rural Slavonia, Croatia, 1985 and 2005. The aim of the study is to identify the secular trends in the anthropometrical parameters of the 4-year-old children in SlavonskiBrod, Slavonia, Croatia, and the nearby rural area by comparing data of Height, Weight, and
mid-arm circumferences from 2005 with the historical control data published in 1985. The cross-sectional study of 342 children, aged 4 years, from Slavonski Brod and the nearby villages was taken in 2005. The body height, weight, and mid-arm circumferences were measured and compared with the historical control data from the study performed in 1985 in the same area using the same methods. The data were compared according to sex and the place of residence. Results show that there were no significant differences in the body height, weight, mid-arm circumference and Body Mass Index (BMI) between the urban and rural children in 2005. The children in 2005 were significantly shorter (103.7 +/- 8.3 cm vs. 108.3 cm in 1985, P < 0.001, one-sample T test) and had lower weight (17.4 +/- 2.7 kg vs. 17.9 kg, P = 0.001, one-sample T test) compared with their counterparts in 1985. In 2005 there was no significant difference in the Body Mass Index (kg/m²) between girls and boys in total (15.9 +/- 2.12, vs. 16.1 +/- 1.8, p = 0.262, Independent samples t-test). Differences between the urban and rural parameters have disappeared over the last 20 years, which could be assigned to lifestyle changes in the rural areas.

Davis, et al. (2008) Conducted on Health behaviors and Weight status among urban and rural children. Pediatric overweight is currently reaching epidemic proportions but little information exists on differences in weight related behaviors between urban and rural children. To assess health behaviors and weight status among urban and rural school-age children. Fifth-grade children at two urban and two rural schools were invited to participate in an assessment study of their health behaviors and weight status. A total of 138 children (mean age = 10 years; % female = 54.6) chose to participate. Children in rural and urban areas consumed equivalent calories per day and calories from fat, but rural children ate more junk food and urban children were more likely to skip breakfast. Urban children engaged in more metabolic equivalent tasks and had slightly higher total sedentary activity than rural children. The BMI percentile was equivalent across rural and urban children but rural children were more often over weight and urban children were more often at risk for over weight. Although some variables were equivalent across urban and rural children, results indicate some key health behavior differences between groups. Results should be interpreted with caution as the sample size was small and there were demographic differences between urban and rural samples.
Luo, et al. (2009) Determined the Differences of Height and Body Mass Index of youths in urban vs. rural areas in Hunan province of China. Economic reforms in China were implemented approximately 30 years ago. Since then, people's nutrition, living conditions and overall health have continually improved, but there has been an imbalance between the progresses in urban vs. rural areas. Height and Body Mass Index (BMI) are regarded as two important indicators of nutritional status and overall health. The aim of this study was to investigate differences in Height and BMI between Chinese youths of rural vs. urban areas and further, to determine whether these differences have changed over time (1990s vs. 2000s). 24,194 urban youths and 7,130 rural youths were recruited in Hunan province of China. In each gender group, the subjects were divided into eight subsets according to age, geographic area residence, and decade when the youths were measured. Independent t-tests were used to test the differences of Height and BMI between the studied groups. Both male and female youths from urban areas were significantly taller than youths from rural areas in both the 1990s and 2000s (all p<0.001), with the exception of the 1990s female 15-18 years subset (p=0.21). The Height of youths was significantly greater in the 2000s compared to the corresponding gender and geographic subset in the 1990s (p<0.001), except for the female 15-18 years subset from rural areas (p=0.10). Similar results were obtained for BMI. There are significant differences in Height and BMI between youths raised in urban vs. rural areas, and positive growth trends of Height and BMI over time (1990s vs 2000s) in youths in Hunan Province of China.

Islam, et al. (2004) Investigated Nutritional status of women in Bangladesh: comparison of energy intake and nutritional status of a low income rural group with a high income urban group. This study evaluated the influence of socio-economic status on energy intake (EI), anthropometric characteristics and body composition (BC) of premenopausal Bangladeshi women in two socio-economic groups. This cross-sectional study measured Height, Weight, biceps and triceps skinfolds by standard procedures. A three-day dietary record was used to estimate EI. The biceps and triceps skinfolds were used to calculate total body fat (TBF), fat-free mass (FFM) and body fat percentage (BF %) according to Durnin and Womersley. FAO/WHO/UNU equations were used to calculate basal metabolic rates (BMR). Two locations in Bangladesh were studied; the Dhaka city area and the west region of the subdistrict Nandail (Betagair Union) in the district of Mymensingh. Study subjects were
premenopausal women (N =191) aged 16(40) years. The high socio-economic group (group H, N =90) consisted of women with high income and educational level. The low socio-economic group (group L, N =101) consisted of rural, low income, illiterate women. Both groups contained three subgroups (non-pregnant, non-lactating =1, pregnant =2, lactating =3). Socio-economic status had a significant effect on body weight, Height, biceps and triceps skinfolds, BMI, TBF, FFM and BF% (P<0.001). These variables were significantly higher (P<0.001) in all subgroups of group H than in the corresponding subgroups of group L. The influence of physiological status on most of these variables was not significant. EI was, however, influenced by both socio-economic (P<0.001) and physiological (P<0.05) status. The mean EI was significantly lower (P<0.001) in all subgroups of group L than in the corresponding subgroups of group H. The contributory sources were different in high and low income groups. In both groups, EI was lower than the recommended level. Based on the dietary and anthropometric results, we conclude that malnutrition is a common feature among low income rural women. This contradicts findings in western countries, where obesity is prevalent in low income groups.

