Chapter II
REVIEW OF RELATED LITERATURE

The research scholar has made sincere efforts to locate and collect the literature relevant to this study. In order to provide the background materials and to evaluate the significance of this study as well as to interpret the findings, the related literature collected from different sources have been presented in this chapter.

Simpson (1989) studied the effect of participation in physical education activity upon health related physical fitness. Subjects were 132 students engaged in various physical activities. Health related fitness components measured were cardio-respiratory endurance, body composition, flexibility and dynamic strength. The analysis of the pre-test and post-test scores indicated significant difference in scores with respect to health related components among the students involved in the physical education program. Significant changes were observed in body composition, flexibility and dynamic strength for the weight and aerobic dance groups. The racket ball group experienced significant positive changes in flexibility and dynamic strength, whereas the control group experienced significant negative changes in cardio-respiratory endurance.

Lenhard et al. (1992) investigated the health related fitness levels of elementary school children aged 5-9. Three thousand elementary school students from the State of Miamme were assessed on their current physical fitness by using AAHPER Health Related Fitness Test. These students scored higher than the national
norms in these items, such as sit-ups, sit and reach and one mile run/walk test. However, their skin fold thickness measurement were significantly large.

Marshall (1968) had studied on Tracking of health-related fitness components in youth ages 9 to 12 years. The purpose of this study was to examine the tracking of multiple health-related fitness components in children from fourth to sixth grade. A battery of fitness tests was used to measure 414 children (213 boys, 201 girls, mean = 9.48 yr, +/- 0.41) from three elementary schools in Southern California. Children were assessed during the fall and spring of each grade. Baseline scores were correlated (Spearman) with each subsequent time point. For boys 3-yr correlations of body mass index (BMI) (0.89), skin fold thickness (0.80), sit-and-reach test (0.67), and the pull-up test (0.66) indicated high levels of tracking. Mile run (0.56), sit-up test (0.46), and waist-to-hip ratio (0.30) tracked moderately. For girls BMI (0.83), sum of skin folds (0.75), sit-and-reach test (0.72), and the pull-up test (0.63) tracked highly, while mile run (0.42), sit-up test (0.47), and waist-to-hip ratio (0.42) tracked moderately. He concluded that relative rankings of BMI, skin fold thickness, and sit-and-reach test performance are more likely to track during early adolescence. Measures of cardiovascular fitness, muscular strength, and endurance and fat distribution may be less likely to track into adolescence, possibly because they are more influenced by changes in physical activity or because tracking may be reduced by measurement error.

Knuttgen (1961) conducted a study on partial determination of fitness, the youth fitness test of the American Association for Health, physical Education and Recreation. The test was given to 319 male and 135 female Danish school children.
The result of the testing was compared with the American standards, which were compiled in terms of both age and the Neilso-Cozens classification index. It was found that approximately 70 per cent of the boys and 86 per cent of the girls exceeded the various American mean scores.

Haung Y C and Malina R M (2002) compared the physical activity and Health Related Physical Fitness in Taiwanese adolescents. The relationship between physical activity and health-related physical fitness was evaluated in 282 Taiwanese adolescents 12-14 years of age. The subjects were randomly selected from the 7th, 8th and 9th grades in two junior high schools in Taiwan. Physical activity was estimated as total daily energy expenditure and energy expenditure in moderate-to-vigorous physical activity from 24-hour activity records for three days, two week days and one weekend day. Health-related fitness was assessed as the one-mile run (cardio respiratory endurance), timed sit-ups (abdominal strength and endurance), sit-and-reach (lower back flexibility), and subcutaneous fatness (sum of the triceps, subscapular, suprailiac, and medial calf skin folds). Physical activity was significantly and positively correlated with one-mile run performance and the sit-and-reach, but not with sit-ups and subcutaneous fat. Overall, the strength of the relationships between estimated energy expenditure and specific fitness items in the total sample vary from low to moderate, with only 1% to 12% of the variance in fitness variables being explained by estimated energy expenditure. Comparisons of active versus inactive, and fit versus unfit adolescents provide additional insights. The more active (highest quartile) were also more fit in cardio respiratory endurance and in the sit-and-reach than the less active (lowest quartile), and the more fit in the one-mile run (better time,
lowest quartile) and the sit-and-reach (highest quartile) were more active than the less fit in each item, respectively.

