CHAPTER 2

REVIEW OF LITERATURE

“The measure of greatness in a scientific idea is the extent to which it stimulates thought and opens up new lines of research.”

Paul A.M. Dirac

“Research is to see what everybody else has seen, and to think what nobody else has thought”

Albert Szent-Gyorgyi
“A review of literature on the research topic makes the researcher familiar with the existing studies and provides a foundation upon which to base new knowledge. It involves the systematic identification, location, scrutiny and summary of written materials that contain information on a research problem” (Polit & Hungler, 1999)

Face new challenges, seize new opportunities, test your resources against the unknown and in the process, and discover your own unique potential. This chapter presents a review of selected literature relevant to the present study. It was an important step in the development of the research project.

**Review of literature is divided into three parts;**

2.1 Review of literature related to physical growth of school going children

2.2 Review of literature related to Nutritional status of school going children

2.3 Review of literature related to effect of Self-instructed modules on physical growth and nutritional status of school going children.

**2.1 Review of literature related to physical growth of school going children**

2.1.1 A study was conducted by Temsumongla Longkumer (2012) on “Physical Growth and Nutritional Status among Ao Naga Children of Nagaland, Northeast India” It tried to find out the physical growth according
to the height and weight and nutritional status according to the body mass index (BMI) study revealed that the girls were taller than boys till 13 years and the boys became taller thereafter. As for weight, the girls were heavier during 10 to 14 years. The mean height and weight increased as the age advanced in both boys and girls. The prevalence of underweight was 30.12% and the prevalence of overweight was 2.28% among the Ao Naga children, and the girls were found to have a higher prevalence of overweight and the boys had a higher prevalence of underweight. This revealed that both underweight and overweight coexisted among the Ao Naga children from Mokokchung town, although the prevalence of overweight was not high.

2.1.2. A study was conducted by Prabir Kumar Manna et al (2011) on "Anthropometric Assessment of Physical Growth and Nutritional Status among School Children of North" The study was carried out on 4457 primary school going children to investigate the physical growth as well as nutritional status of Darjeeling and Jalpaiguri districts (part of North Bengal) of West Bengal. Standard anthropometric methods were applied to measure the height and weight of the children. The study shows that average height of the girls was more than the boys. The weight of children was not increasing with the advancement of age. Physical growth as well as nutritional status of boys was affected more than the girls. Children of higher age group were more affected nutritionally. The weight for age classification shows that no child of 12+ year age was normal.

2.1.3. A study was conducted by Joshi H.S. et al (2011) revealed that undernutrition continues to be a primary cause of ill health and mortality among children in developing countries. Besides poverty, there are other factors that
directly or indirectly affect the nutritional status of children. In the present
study, an attempt was made to find the prevalence of under-nutrition among
school children in 4 – 14 year age group and the role of socio-demographic
characteristics of mother on child nutrition. Methods: Descriptive, cross-
sectional study was conducted in schools of Kaski district of Western Nepal.
A total of 786 students were randomly selected from six schools in the study
area and nutritional status of the children was assessed by anthropometric
measurements. Results: Among 786 students, 26% of the students were found
to be undernourished and 13% stunted, 12% wasted and only 1% both stunted
and wasted. The present study shows highly significant association (p<0.005)
of maternal factors like literacy, occupation, diet knowledge and monthly
per-capita income respectively with child nutrition.

2.1.4. A study was conducted by E.C.C. Chukwunonso Ejike, et al Nigeria
(2010) on “Physical Growth and Nutritional Status of a Cohort of Semi-
Urban Nigerian Adolescents.” The nutritional transition in developing
countries may lead to imbalances in the growth and nutritional status of
adolescents in such countries - events that could result in improper
maturation and morbidity in adult life. Anthropometric data from six hundred
and twenty five (625) secondary school students aged 10-19 years
(adolescents) were collected and their Body Mass Index (BMI) calculated.
The prevalence of thinness and stunting were higher in boys than in girls.
Boys were also slightly more obese than the girls. Under- and over-nutrition
co-exist in the population and affect more boys than girls. There is an urgent
need to address these problems in preventive and curative health care
2.1.5. A comparative study by V.K. Srivastava (2009) “on school going children to compare their anthropometric measurements” with ICMR and NCHS standards, cross sectional school based study was done, based on selected students by random sampling method. Sample size were 2250 (1092 boys and 1158 girls) from selected primary and middle schools. In this study girls exhibited the better nutritional status in terms of “weight for age” and the BMI than the boys while comparing with ICMR standards little slowing down of growth was observed in this study for both sexes.

2.1.6. A study was conducted by Cheal. W.L (2009) in Malaysia and based on “the development of questionnaire for the study of malnutrition and growth association of school going children”. Quantitative analysis of in-depth interview for physical growth and malnutrition was administered on 295 children and their parents. The result reveals children showing sign of malnutrition is in the form of stunning, wasting and underweight for age.

2.1.7. An observational study by Vashist (2009) was done “to rule out physical growth and nutritional status of 214 schools going children in Piuri Garhwal district of Uttaranchal.” Physical growth was measured by standard anthropometric measurements such as height weight head circumference and upper arm circumference, biceps skin folds, triceps skin fold were taken to assess the nutritional status weight. It was been observed that Indian girls were more effected with malnutrition.