**Behice Drugun, et al. (2009)** Conducted studies on comparison of anthropometric characteristic in subjects applied for department of physical education and sports. The aim of this study was too determined of general profile of young subjects and compared the anthropometric characteristics and body composition of different sports groups who entering special skills examination for physical education and sports High School. 304 subjects (88 female, 216 male) were participated for in this study (male: age: 20.76 ± 2.18 years, Height: 174.40 ± 6.46 cm, Weight: 66.18 ± 7.20 kg, Female: age: 20.19 ± 2.18 year, Height: 161.24 ± 5.83 cm, Weight: 52.39 ± 5.59 kg). Various anthropometric measurements (diameters, circumferences and skin fold thickness) were taken from which different anthropometric indices were calculated (Body Mass Index, Scelic index and Grant index). For data analysis, spss 11.0 packet programmed was used. The comparisons were made using One-way ANOVA test. The level of significance was set at p<0.05. the analysis of variance showed that there were statistically significant differences (p<0.00) between in groups in the view point of anthropometric measurements such as Height, Weight, waist circumference, hip circumference, thigh circumference, calf circumference, ankle circumference, thigh length, calf length, foot length, abdomen skin fold and body fat.
We found significant differences all of these parameters in male basketball players and female volleyball players. As a result of this study of young male and female who entering the exam of special abilities of the morphological features vary significantly according to the sports branch that creates these differences in men basketball players and in women volleyball players.

**Chiara Milanese, et al. (2010)** Surveyed the Anthropometry and Motor fitness in children aged 6-12 years. This study aimed at evaluating motor abilities and anthropometric parameters in children aged 6-12 years and their interrelationships. One hundred fifty-two children underwent standard anthropometry (BMI, waist circumference, waist-to-hip ratio, and sum of five skinfolds) and motor fitness tests (standing long jump and 30m dash). Data were stratified by age (6-7, 8-9, 10-12 years) and sex (M/F), and the Spearman correlation coefficient was used to evaluate the correlation between BMI and the other anthropometric measurements in each class as well as the correlation between anthropometric parameters and fitness tests. The effect of age, sex, and individual anthropometric measurement on velocity or jump length was evaluated by ANOVA. BMI positively correlated with waist circumference and subcutaneous fat, and negatively correlated with body density. Motor fitness was not significantly affected by BMI, while sum of five skinfolds negatively associated with velocity in males aged 6-7 years and with jump length in females aged 8-12 years. Motor fitness significantly correlated with age, and performance was higher in males. Moreover, motor fitness tests positively correlated with each other, especially in females. In the 6-12 years period motor performance improves with age and improvement is partially sex-related; this correlation is higher in boys, possibly because of their lesser amount of fat. Subcutaneous fat is a better predictor of physical fitness than BMI or waist circumference. Results also suggest that explosive strength and velocity are related the 6-12 years age span, possibly because both are power events, which involve horizontal movement of the centre of mass.

**Haroonrashid, et al. (2008)** Conducted on Role of Body Mass Index on physical fitness index in two different age groups of health young males from north interior Karnataka, India. The Body Mass Index (BMI) is an index of Weight adjusted for Height. It is one of the useful tools for diagnosing obesity of malnutrition:
however, such diagnosis should take into account a person’s age, gender, fitness, and ethnicity. The objective of this study was to evaluate the BMI and physical fitness index (PFI) of healthy subjects consists of early part and late part of youth of north interior Karnataka, India and also to find out the influence of BMI on PFI in same subjects as such study in this area is least done by competent researchers. Twenty five young, healthy adults belonging to age group of 17-21 years were selected as Group I and fifteen young, healthy adults belonging to age group of 29-40 were selected as Group II subjects in this study. The present study reveals that physical anthropometric parameters were found to be within the expected range of normal in both Groups I and Group II subjects of north interior Karnataka which reflects the adequate nutrition, socio economic status and normal life style of these individuals. In this study, no correlation was found between BMI and PFI score and a positive correlation was observed between BMI and waist hip ratio in both the age groups.

Andreasi, et al. (2010) have conducted a study on Physical fitness and associations with anthropometric measurements in 7 to 15-year-old school children. To analyze associations between health-related physical fitness and the anthropometric and demographic indicators of children at three elementary schools in Botucatu, SP, Brazil. The sample for this cross-sectional study was 988 elementary school students, recruited from the second to ninth grades (an age range of 7 to 15 years). The children underwent anthropometric assessment (Weight, Height, waist circumference and tricipital and subscapular skin folds) and were tested for health-related physical fitness (flexibility: sit and reach test; abdominal strength/stamina: 1-minute abdominal test; and aerobic stamina: 9-minute running/walking test). Data were analyzed using descriptive statistics plus Student’s t test, the chi-square test or Fisher’s exact test and logistic regression with a significance level of 5%. The physical fitness levels observed were significantly influenced by age (all levels), sex (abdominal strength/stamina), obesity (all levels), body adiposity (flexibility, abdominal strength/stamina) and abdominal adiposity (abdominal strength/stamina and aerobic stamina). Females were more prone to be unfit in abdominal strength/stamina. Both obesity and excessive abdominal adiposity predisposed children to be unfit in abdominal strength/stamina and aerobic stamina. Excess body adiposity increased the likelihood of poor trunk flexibility. Unhealthy physical fitness levels were related to female sex, obesity and excessive abdominal adiposity.
Implementing programs designed to effect lifestyle changes to achieve physical fitness and healthy nutrition in these schools would meet the objectives of promoting healthy body weight and increased physical fitness among these schoolchildren.