Blackwell (1990) had conducted a study on an inventory for assessment of attitudes of high school students toward health-related fitness. The purpose of this study was to develop an assessment instrument for measuring of High School students' attitudes toward health-related fitness; and to determine whether students who have participated in a mandated fitness course have more positive attitudes toward health-related fitness than students have not participated in such a course. It was concluded that participation in mandated fitness courses appeared to improve student attitudes towards health-related fitness in general and toward each of the components of health-related fitness and that students who have positive attitudes toward general health-related fitness are likely to have positive attitudes toward each of the components of health-related fitness. Additionally, it was shown that attitudes toward health-related fitness do not seem to be related to gender.

Callaway (1983) constructed percentile norms for Alabama students in grade 1 to 9 based on both AAHPER youth fitness test and AAHPER health related physical fitness test. The subjects were 2545 Alabama boys and girls. Norms were constructed for each test item based on age and sex. The obtained mean performance on each test items were compared with national norms.

Erbaugh S.J (1990) conducted a study on reliability of physical fitness tests administered to young children. The purpose of this research was to establish the reliability of physical fitness tests for first- to third-grade children. The 26 subjects were randomly selected from a larger sample from urban public schools and tested
individually on two days, one week apart. Tests included the Health-related Physical Fitness Test battery of AAHPERD and the modified pull-up of Baumgartner. Reliability estimates ranged from .83 to .99 for the former items so these items seem to be appropriate for assessing fitness of young children. The modified pull-up test was an unreliable item \((r = .52)\). Two possible sources of variation in performance scores should be addressed, children’s motivation and testing protocol.

David (1991) made a study on Health Related Fitness in First Through fourth grade Students. The purpose of this study was to profile the health-related fitness of first through fourth grade students in Massachusetts. Five public schools were randomly selected to represent each of the five geographical regions of Massachusetts. Three hundred forty-eight boys and girls participated as subjects. In each school, one home room class from each grade level was randomly selected. The Physical Best fitness assessment program, developed by the American was utilized to assess the health-related fitness if the students. Test items included measures of body composition by skin fold thickness, cardiovascular fitness by a one mile run/walk, flexibility of the hamstrings by the sit-and-reach test, and muscular strength and endurance of the upper body and abdominal buy pull-ups and modified sit-ups respectively. Means, standard deviations, and percentiles were calculated by class and grade level. The results indicated that the students performed best on the test of hamstring flexibility (75% met the criteria) and worst in cardiovascular fitness (25% met the criteria). When analyzed by gender, the boys scored the best on body composition (69% met criteria) and the sit-up (68%) while scoring the lowest (22%) on the cardiovascular assessment. The girls scored best on hamstring flexibility
(88%), the sit-up (79%), and body composition (71%), while scoring the lowest on the cardiovascular assessment (28%) and the pull-up (19%). No individual class mean for either gender met the health-related criterion reference standard for the mile run. A total of 12% of the students were able to achieve scores necessary to meet all five of the proposed health-related criteria.

Dinucci J. et al. (1990) made a study on reliability of a modification of health related physical fitness test for use with physical education majors. A modified form of the AAHPERD Health-Related Physical Fitness Test was administered to a sample of 200 college physical education majors. The skin fold measures were changed from the original test, and the flexed-arm hang was added to the test battery. The validity and reliability of the test battery has been established for middle school boys and girls. This study determined the multivariate reliability of the modified test battery using a canonical correlation model. The univariate intraclass reliabilities of the test items ranged from .91 to .99. The total redundancy for the modified test battery was .87.