2.1.8. A study was conducted by Saraswathi. C. Hunshalet. al Department of Human Development Rural Home Science College, UAS, and Dharwad on “physical growth status of school going children”. This study has been carried out to determine physical growth of children aged 10 to 13 years. 139
students both boys and girls were selected from two villages of Dharwadtaluk during 2008-09. The results revealed that the mean height and weight of rural boys and girls were significantly below NCHS (50th percentile) and ICMR standards. In case of boys and girls, greater gain in height was observed between 10-11 years as compared to 11-12 and 12-13 years and greater gain in weight was observed between 12-13 years as compared to 10-11 and 11-12 years. Further, age was significantly and positively related to height, weight and chest circumference at 0.01 levels.

2.1.9. A cross sectional study was conducted by Tiwari MK, and Sharma KK (2007) on 551 children of both sex aged 4 years in the Bharia- a primitive tribe of Madhya Pradesh. “Growth and nutritional status of the Bharia-“ A primitive tribe of Madhya Pradesh. Coll Antropol Body weight, height, sitting height, head circumference, upper arm circumference, chest circumference, biceps, triceps, sub scapular and calf skin fold thickness were measured. Body Mass Index was calculated as weight/height2 to calculate chronic energy deficiency. The BMI according to the Indian standard was normal, but when the data was compared with the International standard malnutrition in both sexes was noticed in childhood. Boys remained undernourished after adolescence, while girls reached normal growth patterns.

2.1.10. An epidemiological study by Bhanderi D, Choudhry SK.(2006) “in Gujarat was conducted to assess the health & nutritional status of children of 0-5 years of age group & to study the influence of various epidemiological factors on health & nutritional status of children”. It is a community based cross sectional and sampling method study with 300 samples. Followed by
clinical examination & anthropometrics measurements of the child. Were expressed in standard deviation units from the median for the international reference populations as per WHO, NCHS standards & were compared with WHO, NCHS growth reference data. These nutritional parameters showed a significant association with parental education, socio-economic status, family size, environmental conditions & episodes of common diseases.

2.1.11. A study was conducted by Medhi GK, et al (2006) “to assess the growth and nutritional status of school age children (6-14 years) of tea garden worker of Assam”. Compared to NCHS standard and affluent Indian children, the mean height and weight of tea garden children was inferior at all ages. Assessment of nutritional status using WHO recommended anthropometric indicators revealed a high prevalence of malnutrition among tea garden school age children and malnutrition was both chronic and recent in nature. Prevalence of wasting, stunting and underweight was 21.2%, 47.4% and 51.7% respectively among the children in the age group of 6-8 years. Prevalence of stunting and thinness was 53.6% and 53.9% respectively among the children in the age group of 9-14 years age group.

2.1.12. A study was conducted by Central Bureau of Statistics, Nepal on school going students revealed that male to female ratio (0.97:1) of children in 5–15 age groups in the Kaski district. According to Waterlow classification 26% of students were found to be undernourished in 4 to 14 age group and the percentage of wasting in our study was 12% (95% CI 10% - 14%).
2.2 Review of literature related to Nutritional status of school going children

2.2.1 A study was conducted by IOSR Journal of Nursing and Health Science Volume 3, Issue 1, Ver. I, (Nov - Dec. 2013), “to determine the nutritional status and dietary habits of school aged children (6-12 years)” Based on the World Health Organization (WHO) standard mean of Body Mass Index (BMI), obesity and overweight constituted higher percentage among students in the private school than in the public school, while underweight was high among students in the public school (18.7%) compared to students in private school (7.5%). More than half of the public school students (52.7%) complaining of short stature compared to 27.4% of the private school students. A statistically significant difference between the two studied groups regarding taking lunch meal (P-value = 0.03) and the students' preference of eating fried food (P-value = 0.00) were detected. There were statistically significant differences between the two studied groups regarding their Body Mass Index and daily food consumption.

2.2.2 A study was conducted by Anjum Fazili et al. (2012) on “Nutritional Status of School Age Children (5-14 years) in a Rural Health Block of North India (Kashmir)” Using WHO Z-Score System the study revealed that Both mean weight and height were higher in females than males. The overall prevalence of under nutrition was 19.2%. The prevalence of underweight was lowest in 5 year female (0.0%) and highest in 6 year male (21.5%). For Stunting 7 year males recorded the lowest (0.0%) and 12 year males the highest (28.5%) prevalence. The highest and lowest prevalence of wasting was recorded in 6 year old females (2.56%) and 9 year old males (24.6%)
respectively. Prevalence of thinness was lowest in 13 year old females (14.2%) and highest in 13 year old males (47.1%). The overall prevalence of thinness was 29.0% with 31.9% males and 26.2% females falling below the cut off, the difference being statistically insignificant.

2.2.3 A study conducted by G K Mendhi et al. (2006) on “Growth and Nutritional Status of School age Children in Tea garden workers of Assam” reveals that. The overall prevalence of wasting under nutrition in 6-8 year old children was 21.1%, stunting 47.4% and underweight 51.7% & of thinness was males 51.8% and females 56.8%.

2.2.4 A study conducted by Bandopadyay et al.(2000) on “A Nutrition Survey of school children, Navinagar Mumbai” reported that prevalence for wasting 17.0%, stunting 16.8%, and underweight 42.3%.

2.2.5 A study conducted by Mitra et al.(2007) on “Nutritional Status of Kamar Tribal Children, Chittisgarh” reported that prevalence of underweight was 90.0% and stunting was 47.5% respectively.

