CHAPTER I

INTRODUCTION

Health is the real wealth of the nation. Health is a state of complete physical, mental, emotional and social wellbeing and does not refer merely to the absence of disease. The health status of individual is measured in terms of the extent of growth potential achieved or growth retardation affected by the environment. It reflects harmony between body, mind, soul, society (stress, lifestyle, working condition etc.) and ecosystem (air, water and soil).

A nation’s most valuable assets are healthy children because they will be tomorrow’s youth and provide the human potential required for its development (Biswas S et al 2009). “A nation realizes its potentialities through its children and is judged by what it does for children”. Children constitute most important section of the society and the future of the nation lies in their wellbeing.

According to a survey done by “The fair chance of life” in India 18 lacs children (out of 2.6 crore/year) die every year within a week of their birth due to malnutrition. Almost forty thousand children die every year due to malnutrition in our country.

The infrastructure and facilities should be available to assist all children to achieve their optimal growth and developmental potential during the most vulnerable phase of their lives. Investment in their healthy
growth and development is the most rewarding for the country (Leena et.al 2011).

Children, the future citizens require special care at budding stage to ensure their healthy growth (Tej Verma et.al 2003). Healthy children grow to become healthy adults with optimal physical strength and emotional poise to become useful members of our society and contribute effectively in the nation building process. (Meharban 1993).

The early years are very plastic and formative for the growth and development of the child. Children needs appropriate living conditions in order to reach optimum growth. Any disturbing factor can negatively affect their growth.

The appropriate growth of babies and children is a sign of their sound physical as well as mental health. The first three years of life are very significant and irretrievable for the growth. During this period, taking good care of babies including proper diet and providing them a lovely surrounding (which) are essential for their growth (Grant J. 2005).

The relationship between malnutrition and infection and their influence on human growth and development are complex. Inadequate growth of children in poor countries is generally the consequences of infectious disease and low nutrient intake, especially inadequate energy and protein intake, relative to nutritional requirements. (Martorell et.al 1986; Lutter et al., 1990; Bouis et.al 1998). More than half of the malnourished
children in the developing world are found in South Asia (UNICEF, 1993, 1996). In a vast and multiethnic country like India, the extent and type of malnutrition among children varies from region to region and from state to state, depending upon the geography, socioeconomic factors, food habits, levels of literacy, climate, religious and cultural beliefs (ICMR, 1972; Gopalan 1978; Rao et al 1994; Ghosh et al 2001)

Malnutrition is a widely prevalent problem in India and one of astonishing magnitude. According to the National family health Survey (1992-93), more than half (53%) of children below four years of age are under nourished. In 1998, 29.1% children between 1-5 years of age suffered from moderate and 12.3% from severe under-nutrition. Nutritional adequacy is one of the key-determinants of health and well being of the children. Under-nourishment not only retards physical development but also hampers the learning and cognitive process, leading to sluggish educational, social and economic development. 170 million children under six years of age constitute 17.5% of India’s population (census: 2001). One in three of these children is born with low birth weight and is thus denied the best possible start in life. The high incidence of low birth weight compounded with inadequate care and restricted access to health services translates into high rates of child malnutrition and threatens the process of healthy development, culminating in a high infant mortality rate. India has a high IMR (Infant mortality rate) of 50 per 1000 children,
with Madhya Pradesh on top with 67 IMR and Kerala with minimum 12 IMR on bottom. (Registrar General: 2011).

Protein energy malnutrition in growing children has always been a major public health problem in the developing countries. Severe clinical forms of diseases like Kwashiorkor and Marasmus are easy to recognize, but milder forms of the disease manifest themselves in varying degrees of growth retardation which could well be detected by the use of anthropometry. Infants from rural areas are generally well protected against malnutrition, because the majorities are breast-fed up to the age of 9 to 12 months. The school child, being more or less independent, can fend for himself, but the preschool child is neither breast-fed nor independent and is therefore likely to suffer more from various nutritional disorders.

