CHAPTER - II
REVIEW OF RELATED LITERATURE

In this chapter an attempt has been made to take cognizance of studies which have relevance to the present problem of the study.

The review of research reports related to the present study that the research scholar could gather are presented in this chapter in order to provide the background material to evaluate the significance of this study as well as to correlate its results.

For the synopsis purpose the review of related literature was limited in scope. After reviewing the related literature what must obvious the researcher has found that there was no agreement on as well as no crystal clear classification of the component factors of motor performance, motor ability, motor capacity, motor fitness and physical fitness. The said disagreement and impure classification of the concerned factors are first brought forward here. For example:

Clarke (1978) has given following chart regarding the components of movements:
Figure 2.1 Chart of Physical and Motor Fitness Elements

Barrow (1977) has included following components of motor movement: Strength, speed, endurance, agility, balance, flexibility, coordination, kinesthetic sense, and accuracy.

Barrow and McGee (1978) stated that strength and endurance, however, are not the dominant factors in motor ability that they are in motor fitness.

Barrow (1954) developed a test for measuring motor ability for men and purpose of the studied was to develop an easily administered test of motor abilities for college men. Expert opinion was used in the validation process and eight factors of motor ability and Twenty Nine items measuring those factors were chosen. Tests were administered on 222 college men and through statistical
analysis norms, profiles and directions of administration of tests were developed in a form of test manual.

Johnson et. al. (1966) excluded flexibility, endurance and strength from motor ability and they have listed them under health and physical fitness factors. They have further listed motor performance factors as speed, power, agility, balance, reaction time and coordination.

Fleishman (1964), in his book on 'the structure and measurement of physical fitness’ has intensively as well as extensively studied and found the following factors: explosive strength, dynamic strength, static strength, trunk strength, extent flexibility, dynamic flexibility, gross body equilibrium, balance, speed of limb movement, gross-body coordination, stamina, multi-limb coordination, control precision, response orientation, reaction time, rate control, manual dexterity, finder dexterity, arm and hand steadiness, wrist-finger speed, and aiming.

Clayne and Hirst (1980) have mentioned the fitness factors as strength, endurance, flexibility and motor performance factors as power, agility, speed, reaction time and balance.

These references bring out the discrepancy in naming components and their classification. Clarke has mentioned nine factors for motor movement. Barrow has included two more factors.
Barrow and McGee have excluded two factors namely, strength and endurance from motor ability. Johnson et al. have excluded one more factor that is flexibility and added one more i.e. reaction time. Clayne and Hirst agreed with Johnson et al. on fitness factors abut have removed coordination from the motor performance factors listed by Johnson et al. Fleishman has found twenty one factors, eleven of physical fitness and ten of motor ability.

The second glaring observation of this researcher through various research studies done so far that very few studies dealt with rural areas and school going children with different topographical and socio-economic background.

In the contest of Nepal, very few research studies have been done in physical education. Developed countries have widely studies in this field so that they had become/achieved higher level of fitness and sports performance. Whatever studies available in the library has been tried to summarize hereunder.

Baruwal and et. al. (1980) had compared motor fitness between the boys of general school and sports school of Amravati in the age group 11-13 using three test items as standing broad jump, potato race and bar snap and found no significant difference in their motor performance.
Maharjan (1984), found no significance difference in motor ability performance among the fifteen to seventeen years boys from urban and rural area, three test items were used for this study; they were obstacle race, Basketball throw and Broad jump.

Maharjan (1985), in his study about physical fitness and found highly significance difference in the motor fitness between the boys of Boarding and General schools under the age group of 14-15 years. Test items used were vertical jump, Chin-up and shuttle run.

Jha (1990), in his study, results showed that there were significant difference of all three grader boys of Terai, Hill and Himalaya regions but the fitness norms developed for Nepal was very much poor in comparison to European level of physical fitness. Test items used were push-ups, sit-ups, Harvard-step test and 50m-dash.

Singh, Kundan (1990) had studied to compare motor fitness among the schools boys of India and Nepal residing in same hostel in public secondary school, Delhi. He had concluded through his findings that Nepalese boys were superior in motor fitness performance by applying JCR test of motor fitness.

Shrestha (1999), studied on motor ability among the boys of boarding and public school and found that there is no significant difference between the boys of two schools under study. They were
from fitness to sixteen years age group and applied test items were standing broad jump, Zig-Zag run and 6 lb. medicine ball throw.

Maharjan (2000), in his study it was concluded that there was no significant difference among the Basketball and the Kho-Kho players, even then it was observed that Basketball player were faster in speed and better in sit-ups, vertical jump and pushup then the Kho-Kho players among the 12 items used to measure fitness level of the players.

Perbix (1950) studied relationship between somatotype and motor fitness in women. Four motor fitness tests were given to 83 physical education majors and approximately 100 non-majors who had been somatotyped by Sheldon. Correlation between test scores and somatotype components were computed by determining the means and standard deviations of each component. It was found that the physical education major group tended to have slightly more dominant mesomorphic traits. Significant relationships were indicated between mesomorphy and strength and power. Inverse relationship was indicated between endomorphy and strength and power.

Sills (1950) studied to (a) analyze the relationships of body components to the performance of motor skills; (b) analyze the relationship of the components endomorphy and ectomorphy to one
another, and (c) analyze the relationship of these three components endomorphy, mesomorphy, and omonomorphy were identified as discrete factors. Ectomorphy was not identified as a separate factor, but as a negative aspect of endomorphy and mesomorphy.