2.2.6 A study conducted by Chowdhary et al.(2012) on “Prevalence of under nutrition in Santal Children of Puriliya district West Bengal” revealed that the overall prevalence of under nutrition from Puriliya West Bengal also reported figures of underweight 33.7%, wasting 29.4% and stunting 17.0%.

2.2.7. A study conducted by Subal Das and Kaushik Bose (2012) “among the Onges tribe of the Andaman and Nicobar Islands with the objectives of assessing their nutritional status” included estimation of indices of assessment of nutritional status. A mild to moderate degree of malnutrition was found in 85% of children of pre-school age and severe malnutrition in
10%. The Onges had low intakes of iron, vitamin A and vitamin C. The high prevalence of under nutrition and micro nutrient deficiency disorders could be important factors contributing to the high childhood mortality.

2.2.8. A cross sectional study was conducted by Amit Kaushik et al. (2012) “Nutritional status of rural primary school children and their socio-demographic correlates from Varanasi”. Eight hundred and sixteen students from four schools were involved in the study. Out of total 816 study subjects 429 or 52.6% (201 boys and 228 girls) were underweight and 75 or 9.2% (39 boys and 36 girls) were stunted. Educational status of the parents was found to be significantly associated with the nutritional status of school children as the literacy status of the parents has been revealed to be strongly associated with nutritional status of children, there is an increasing need to focus the efforts towards the parents to improve the nutritional status of primary school children.

2.2.9. A study was conducted by Vandana Sati and Saroj Dahiya (2012) on “nutritional assessment of rural school going children (7-9yrs) of Hisar district, Haryana”. Nutritional status of children was assessed in terms of dietary assessment, anthropometric measurement and clinical assessment of signs and symptoms of various nutrient deficiency diseases. Dietary assessment was done by 24 hour dietary recall method for three consecutive days of 100 children. Anthropometric measurements were used to construct indices for malnutrition that were compared to reference values. The results of the study revealed that food and nutrient intake was inadequate and anthropometric measurements (mean height and weight) were significantly (P<0.05) lower than reference value. Regarding prevalence of malnutrition, it
was found that 54.11 percent of the children were stunted and 55.5% were underweight. There is an urgent need to promote the importance of balanced diet and preparation of nutrient-rich recipes based on locally available food stuffs to improve their nutritional status. Awareness programs regarding affordable but nutritious foods should be introduced by the government through community participation, involvement of NGOs and other sectors. Results of the study can be of use for planning need-based supplementary nutrition programs by the policy-makers for the school children.

2.2.10. A descriptive cross-sectional study was carried out by Amosu F. and Obafemi (2011) “To assess the nutritional status of children aged 6-59 months, of low-income earners in Ipokia local government area of Ogun state, Nigeria,” Nutritional status was assessed using anthropometric measurements of height, weight, chest and arm circumference, and was compared with NCHS standards. Dietary assessment was based on weighed inventory method and 24 h recall obtained from their mothers. There were no significant differences between the males and females except for males having a significant higher Lean Body Mass (LBM) than the females. The intakes of protein, iron, calcium and vitamin A were inadequate in both males and females. Majority of mothers of the children were uneducated (80.7%) and earned a paltry monthly income. The findings show that the nutritional status of Under-5 children in the study location which happens to be a rural area was quite poor. Also from the results, it is evident that malnutrition is still a major public health problem among young children due to the poor socioeconomic status (poverty and poor educational background) of their parents, and thus, there is a need for better nutrition of the Nigerian child.
2.2.11. A study was conducted by Anurag Srivastava et al (2010) on “Nutritional status of school-age children - A scenario of urban slums in India”. The mean height and weight of boys and girls in the study group was lower than the CDC 2000 (Centers for Disease Control and Prevention) standards in all age groups. Regarding nutritional status, prevalence of stunting and underweight was highest in age group 11 yrs to 13 yrs whereas prevalence of wasting was highest in age group 5 yrs to 7 yrs. Except refractive errors all illnesses are more common among girls, but this gender difference is statistically significant only for anemia and rickets. The risk of malnutrition was significantly higher among children living in joint families, children whose mother's education was [less than or equal to] 6th standard and children with working mothers. Most of the school-age slum children in our study had a poor nutritional status.

2.2.12. A study was conducted by Sudesh Jood et al, (2010-2011) on “90 rural school children in 4 areas of Haryana state “to assess the nutritional status of school children” Mean of the daily intake of all nutrients were found lower than their respective recommended dietary intake (RDI) mean of height and weight of 10 children were found lower in two areas when compared to their reference values. On the basis of weight for age and height for age criteria as well as clinical examination majority of children, were normal in one village. An expert group on supplementary feeding had remarked that the current mid-day meal programme in India should be viewed more as a feeding programme rather than a nutritional programme since its primary objective is to alleviate hunger and improve school attendance and enrolment.
2.2.13. A study was conducted by Neufingerl N, et al (2010)“ to assess the nutritional status of school-aged children impacts their health, cognition, and subsequently their educational achievement”. The school is an opportune setting to provide health and nutrition services to disadvantaged children. A total of 369 studies from 76 different countries were included. The available data indicate that the nutritional status of school-aged children in the reviewed regions is considerably inadequate. Underweight and thinness were most prominent in populations from South-East Asia and Africa, whereas in Latin America the prevalence of underweight or thinness was generally below 10%. More than half of the studies on anemia reported moderate (> 20%) or severe (> 40%) prevalence of anemia. Prevalence of 20% to 30% was commonly reported for deficiencies of iron, iodine, zinc, and vitamin A. The prevalence of overweight was highest in Latin American countries (20% to 35%). In Africa, Asia, and the Eastern Mediterranean, the prevalence of overweight was generally below 15%. The available data indicate that malnutrition is a public health issue in school-aged children in developing countries and countries in transition.