**STUDIES OF PHYSICAL FITNESS VARIABLES**

_Chillon, et al. (2011)_ Made a Physical fitness in rural and urban children and adolescents from Spain. We aimed to examine the differences in fitness components between rural and urban Spanish children and adolescents. Design/method: A sample of 2569 school children (1068) and adolescents (1501) from urban and rural areas from the region of Aragón (Spain). Physical fitness was assessed by 7 tests: 20m shuttle run, speed shuttle run, sit and reach, standing long jump, handgrip strength, bent arm hang and sit-ups in 30s (s). Differences (in fitness and anthropometry) by place of residence were examined by one-way analysis of covariance. Results: Rural young people had higher cardio respiratory fitness, but lower speed-Agility and flexibility than urban young people (all p<0.001; mean differences=1.5mL/kg per min, 0.4s and 0.9cm respectively). Regarding muscular fitness, rural young people had a better performance in handgrip strength (mean difference=0.8kg), bent arm hang (mean difference=2.3s), and a lower performance in sit-ups in 30s (mean difference=0.9s) (all p<0.001), compared to their urban peers. Rural young people had a lower body mass, Body Mass Index (BMI) and sum of skinfolds (all p<0.05; mean differences=1.1kg, 0.3kg/m (2) and 4.9mm respectively) than their urban peers. Effect size was small-medium (Cohen's d=0.1-0.3). Conclusion: Rural Spanish children and adolescents had overall a healthier profile than their urban peers in terms of cardio respiratory fitness, upper- and lower-limb muscular fitness and adiposity, while they performed worse in speed-Agility and flexibility. The place of residence should be taken into account when implementing effective interventions to promote physical activity and health.

_Aandstad, et al. (2006)_ Conducted a study on a comparison of estimated maximal oxygen uptake in 9 and 10 year old schoolchildren in Tanzania and Norway. To compare estimated maximal oxygen uptake (VO2max) in Tanzanian and Norwegian children, by using the same bicycle protocol in both samples. Methods:
Maximal oxygen uptake was estimated from an indirect maximal watt cycle ergometer test in 156 rural boys and girls in Tanzania. Similarly aged urban Norwegian boys and girls (n = 379) who underwent the same test were used for comparison. The Tanzanian children also participated in a 20 meter shuttle run test and a test of bicycle skill. The Tanzanian children were tested at altitude (approximately 1800 meters), while the Norwegian children were tested at sea level.

Results: In the cycle ergometer test, estimated relative VO2max was similar in Tanzanian and Norwegian boys, while Tanzanian girls had 8% lower estimated VO2max compared with Norwegian girls (p<0.001). Only one third of the Tanzanian children were able to ride a conventional bicycle. Excluding subjects not able to ride a bicycle, there was no difference in estimated VO2max between Norwegian and Tanzanian children. The Tanzanian boys and girls reached significantly higher estimated VO2max in the shuttle run test compared with the cycle ergometer test (p<0.001). Conclusions: Tanzanian and Norwegian children attained similar relative VO2max in the cycle ergometer test. However, the comparison was hampered by differences in altitude and the poor cycle ergometer skills in the Tanzanian children, both of which probably underestimated their VO2max.

Dregva and Vaicaitiene, (2006) Evaluated for Anthropometrical data and physical fitness of Lithuanian soldiers according to the socio-demographic characteristics. The aim of this study was to assess the anthropometrical data and physical fitness of soldiers according to the socio-demographic characteristics during one-year compulsory military service. The Height and Weight of 197 soldiers were measured at the beginning and at the end of their service, and Body Mass Index was calculated. The physical fitness was evaluated using index of ability on the basis of 2 km walking test. Conscripts from cities were taller than conscripts from rural areas. At the beginning of the service every fifth was over Weight (25< or = Body Mass Index<30 kg/m2) or obese (Body Mass Index> or =30 kg/m2): 17.9% of conscripts from rural areas as well as 17.6% from urban were over Weight and 1.9% from rural as well as 1.1% from urban areas were obese. A tendency that the Weight of conscripts gradually increased with the level of education was observed. There were no significant differences in index of ability according to the level of soldiers' education as well as place of residence. During one-year service the Height of soldiers did not change, however, their Weight increased in average by 5.5+/4.5 kg (p<0.01).
The part of over Weight persons at the end of the service increased 2.3-fold. Physical fitness of soldiers after one-year service significantly decreased compared with the beginning of the service. In order to decrease the rate of over Weight soldiers and to increase their physical fitness the health promotion programs in Lithuanian Army are needed.

Ji, et al. (2005) Predicted the Step-test on surveillance of students' physical fitness and health. To analyze the role of step-test on large sample surveillance in students' physical fitness and health. Totally, 36,237 students aged 12-, 14- and 17-year-old from fifteen Chinese provinces taking part in the 2004th National Surveillance on Students' Physical Fitness and Health were enrolled in this study. All of them passed through the step-test, of which the indices were calculated in combining with the performance time and pulse rates in resuming period. The means of step-test index were analyzed among various youth groups, and compared with the obesity, over Weight and the normal-Weight subjects. As compared with the general level of physical growth, the means of step-test index were found higher in rural groups than in urban ones, and higher in southern groups than in northern ones. The highest means of index was found in the rural groups in having the lowest socio economic status, and also the lowest means found in metropolis groups having the highest socio economic status. These gaps were due to the change of life style, absence of physical exercise and relatively to the high body Weight of the high socio economic-level groups. Among the obesity, over Weight and normal-Weight youths, the means of step-test index was shown in a gradient decrease tendency, and those significant gaps might be found between the obesity and the over Weight, and the overWeight and the normal-Weight groups, showing that there should be harmful influences of over Weight and obesity on the youth's cardiovascular function. As a safe and easily-taken measure for cardiovascular function, the step-test should be useful in regularly measuring the national students' physical fitness and health status.

Yamauchi and Umezaki, (2005) Studied the Rural-urban migration and changing physical activity among Papua New Guinea Highlanders from the perspective of energy expenditure and time use. Examined the effects of rural-urban migration on nutritional status, daily activity patterns and physical activity levels for a Papua New Guinea Highland population. A large sample (n = 353) of adult males and
females was selected for anthropometry and a smaller sample (n = 56) for behavioral observation in conjunction with heart rate monitoring. Urban migrants had higher Body Mass Index and more body fat than their rural counterparts, particularly the females. The physical exertion index calculated for observed activities using heart rate values was much higher in farming activities in the rural area than in sedentary work activities in the urban area. In addition, walking time was notably shorter in the urban group than in the rural group (118 vs 52 min/day in males and 116 vs 29 min/day in females). Consequently, despite the urban group spending a shorter time resting and a longer time working, their daily physical activity level did not achieve the desirable level (1.75-1.80). It is thus necessary for urban residents to increase walking time to about 2 h per day, the level observed in their rural counterparts.