Chen W et al. (2002) had constructed norms for children and adolescents for determining healthy body mass index norms from health related physical fitness test. Body mass index norms for children and adolescents were developed from a reference population that includes obese and slim subjects. The validity of the norms was influenced by the observed secular increase in body weight and body mass index. They hypothesized that the performance of children in health-related physical fitness tests would be negatively related to increased body mass index, and therefore fitness tests can be used as a criteria for developing a more appropriate set of body mass
index norms. They evaluated the existing data from a nation-wide fitness survey for students in Taiwan (444 652 boys and 433 555 girls) to examine the relationship between body mass index and fitness tests. The fitness tests used included: an 1600-m run/walk; a standing long jump; bent-leg curl-ups; and a sit-and-reach test. The body mass index percentiles developed from the subgroup whose test scores were better than the 'poor' quartile in all four tests were compared with those of the whole population and linked to the adult criteria for overweight and obesity. The body mass indices were significantly related to the results of fitness testing. A total of 43% of students had scores better than the poorest quartile in all of their tests. The upper body mass index percentile curves of this fitter subgroup were lower than those of the total population. The 85th and 95th body mass index percentile values of the fitter 18 year-old-students (23.7 and 25.5 kg m (-2) for boys; 22.6 and 24.6 kg m (-2) for girls) linked well with the adult cut-off points of 23 and 25 kg m (-2), which have been recommended as the Asian criteria for adult overweight and obesity. Hence, the body mass index norms for children and adolescents created from selected subgroups that have better physical fitness. They found out that the new norms based on this approach might be used not only to assess the current status of obesity or overweight, but also to encourage activity and exercise.

Jackson and Baker (1986) conducted a study on 825 young females with AAHPERD Health-related fitness test to measure back and hamstring flexibility. The measurements included the sit and reach test and passive hamstring flexibility. The correlations between the sit and reach test and total back flexibility, upper back flexibility and lower back flexibility were low. These findings indicate that the sit and
reach test has moderate criterion-related validity, when used as an assessment of hamstring flexibility in the health-related fitness test.

Pellett (1990) studied on the relationship between health-related physical fitness levels and academic achievement in elementary students. The purpose of this study was to investigate the relationship between health-related fitness levels and academic achievement in elementary school children. A sample of 105 elementary students in grades 4 and 5 were tested. The study consisted of 64 males and 41 females in both grades. The AAHPERD Physical Best Test was used to measure physical fitness. Test items included body composition (sum of the triceps and calf skin folds), one mile walk/run, sit-ups, and sit and reach SAS Canonical Correlation Analysis was used to examine the relationship between health-related physical fitness and academic achievement. Means and standard deviations were calculated for both genders, and female and male alone. Results indicated that there was no significant relationship (p>.05) between health-related physical fitness levels and academic achievement in fourth-and fifth-grade students.

Perry et al (2002) conducted a cross-sectional comparative study of health and fitness-related variables in a small sample of children of Japanese descent on two continents. The objective of the study was to compare physical characteristics, health and fitness-related variables, and nutrient intake between children of Japanese ancestry living in the United States and Japan. The subjects for the study were fourteen children of Japanese descent living in the United States and 14 sex- and age-matched children living in Japan. US and Japanese resident groups were compared on physical
characteristics, health and fitness-related variables, and nutrient intake using the t test for paired samples. To assess differences between groups in variables not statistically significant, effect sizes were calculated using the Cohen d test of standardized differences. The following significant differences were found between US and Japanese resident groups, respectively: body mass index, 19.3 and 16.9, \( P = .02 \); percentage of body fat, 22.0% and 14.3%, \( P = .002 \); vertical jump, 28.9 and 34.4 cm, \( P = .02 \); and flexibility, 58.2 and 42.6 cm, \( P = .002 \). Using the Cohen d test, US residents showed a moderately greater systolic blood pressure (107.5 vs 101.9 mm Hg, \( P = .10 \)) and leg strength (81.5 vs 55.8 kg, \( P = .11 \)) than did Japanese residents. They conclude that a small sample (\( n = 14 \)) of children of Japanese descent living in Florida showed more adverse health-related characteristics than did a comparable group of their peers living in Japan. The results were related to differences in their diets. It remains to be seen whether the differences in diets are related to where the children live.