2.2.14. A study was conducted by Sharma S and Nagar S (2009)“ To determine the impact of educational intervention on knowledge of mothers regarding childcare and nutrition in Himachal Pradesh” aimed at providing educational interventions to mothers regarding knowledge on children and nutrition. A total sample of 150 mothers was selected from two villages, one of which served as experimental group and the other acted as control group. The tool consisted of a self-structured questionnaire schedule covering aspects of childcare and nutrition. All mothers were first pre tested regarding
their knowledge on nursing, neonatal and infant care, health, child’s growth, behavior and nutritional aspects. Intervention consisted of educating mothers in the experimental group for a period of one and a half years. All the mothers were then post-tested on the above aspects. Significant differences were seen in all the aspects of childcare and nutrition between experimental and control group mothers during post-testing.

2.2.15. The Internet Journal of Epidemiology. 2009 Volume 8 “A study conducted on the National Status of Urban Primary School Children 5-11 yrs. in Meerut”. Weight and height of the children were recorded on a pretested Performa and were analyzed. Out of 800, 396 children (49.5 %) were found to be malnourished. Grade I malnutrition was most common (35.5%) followed by grade II (11.4%) and grade III (2.6%) malnutrition. Wasting was found in 44.6% children (46.3% girls and 43.2% boys) out of which 1.2% children showed severe degree of wasting. Stunting was found in 43.8% children (46.0% girls and 41.8% boys). Malnutrition can make learning difficult and can seriously hamper the educational process and the child’s intellectual growth.

2.2.16. A study was conducted by Wilson S. (2009) “To investigate health implication of chronic hepatospleenomegaly in Kenyan school aged children” which were chronically exposed malaria infection and schist soma mansoni. This study shows that hepatomegaly with chronic exposure to malaria a schist soma is not a benign symptom among school aged children but has potential long term health consequences.

2.2.17. A study on the nutritional status by Haboubi GJ and Shaikh RB. (2009) was conducted on “A comparison of the nutritional status of
adolescents from selected schools of South India and UAE”. A total 2459 adolescent boys and girls between the age of 10 to 16 years old were selected as samples. The result showed, regardless of gender, the rate of stunting was higher in Indian adolescents from India (25.5%-51%) compared with Indian adolescents in UAE (3.1%-21%). The thinness was also more in India (42%-75.4%) when compared to adolescents living in UAE (4.5%-14.4%). The study concluded improved economic conditions favours better expression of genetic potential for physical growth.

2.2.18. A study was conducted by Appoh LY and Krekling S (2008) undertook a “study on maternal nutritional knowledge and child nutritional status in the Volta region of Ghana”. The data was collected in Ghana on 55 well-nourished and 55 malnourished mother-child pairs. Data on mother's demographic and socio-economic characteristics as well as child anthropometric data were also collected. Bi-variate analysis gave significant associations between child nutritional status and the following variables: time of initiating of breastfeeding, mother's knowledge of importance of colostrums and whether colostrums was given to child, age of introduction of supplementary food, and mother's knowledge about causes of kwashiorkor. Maternal formal education and marital status were also found to be associated with child nutritional status in bi-variate analyses. Further analysis with Logistic regression revealed that maternal nutrition knowledge was independently associated with nutritional status after the effects of other significant variables were controlled for. Maternal education on the other hand was not found to be independently associated with nutritional status. These
results imply that mother's practical knowledge about nutrition may be more important than formal maternal education for child nutrition outcome.

2.2.19. A study was conducted by Manish Jain (2008) “To assess the relationship of height weight and blood pressure in school going children”: .Prospective cross sectional study was carried out in rural school going children of wardha district height weight and blood pressure (systolic and diastolic) is taken in both sexes followed by complete examination. Correlation coefficient showed highly significant. Coefficient correlation of height with systolic blood pressure and diastolic blood pressure. So there is a need for checking BP to detect hypertension in children so remedial measures can be taken.

2.2.20. A study conducted by Ambilly G (2008) “To emulates the percentage of obese and overweight children in rural as well as in urban areas”. In this 2886 school going children were taken and screening was done identified by physical examination. The result of the study revealed that percentage of obese and overweight children are growing in both urban as well as rural area of Kerala and in different state of world. Study also revealed overweight is more common in boys and underweight in the girls of same age group.

2.2.21. A study conducted by Sridhar G et.al (2007) showed “that anemia prevalence” (hemoglobin concentration <120 g/L) ranged from 19 to 88% across five different cities in India .Other micronutrient deficiencies including, foliate, riboflavin, niacin, vitamin C, vitamin A, and vitamin B12 were also present based on biochemical parameters in one study and clinical signs of deficiency in three other studies. Overweight t and obesity was prevalent among 8.5-29.0% and 1.5-7.4% respectively among school
children, as indicated by 11 studies. A current estimate, using well designed methodologies, of prevalence of micronutrient deficiencies and information on the etiology of anemia among children of middle and high socio economic status (MHSES) groups would be valuable to help understand the nutritional status and extent of micronutrient malnutrition.