**Child care is cost effective**

Child care is highly cost-effective because when you save the life of an infant you provide him at least of 50 years more. On the other hand when an old man is salvaged from the clutches of cancer or stroke, he has no more than 2 to 5 additional years to live. There is no denying the fact, however that producing and nurturing children with optimal care is time-consuming by cost effective. They need constant supervision and protection for a long period of time and a considerable cost is involved in their feeding, providing education and health care, etc. They pay back their
debt to the family and society only if they survive as useful citizens without any disability and are able to generate fiscal resources by participation in the developmental activities of the nation. However, if children die prematurely during their childhood, the resources expended on them are doomed because they have not lived long enough to pay back their debt to the society.

1.1 GROWTH

Growth is a dominant biological activity during the first two decades or so of human life, including, of-course nine months of prenatal life. Growth is an essential feature of child’s life which distinguishes him or her from an adult. The process of growth starts from the time of conception and continues till the child becomes a mature adult. Growth means an increase in size or mass of tissues. It is predominately attained through multiplication of cells or increase in the size of cells thus it is a quantitative term (Rajesh Dixit 2006). Growth is an increase in the size of the body as a whole or the size attained by specific parts of the body. It is a fundamental characteristic of all living organisms.

The term development is frequently used along with growth and even considered synonymous by some people. The term “growth and development” are often used together because they go hand in hand
simultaneously. But growth and development are not the identical. Therefore it requires a careful examination and proper understanding.

The child is characterized by two fundamental facts – the growth and the development. Growth means the increase in the size of the various parts and organs of the body by multiplication of cells and intercellular components during the period commencing from fertilization to physical maturity. Changes in size are outcomes of three underlying cellular processes: (a) an increase in cell number or hyperplasia; (b) an increase in cell size or hypertrophy; (c) an increase in intercellular substances or accretion.

Development means a progressive series of changes that occur as a result of maturation and experience. Development implies qualitative change; this means that development does not consist merely of additional inches to one’s height or of improving one’s ability. Instead, it is a complex process of integrating many structures and functions (Van den Daele 1976). Development is a continuous process from the moment of conception to death but occurs at different rates, sometimes slowly and sometimes rapidly.

The most crucial period of a child’s growth is the first six years of life, since about 40% of physical growth and 80% of mental growth are believed to take place during these years. In this age, the foundations for
physical, psychological and social development are laid. It has been established that the poorly nourished child grows less rapidly both physically and mentally. (Leena Sunil Khandalkar 2011)

**DEFINITIONS OF GROWTH**

According to Bruce Barton:

“Normal dimensional changes in the amount of living substance that is measured in units of change per unit of time, does not necessarily have to be increased in size”. Ex: Thymus gland after puberty decreases.

According to Watson and Lowery “growth means an increase in the physical size of the whole or any of its parts.” It can be measured in terms of centimeters and kilograms or metabolic balance i.e. retention of hydrogen and calcium in the body.

Juan Comas defines it “as the objective manifestation of hypertrophy and hyperplasia of the organism constituent tissues and is determined by post natal body size.”

This increase in body size is limited by predetermined constitutional and hereditary factors. It is however influenced by exogenous factors like diet, climate, race, environment etc.

An individual may grow in size but some organs though fully grown in size may fail to develop to perform the specific functions. In
both growth and development interactions of several processes with each other are involved.

**GROWTH AND DEVELOPMENT**

**Watson and Lowery** (1960) have tried to distinguish between the two processes. They say that **growth may mean increase in physical size of the whole or any of its part which may be measured. On the other hand, development indicates an increase in skill and complexity of function.** In any case the processes of development and growth are not the same but are interrelated and interdependent.

The study on growth of children is the most important criteria for recognizing health of children (Navali et.al, 1992). Growth of a child is influenced by the different socio-economic conditions, education, sanitation, family size, food habits, religions, customs, attitudes and food fads in community will affect the growth and nutritional status of child. A number of studies have been undertaken to determine the factors associated with growth and health status of a child.