Adamo, et al. (2011) Conducted study on Correlates of aerobic fitness in urban and rural Portuguese adolescents. This study was designed to gather anthropometric and fitness-related data on Kenyan children living in urban (UKEN) and rural (RKEN) environments and to compare them with previous data collected on Canadian children in order to examine the potential nutrition-physical activity transition. Height, Weight, waist circumference, triceps skinfolds were directly measured on rural (RKEN) and urban Kenyan (UKEN) children (n = 179, 9-13 years) and compared with existing data from Canadian children living in urban and rural environments (n = 274, 9-13 years). Aerobic fitness was measured using the 20 m shuttle run, flexibility using the sit-and-reach test and isometric handgrip strength was assessed. None of the RKEN children were over Weight or obese (OWO). However, 6.8% of UKEN boys and 16.7% of girls were OWO. The RKEN children had lower BMI, waist circumference, and triceps skinfolds than all other groups (UKEN, and Canadian: p<0.05). UKEN children were leaner than Canadian children (p < 0.05). Male and female RKEN children had higher running speeds, and aerobic fitness than UKEN children (p<0.001). Isometric strength was not different between Kenyan groups and was not different from urban living Canadian children. UKEN children were the least flexible group, and girls were more flexible than boys in all groups. Urban Kenyan children appear to be showing signs of the nutrition-physical activity transition, as judged by the anthropometric similarities to contemporary living Canadian children. Further support is provided by examining the difference in
prevalence of over Weight/obesity among UKEN compared with their RKEN counterparts and their lower aerobic fitness level.

**Albarwani, (2009)** Conducted a study to compare the Child obesity and fitness levels among Kenyan and Canadian children from urban and rural environments: A KIDS-CAN Research Alliance Study. The aim of this research was to study the effects of over Weight and leisure-time activities on maximal aerobic capacity (VO2max) in urban and rural Omani adolescents. A total of 529 (245 males, 284 females) adolescents, aged 15-16 years were randomly selected from segregated urban and rural schools. Maximal aerobic capacity was estimated using the multistage 20-meter shuttle-run test. The Body Mass Index (BMI) of urban boys and girls was significantly higher than that of rural boys and girls. Urban boys and girls spent significantly less weekly hours on sports activities and significantly more weekly hours on TV/computer games than their rural counterpart. Urban boys and girls achieved significantly less VO2 max than rural boys and girls (44.2 and 33.0 vs. 48.3 and 38.6 mL/kg/min, respectively). Maximal aerobic capacity was negatively correlated with BMI in urban boys. Over Weight and inactivity had significant negative effects on cardio respiratory fitness in urban boys and girls as compared to their rural counterparts. Weight gain in adolescence requires early intervention.

**Chen, et al. (2008)** Studied the Effects of over Weight and leisure-time activities on aerobic fitness in urban and rural adolescents. This cross-sectional study examined factors related to children's physical fitness and activity levels in Taiwan. A total of 331 Taiwanese children, aged 7 and 8, and their mothers participated in the study. Children performed physical fitness tests, recorded their physical activities during two weekdays and completed self-esteem questionnaires. Research assistants measured the children's body mass and stature. Mothers completed demographic, parenting style and physical activity questionnaires. Attending urban school, lower Body Mass Index (BMI), older age and better muscular endurance contributed to the variance in better aerobic capacity, and attending rural school and better aerobic capacity contributed to the variance in better muscular endurance in boys. Attending urban school, lower BMI and better athletic competence contributed to the variance in better aerobic capacity, and younger age, rural school and higher household income contributed to the variance in better flexibility in girls. Despite the limitations of the
study, with many countries and regions, including Taiwan, now emphasizing the importance of improving physical fitness and activity in children, an intervention that is gender, geographically, and developmentally appropriate can improve the likelihood of successful physical fitness and activity programmes.

De, et al. (1980) Studied “Does living setting influence training adaptations in young girls?” Physical efficiency tests were performed on urban school boys drawn from high socio-economic status in comparison to rural school boys. The Height and Weight records of the subjects indicating growing process showed that the rural boys attained less physical growth than their urban counterparts. The Vital Capacity and Peak Expiratory Flow Rate data expressed either per unit of Height or body surface areas were significantly lower in rural boys. These findings indicated a poor development of the thorax in the rural group. However, the determined grip strengths for both the groups were similar. The grip test might reflect improvement of muscle mass in case of rural boys as a result of regular physical activity employing the arm muscles.

Tinazci, et al. (2009) has made an investigation on the Physical fitness of rural children compared with urban children in North Cyprus: A normative study. The aim of this study was to investigate the effects of environmental factors on physical fitness of rural and urban children. Methods: To reveal the differences between physical fitness of children living in urban and rural districts of the Turkish Cypriot population, 3939 nine- to eleven-year-old male primary school children from 90 schools of North Cyprus were tested. Testing procedures were similar to the Eurofit tests. Results: The results showed that Body Mass Index and skinfold thickness were higher in the urban children (P < .05). Differences in cardiopulmonary and motor fitness were also found between groups. In addition, flexibility and muscle endurance were significantly higher in the rural children. Conclusion: The significantly lower flexibility, muscle endurance, and strength of urban children might indicate a lower habitual physical activity level.