Arnhold (1993) investigated through his study on assessment of selected fitness components of preschool children. The investigation included 26 children ages 3-5 enrolled in pre-school programme in the Grove City and Slippery Rock PA, area. The children were tested in five area of fitness according to the AAHPERD physical Best Fitness Programme. Data were collected on each child in the following areas: half-mile run/walk for cardio vascular endurance, sum of two skin fold means for body composition sit and reach for flexibility, number of sit-ups completed in 1 minute for abdominal strength and endurance, and modified pull-ups for upper body strength and endurance. Means, standard deviations, and range of scores were calculated for each age group on each test. A Kruskal-Wallis ANOVA was used to
compare the three age groups in each of the five tests. The mean sum of skin fold and sit-and-reach scores for all age groups met the Physical Best health-related fitness standards for five years old boys and girls. The mean sit-up score, however, did not reach the standard for five years old boys and girls. There was no significant difference found at the .05 level between the age groups in any of the selected fitness components. The children were, however, able to perform each of the tests, indicating that physical fitness can be assessed at the preschool level using existing assessment batteries.

Butterfeld S.A. et.al (1992) conducted a study on age, sex, and body mass index in performance of selected locomotor and fitness task by children in grades K-2. The purpose of this study was to examine the contributions of three predictor variables (age, sex, and body mass index) to performance of seven fundamental movement skills (locomotors; run, gallop, hop, leap, jump, skip, and slide) and four fitness tasks (grip strength, step test, sit and reach, and timed sit-ups) by 65 children in Grades K-2 (M=6 yr.). A multiple regression analysis indicated that running, leaping, and skipping improved with age. No sex differences were observed on any of the seven skills. In terms of the four fitness tasks, age was positively associated with timed sit-ups and grip strength and inversely associated with step-test performance. Sex was associated with step-test and sits and reach performance (girls performed better on both). Finally, body mass index was related to increased grip strength and fewer timed sit-ups.

Berger and Paradis (1969) conducted the AAHPER physical fitness tests on 115 boys of junior high school, to compare the physical fitness scores of white and black seventh grade boys of similar socio-economic level. The two racial groups were
matched. It was concluded that black male students in the seventh grade had a higher level of physical fitness than whites.

Gostin and Burder (1986) conducted a study on AAHPER test battery and the AAHPER battery was used to evaluate fitness levels in South African school children. This battery of field tests of various aspects of physical fitness was conducted in white (N=98), colored (N=92) and black (N=32) senior high school pupils. White subjects scored higher on tests of aerobic and anaerobic power, and speed sit-ups. Black subjects were stronger than the other two groups. There were no differences between the subject groups on tests of balance, upper body endurance and agility, than female result on all tests except flexibility. Male results were higher than female’s results on all tests except flexibility where the trend was reversed. It was felt that social and economic factors and the intensity of habitual physical activity played a significant role in the result of this study.

Physical fitness norms for Nigerian boys and girls of 11 to 18 years of age were constructed by Anyanwu (1997). The test items included were shuttle run, push-ups for boys, chair push-ups for girls, flexed knee sit-ups, 45 meter dash, standing long jump, pull-ups for boys, flexed arm hang for girls, nine minute run for subjects 11-12 years and 12 minutes run for subjects 13-18 years. A comparison of the United State and the Nigerian Youths showed that at the upper age level the United State Youth had better physical fitness status than their Nigerian counter parts, whereas at the lower age level there was not much difference.
Johnson (1971) conducted a study to gain an understanding of the inter-
relationships between students level of physical fitness. A further purpose was to
determine whether Negro students differed significantly in terms of physical fitness
and self-concept from white students. He found that Negro high school boys were
superior to white school-boys in strength, cardio-vascular endurance, state of health,
physical appearance, skills and sexuability. A greater relationship between physical
fitness and self-concept was found among white than among Negro high school
students.