Everett and Sills (1952) studied the relationship of grip strength to stature, somatotype components, and anthropometric measurements of the hand. Four hundred students ranging in age from 14 to 29 years (less than 6 percent over 20 years of age) were measured. It was evident from the results that the variables of weight, height, the mesomorphic component, and an anthropometric measurement of the hand all contributed to the higher multiple correlations with hand grip strength. When any one of these variables was deleted, a significantly lower correlation resulted, thus indicating that each of these variables was sufficient importance to merit consideration in future studies of hand grip strength. The use of only anthropometric measurement of the hand proved to be adequate since the use of more than one added little or nothing to the multiple correlations.

Burley and Anderson (1955) found that power as measured by jumps and reach test is closely associated with athletic success. They reported that power is more closely associated with track, Swimming, Basketball and Baseball than to Boxing, Wrestling,
Hebbelinck and Postma (1963) analysed anthropometric measurements, somatotype ratings, and certain motor fitness tests of physical education majors in South Africa. Selected anthropometric measurements and somatotype ratings of physical education majors were studied and their relation to the performance of certain motor fitness tests determined. The anthropometric data showed a predominant trend towards the athletic type as described by Kretschmer. The mesomorphic trait was the most distinctive feature of the subject's somatotype. The mesomorphs were superior in all motor fitness tests except in 60 yards dash and the ectomesomorphs excelled the endo-mesomorphs in all tests except the shotput.

Nicolau (1966) conducted a study through a basic fitness tests developed by Fleishman which were administered to the 1964 varsity football squad at the University of Bridgeport before and after the pre-season conditioning programme as an index of football fitness. Half of the players used the traditional programme consisting of a short jog, stretching exercises, push-ups, sit-up, leg raises, toe touching, neck bridging, grass drills and running in a circle at top speed over players who were lying down. The other half used the circuit training principle with vertical jump, push-ups, leg lifts, squat
thrust, step-up, bent arm hangs, grass drills and dip at the 8 station. The circuit training group improved significantly while the traditional group did not, but differences in improvement were not significant.

In a study by Phillips (1967), the comparison of motor ability, physical fitness, body image and attitudes towards physical education, resulting from one semester participation in basic skills or selected ability courses, showed mixed result and no consistent pattern favouring either type of programme. Either type of course appeared equally valuable in the physical education curriculum.

The purpose of Lee's (1972) study was to compare the effects of elementary courses in volleyball, soccer, tennis and conditioning of selected physical fitness tests. Seventy seven subjects were divided into four groups and met twice a week for a period of twelve weeks. The findings of the study indicated that i) all of the four activity groups improved their score to some degree on all of the nine selected tests items (right and left) hand grip, the vertical jumps, the standing broad jump, the sit-ups, the push-ups, 50 yard dash, the 60 yard shuttle run and 880 yard run/walk; ii) the soccer group showed significant improvement of five of the test items (the vertical jump, the standing broad jump, the pull-ups, the 60 yard shuttle run and 50 yard dash) at .05 levels; iii) the volleyball group showed improvement at .05 levels on the test on 50 yard dash; iv) except 60 yard shuttle
run, no significant differences were observed in the physical performance among the four groups and v) Soccer group was found better than volleyball group in the improvement of the 60 yard shuttle run.

Kalpana (1981) compared certain physiological and physical variables of Gymnasts and football players. The subjects were sixteen male gymnasts from Central Reserve Police (C.R.P.F.) gymnastic team and 16 football players of the inter university from L.N.C.P.E. Gwalior. The variables were resting heart rate, fat content (skinfold thickness), hyman index, Harvard step test, 50 meter dash, leg strength and grip strength. Mean difference of both the groups were tested for significance of difference by ‘T’ test. The study revealed that gymnastic exercises have got superior training effect on development of leg strength, hyman index and reduction of body fat; whereas football can influence more in developing cardiovascular endurance and speed better than in the case of gymnastic training and practice; and gymnastic and football are having more or less the same influence on resting heart rate and grip strength.

Joseph (1983) studied the relationship of power, agility, flexibility, measurement of selected body segments to volleyball playing ability, taking thirty volleyballers and found that power was the most reliable
single variable in predicting playing ability in volleyball; arm length and leg length also were reliable. Flexibility and agility showed insignificant relationship to the playing ability.

Mall (1985) conducted a study to compare the physical fitness of the woman gymnasts and woman hockey players at the inter-college level affiliated to Guru Nanak Dev University, Amritsar. The age of the subjects ranged between 16 to 20 years. The N.P.E.P. test was administered to obtain the physical fitness score. The mean values were calculated for both the groups. Woman gymnasts were found more physically fit as compared to the woman hockey players. There was much difference in jumping ability as measured in the woman gymnasts and woman hockey players.

Uppal and Roy (1986) made an attempt to predict soccer playing ability of University boys with the help of motor fitness components. They administered 5 tests for motor fitness components namely speed (50 mts. dash), agility (4 x 10 mts. shuttle run), maximum leg strength (leg dynamometer), explosive leg strength (standing broad jump) and cardio respiratory endurance (Cooper's 12 min. run/walk test). They had concluded that all the motor fitness variables (speed, agility, maximum leg strength, explosive leg strength and cardio respiratory endurance) are significantly related to dependent variables (soccer playing ability).
and the soccer playing ability can be predicated with the help of developed prediction equation.