Zhao, et al. (2005) Made a comparative Analysis of motor performance status in students of Han nationality in fifteen provinces in China. To analyze the motor performance status in students of Han nationality in fifteen provinces in china.
Totally, 161,804 students of Han nationality aged from 7 to 18 years old were involved in the Chinese Surveillance on Students' Physical Fitness and Health in 2004. Motor abilities were accessed with the aid of gripping power, 50 m dash, standing long jump, and 1-min sit-ups. Based on general statistical description, principal component analysis and linear regression, the development characters of students' motor performance were explored. This research showed some characters similar to those of last ones: motor capability was improved in correlation with age; boys did better than girls, the difference between 18 year-old rural boys and rural girls was 15.3 kg, -2.0 s, 58.6 cm, 8.7/min; the urban students performed better than the rural ones, the difference between 15 year-old urban boys and rural boys was 0.9 kg, -0.2 s, 3.5 cm, 3.5/min. The first principal component might represent the 4 tests greatly. Regression analysis on principal component quantitatively interpreted the influence of factors such as age, sex and area. The general principles of exercise quality development of students are still in work. Principal component analysis should be adequate and convenient in motor performance analysis.

**Ozdirenc, et al. (2005)** Investigated Physical fitness in rural children compared with urban children in Turkey. In a crowded modern world it is vital that the promotion of sport and exercise should be compatible with environmental and public health outcomes. This study aims to investigate the effects of environmental factors, lifestyle and leisure time activities on physical fitness in rural and urban children. A cross-sectional observational study of 98 rural and 74 urban healthy children (aged 9-11 years) was conducted in Turkey. A questionnaire was used in collecting information about the children's physical activity habits and their school's facilities. The physical fitness of children was evaluated with EUROFIT test battery. The rural children preferred to play football and volleyball while the urban children had a tendency to prefer indoor sports. The percent of urban children not involved in any sports activity was 35%, while this rate was 30.6% for rural children. It was also found that the urban children watched TV more than the rural children (13.4 ± 2.7 h/week, 10.9 ± 2.7 h/week, respectively). The results showed that Body Mass Index and skinfolds thickness were higher in the urban children (P < 0.05). There were no significant differences in the hip-waist ratio or the hip and waist circumference between the two groups. In cardiopulmonary and motor fitness, no difference was found between the two groups. In contrast, flexibility and muscle endurance were
significantly higher in the rural children. Conclusion: The children living in the urban areas were more inactive and obese, which resulted in a decrease in their flexibility and muscle endurance fitness.

Pena Reyes, et al. (2003) Evaluated Urban-rural contrasts in the physical fitness of school children in Oaxaca, Mexico. The physical fitness of school children resident in an urban Colonia and in a rural indigenous community in Oaxaca, southern Mexico, was compared. Two measures of performance-related fitness (standing long jump, 35-yard dash [32 m]) and four measures of health-related fitness (grip strength, sit and reach, timed sit-ups, distance run) were taken on 355 rural (175 boys, 184 girls) and 324 urban (163 boys, 161 girls) school children, 6-13 years of age. Urban children were significantly taller and heavier than rural children. Absolute grip strength did not consistently differ between rural and urban children, but when adjusted for age and body size, strength was greater in rural children. Explosive power (standing long jump) and abdominal strength and endurance (timed sit-ups) were better in urban than in rural children without and with adjustment for age and body size. Urban-rural differences in running speed (dash) and flexibility (sit and reach) varied by age group and sex. Younger rural children and older urban girls performed better in the distance run, whereas older rural and urban boys did not differ in endurance. The size advantage of urban children does not necessarily translate into better levels of performance- and health-related physical fitness. The observed differences may be related to activity habits associated with school physical education and lifestyle in the respective communities.

STUDIES ON PHYSIOLOGICAL VARIABLES

Chen, et al. (2004) Conducted the study to find out the Testing and analyzing the lung functions in the normal population in Hebei province. To investigate the lung function of the normal subjects living in Hebei province and its correlative factors such as living circumstance, age, Height, and body Weight. The lung volumes and breath capacities of 1,587 normal subjects were tested by portable spirometers (Scope Rotry) from August to October in 2002. The influences of living circumstance, age, gender, Height, and body Weight on lung functions were observed and analyzed. No significant difference was found between urban and rural areas in all indexes (P
>0.05); however, significant difference existed between male and female subjects (P = 0.000). The change trends of lung function in male and female subjects were similar. Growth spurt appeared at the age of 12-16 years in male subjects and 12-14 years in female subjects. Vital capacity (VC), forced vital capacity (FVC), and forced expiratory volume in one second (FEV1) reached their peaks at the age of 26-34 years and then decreased with age. Peak expiratory flow (PEF), 25% forced expiratory flow (FEF50%), and 75% forced expiratory flow (FEF75%) appeared at the age of 18 and then went down with age. Both Height and Weight had a correlation with all the indexes of lung functions, although the influence of Height is stronger than Weight. All the indexes of lung function have correlations with age, Height, and Weight. Lung function changes with aging, therefore different expected values shall be available for the adolescence, young adults, and middle-aged and old people. This study provides reference values of lung function for normal population.

**Zverev and Gondwe, (2001)** Analysed the Ventilators capacity indices in Malawian children. To determine whether the pulmonary function deficit documented previously in Fulani children is also present in adult Fulani herdsmen in northern Nigeria. The subjects for this study consisted of adult Fulani men from the hamlet of MagamaGumau and adult non-Fulani men from the city of Jos. Age, Height, Weight, mid-arm circumference (MAC), triceps skin-fold thickness, forced vital capacity (FVC), forced expiratory volume in one second (FEV1), forced expiratory flow during the middle half of the FVC maneuver (FEF25-75%), and peak expiratory flow rate (PEF) were measured. Body Mass Index (BMI) and FEV1/FVC were calculated for all subjects. Multiple regression analysis was performed to identify correlations between pulmonary function parameters and anthropometric variables. The 44 Fulani subjects and 28 urban subjects were well-matched for age and Height. The Fulani men weighed significantly less than the urban men (58.5+/−9.4 versus 67.4+/−11.3 kg, p <0.001) and consequently had significantly lower BMI, MAC, and triceps skin-fold thickness. The only significant difference in pulmonary function parameters between the two groups was in FEV1/FVC (0.93+/−0.1 versus 0.85+/−0.1, p <0.001). Small but significant correlations were found between pulmonary function parameters and anthropometric variables for both study populations. The pulmonary function deficits documented previously in Fulani children and adolescents were not present in adult Fulani men. However, the observed elevation in FEV1/FVC in the rural Fulani men as
compared to their urban counterparts, which is often seen in restrictive pulmonary patterns, deserves further study.