Walker (1982) conducted research on fifty blacks and fifty white females 10th
grade students were randomly selected and compared on the AAHPERD youth fitness
test. The black students scored significantly higher (p 0.05) than the white students on
leg power (M=44.6% and 31.2% respectively) and speed (M=57.8% and 30.1%
respectively). The white students performed significantly higher than the black
students on abdominal strength (M=31.5% and 27.7% respectively). No other
comparisons were significant.

Mukherjee (1978) made a comparative study of physical fitness of young boys
in the age group of 13-17 years belonging to rural and urban and also less active boys
of the same age group. The result of this study was that there is no doubt that regular
physical activity contributes significantly to the enhancement of physical status.
Physical fitness of rural active subjects were definitely of superior level than the boys
living in the city. Pure food, fresh unpolluted air, and reasonable regular physical
hardships are chief contributory factors in promoting physical fitness.
Berger and Paradir (1969) compared the physical fitness scores of white and black seventh grade boys of similar socio-economic levels. It was concluded that black male students have a higher level of physical fitness.

Saha (1985) made a study to compare the selected physical fitness variables and anthropometric measures of tribal and non-tribal students of Tripura. They were tested with selected items of AAHPER Youth Fitness Test i.e. 50 Yards run, 40 yards Shuttle Run and 600 Yards Run/Walk and selected anthropometric measurements i.e. Chest girth, height, weight, upper arm girth, thigh girth and calf girth. In all tests and measurements the mean score of the composite scores of tribal students was higher than their non-tribal counter parts but none of the differences in the means were found statistically significant at .05 level of confidence.

Boone (1967) administered AAHPER Youth Fitness Test to 100 rural and 100 urban boys. The urban boys were found superior to the rural boys and the difference was significant at .01 level. The two samples were weaker on the same components of physical fitness.

Mehta (1985) compared the fitness of tribal and non-tribal school girls students of each tribal and non-tribal schools and age was between 12 and 17 years. There was significant difference found in physical fitness level as obtained from AAHPER Youth Fitness Test between tribal and non-tribal girls. The performance was significantly greater in flexed arm hang, sit-ups and shuttle run. Non-tribal girls were significantly better than tribal girls in total physical fitness.
Brongdon (1973) compared the physical fitness and anthropometric measurement of pre-adolescent Mexican American and Anglo-American males. 300 subjects were tested from each group of AAHPER Youth Fitness Test and thirteen anthropometric measurements were made. The findings revealed significant differences between the Mexican American and Anglo-American males in certain physical fitness items and anthropometric measures. When the single factor of age was correlated with each of the individual physical fitness items and each of the anthropometric measures, few significant differences were evident. The results indicated that the Anglo-American males are larger in gross body size and they were superior in performing selected physical fitness items. Both groups exhibited higher body measurements and fitness scores at each succeeding age level. That denoted a relationship between age, physical fitness and physical growth. Age as a predictive factor is equally important to Anglo-American students.

Busch (1970) conducted a study on South Dakota high school girls. One school was selected to represent each region or section and the number of students selected from each school was in proportion to the school’s enrollment. One thousand South Dakota girls were selected as subjects from all the high schools from grade 7 through 10. AAHPER Youth Fitness test was administered. Norms were established by computing every fifth percentile. The scores of South Dakota girls were compared with those of National girls, using age only. The median scores of South Dakota girls were higher than those for national girls in all items except flexed-arm hand.

Beckford (1976) conducted a study to evaluate the physical fitness level of Navajo girls who were 14 to 16 years old. AAHPER Youth fitness test was
administered on the subjects selected from seven schools of the region to measure the physical fitness level. It was also established on the basis of scores obtained from test results from these schools. These norms were compared to national norms found in the manual accompanying the AAHPER youth fitness test. The results of this study gave an indication of the overall fitness level of 14, 15, and 16 years old Navajo girls of the seven test items. The Navajo norms were below the national norms on five items and above on the softball throw and 600-yard run-walk.