Scriber and Clark (1986) studied on measurements of selected physical fitness components in college football players during periods of training and detraining. The purpose of this study was to evaluate a college football conditioning program by investigation selected components of physical fitness. This assessment was made by measuring changes in body composition, cardiovascular endurance and muscular strength in college football players during various periods of training and detraining. Subjects were 43 members of 1984 Ithaca college varsity football team that were placed into 4 groups based upon playing position. Data were obtained for 8 linemen. Body composition (percent body fat) was determined with a Skyndex electronic skinfold caliper programmed for a formula developed by Jackson & Pollock (1978). Cardiovascular endurance (VO₂ max.) was determined from a sub maximal bicycle ergometry test based upon the Fox (1973) protocol. Upper and lower body strength was determined by a single maximum lift for the bench press and the squat press. Measurements were taken at 5 intervals during an 8 month period between July 1984 and March 1985. Testing periods were taken at the beginning, middle, and end of the regular playing season and
before and after a 6-week winter conditioning program. Analysis of data consisted of a 4 (group) x 5 (time) repeated measures factorial ANOVA designs for each variable. A post-hoc Tukey test for HSD was used for all significant F-scores (p < .05) to determine specifically where significant differences occurred between groups and/or over time. Significant differences were found between groups for body composition and cardio-vascular endurance and upper and lower body muscular strength. It was concluded that the pre-season, in season and off-season conditioning program met the objectives for the variables studied.

Dey and Dey (1987) studied selected anthropometric measurements and physical fitness components of offensive and defensive players in football and found that defensive players have significantly higher leg length, thigh girth, weight than of offensive players.

Mann (1989) in a comparative study concluded that the significant differences among the gymnasts, volleyball and badminton players were according to their nature of activity. It was found that gymnasts were significantly superior in the test of sit-ups, flexed arm hang and standing broad jump in comparison to volleyball and badminton players, whereas badminton players were found significantly faster in shuttle run, 50 yard dash and 600 yard run, than their counterparts.
Singh Ajmer (1986) had studied as Normative study of physical fitness of Punjab University men students and found that the students belonging to the rural areas were significantly superior in their performances on different items of Fleishman's physical fitness test battery when compared age-wise students from the urban areas.

Rajni, Negi and Singh (1994) studied on effect of break in training and re-training on physical fitness and technical skill of football players. The study was conducted to investigate the effect of four weeks training break on the body weight, percentage of body fat, components of physical fitness and technical skills of 21 male footballers undergoing a ten-month regular diploma course at Netaji Subhash National Institute of Sports, Patiala. Results revealed that break in training had produced significant deterioration in the explosive strength of legs, strength of the abdominal muscles, agility, endurance and the flexibility of the subjects. Technical skills of specific kicking, 10 yard dribbling and 6 x 50 yard dribbling also deteriorated significantly due to the break in training. Performance of the Players in 40m dash, medicine ball put and throw for distance through deteriorated due to the 4-weeks of detraining yet the difference to be confirmed.
Kunnas and Karvonen (1964) chose a battery of seven tests and applied it on the boys of four secondary schools in Halsinki and in Lathi. The battery was called “Every man’s fitness test” and consisted of step-test, sargeant jump, chining, push-ups, side leg raising, alternative knee touch-hips and forehead knee-touch. However, it was a ‘hard test’ and caused muscle soreness on the following.

The results of the test invited few comments:-

1. The recovery of the heart rate after exercise showed no age trend.
2. In sargeant jumps, Chining, push-ups and leg raising, the results improved with age.
3. The results on the other tests were irregular.

Hunsicker and Reiff (1966) compared the physical fitness level of American boys and girls during the year 1965 with those of students attending school during 1957-58. The fitness of the subjects was measured by AAHPER Youth Fitness Test for boys and girls. The results of the statistical analysis included: percentile scores based on Nelson-Cozens classification index were also determined for each test and for both sexes. It was observed that the physical fitness level of
public school children grade 5-13 in 1965 was above than that in 1958.

Boone's (1967) purpose of the study was to find out fitness of urban and rural boys. The result of the study showed that urban boys were superior to rural boys and difference between the two was significant at .05 level of confidence. It was further concluded, that two sample were weaker in the same components of physical fitness.

Busch (1970) made a normative study of the AAHPER Youth Fitness Test in grade seven through ten in the state of South Dakota. He found that the medium scores of South Dakota girls were higher than those of national girls in all items except the flexed arm hang.

A comparative study was conducted by Dahl (1971) to determine physical fitness differences between Negro and white boys. Sit-ups, standing broad jump and softball throw tests were used to measure the level of physical fitness on two hundred subjects. It was found that the Negro boys were significantly superior to the white boys on over all physical fitness level.
Johnson (1971) found whether the Negro students differed significant from the white students in terms of physical fitness and self concept. One hundred and thirty-five, eight and nine grade students were tested. Among them seventy nine were whites and sixty six were Negroes. Mean, SD,'t' ratio probabilities were conducted for all the variables and the results were as follow.

1. Negro junior high school boys were superior to white junior high school boys in terms of strength and cardio-vascular endurance. The strength items were statistically significant at .05 level of confidence.

2. There was no significant difference between Negro and White male junior high school students in terms of flexibility, co-ordination and balance.

3. Eight grade students were superior to nine grade students only in terms of explosive strength and static strength.

Veeraswami (1973) conducted a study to evolve physical fitness norms for higher secondary school of greater Gwalior. It was concluded that in all items except pull-ups of the AAHPER Youth Fitness Test, the mean score in Indian boys in all age groups were lower than the percentile of American norms. There was a positive but low order of relationship between physical fitness and
participation in physical activities. There was a positive low correlation ($r=.13$) between physical fitness and academic achievement.