**Van Niekerk, et al. (1979)** Studied Prevalence of asthma: a comparative study of urban and rural Xhosa children. An epidemiological study was undertaken to determine the prevalence of asthma in young urban and rural black (Xhosa) children. One thousand three hundred and seventy five children were studied, 694 from a Cape Town African township and 671 from a rural area in Transkei. The exercise tolerance test which required free range running at maximum effort for 6 min was used to identify asthmatic subjects. A fall of 15% or more in the post-exercise FEV1 and PEFR values was regarded as a positive result. Twenty-three children were found to be asthmatic, twenty-two from the city area, but only one from the country, giving a prevalence figure for asthma of 3.17% in the first group and 0.14% for the second. Possible reasons for these differences are discussed. The exercise tolerance test was found to be a useful tool for epidemiological studies of asthma.

**Van Rooyen, et al. (2002)** Compared the cardiovascular reactivity in Black South-African males of different age groups: The influences of urbanization. Blacks in an urban environment seem to be more vulnerable to excessive increases in blood pressure during daily life events. This greater cardiovascular reactivity during acute stress situations in urban Blacks may lead to the development of hypertension in their later lives. Because Blacks in South Africa are involved in a massive process of urbanization, which may lead to chronic diseases of lifestyle like hypertension and diabetes, this study was undertaken to compare the cardiovascular reactivity patterns of urbanized and rural Black males in the North-West province of South Africa. Two hundred twenty-three Black males of different age groups, Group 1: younger than 25 years of age; Group 2: between 25 and 44 years of age; and Group 3: 45 years of age and older. Participants were randomly selected from rural and urbanized settlements. After resting blood pressure was recorded with a Finapres apparatus, and cardiac output, stroke volume, heart rate, and total peripheral vascular resistance had been obtained, an acute laboratory stressor (hand dynamometer exercise) was applied and the above measurements repeated. The SBP, DBP, and MAP increased 28% and 42% in both the rural and the urbanized groups. There was a shift from a central reactivity pattern (increased cardiac output) in the young rural group (< 25 years) to a peripheral
reactivity pattern (increased total peripheral resistance) in the > or = 45 years old urbanized males after applying the stressor. Cardiovascular reactivity differs between Black males from a rural area compared to urbanized Black males. The urbanized males > or = 45 years of age were at a higher risk of developing cardiovascular disease because their total peripheral resistance reactivity increased the most during application of the stressor.

**Iskandarova, (2006)** Conducted the study on morph functional state of the respiratory system in 18-27-year-old persons living in Uzbekistan. The morphofunctional state of the respiratory system was studied in 2104 male Uzbeks aged 18-27 years from rural and urban areas. The chest circumference, frontal and sagittal diameters, respiratory excursion and vital capacity, breath holding were found to be higher in the rural males in almost all age groups than in the urban ones, suggesting that the latter had a low activity. The increase in the diametrical chest sizes mainly occurred by the asthenic type in the rural males and by the hyperstenic type in the urban ones. Unlike the urban males, the rural ones showed a more developed respiratory system and its rather higher functional and adaptive capacities. There was a close correlation of the total sizes of the body with the morphological signs of the chest and their low correlation with the external respiratory functional parameters.

**Karpovich, et al. (1968)** States that the time required for pulse rate to return to normal after exercise depends upon the intensity of the exercise and upon the condition of the individual. On the other hand better physical condition tends to shorten the period of recovery.

**Miles, et al. (1965)** Conducted a study on the effect of changes in Barometric pressure on maximum breathing capacity and observed that maximum breathing capacity is considerably higher at high altitude than at sea level.

**Antan, et al. (1993)** Compared physical fitness components such as speed, strength and agility, physiological variables pulse rate blood pressure and breathe holding time and psychological variables such as anxiety and aggression among Nicobar and Karaikal boys. The subjects were 30 boys from JawaharVidyalaya, Nicobar and 30 boys from JawaharNavodayaVidyalaya, Karaikal. Data were collected
and was statistically analyses using ‘t’ ratio. It was concluded thus: it was found out that the physical fitness variables of the Nicobar boys were better than the Karaikal boys. It was found that the psychological variables of the Nicobar boys were better than the Karaikal boys. It was found that the karaikal boys were better than the Nicobar boy’s psychological variables.

**Guenette, et al. (2007)** Compared the mechanics of breathing including the measurement of expiratory flow limitation, end-expiratory lung volume, end-inspiratory lung volume, and the work of breathing in endurance-trained men (n=8) and women (n=10) during cycle exercise. Expiratory flow limitation was assessed by applying a negative expiratory pressure at the mouth. End-expiratory by having subjects performs inspiratory capacity man oeuvres. Transpulmonary pressure, taken as the difference between esophageal and airway opening pressure, was plotted against volume and integrated to determine the work of breathing. These data suggest that expiratory flow limitation may be more common in females and that they experience greater relative increases in end-expiratory lung volume and end-inspiratory lung volume at maximal exercise compared to males. The higher work of breathing in women is probably attributed to their smaller lung volumes and smaller diameter airways. Collectively, these findings suggest that women utilize a greater majority of their ventilator reserve compared to men and this is associated with a higher cost of breathing. A number of studies have been conducted on the effect of exercise on heart rate. Heart rate is considered to be one of the most useful and common cardiovascular parameters in sports medicine.