2.2.22. A study conducted by Rostami N, Farsar A R et al.(2007) “To determine Vitamin –A status using conjunctiva impression cytology (CIC) in children aged 2-5 years” Prevalence sub clinical Vitamin – A in 2-5 years old children in Tehran. East Mediterranean health. They assessed 1257 randomly selected children in urban and rural areas of Tehran. History of using supplemental vitamin – A, respiratory or diarrheal infection in previous 6 months, residential location, parents education, family economics status and child age, sex and weight were recorded. Subclinical vitamin – A deficiency was found in 23.6 % of the sample, the rate classified as a moderate public health problem. There was a statically significant relationship between sex and age.

2.2.23. Joshi HS et al (2007) conducted a Cross Sectional Study in the Western Region of Nepal,” to find the prevalence of under-nutrition among school children in 4 – 14 year age group” and the role of socio-demographic characteristics of mother on child nutrition. A total of 786 students were randomly selected from six schools in the study area and nutritional status of the children was assessed by anthropometric measurements. Among 786 students, 26% of the students were found to be undernourished and 13% stunted, 12% wasted and only 1% both stunted and wasted. The present study shows highly significant association (p<0.005) of maternal factors like
literacy, occupation, diet knowledge and monthly per-capita income respectively with child nutrition. Maternal education status, socio-economic status, occupation and dietary knowledge are important determinants of nutritional status of school children.

2.2.24. A study was conducted by Waihenya EW, et.al (2007) on “Maternal nutritional knowledge and the nutritional status of preschool children in a Nairobi slum”. Nutritional status of 363 children aged six to 24 months was measured and nutritional knowledge of their mothers assessed. The study established that most mothers (97.5 percent) have access to nutrition education. Prevalence of stunting (86.2 percent) and underweight (58.4 percent) was high but that of wasting (1.9 percent) was low. There was no significant relationship between the nutritional status of children and overall nutritional knowledge. Unexpectedly, a negative relationship was found between nutritional status and mothers' ability to recognize clinical signs of malnutrition, knowledge in the weaning process and dietary management during sickness. Nutritional knowledge alone is inadequate in ensuring young children's nutrition security and, hence, for nutritional education programmes to have a positive impact, facilitation strategies must be incorporated.

2.2.25. A study conducted by The WHO (2007) on “Urban adolescents carried out the prevalence of overweight “(≥85th centile) was 6% (CI: 5.2, 6.2), and it was significantly higher (p<0.05) among girls (7.1%; CI: 6.3, 7.9) compared to boys (4.4%; CI: 3.8, 5.0). Multivariate logistic regression analysis has revealed that the risk of overweight was 3 times higher among the adolescents, who have not participated in outdoor games and sports and 2
times among adolescents who did not participate in household activities and 2 times higher among adolescents, who were watching TV ≥3hrs/day.

2.2.26. A study conducted by Singh MB et al (2006) on “nutritional status of children aged 0-5 years in a area of western Rajasthan, India Public Health Nutrition” was undertaken to assess the impact of drought on the nutritional status of pre-school children aged 0-5 years from a rural population in a desert area facing drought areas of western Rajasthan.” A total of 914 children were examined at household level, with nutritional status assessed by anthropometry. The results revealed growth retardation. Stunting (malnutrition of long duration) was observed in 53% of children and underweight in 60%. Due to inadequate consumption of daily food the children were suffering from wasting and PEM. Efforts should be made to incorporate measures, such as ensuring the supply of adequate energy and protein to all age groups and especially pre-school children, into ongoing nutrition programmes in order to improve the food security of local inhabitants in this area.

2.2.27. A study was conducted by Tripathi MS, Sharma V.(2006) “To assess nutritional status of pre-schoolers in slum areas of Udaipur City” 2006 The was conducted in pre-schoolers (2-6 years) from ten different slums of Udaipur City in Rajasthan with the aim to their nutritional status”. From the data and observations recorded was observed that majority of the subjects were from nuclear family with monthly family income of less than Rs.1500/-. More than 50% of these pre-schoolers showed symptoms of protein energy malnutrition and anemia, Classification for degree of malnutrition as per IAP showed that majority of these subjects (66%) were under weight (Grade I and
II. So this malnutrition was either of PCM (past chronic) or CLM (current long duration)

2.2.28. A study was conducted by Jayasekera CR. (2006) “To evaluate the prevalence of protein energy malnutrition (PEM) in children under five years” (n = 52), in three randomly selected, State operated foster care institutions in Sri Lanka”. The prevalence of PEM, was (51.9%), underweight (63.5%) and wasting (25.0%) was found to be considerably higher than the national prevalence (13.5%, 29.4%, 14.0%, respectively). Based on this preliminary evidence, it is recommended that a study representative of all institutionalized children in both State and private facilities be conducted to identify deficiencies and recommend improvements to institutional care in Sri Lanka.