Brar (1975) compared the physical fitness of the different socio-economic groups. It was concluded that the socio-economic difference did not have any effect on physical fitness of an individual. But the subject belonging to the lower socio-economic groups were as good as subjects belonging to the higher socio-economic group.

Andrews (1976) undertook a comparative study of physical fitness of South African and Canadian boys. One-minute speed sit-ups, standing broad jump, shuttle run, flexed arm hang, 50 yards dash and 600 yards run/walk test variables were administered. It was found that the South African boys were significantly superior in physical fitness level than Canadian boys.

Backford (1976) conducted this study to evaluate the physical fitness level of Navajo girls 14 to 16 years old. 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 was a par to the national norms on 5 items and above on the softball throw and 600 yards run-walk.
Mall, N.N. and Paul (1976) investigated and analyzed physical fitness of high school students and found that the relationship (if any) of their physical fitness to socio-psychological variables. The results was that physical characteristic of height and weight of three selected groups (13, 14 and 15) with high academic achievement did not show any significant differences.

Physical fitness norms for Nigerian boys and girls of 11 to 18 years of age were constructed by Anyanwa (1977) 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 minute run for subjects 13-18 years. A comparison of the mean scores of the United States and the Nigerian youth showed that at the upper age levels, the United States youth had better physical fitness status than their Nigerian counterparts, whereas at the lower level there was much differences between the two groups.

Zuti and Corbin (1977) established physical fitness norms for college freshmen. They took 3000 freshmen of Konsas State University from the age of 17.6 to 19.5 years. The tests were conducted for strength, flexibility, body composition and cardiovascular fitness. The results appeared to indicate that college
freshmen at Kansas State University were of standard and as similar to the average American.

Mookerjee (1978) made a comparative study of physical fitness of young boys in the age of 13-17 years belonging to rural and urban and also less active boys of the same group. It was established that regular physical activity contributed significantly to the enhancement of physical status. Physical fitness of rural active subjects was definitely of superior level than the boys living in the city. Pure food, fresh and unpolluted air and reasonable regular hardship were chief contributory factors in promoting physical fitness.

Tateja (1978) conducted a study to find out the comparison of physical fitness of rural and urban school students of Delhi. It was found that in AAHPER Youth Fitness Test mean of the urban high school students was higher than the rural high school students, where as the means of the rural high school students were slightly higher than the means of the urban high school students in the NPED test. It was also found that there was no significant difference in physical fitness level of rural and urban high school students of Delhi.

Kiesel (1978) determined the relationship between physical fitness knowledge and the physical fitness level of the young adult
males and senior high school boys, aged between 17 to 30 years. A low and significant positive linear relationship was found between the knowledge of the factor pertaining to physical fitness and a person’s physical fitness level. The curvilinear correlation was calculated between physical fitness knowledge and physical fitness level and was found to be insignificant.

Ray (1979) compared the physical fitness of the tribal and the urban students in Tripura. It was found that urban tribal students were better in pull-ups and softball throw for distance and their performance was significant at .05 level of confidence. But the remaining five test items i.e. 50 meter dash, 600 meter run/walk, sit-up, shuttle run and standing broad jump, the performance of none of the groups was found, statistically significant at .05 level of confidence.

Chandrashekar (1981) conducted a comparative study of physical fitness components of football and basketball players by measuring speed, flexibility, leg explosive strength, gross body coordination and cardio-respiratory endurance of the player and concluded that:

1. The basketball players were comparatively superior to football players in the extent flexibility and dynamic flexibility:
2. The football players were superior in leg explosive strength, abdominal strength and gross body coordination.

Sittmaun (1981) developed norms for 372 male and 648 female students enrolled in the health and physical fitness concept classes of North-East Missouri State University. The subjects were tested for the sum of 6 skinfolds, predicated 1% fat, predicated vo2 max, grip strength, leg strength, back strength, vertical jump for distance and vertical jump for power. Mean standard deviation and range for all variables were recalculated. Percentiles in increments of five were constructed for each variable in each classification.

Thiruppathi (1982) computed physical fitness norms for the boys of junior college in Sholapur district. American Alliance for Health, Physical Education and Recreation AAHPER Youth Fitness Test was administrated on them. The two scale namely ‘t’ score and hull-scales were constructed for the combined samples of the junior college and separately for class 11th and 12th boys.

Taddonio (1982) compared the physical fitness of public school students from economically backward areas with national norms; and also made a comparison of the physical fitness of public school students from high poverty areas with those from low poverty areas. AAHPER Youth Fitness Test was used to measure the
physical fitness of the subjects. The result revealed that there was no difference in physical fitness of boys or girls from the economically deprived sample and boys and girls represented by the 1975 national norms. No differences were found in physical fitness of boys or girls from the high poverty areas and the low poverty areas.

Maity (1983) made a comparative study of physiological and physical fitness variables between tribal and non-tribal high school students of Murakatha Nehru Vidya Bhawan in Midnapur district of West Bengal. The subjects chosen for the study were between the ages of 14-17 years. It was observed that the tribal students were significantly superior in peak respiratory flow rate, speed, endurance and anaerobic power than the non-tribal students of same age groups.

Sandhu (1983) investigated differences if any, in rural and urban students of district of Amritsar. Fifty subjects each from rural and urban areas were selected for the purpose of this study. Statistical significant differences were found in rural and urban student's when t-test was employed. Further the study revealed that rural area students were more fit than urban students of Amritsar in these tests of the study.
Kaur (1983) conducted a study related to the comparison of physical fitness of public school and government school girls. She concluded that the students of public school were physically more fit as compared to the students of the government schools girls.