Birth weights below 2,500 grams have been found to be very closely associated with poor growth, not just in infancy but also throughout childhood (Butt, et al: 1996, Bavdekar et al: 1994). Higher mean values for different anthropometric measurements among the children of higher socio-economic groups have been reported by Currimbhoy (1963), Swaminathan
et al. (1964), Banik et al. (1972), Gupta et al. (1973), Dhamija et al. (1976), Vijayaraghavan (1976) and many others.

A study in Guatemala found that children in villages with supplementary feeding had higher growth than those without it (Guzma´n et al., 1968).

Jain and Saxena (1977) found that the children from lower socio-economic group are lighter in weight, shorter in height, lesser in chest circumference and arm circumference but the head circumference was not differing much from those of the higher socio-economic group. On the average the nutritional status of urban children has been found to be better than that of the rural (Chaudhury et.al, 1983). Gupta et al. (1973) observed that the values of rural children were similar to those of the urban poor socioeconomic group. The main cause of growth variation and retardation in India is the countrywide high prevalence of malnutrition (Visweswara Rao, 1978; ICMR, 1984b)

In spite of high prevalence of Protein Calorie Malnutrition among children, systematic and extensive growth studies in India are not adequate to highlight either the variation in growth or its change in different parts of the country in different communities. The only information available for the general Indian children comes from the major study made by Indian Council of Medical Research (ICMR, 1984a, b) during 1956-1965.
Niels Christiansen’ Jose O.Mora et al (1975) studied Physical growth was found to be positively associated with expenditure on food, sanitary conditions in the home, mother's age, birth interval between surviving children, level of parental newspaper reading, aspirations for children, and socioeconomic status.

Physical growth was negatively associated with crowded living conditions and family size. The findings emphasized the importance of within-class social differences as they affect the physical growth of young children.

The pattern of growth is influenced by environmental and socio-economic conditions. A large number of social-economic variables are associated with the physical development of children. These variables are consisting of parental profession, income, education, birth order, family size, and urbanization.

Research results reveal that children belonging to different income levels have shown significant differences in their growth pattern. Hanumantha Rao and Satyanarayan (1975) Vijayaraghavan (1971), Banik (1982) found that Children from economically advanced groups are taller and heavier than children from under privileged groups. Country wide survey of growth on low income group school children indicate that their heights and weights fall below the 5th percentile of well fed normal children.( Swaminathan 1971 ).
Eiben et al. (1996) evaluated the effect of socio-economic status on weight and height of children. Their results showed that people of high economic status had more height than low economic status. Qumra S R, Mehta’s et al. (1990) studied about physical growth in school girls and found that the LSES (low socio-economic status) girls were significantly smaller in every physical measurement as compared to USES girls. Chatterjee and Mandal (1991) found that girls from rural West Bengal were lighter and shorter as compared to Indian norms for girls from higher socio-economic status groups. The positive relation between family income and physical growth might be attributed to the fact that when parents have lack economic resources it becomes difficult for them to provide quality care, proper environment, less access to quality nutrition medical care and opportunities for physical activity which is necessary for proper physical growth of children.

Peck and Vagero (1987) showed that children from larger families tend to be shorter than small families. But some British studies showed that the family size-height relationship is not linear correlation with growth. Silva and et al. (1985) determined the effect of socio-economic factors and birth weight on growth of children. Their result revealed that socio-economic status and birth weight were significantly correlated with stature,
while the sex of children, maternal age, size of family, and ordinal position of the child in the family were not significantly related to each other.

The environment seems to produce its effect on growth mostly by the presence or absence of infective, parasitic and psychological illness and above all the plan of nutrition. Research work tends to suggest that environmental influences especially for diet are of greater importance than genetic background or other biological factors (Narasinga Rao et.al, 1977).

Adults and children from disadvantaged areas of developing countries are considerably smaller than upper-class adults and children from the same countries or those from industrialized nations (Martorell, 1985).