Grand et. al (2000) had made a study on relation ships between physical activity, physical fitness, muscle strength and nutritional state in 5 to 11 year old children. The purpose of the study was to assess different aspects of physical activity and fitness in order to develop a basis for sport programmes for overweight and obese children. Eighty-eight pre pubertal children (49 boys, 39 girls, 4.8-11.4 years old, 61% obese, 14% overweight and 25% normal weight) were examined. Children were grouped according to their nutritional state. The result shows that overweight and obese children were less fit and watched more TV than their normal weight counterparts. Fat mass did not correspond to total energy expenditure, activity-related energy expenditure or physical activity level. Muscle strength was not associated with fat mass in young children, but was inversely associated with fat mass in older children.

Yadav and Singh (1999) had made a study on Nutritional status and dietary intake in tribal children of Bihar. The objective was to assess the dietary intake and nutritional status in children of the tribal areas of Bihar. Study covered 396 villages from 17 tribal districts of Bihar. Subjects for the study were 1847 preschool children
(0-6 Years) were studied. 24 hours recall method was used to assess the nutrition intake and anthropometric measurements included height and weight. Nutritional intake was compared with Indian Council of Medical Research recommended dietary allowances (RDA) and nutritional status assessed by SD classification. The overall prevalence of stunting was about 60% and underweight about 55% and was comparable in boys and girls. However, wasting was more frequent in girls (urban 34.5% vs. 16.3% and rural - 34.9% vs 18%). The level of malnutrition was not very different in rural and urban areas. They concluded that the nutritional status and dietary intakes of tribal children in Bihar is very poor. Urgent remedial measures are required in this context, particularly on a war footing in especially vulnerable districts identified by this survey.

Gowri and Manjusha (2003) had made a study on Nutritional Status of Street children. 100 children aged between 8-15 years with 50 children each (37 boys and 13 girls) from Rajamudi, East Godavari. A sub sample of 20, ten each from the street and institutions represented by equal of boys and girls were selected to assess their hemoglobin status. The nutritional status of these children was assessed through, anthropometric measurements, dietary survey and biochemical assessment. Weight of the children was obtained by using portable weighing scale. Height was measured by the use of stadiometer and by using fibre measuring tape, mid arm circumference was obtained. The street children on the whole were obviously under weight for their age. The 13 to 15 year category of both boys and girls had recorded weight deficits of 44 and 38 per cent respectively as compared to the ICMR reference values. This age category seemed to have the highest deficit indicating progressive deterioration in the
nutritional status of these undernourished children. The weight deficits of boys were found to be increasing with advancing age. Thirty three per cent weight deficit was recorded by boys of 10-12 years, while it was only 23 per cent for girls of the same age category. The predominant weight deficits observed among the street children might have been due to the non availability of optimum amounts of food primarily because of economic constraints.

Kumari and Singh (2003) conducted a status Study of Nutrition on Scheduled Caste Adolescents from Deprived Section of Society. A sample of 100 deprived section families having one adolescent (13 to 18) years was randomly selected from these families. 143 adolescents comprising 75 males and 68 females were selected from Samastipur district in North Bihar. Anthropometric measurements taken were height and weight. Clinical symptoms and hemoglobin level were recorded with the help of a medical personal. Information on food intake patterns was collected through 24 hours recall method by using a set of standardized vessels. The mean weight, height and BMI were selected as variables and these mean values showed that adolescents were underweight. It was observed that 26.6% of the male were severely malnourished with grade 3 chronic energy deficiency and 27.9% of females had grade 2 11% male and 8.8% females were malnourished. About 42.7% male and 36.8% female were in the normal category.

Gadra et al (1973) had revealed that tribal children of Madhya Pradesh compared equally with non-tribal children in weight, head and mid arm circumference and had smaller heights and greater chest circumference. A comparative study of the weight pattern of pre-school children of Tangkhul Naga tribes in the hilly area and the
Meetei and Muslim in the valley of Manipur revealed significantly higher mean weight for the tribal children than others probably because of higher consumption of flesh food [Lurwang, 1981]. Chandrasekharan and Aswathi [1982] compared the nutritional status of urban, rural and tribal pre-school children in Udaipur and found that malnutrition was more or less uniform among females where as there was a distinct difference among males because of the maternal preference. According to the authors the percentage of children below 30 percent of the Harvard standards for their mean weight and height was more in tribal areas than in rural and urban.