Devi (1984) constructed motor fitness norms for secondary school girls. For this purpose she selected eighty students of Central School No.1 Gwalior, from grade eight and nine. It was concluded that a common scale of AAHPER Youth Fitness Test could be used for the grades eight and nine and Sigma scales and Hull scales were more suitable than the T-scales.

Robins (1985) made an attempt to develop percentile norms for Albanian students in grade 1-9 based on their performance on both the AAHPER Youth Fitness Test (YFT) and AAHPER Health Related Fitness Test (HRFT). The result indicated that Albanian students performed better on events measuring agility, speed and cardiovascular endurance. The national group performed better on events measuring abdominal muscular endurance and flexibility.

Scriber (1985) conducted a study to evaluate a college football conditioning programme by investigating selected components of physical fitness. It was found that there was significant difference between groups for body composition and cardiovascular
endurance. Significant changes occurred over time in the entire group for body composition, cardio-vascular endurance and upper and lower muscular strength.

Kim (1986) investigated the relationship between the Korean Youth Fitness Test (KYFT) and the AAHPERD Health Related Physical Fitness Test (AHRPFT). Four additional relationships between the tests after changing an item or items from one or both of the tests were also investigated to find information about the nature of the tests, or a motor fitness and a health related physical fitness test. Three hundred Korean male students of grades 7th to 11th were the subjects. The middle school students were less homogeneous in their performance than the high school students and the correlations between the KYFT and the AHRPFT were higher for the middle school students than for the high school students. There was a significant relationship between the KYFT and the AHRPFT for the middle and the high school students. The highest correlation among the five co-relational comparisons were found between the KYFT and the AHRPFT.

Singh (1986) prepared physical fitness norms for high school boys of Punjab state. Data were collected on five thousand subjects from the various schools in the state. The test administered,
consisted of eight items: i.e. standing broad jump, sit and reach test, agility run, sit ups bent knee, 50 meters dash, push ups (chairs), cricket ball throw, 600 meters run / walk. The percentile norms for physical fitness tests were found to be valid and suitable to assess the physical fitness level of the high school boy's ages 12 to 15 years of their age.

Singh (1986) conducted a normative study of physical fitness of Panjab University men students. The analysis further revealed that the students belonging to the rural areas were significantly superior in their physical fitness compared to the students belonging to the urban areas. It was also observed that sports and other form of physical activities are more popular with this group of students. Result revealed that significance differences exist for three experimental groups in the 9 minute run and one experimental group in sit and reach. Significant differences were shown between sexes in the fifth grade control group in all three tests.

Morgan's (1987) studied second and fifth grade students who were involved in a eight weeks, five to ten minutes physical fitness programme. Four experimental and two controlled groups were pre-tested and post-tested in 9 minute run, sit-up and sit and reach. Results revealed that significance difference between the three
experimental groups in the 9 minute run and one experimental group in sit and reach. Significant difference was shown between sexes in the fifth grade control group in all the three tests as well.

Abdulnaur (1988) compared physical fitness of secondary school students in Kuwait and America. AAHPER Youth Fitness Test was administered to 6502 between age group of 14 to 17 years. The results indicated that the boys and girls in Kuwait demonstrated low levels of physical fitness than American boys and girls.

Singh (1988) constructed a physical fitness norms for male teenagers of Jammu and Kashmir state. The study concluded that the students belonging to age-group 16 to 19 years showed better performance in all the test items over the teen age-group of 13-15 years.

Kaur (1989) made an attempt to prepare percentile norms of physical fitness for high school girls of Punjab State. Fisherman's Test Battery was administered. The data were collected from randomly selected 4000 subjects studying in different schools in Punjab State. The result indicated that there was significant difference in rural and urban students of Punjab state.
Aujla (1990) studied the differences in physical fitness, if any, between Jat Sikh girls living in rural and urban areas in Punjab. The results of the study revealed that urban girls were slightly better in physical fitness than Rural girls. Further, the results showed that rural girls were better in 100 meters, 200 meter run and vertical jump. But urban girls were better than rural girls in shot-put.

Ingico (1990) made a study to determine and compare fitness levels of children enrolled in daily and weekly physical education programme. The most significant finding was that daily physical programme scored significantly better on each health related fitness items, across the grade and gender than weekly program of physical education.

Rimmi (1992) conducted a study to see the differences between urban and rural students of Patiala district. The results of the study showed no significance difference in age and weight, but significant difference was found in height. Urban males were superior in SRJ, rural were superior in 50 meters dash: and in endurance, but in general term rural girls were superior to urban girls.

Chandel (1993) conducted a study to compare the selected physical fitness variables and anthropometric measures of tribal and non-tribal students of Himachal Pradesh. In all tests and
measurements, the composite mean scores of tribal students were higher than their non-tribal counter-parts but none of the difference in the means was found statistically significant at 0.05 level of confidence.

Singh (1993) conducted a study of physical fitness status of students of department of physical education, Panjab University, Chandigarh and Kurukshetra University, Kurukshetra. He collected data on 34 male subjects and 27 female students by using AAHPER Physical Fitness Test. The students of Kurukshetra University were found superior on overall physical fitness status where as girls of Panjab University were significantly better than Kurukshetra University in speed and agility components. However, no significant differences were observed in the overall physical fitness between the subjects of both universities.