The growth status of children, especially their height, is influenced by hereditary and environmental factors. In contrast, body weight is more sensitive to environmental factors (Musaiger A O et al 1989). Cultural variations in behavior also have a significant influence on the growth of preschool children (Huda S 1988 & Al Isa et al 1988).

Urban and rural environmental differences in growth of children have come into focus of interest in the last years. There are several studies which have reported contradictory evidences in samples from various countries and cultures and with various age ranges. Bielicki (1986) and Eiben et al. (2005) reported that within a specific country or cultural group
in Europe, children who were living in urban areas have greater size than rural areas, while there were no significant differences in the growth status in children who were living in urban and rural areas in United Stated and Canada (Pena Reyes, M.E., W.K. Tan and R.M. Malina, 2003, Eveleth, et al 1990, Malina, R.M., et al 1981, Lin, W.S., et al 1992) reported significant differences in growth and maturity status in China’s children in urban-rural conditions.

Data from Africa, also revealed that urban – rural contrasts are evident in the growth and body size (Pawloski, L.R., 2002, Cameron, N., 1992). Malina et al (2004) pointed out that body size is related to performance of many physical fitness components. Hence, the size differences commonly observed in urban rural children may also be related to different levels of physical fitness. In contrast, to consider the growth status of rural and urban children, corresponding comparisons of physical performance are relatively limited; however, these researches have been shown ambiguous evidences within countries.

PARAMETERS OF GROWTH

- **Height (cm):** is measured in children too young to stand; height is measured once the child can stand. In general, length in normal term infants increases about 30% by 5 month and > 50% by 12 month; infants grow 25 cm during the 1st year; and height at 5 yr is about
double birth length. In boys, half the adult height is attained by about age 2; in girls, height at 19 month is about half the adult height. Rate of change in height (height velocity) is a more sensitive measure of growth than time-specific height measures. In general, healthy term infants and children grow about 2.5 cm/month between birth and 6 month, 1.3 cm/month from 7 to 12 month, and about 7.6 cm/year between 12 month and 10 year. Before 12 month, height velocity varies and is due in part to prenatal factors (e.g. prematurity). After 12 month, height is mostly genetically determined, and height velocity stays constant until puberty; a child's height relative to peers tends to remain the same. Some small-for-gestational-age infants tend to be shorter throughout life than infants whose size is appropriate for their gestational age. Boys and girls show little difference in height and growth rate during infancy and childhood.

- **Body weight (kg):** Weight follows a similar pattern. Normal term neonates generally lose 5 to 8% of birth weight in the days after delivery but regain their birth weight within 2 week. They then gain 14 to 28 g/day until 3 month, then 4000 g between 3 and 12 month, doubling their birth weight by 5 month, tripling it by 12 month, and almost quadrupling it by 2 year. Between age 2 year and puberty, weight increases 2 kg/yr. The recent epidemic of childhood obesity has involved markedly greater weight gain, even among very young children. In general, boys are heavier and taller than girls when growth
is complete because boys have a longer pre-pubertal growth period, increased peak velocity during the pubertal growth spurt, and a longer adolescent growth spurt.

- **Chest circumference (cm.)** Chest circumference at nipple level during mid-expiration is – 3 cm less than the head circumference at birth, equals at one year and exceeds afterward. Persistence of chest circumference less than head circumference beyond infancy indicates larger head e.g. hydrocephalus or smaller chest e.g. malnutrition.

- **Mid-arm circumference (cm.)** Mid-arm circumference is measured at a midpoint of the hanging left arm, between the tip of acromian and olecranon processes. After initial child growth, Mid-arm circumference remains constant (16-17 cm) between 2-5 years of age, due to replacement of body fat with muscle mass. A Mid-arm circumference of < 13.5 cm at any age beyond infancy indicate malnutrition- basis of various field methods for diagnosis of malnutrition.