Kallas et al (1991) conducted a study to evaluate nutritional status of children under 10 years of age. 520 children living in slum in the city of Sao Polo were selected as the subjects. The weight-for-age index revealed the following results: atrophy, 46.9 percent; PCM I: 42.8 percent; PCM II: 9.9 percent; PCM III: 1.1 percent. The height-for-age index revealed the following results: eutrophy79 percent; PCM I: 15.9 percent; PCM II: 3.4 percent; PCM III: 1.5 percent. According to the Secane - Latham criteria the following results were formed. Eutrophy 43.1 percent; balanced chronic malnutrition19.1 percent; acute malnutrition 24.6 percent, evolutes chronic malnutrition 9.2 percent; and chronic malnutrition in recovery 4.0 percent.

A study on 600 school children aged 7-13 years by Haithmi et al (1989) to find the nutritional status and growth. The result showed that body weight, body height, mid arm circumference and triceps skin fold thickness are almost linear with increasing age among the studied group. Generally girls showed significantly higher values of all studied anthropometric measurements than boys above 11 years. Following the approach of Waterlow's classification, the percentage of under
weight, stunting, and concurrent wasting, and stunting were found to be 8.9 percent, 25.8 percent, 22.2 percent, and 2.9 percent respectively.

Gupta (1989) had studied the health status of rural school children of either sex between the age group of 5-17 years and had revealed that only 19% girls had weight equal to 80% of Hardward standards. The mean height of these children was 90-94% of Hardward standards.

Dettwyler (1992) conducted a study on anthropometric assessment on adults from six rural villages in Southern Mali. Mali is typical for human popula...

females are shorter and lighter than males. Both females [N=320] and males [N=121] are shorter and lighter than their U.S counter parts. Mean weight in the sample is 53.4+/-8.5 kilos for males and 58.8+/-6.5 kilos for males. Mean height is 160.4+/-5.7 centimeter for females and 173+/-6.6centimeter for females. The data for height in males are very similar to those reported from other surveys in Mali and show no evidence for a positive secular trend in height. Mean body mass index [BMI] is 20.8 for females and 20 for males. Average arm circumference is 26.5 centimeter for females and 26.4 centimeters for males. Adult values for anthropometric measurements reflects child hood stresses of malnutrition and disease and a life time accommodation to a high carbohydrate, low protein -diet hard physical labor.

Females are significantly closer to the U.S standards than males for weights, height, B.M.I and arm circumference. In addition females exhibit significantly more variability than males for weight, arm circumference, and head circumference, but not for height; suggesting that variability in adult height does not reflect the presence or absence of females buffering or the level of environmental adversity.
Bernard (1991) compared the anthropometrical measurements of Caucasian and Negro boys and girls. The selection included 75 Caucasian boys, 75 Caucasian girls, 75 Negro boys and 75 Negro girls. He noted that although there are significant anthropometric differences between boys and girls and Negro and Caucasian, these differences do not warrant separation by race and/or sex for purposes of educational instructions.

Kiyu (1991) investigated the nutritional status of children in rural Saravak, Malaysia. For his study the nutritional status of 641 children between the age of 0-4 years of old age, from 835 households in 45 randomly selected rural villages with water supply in Saravak were determined. Based on waterlow's and the National Centre for Health Statistics (NCHS) standards, 61% of children were stunted 41% were wasted on Gomaz’s classification and NCHS standards 81.9% of the children were mal nourished. There was no sex differences in nutritional status. The percentage of the mal nourished children increased continuously with age while the percentage of the children who were wasted increased from 6-36 months and then it leveled off. The percentage of stunted children also increased with age but the increase was sharpest in children who were 12-23 months old. It is noted that the Gomez’s classification over estimate the prevalence of under nutrition.