Tyagi (1993) developed physical fitness norms for boys and girls in grade 9 to 12 of Delhi state. Analysis of the data revealed that this study exhibited no significant differences in physical fitness across age in both boys and girls. It was also observed that physical fitness was significantly correlated to height and weight in the case of boys and not in the case of girls.
Singh (1996) constructed physical fitness norms for primary school children on Glover (1967) physical fitness test battery. He concluded that no significance difference found in any age group 6-11 years in standing long jump. In shuttle run, urban children were superior than rural children in age group 6-7 years. In sit ups, urban children were superior than rural children and in seal crawl, rural children were superior than urban children.

Sharma (1997) constructed motor fitness battery for elementary school children of Delhi (UT). He concluded that advancement in age has been found related with better performance in all variables, except toe touching variable. Percentile norms have been promoted to record the performance of the subjects on the basis of motor fitness test battery.

Kumar (1998) conducted a study on physical fitness of Himachal Pradesh high and higher secondary school boys. He developed norms for four different age groups. The results further show that there was a significant linearity from 13 year to 16 year male subjects of Himachal Pradesh in almost all the fitness components. The boys of 16 years age were found significantly superior than 13 to 15 years boys. The 15 years boys were better
than 14 and 13 years boys.Similarly, 14 years boys were superior than 13 years boys in all the components of Fleishman's test battery.

Alnaddaf (1998) determined the relationship among health-related physical fitness components and coach's rating of athlete's ability. The health-related physical fitness components among male teams and female teams and gender effects of the health-related physical fitness tests were also investigated. The results did not reveal any significant relationship between coach's rating and any of health-related physical fitness components. Significant differences existed on the one-mile run, absolute bench press, curl-ups, and the relative bench press tests among the male teams. Significant differences existed on the one-mile run, absolute bench press, absolute leg press, curl-ups, and sit and reach tests among the female teams.

Kaur (1999) compared the motor fitness of rural and urban girls studying in Punjab schools. The secondary purpose of the study was to prepare grading scales in motor fitness for the school girls studying in grade eleven and twelve. In all 4000 girls of grade eleven were selected as a sample for the study. The AAHPER Youth Fitness Test was used for the purpose. Based on the findings of the study, following conclusions were drawn:
1. Rural girls possessed better shoulder strength than urban girls.
2. Abdomen strength of rural girls was found better than urban girls.
3. Leg strength of rural girls was found better than urban girls.
4. Agility was found lesser in urban girls than rural girls.
5. Cardio-vascular endurance was found better in rural girls than urban girls.

Huff (2000) investigated the differences in the physical fitness levels between home school students and public school students. When the data from this research were compared to the national norms, 56% of the female home school students, 48% of the male home school students, 39% of the male public school students, and 35% of the female public school students scored above the 50<sup>th</sup> percentile. Since physical fitness assessment of home school students is a new field of research, there is a paucity of empirical evidence to support or reject these findings.

Patterson (2000) determined a functional relationship between distant interactions (a component of active monitoring) by physical education teachers and elementary students moderate to vigorous physical activity (MVPA) levels during fitness instruction. The results indicated the use of distant interaction increased the MVPA levels for
the students farthest from the teacher while the close students maintained their levels.

Miller (2001) states that despite great public interest in health and physical fitness, opportunities for exercise in a child's school day are declining as school administrators often choose to cut physical activity time in favour of classroom instruction time. An posteriori Tukey's analysis of the interaction effect showed that classroom behavior was significantly improved during the walking session versus the other non-walking sessions for each class.

Dean (2001) determined the effect of a female physical educator's physical appearance on the cognitive performance of junior high school students on a test of health related fitness knowledge. AAHPER test of examination was administered to the students in a pre-test and post-test format. Additionally, students attitude towards the physical educator were assessed. A student attitude questionnaire (SAQ), which included 8 items and required responses on a 5-Point Likert-scale, was administered to the students. Post-test means were compared between groups with the pre-test scores used as a covariate. After satisfying the pre-test score assumption of homogeneity for both groups, a significant group x post-test score interaction existed: SAQ sums were analyzed
for all participants and detected no significant group x time interaction. Paired t test showed that significant differences existed between all combinations of SAQ mean scores, except for the values of week one to week three, which demonstrated a trend toward being significant.

Ciccomascolo (2001) compared the effect of two types of undergraduate physical education classes i.e., Wellness and fitness, on health behaviors of college students. The results suggest that students in the Wellness group had more social interaction with peers and their instructor and were able to focus on attaining their health behavior goals. Also, students in Wellness courses may have learned why they should balance their physical, social, and emotional dimensions in life and not just how to do so. Conversely, the focus of fitness based courses were primarily focused on the physical dimension only.

Ruiz (2001) conducted a study on 279 Hispanic children who were enrolled in sixth grade physical education classes in a South Texas area of intermediate school. General linear model analyses revealed that: (1) the attitudes toward physical activity domains, gender and their interaction were not statistically significantly related to the self-reported physical activity level of the participants; (2) the
attitudes toward physical activity, gender, and their interaction were statistically significantly related to the cardio-vascular endurance of the participants; and (3) the self-reported physical activity level, gender and their interaction were statistically significantly related to the cardio-vascular endurance of sixth grade Hispanic students.

Pierce (2001) conducted a study to examine the changes in Physical Activity (PA), fitness, and potential mediators of Physical Activity (self-efficacy), decisional balance (DB), and stage of change, measured 18 weeks following completion of a Personal Physical Fitness (PPF) class. Results suggested that maintenance of Physical Activity, fitness, and mediators of Physical Activity for five months following a PPF class and a consistent relationship between PA, fitness and mediators of PA. Moreover, there was no added benefit in providing a minimal contact intervention during this period.