**Dinx, et al. (1993)** say that it can be measured at rest, during exercise and after recovery from exercise either directly or by teletransmission and it is the most simple and efficient test. The Weight of the athlete’s heart does not generally exceed 500grms. Training has a good impact on heart rate. Training reduces resting heart rate. But the workload given in the training period has a correlation with the reduction in heart rate. As Devaries, et al. (1994) explains, other things being equal, the trained individual has a lower heart rate for any given workload.
KuKulu, et al. (2010) Analyzed the Dietary habits, economic status, academic performance and Body Mass Index in school children: a comparative study. The changes in dietary habits and way of life of adolescents can lead to some nutrition problems. The purpose of this study was to compare dietary habits of children living in metropolitan and non-metropolitan areas regarding their physical characteristics, socio-economic milieu and educational level. A total of 737 students studying in the 6th, 7th and 8th grades of two different primary schools took part in the study. Data were collected by a questionnaire including dietary habits of participants. Furthermore, the Weight and Height of students were measured and their Body Mass Index was calculated. During the study, while 4.3 percent of students living in the non-metropolitan area were found obese, this figure was 8.4 percent in the metropolitan area. A big majority of non-metropolitan students have breakfast and lunch at home. Metropolitan students not having lunch at home have their lunch at restaurants or school canteens and generally consume more snacks. The obesity risk of students participating in the study was found to be high. Intervention programs should be organized in order to inform the students about the importance of healthy nutrition and lead them to change their current consumption behavior.

Minaker, et al. (2006) Have conducted a study on School region socio-economic status and geographic locale is associated with food behavior of Ontario and Alberta adolescents. In an attempt to elucidate broader determinants of adolescent dietary intake and habits, food intakes and selected food behaviors of grades 9 and 10 students from Ontario and Alberta were examined according to school region socio-economic status and urban/rural locale. Using a stratified random sample framework, 53 high schools from 28 school boards were recruited (45 public and 8 private; 33 urban and 20 rural). Median family income for Canada Post's forward sortation area of the school was used to define school region SES. Public and private schools were compared as a proxy measure of SES. A web-based survey of food intake and behaviors, including a 24-hour diet recall and food frequency questionnaire, was completed by 2,621 students in grades 9 and 10. Comparison of intakes and behaviors by school designation as urban/rural, public/private or regional SES (generalized linear model procedure) controlled for student gender and grade distribution and
number of participants within schools. School region SES ranged from dollars 40,959 to dollars 85,922/year. Vegetable and fruit consumption ($p < 0.001$), fibre intake ($p < 0.001$) and frequency of breakfast consumption ($p < 0.01$) increased with increasing income, while added sugar intake decreased ($p < 0.01$). Private versus public school students had lower intakes of sweetened drinks ($p<0.01$) and higher intakes of fibre ($p=0.02$). Rural students reported higher mean intakes of calcium (1106 vs. 995 mg/day, respectively, $p = 0.03$) and milk products (2.7 vs. 2.3 servings/day, $p < 0.01$) than urban students. Selected food behaviors of youth from Ontario and Alberta improve with increasing school SES and vary with rural/urban school locale. Identifying regional demographics may be useful in tailoring healthy eating programs to the specific school.

Dollman and Pilgrim, (2005) investigated the Changes in body composition between 1997 and 2002 among South Australian children: influences of socio-economic status and location of residence. To compare rates of change in South Australian children's body composition between 1997 and 2002 in subsamples based on location of residence and socio-economic status. Year 6 children from randomly selected South Australian schools in 1997 (32 schools, n=1,423) and 2002 (29 schools, n=992) were compared on: Body Mass Index (BMI), sum of triceps and abdominal skinfolds (skinfold sum) and waist girth. Samples were partitioned into urban (population >20,000) and rural (<10,000) subsamples, and low, medium and high SES. ANCOVA, controlling for boys decimal age and girls predicted menarcheal age, was conducted for the whole sample, and where interactions were significant, separately in socio-demographic strata. Between surveys, there were significant increases in boys waist girth ($p=0.004$) and skinfold sum ($p=0.007$), and girls BMI ($p=0.0005$) and skinfold sum ($p<0.0001$). There were significant interactions of survey year and sociodemographic variables among girls only. While there were no significant changes in anthropometric variables among rural and high SES girls, urban girls increased in skinfold sum ($p<0.0001$), waist girth ($p=0.033$) and BMI ($p=0.0007$). Low ($p<0.0001$) and medium ($p=0.001$) SES girls skinfold sum increased between surveys. Secular trends in Australian children's body fatness are continuing. Further, the rates of change in girls are affected by the socio-demographic milieu. Implications: The development of targeted interventions to combat child obesity will
depend on a clearer understanding of how environmental influences on Weight status are distributed across the sociodemographic landscape.

**Jackson, et al. (2003)** Conducted a study of the rural urban differences in Weight, body image, and dieting behavior among adolescent Egyptian schoolgirls. Overweight and obesity prevalence among adolescents is increasing worldwide and may be associated with increased risk for the development of obesity and chronic diseases in adulthood. Dissatisfaction with Weight and body shapes is a contributor to the growing incidence of adolescent eating disorders. Our purpose was to compare the relationship between body Weight and body image in a convenience sample of rural and urban girls. We also wanted to examine the influence of the mothers on their daughters by asking the girls how their mothers would classify their body shapes. Three hundred and forty adolescent Egyptian schoolgirls representing Cairo and surrounding rural areas were studied. The girls were from private and public schools. Weight, Height, waist and hip circumferences were measured. Body image was determined by asking participants to indicate which of five silhouettes of a female body most closely resembled her own current body size. We also asked them to select the silhouette that closely resembled their mothers current body size. Using the Centers for Disease Control and Prevention reference standards, 35% of the girls were \( \geq 85 \)th percentile, while 13% were \( \geq 95 \)th percentile. Overweight was more prevalent in urban than rural girls and in those with higher socio-economic status than in lower socio-economic status girls. Girls perceptions of how their mothers viewed their bodies differed from how the girls viewed their own bodies. From a policy point of view, these data underscore the need to consider not only the health risks associated with overweight and its distribution on the body, but also the Weight and body image of the target audience in the design of clinical and public health intervention programs worldwide.