2.2.29. A study was conducted by Omondi D (2006) “To assess childhood awareness of childhood hearing impairment and the pattern of assess to utilize of ambulatory care services”. Study was done on hearing impaired children despite adequate parental awareness of chronic childhood disability health facilities were underutilized. This indicates the need to future stimulant and maintains a desirable level service for diagnosis treatment and habitation of childhood hearing impairment

2.2.30. A study was conducted by National Institute of Nutrition, ICMR (2006) on “Nutritional status of preschool children reflects the overall development of the community”. Under nutrition is a cumulative effect of factors such as poverty, inadequate intake of food, illiteracy and ignorance, food taboos, large family size, poor personal hygiene and environmental sanitation, lack of basic health care facilities and inadequate access to safe
drinking water (WHO 2003). The recent WHO new child growth standards study) in different countries has clearly established the fact that, given optimal conditions, growth of the children will be similar irrespective of the country they belong to. In spite of rapid growth in agriculture and industrial achievement in the recent past, under nutrition continues to be a major public health problem in India. One of the major causes of under five-year mortality is under nutrition in almost all the developing countries. Several studies have also shown that intra-uterine growth retardation, low birth weight and under nutrition during childhood may also lead to higher risk of developing obesity during adult life.

2.2.31. A comparative study was conducted by Oninlaet al. (2006) on “Nutritional status among urban and rural Nigerian school children”. The result on 366 rural and 383 urban children depicted that mean nutritional indices weight for age, weight for height and height for age were significantly lower in rural than urban children.

2.2.32. A study was conducted by Kumari S, (2005) on “Nutritional status of scheduled caste pre-school children in Bihar” on anthropometric measurements showed that all the children of scheduled caste families under investigation were under weight and suffered from protein energy malnutrition, night blindness, angular stomatitis, enlargement of liver, anemia, spongy bleeding gum and a few cases of bow legs, polio and keratomalacia. The hemoglobin level was below World Health Organization (WHO) standard. Their intakes of protective foods and nutrients such as energy, calcium and iron were less than respective recommended dietary
allowances (RDA). Socio-economic environment is responsible for poor nutritional status of scheduled caste of pre-school children.

2.2.33. A study was conducted by Kumari S, (2005) on “The prevalence of anemia among the Scheduled Caste preschool children of Punjab”. Blood sample was collected from 3,500 children ranging in age from 1+ to 5+ years and hemoglobin was estimated by cyanomethaemoglobin method. Anemia was diagnosed when hemoglobin was less than 11 g/dl. The study revealed the overall prevalence of anemia as 81.66%. The frequency of anemia was maximum in age group 2+ and minimum in age group 5+ nutrient intakes. Apart from age, nutritional status and food availability, feeding practices the dietary adequacy (qualitative and quantitative) of preschool children residing in rural areas near Mysore (a district in south India) was assessed by the Food frequency method and 24-h recall method’. The overall nutrient intake was found to be inadequate

2.2.34. A study was conducted by Heath DL, Panaretos KS. 2005 on “Nutritional Status of primary school children in Townsville”. The setting was based in three Northern Queensland Health regions (pre) primary schools with high proportion of Indigenous children. The result of the study showed that more number of children were overweight to obese than underweight children. There was no significant difference in Body Mass index (BMI) between indigenous and non-indigenous children. Indigenous children were shown to consume less vegetables and dairy products and were significantly more likely to suffer from anemia and eosinophilia than non-indigenous children. The study concluded the health status of indigenous is poorer than of non-indigenous children and they demonstrate an immediate need to
implement appropriate nutritional programs within the school environment to improve dietary habits and overall health.

2.2.35. A survey conducted by the National Nutrition Monitoring Bureau (NNMB) (2005-06), was conducted on recent surveys which states about one third of preschool children were consuming adequate amounts of protein and energy and a fifth of them were consuming diets deficient in both the nutrients. According to WHO child growth standards, the prevalence of underweight (<Median–2SD) was 40%, stunting 45% and 16% were wasted among <5 year children. However, none of them exhibited signs of kwashiorkor or marasmus. In spite of launching of several nutrition intervention programmes, micronutrient deficiencies are still largely prevalent. The median intake of various micronutrients such as iron, vitamin A, folic acid and riboflavin are grossly inadequate. More than 70% of children were consuming <50% of RDA of these nutrients. About 70% of preschool children suffer from anemia and 60% from sub-clinical vitamin A deficiency.

2.2.36. A study was conducted by Sunita Kumari (2005) “To assess the nutritional status of school children from Bihar”. The findings reported a high incidence of malnutrition as revealed by anthropometry. Increment in height and weight were more in girls than in boys although not much variation in intake of food and nutrients.

2.2.37. A study was conducted by Bharati and Sunanda (2005) on “Anthropometric measurements of 560 school children in Raichur”. The results highlighted that the nutritional status of the children from rural and
urban areas was lower than the NCHS standards, girls showed lower measurements than boys.

2.2.38. A descriptive study was conducted by Shakya SR et al (2004) on “Nutritional status and morbidity pattern among governmental primary school children” to assess the nutritional status and morbidity pattern of primary school children. The methods used in this study are descriptive, cross sectional study was administered in the five governmental schools the schools were selected using simple random sampling technique. From these selected schools, a total number of 818 students studying from class I to V were enumerated in the study using census survey method. The results are revealed that, among 818 students, 61% of the students were found to be malnourished. The students were more stunted (21.5%) than wasted (10.4%). Only 5.4 % of the students were found to be both wasted and stunted. The collected blood and stool samples from the students revealed parasitic infestation of 65.8% and anemia of 58%. The most common diseases in those schools were: skin diseases (20%), dental caries (19.8%), and lymphodenopathy (10.5. The study result revealed the urgent need for initiation of school health program with specific emphasis on prevention of diseases, improvement of personal hygiene and nutritional status with the collaboration of governmental and nongovernmental institutions.