Mcmillan and Erdmann (2001) described gender-specific health-related physical fitness measurements in kindergartners and determine relationships between body fatness and health-related physical fitness test performance. Significant positive relationships were found between SSK and 1-mile walk/run times for both boys and girls. Significant inverse relationships were found between SSK and pull-ups for both boys and girls as well as SSK and 1-min bent-
knee sit-ups for both boys and girls. Neither boys nor girls showed a significant relationship between SSK and sit and reach. Excluding the sit and reach test, researcher found higher body fatness to be significantly associated with poorer health-related physical fitness test performance in both kindergarten boys and girls.

On the variable of health related physical fitness; Boone (1967) found that urban boys were superior to rural boys; whereas Dahl (1971) and Johnson (1971) found Negro boys to be more physically fit than white boys. Veeraswami (1973) found low positive correlations between physical fitness and physical activities. Brar (1975) concluded that socio-economic status is not a predictor of physical fitness. Andrews (1976) found that South African boys were significantly superior in physical fitness than Canadian boys. Results of Mookeryee (1978) revealed that regular physical activities contributed significantly to the enhancement of physical fitness; whereas Tateja (1978) found no significant difference between rural and urban boys on the variable of physical fitness. Kiesel (1978) concluded that knowledge of factors pertaining to physical fitness had effect on physical fitness level. Similar type of trends were found by Ray (1979), Taddonio (1982), Maity (1983), Kaur (1983), Devi (1984), Robins (1985) and Kim (1986). Kaur (1989) prepared percentile norms in physical fitness for high school girls of Punjab
State and concluded significant difference in rural and urban girls. Indico (1990) concluded that daily physical fitness programme had significant effect on physical fitness than weekly programmes. Singh (1996) found no significant difference in the age group of 6-11 years in standing long jump whereas Kumar (1998) found that boys of 16 year age of Himachal Pradesh were significantly superior than 13 to 15 year boys Kaur (1999) conducted that rural girls possessed better shoulder strength, abdominal strength, leg strength, and cardio-vascular endurance than urban girls. In another study Ciccomascolo (2001) suggested that students of Wellness group had more social interaction with peers and their instructor. Ruiz (2001) found that the self reported physical activity level and their interaction were significantly related to their cardio-vascular endurance. Mecmillan (2001) found significant correlation between SSK and 1 mile walk / run times for both boys and girls but there was significant inverse relationship between SSK and pull-ups for both boys and girls.

Burnham (1967) investigated the comparative twenty effect of isotonic and isometric exercise in the development of muscular strength for individual with different levels of strength. The multiple liner regression analysis revealed no significant differences between isometric and isotonic programmes in
developing muscular strength of the arm or legs or either group as a whole or for the different initial levels.

Dass (1980) prepared physical fitness norms for classes nine through eleven of Delhi administration schools. In each percent of students were tested on the items of AAHPER Youth Fitness Test and N.P.F.P. battery “A”. The items in the N.P.F.P. battery were the same as included in the syllabus of C.B.S.E. Percentile norms were prepared in the statistically analyzed which included the abdominal strength of the Indian students seemed to be very poor as compared to those of American students. The performance of students of class 11th was very poor in all items of fitness tests, and there was a remarkable sports performance in class 10th and 11th through still lower than that of students in America except in pull up measuring shoulder girdle strength.

Mehta (1981) compared physical fitness of tribal and non-tribal school girls of Indore division. The results of the study showed that tribal girls were better in arm strength, abdominal strength and agility. For their non tribal girls were better in explosive strength and endurance.

Walker (1982) conducted study on white and black female students at northern high school. Statistically analyzed, it was
concluded that the black subjects scored significance higher (p.05) than the white subjects on leg power, (m= 44.6% and 31.2%) and (m=57.8% and 39.1%) respectively. The white subjects performed significance higher than black subjects on abdominal strength (m=31.5% and 24.7%). No other comparisons were significant.

Pizarro (1982) investigated the use of the Health Related Physical Fitness Test and the Modified Pull-up with mainstreamed EMP/TMR children. Comparison of health related fitness levels and modified pull-up scores of mainstreamed EMR/TMR children to normal children was a secondary aspect of the study. Subjects for the study were 126 twelve to fifteen year old male and female, normal, EMR and TMR children from mainstreamed settings. Mainstreamed EMR/ TMR children were found to have lower health related fitness levels than normal children. Significant differences between normal and mentally handicapped were noted for the modified sit-ups, sit and reach, 880 yard run, and Modified Pull-ups. Non-significant differences between normal and EMR/ TMR adolescents were found in the assessment of body fat. Comparison between sexes indicated that fitness trends in retarded populations are similar to normal populations. Males demonstrated significantly more strength and endurance, and better cardio respiratory
endurance than females. Females were significantly more flexible than males and tended to have greater amounts of body fat.

Bale and Davis (1983) studied body build, explosive strength, grip strength and cardio-respiratory fitness of female field hockey players and results were compared with similar investigations of female hockey players. The subjects were divided into four groups according to their respective playing positions and above morphological strength and fitness variables were examined in relation to these field positions. The somato and body composition of the forward and halfbacks were similar but both these groups were lighter, had lower percentage of fats and lean body weight than the back and goalkeepers. The halfbacks were fittest both on the tests of explosive strength and on the test of cardio-vascular fitness.