**Starrin, et al. (1993)** Conducted a study to determining that the Community types, socio-economic structure and IHD mortality--a contextual analysis based on Swedish aggregate data. The importance of social and economic conditions for people's health has been receiving more and more attention during the past 10 years. The question that is raised in this study is if the link between socio-economic factors in society, seen in the more composite sense, and cardiovascular mortality are
dependent on different socio-geographical contexts? Two contextual situations are used; one concerns the dimension which places the analysis in an urban-rural context and the other, the dimension placing it in a context which describes people's forms of work. The study is based on aggregated data on the social and economic conditions for men in the municipalities in Sweden for the period 1983-1987. The results show that the link between various dimensions of the socio-economic structure and IHD rates is more pronounced in the urban and white-collar community types than in rural and blue-collar communities. In the community type where the links are more pronounced the IHD rate is lower and in the type where the links are less pronounced the IHD rate is higher. The results are discussed in relation to different theoretical perspectives.

**Spink, et al. (2003)** Examined whether different types of family influence (i.e., conformity, compliance, obedience and modeling) that are associated with physical activity differ on the basis of SES in youth and adolescents. Eighty-eight youth from a midsized Canadian city who were involved in a summer youth programme participated in the study. Census data on the neighbourhoods where the youth programmes were located was used to classify participants as high or low SES. Participants (mean age 12.6 years, +/− 2.07) completed a questionnaire asking them which family social influences were associated with being active. Discriminant function analysis revealed that four forms of family influence differentiated between high and low SES groups (Wilks’ X = .817, f (4) = 17.02, p = .000, Canonical r = .428). Based on the standardized discriminant – function co-efficients, in the low SES group family conformity, family obedience and family modeling were associated with being active, while in the high SES group family compliance was associated with being active. The current results provide preliminary support for the idea that family influences associated with physical activity may differ based on socio-economic status, suggesting that future interventions designed to increase physical activity may need to target different family influence correlates.

**Fahlman, et al. (2006).** Revealed in his study Ethnic and socioeconomic comparisons of fitness, activity levels, and barriers to exercise in high school females. The purpose of this study was to determine if high school females differed in individual measures of health-related physical fitness, barriers to exercise, or activity
level based on ethnicity or socioeconomic status. A cross-sectional sample consisting of African American (28%), Hispanic (23%), and white (49%) female high school students, 46% from low socioeconomic groups and 54% from moderate or high socioeconomic groups (n = 1314, age = 16.2 +/- 0.9) participated in this study. A 15-question survey instrument assessed barriers to exercise and activity level. The Fitnessgram fitness test assessed aerobic capacity and Body Mass Index (BMI), and skinfold caliper was used to assess percent body fat. Significant differences between African Americans, Hispanics, and whites were found on the following dependent variables: BMI, percent fat, mile run, perceived barriers to exercise, and activity level. Significant differences between socioeconomic groups were found on the following dependent variables: percent fat, mile run, activity level, and perceived barriers to exercise. These results suggest that students of minority and low socioeconomic groups should be given separate and different interventions regarding health-related fitness.

Pawlinska, et al. (2007) has made an attempt to Assessment of the effect of socioeconomic factors on the prevalence of respiratory disorders in children. Numerous studies indicate that major health problems in children are illnesses of the respiratory system. Currently, increased attention is being paid to family social conditions and environmental factors in the pathogenesis of these illnesses. The aim of this study was to determine whether socio economic factors are related to child morbidity and whether the frequency of some infectious illnesses (influenza, angina, infections of upper and lower respiratory tract) among children is associated with their tempo of growth. The data came from a cross-sectional survey on 119 girls and 106 boys, aged 9-10 years, attending a primary school in Opole, Poland. In the present study, the rate of biological development was evaluated using Height and Height-to-Weight proportion. Height and Weight were measured and used to calculate BMI. The socioeconomic status and child morbidity were assessed, as based on the information giving by parents. To assess the socio economic status, the following factors were analyzed: education of parents and self-assessment of their material condition. Statistical analysis of the material was conducted using Chi-square test and analysis of variance (ANOVA). The results indicate that illnesses of the respiratory system are more frequent among children from families with a low socio economic status. Education of mother was most strongly related to the prevalence of these diseases.
The prevalence of respiratory infections in the group of children whose mother have primary and vocational education was more than twice as common as that in the group of children whose mother have university education. No significant association was found between increased morbidity and the tempo of children's growth, but children who suffer from infectious diseases frequently are, on average, shorter and fatter than other children.

*Malina, et al. (2009)* Prepared socio economic variations in the growth status of urban school children 6-13 years of age in 1972 and 2000 was compared. The children were resident in the city of Oaxaca and were students in the same primary school in each year. Socioeconomic status (SES) was based on parental occupation. Height, sitting Height, estimated leg length, Weight, and the Body Mass Index in 218 boys and 191 girls in 1972 and 173 boys and 166 girls in 2000 were compared. Sex-specific MANCOVA was used to evaluate SES differences within each year, while sex- and SES-specific MANCOVA was used to evaluate differences between years. The prevalence of stunting, over Weight and obesity was estimated. There were no SES differences among boys and girls in 1972 and boys in 2000; low-middle and middle SES girls were significantly taller and heavier with longer legs than low SES girls in 2000. Within each SES group, children in 2000 were significantly larger in body size and segment lengths except for sitting Height in low SES children of both sexes. Estimated secular gains increased from low to low-middle to middle SES in both sexes. Inequitable gains by SES contributed to an increase in the magnitude of differences between SES groups, especially between low SES children on one hand and low-middle and middle SES children on the other hand. The prevalence of stunting declined while the prevalence of over Weight and to a lesser extent in obesity increased from 1972 to 2000, more so in low-middle and middle SES than in low SES children.