2.2.39. A study was conducted by Wickramasinghe VP and Lamabadusuriyas S.P. (2004) on “Nutritional status of school children in an urban area of Sri Lanka”. A study was conducted on the nutritional status of 8 to 12 years old school children in an urban area of Sri Lanka. Seven schools situated in the city of Colombo were randomly selected as sample.
Anthropometric data of 1224 children (48% boys) and feeding practices and behavior pattern data of 1102 children (44% boys) were analyzed. The result showed obesity prevalence among boys (4.3%) was higher than in girls (3.1%). The prevalence of thinness was 24.7% in boys and 23.1% in girls. 5.1% boys and 5.2% of girls were stunted. 7.0% of boys and 6.8% of girls were underweight. 66% of obese children and 43.5% of overweight children belongs to the high income category. The study concluded obesity and overweight in older children are some emerging nutritional problems and diet in response to social and cultural changes.

2.2.40. A study was conducted by Guiching Zhang (2004) “To assess the factors for snoring in primary school children in domestic environment”. Survey done and analytical data showed that snoring was common in primary school going children. Domestic environment may play a significant role in increased prevalence of snoring. Exposure to nitrogen dioxide domestic environment is associated in snoring in children.

2.2.41. A study was conducted by Swami HM et.al (2001) “Nutritional Status of pre-school children was assessed by weight for age criteria by making domiciliary visits”. The study was carried out on nutritional status of 1286 pre-school children selected by a stratified random sampling and residing in urban, rural and slum areas of Chandigarh by The overall prevalence of protein energy malnutrition (PEM) was found to be 51.6% while 65.4%, 26.3%, 5.3% and 3% of children had grades I, II, II and IV PEM, respectively. The prevalence of PEM was significantly higher among Integrated Child Development Service (ICDS) beneficiaries (53.8%) than non-ICDS beneficiaries (46.9%); P<0.05. More attention and better impetus
are required to be given to improve the nutritional status of pre-school children in Chandigarh.

2.2.42. A study was conducted by Suruchi Tiwari (2001) “To show the gender bias in school going children in Allahabad” India. Survey shows that girl child does not enjoy all the rights of children. In his gender and culture that determines the position of girl child is the Indian social structure. Study reveals strong gender bias in both higher and lower caste slum ever less regarding to the fulfillment of demands

2.2.43. A cross sectional study was undertaken by Cherinet (2000) on “To determine the magnitude of goiter in school children and measure indicators of iodine deficiency including the most commonly consumed staple foods”. In ten villages from four administrative region of Ethiopia 2485 randomly selected elementary children were examined for clinical signs of goiter of the urinary measurements 70% of the samples showed moderate and 30% mild iodine deficiency. The study also provides further evidence that coli form and E. Coli isolated from drinking water contribute to the high incidence of endemic goiter other than iodine deficiencies. Iodine deficiencies disorders can be prevented by ensuring normal iodine nutrition through instituting ways that avail iodinate salt to the survey population

2.2.44. A study conducted by Zalilah Mohd Shariffetal “On nutritional Status of Primary School Children from Low Income Households in Kuala Lumpur” in which growth status was examined in relation to gender and age factors in urban primary school children (6-10 years old) from low income households. The sample consisted of 4212 boys (53%) and 3793 girls (47%). Data on weight and height data were obtained from two sources –
investigator’s and teachers’ measurements of the school children. Prevalence of overweight (> 2 SD of NCHS/WHO reference median) was found in 5.8% of the sample. For both, prevalence of under nutrition and over nutrition, more boys than girls were found to be underweight stunted wasted and overweight. Compared to girls, boys had lower mean z-scores for the variables height-for-age (p<0.05) and weight-for-height (p<0.01). Older children had significantly lower mean z-scores for height-for-age (p<0.001) but higher mean z-scores for weight-for-height (P<0.001) than younger children. This finding indicates that with increasing age, stunting is associated with improved weight-for-height or that the children’s weights have been adapted to their short statures. In conclusion, results demonstrate a high prevalence of underweight, stunting and wasting and an increasing prevalence of overweight among these low-income school children.

2.2.45. A study was conducted by Sati and Dahiya (2012) on “Nutritional Assessment of Rural School-Going Children (7-9 Years) of Hisar District, Haryana”. The present study was conducted to assess the nutritional status of 200 rural school going children (7-9 years). Nutritional status of children was assessed in terms of dietary assessment, anthropometric measurement and clinical assessment of signs and symptoms of various nutrient deficiency diseases. Dietary assessment was done by 24 hour dietary recall method for three consecutive days of 100 children. Anthropometric measurements were used to construct indices for malnutrition that were compared to reference values. The results of the study revealed that food and nutrient intake was inadequate and anthropometric measurements (mean height and weight) were significantly (P<0.05) lower than reference value. Regarding prevalence of
malnutrition, it was found that 54.11 percent of the children were stunted and 55.5% were underweight. There is an urgent need to promote the importance of balanced diet and preparation of nutrient-rich recipes based on locally available food stuffs to improve their nutritional status. Awareness programs regarding affordable but nutritious foods should be introduced by the government through community participation, involvement of NGOs and other sectors. Results of the study can be of use for planning need-based supplementary nutrition programs by the policy-makers for the school children.