Barfieled et al. (2001) documented that children tend to track in the same fitness categories (at risk-note at risk for poor fitness) from grades 5 through 7. In the current study, consistency of classification on the body mass index was higher among older girls than younger. Although gender differences were noted in grades 3 and 4 on strength and aerobic capacity scores (i.e. higher agreement among boys), gender was not associated with consistency of classification on other test items across grade levels.
Stephen et al. (2002) conducted a study on Physiologic, Psycho logic, and Health Predictors of 6-Minute Walk Performance in Older People and found that all physiologic, psycho logic and health scores were significantly associated with 6 minute walk distance (6MWD). It also revealed that 10 factors (visual contrast sensitivity lower-limb strength, simple reaction time, postural sway, maximal balance range, PANAS positive scale score, SF-36 pain score, number of medications used, SF-36 general health subscale score, age) were significant and independent predictors of 6MWD performance.

Short et al. (2004) conducted a study on Age and Aerobic Training Effects on Whole body and Muscle Protein Metabolism. Seventy-eight healthy, previously untrained men and women aged 19-87 year were studied before and after 4 month of bicycle training (up to 45 min at 80% peak heart rate, 3-4 days/wk) or control (flexibility) activity. At the whole body level, protein breakdown (measured as [13 C] leucine and [15 N] phenylalanine flux), Leu oxidation, and protein synthesis (nonoxidative Leu disposal) declared with age at a rate of 4-5% per decade (p< 0.001). Fat free mass was closely correlated with protein turnover and declined 3% per decade (p<0.001), but even after covariate adjustment for fat-free mass, the decline in protein turnover with age remained
significant. There were no differences between men and women after adjustment for fat-free mass. Mixed muscle protein synthesis also declined with age 3.5% per decade (p< 0.05). Exercise training improved aerobic capacity (9%) overall (p< 0.01), and mixed muscle protein synthesis increased 22% (p< 0.05), with no effect of age on the training response for either variable. Fat-free mass, whole body protein turnover and resting metabolic rate were unchanged by training. Thus conclude that rates of whole body and muscle protein metabolism decline with age in men and women, thus indicating that there is a progressive decline in the body are remodeling processes with aging. This study also demonstrates that aerobic exercise can enhance muscle protein synthesis irrespective of age.

Storer et al. (2005) conducted a study on Endurance Exercise Training during Haemodialysis Improves Strength, Power, Fatigability and Physical Performance in Maintenance Haemodialysis Patients on Twelve MHD Patients. They performed incremental and constant work rate cycle exercise tests to determine peak work rate, VO2 peak and endurance time (ET). Lower extremity strength, power and fatiability, stair-climbing time, 10 m walk time and a timed up-and go were assessed before and after 8.6+2.3 weeks of thrice weekly, progressive, semi-recumbent, leg-cycle training during haemodialysis. Initial training intensity and duration targets were set
at 50% peak work rate (WR) and 20 min, respectively, with a goal of progressing to 40 min at the highest WR tolerable. Non-exercising MHD patients and healthy volunteers with similar age, gender and race/ethnicity served as comparison groups and concluded that nine weeks of leg-cycling during haemodialysis in MHD patients improves not only cardiopulmonary fitness and endurance but also muscle strength, power, fatigability and physical function. These data underscore the value of endurance training in MHD.

Davis Melissa (2005), with the primary purpose of the study to determine the Relationship of Self-Reported Resistance Training to Lipid Profiles. The study consisted of 10 subjects between the ages of 19 and 35. Participants were assigned to an exercise group or control group based on self-reported resistance training and according to ACSM standards. After means were determined for the data gathered, the exercise group had lower averages of weight, percent body fat, total cholesterol, low-density lipoprotein and triglycerides, as well as, a higher average of high-density lipoproteins. Two sample t-tests were performed to determine significance. It was determined that no significant difference existed between serum lipid profile levels of the control group and the self-reported exercise group. This study is important because it expands our knowledge of the relationship between resistance training (RT)
and lipid profiles, relying on self-reported data and focusing on an at-risk population.

On the variable of abdominal muscular strength endurance; Burnham (1967) revealed no significant difference between isometric and isotonic programs in developing muscular strength. Dass (1980) found that performance of tenth and eleventh class students of Delhi was remarkable in muscular strength but still lower than students in America. Mehta (1981) showed tribal girls were better in arm strength, abdominal strength and agility than non tribal girls. On the other hand Walker (1982) found that black subjects were higher in leg strength than white students. Bale and Davis (1983) found that half backs were better in explosive strength and cardio-vascular fitness than the other players. Stephen (2002) found that in older people all physiological, psychological health scores were significantly associated with 6 minute walk distance (MWD). In the latest studies Short (2004) concluded that the rates of whole body muscle protein decline with age in men and women. This study also demonstrates that aerobic exercise can enhance muscle protein irrespective of age. Similar results were shown by Storer (2005). Devis (2005) found no significant difference between serum lipid profile levels of experimental and control groups.
From all these reviews, it has been concluded that there was no uniformity and agreement between the experts and the writers regarding the components of motor ability and other aspects of motor ability performance or movement. Review thus reveals, that this was yet an unsolved problem in regards of factors of motor ability and motor performance. More studies are required to be undertaken in this area. The less said the better, as regards related research studies in Nepal. For Nepal it was a novel study that was direly required to measure the motor ability performance and fitness level of the boys concerned.

This study was an attempt in this direction so as to solve that question of disagreement between foreign scholars by Nepali scholar through the application of tests selected from the scattered literatures.

The review further indicated that this study was needed to cover as many topographical areas to have a true picture of comparison of motor ability performance of children living in them.

The highly useful source of required tests and procedures to suit the environment of the present study was certainly related to the aforesaid work of Fleishman, Johnson and Nelson to set the battery for motor ability and develop norms for future reference.