A study was conducted by Villal Pando (1992) in nutritional status of nation wide sample of rural Mexican population. The investigation evaluates semi-longitudinally the nutritional level of a sample of the rural population of Mexico. A total of 151,552 individuals in 2,587 households from 208 rural communities were
evaluated. The body weight and height of rural boys and girls were found to be significantly lower than in their urban counterparts. Severe forms of weight for age or height for age inadequate were more frequent in females than in males, in smaller communities than in larger ones, and in economically depressed zones than in those with a good economy. The data showed a lower frequency of mild and moderate forms of possible malnutrition than previous studies (20 Vs 50 per cent). Using as a criterion weight for age these differences are explained on the basis of sampling bias.

Heywood (1991) made a study on motor development and nutritional status of young children in Madang. He found the relationship between the nutritional status and motor development through a cross sectional study of 457, 0-2 year old children in Madang, Papua New Guynea. The median ages at which the major motor developmental milestones are attained are almost comparable to western populations up to 6 months of age. However, crawling and independent walking are slower to develop at any given age, children of higher nutritional status by weight for age, length for age or weight for length were more likely to have attained a given developmental stage than children of lower nutritional status.

Groos and Smith (1992) in their study on age at Menarche and associated nutritional status variables in Karimui and Daribi census divisions of Simbu Province in 1987. The subjects for the study were 310 girls and young women from the same province. The nutritional status variables investigated and found to be associated with the age at menarche are height, weight, and triceps skin fold thickness. At any given age girls whose nutritional status was better, particularly in terms of weight, were more likely to have commenced menstruation. Menarche appears to be followed
closely by onset of reproductive function, with the age at the birth of first children at the age of 17.2 years. A consequence of early entry into reproduction particularly for girls in areas where undernutrition is common.

Mony (1993) studied the anthropometric measurements of adolescents in the age group of 16-18 years indicated that weight for age and height for age of adolescent boys and girls were below the NCHS standard as well as the Indian standards.

Chopdar and Mishra (1980) had conducted a study on health status of rural school children in Orissa, they observed from their study that the height of the children were higher than the National Standard. Swaminathan et al (1971) made a study on Health survey of the Onge tribes of Little Andaman subjects for the study were tribal boys and girls up to the age of 15 years old. The weight-for-age classification showed that the children up to the age of 15 years were higher weight than the standard. Sarupriya and Mathew (1987) had made a study on scheduled tribes in Gogunda Village, Rajasthan revealed that 86% of the children had normal weight for age and the rest had more height than the expected standard.

Gore et al. (1977) found that 40 percent of the tribal children in the Indravati river basin were under weight while no children were found to below the critical limit for height. Choptar and Samel [1979] had revealed that 57.58 percent of the child beneficiaries of Subdega tribal ICDS project in Orissa were malnourished.

Leelaraman (1990) found that large percent of rural poor and urban girls had weight deficit by 75% of NCHS standard as compared to upper middle income where only 20% deficiency existed. Nedberg (1990) conducted several studies and demonstrated inferior anthropometric status and higher neutrality among girls than
among boys in South Asia. The data showed that anthropometric status of females of sub urban African of were better than that of males.

Solars and Lifshitz (1992) studied body weight progression and nutritional status of patients with familiar short stature with and without constitutional delay in growth. The study was to determine whether affected growth deceleration in patients with constitutional delay of growth, retrospective weight and growth data and a cross sectional nutritional assessment was performed. Patients studied included 52 constitutional delay of growth children with delayed bone age and 15 children with familial short stature with out bone age delay. Body height and length-height progression were evaluated from birth to 12 years using z scores. Significant differences were noted between patients with constitutional delay of growth and familial short stature in their weight/length ratios and weight/height ratios profiles from 4 months to 12 years.

According to Swaminathan (1986) nutritional status is the health status of an individual is influenced by the intake of essential nutrients. The distribution of children on the basis of nutritional status index developed, revealed that majority of the boys and girls had low to medium nutritional status. Among the different age groups, better nutritional status was observed among 13 to 15 years boys and girls. For boys the mean nutritional status index was found to increase. However, in the case of girls, a contradictory result was obtained up to 12 years, and 10 to 12 years had the lowest nutritional status probably due to the psychological changes, which occur in the body during that period. Birth order of boys was found to influence the nutritional status of children.