2.2.46. A study was conducted by Sati and Dahiya (2012) on “Open Access Scientific Reports” revealed that the present study was conducted in Hisar district, Haryana to assess the nutritional status of 200 rural school going children (7-9 years). Nutritional status of children was assessed in terms of dietary assessment, anthropometric measurement and clinical assessment of signs and symptoms of various nutrient deficiency diseases. Dietary assessment was done by 24 hour dietary recall method for three consecutive days of 100 children. Anthropometric measurements were used to construct indices for malnutrition that were compared to reference values. The results of the study revealed that food and nutrient intake was inadequate and anthropometric measurements (mean height and weight) were significantly (P<0.05) lower than reference value. Regarding prevalence of malnutrition, it was found that 54.11 percent of the children were stunted and 55.5% were underweight. There is an urgent need to promote the importance of balanced diet and preparation of nutrient-rich recipes based on locally available food stuffs to improve their nutritional status. Awareness programs regarding
affordable but nutritious foods should be introduced by the government through community participation, involvement of NGOs and other sectors. Results of the study can be of use for planning need-based supplementary nutrition programs by the policy-makers for the school children.

2.2.47. A study conducted by Saraswati C. et.al. (2012) on “Physical growth status of school going children” was carried out to determine physical growth of children aged 10 to 13 years. 139 students both boys and girls were selected from two villages of Dharwad taluk during 2008-09. The results revealed that the mean height and weight of rural boys and girls were significantly below NCHS (50th percentile) and ICMR standards. In case of boys and girls, greater gain in height was observed between 10-11 years as compared to 11-12 and 12-13 years and greater gain in weight was observed between 12-13 years as compared to 10-11 and 11-12 years. Further, age was significantly and positively related to height, weight and chest circumference at 0.01 level.
2.3 Review literature related to Self-instructed modules on physical growth and nutritional status of school going children

2.3.1 A Study Conducted By Sahbanathul Missiriya on teaching programme on protein energy malnutrition, Childhood Constitutes The Foundation Of Adult Productivity, And Nutrition Is The Major Determinant Of This Foundation. True Experimental Design Was Adopted To Determine The Effect Of Nutritional Bolus On Protein Energy Malnutrition Among Preschool Children. From North Chennai, In Control Group 168 Children And In Intervention Group 174 Children With Grade I & II Malnutrition According To IAPA Classification Were Selected Randomly. Nutritional Bolus Is Food With Mixed Powder(100gms) Made By Grinded Rice(30gms), Soya(20gms), Groundnut(20gms), Bengal Gram(10gms) And Jaggery(20gms)] Were Provided To All Children Regularly For 6 Months In Experimental Group With Planned Teaching Programme On PEM. 59.8% Improvement Was Observed After Intervention. There Was Highly Significant Association Between Age Group And Sex Of The Children With Grading Of Underweight, Stunted And Wasted And Also Mid-Arm Circumference Impairment (P<0.001). The Study Concluded That Nutritional Bolus On PEM Was Effective To Improve The Nutritional Status Of Children.

2.3.2 A study was conducted by Rachna Kumari and Jyoti Sarin on “Effectiveness of Planned Teaching Programme Regarding Prevention And treatment of Protein Energy Malnutrition In terms of Knowledge and Expressed Practices of Mother’s of under five
children”, Protein energy malnutrition (PEM) is a global problem. Nearly 150 million children under 5 years in the world and 70-80 million in India suffer from protein energy malnutrition. The finding reveals that the coefficient of correlation between pre-test knowledge score and skill scores is 0.22, suggesting a low correlation between pre-test knowledge and expressed practices score of mothers of under five children regarding protein energy malnutrition. The computed r value (0.22) indicates that the positive correlation between the pre-test knowledge scores and practice scores is not significant at 0.05 level. Further, findings in table also reveal that coefficient of correlation between post-test knowledge scores is 0.39 indicating a significant relationship between the post-test knowledge scores and expressed practices scores at 0.05 level of significance. The finding suggest that there is marked relationship between the post-test knowledge scores and expressed practices scores of mothers of under five children regarding protein energy malnutrition. Thus, null hypothesis H03 was rejected and research H3 was accepted. This suggested that PTP was effective in enhancing the knowledge as well as the expressed practices of mothers regarding protein energy malnutrition.

2.3.3 A study conducted by Children Nayana and J. Umarani on “Planned teaching program creates awareness regarding prevention of Vitamin-D and Calcium deficiency” stated that Children are the most precious possessions of mankind and special gift to the world. Vitamin D deficiency is a common problem in India. The present study was conducted to assess the effectiveness of planned teaching programme on knowledge regarding prevention of Vitamin D and Calcium deficiency in children among the mothers of under five year children
in selected urban area at **Mangalore Dakshina Kannada**. The sample size was 100 mothers of five year children. The sample selected by non-probability convenience sampling technique. The tool was used demographic proforma and structured knowledge questionnaire. The result showed that the mean and standard deviation of post-test knowledge score of mothers of under five children (20.30 ± 3.040) was much greater than (8.41± 1.854) pre-test. The calculated value $t_{99} = 35.31$ was greater than the table value $t=1.66$ which indicates that planned teaching programme was effective on level of under five year mothers knowledge and also study found that there was a significant association between the levels of knowledge with selected demographic variables. Hence the null hypothesis was rejected and research hypothesis was accepted.