**Criteria for growth and development:**

A child of better growth and development are:

- Alert
- Vigorous
- Quickly recovering from fatigue
- Sleeps well at night
• Clear bright eyes
• Straight well formed teeth,
• Pink unbleeding gums
• Lustrous healthy hair
• Firm muscles
• Good appetite
• Regular bowel movement

Determinants of growth and development:

1. Genetic inheritance:

Genetic factors influence growth and development, especially height and weight, mental and social development and personality.

2. Nutrition:

Nutrition influences growth and development before as well as after birth. In fact, retardation of growth rate is an indication of malnutrition. Deficiency in calories or reduced food intake results in malnutrition. Malnutrition delays growth and may affect size of body parts, proportions, body chemistry, and the quality and texture of some tissues (ex: teeth and bones). Malnutrition may also delay growth and the
adolescent growth spurt. When the diet is improved the child begins to grow in height and weight.

3. **Age:**

Growth rate is maximum during foetal life, during first year of life and then again at puberty. At other periods, growth is slower.

4. **Sex:**

At about the age of 10-11 years, female children show a sudden increase in height and weight. Growth spurt corresponds to puberty. In male children, the growth spurt occurs a little later, i.e., between 12 and 13 years.

5. **Physical surroundings:**

Sun shine, good housing, lighting and ventilation have their effects on growth and development.

6. **Psychological factors:**

Love, tender care and proper child-parent relationship do affect the social, emotional and intellectual development of children.
7. **Infections and parasitosis**:

   Certain infections of the mother during pregnancy (e.g. rubella, syphilis) affect the intra-uterine growth of the foetus. Infections after birth (e.g. diarrhea, measles) slow down growth and development, especially in the malnourished child. The intestinal parasites (e.g. roundworms) by consuming considerable quantities of nutrients hamper growth and development.

8. **Economic factors**:

   The standard of living of the family is an important factor. Children from well-to-do families have better height and weight. The economic factor is connected with the nutrition and living of the people.

9. **Other factors**:

   These comprise the birth order of the child, birth spacing, birth weight in single and multiple pregnancies, education of the parents, etc. In short, a normal childhood implies proper physical, mental and emotional development, and is a prerequisite for a full adult life.
10. **Illness:**

11. Systemic disease has an effect on child growth, but the plasticity of the human organism during growth is so great that the clinician must differentiate between minor and major illnesses.

12. **Race:**

   Anthropologists have expressed difficulty in defining race. Some racial differences are due to climatic, socioeconomic, and nutritional differences. However, gene pool differences account for the fact that North American blacks are ahead of whites in skeletal maturity at birth and at least during the first two years of life.

12. **Climate and seasonal effects:**

   Climate has been found to have little direct effect on the rate of growth. Growth rates are maximal in summer and minimal in winter.

13. **Exercise:**

   The effects of exercise on linear growth have not been proven quantitatively. Children that exercise strenuously and regularly have not been shown to grow more favorably but they have more developed motor skills and increased muscle mass.
ASSESSING GROWTH

In children, the parameters of growth generally used are weight, height (or length in infants), and head and chest circumferences. These characteristics are measured and compared with the reference standards.

Because children are constantly growing and changing, it becomes important for health care professionals to assess their progress periodically. Any problems can thereby be detected early and treated.

A complete assessment of physical growth includes the collection of anthropometric data. This includes height and weight, weight for height (all with percentiles plotted on the National Centre for Health Statistics (NCHS) growth grids), upper arm circumference, and triceps and sub scapular fat folds. The minimum measurements taken should be height and weight.

Growth measurements must be recorded at regular intervals in order to show the growth patterns of a child. Height and weight taken only once do not lend themselves to interpretation of growth status. Children generally maintain their heights and weights in the same channels during the preschool and early childhood years, although the channels are not well established until after age two. Individual children at times
grow at faster or slower rates; nonetheless, they should follow along the same channels.

The height and weight of a child should be in proportion to one another; this can be assessed by plotting the weight for height. A gross assessment can also be made by noting the difference between the height and weight channels, a difference of more than two channels is suggestive of overweight or underweight and should be investigated further. Skin fold measurements also yield more specific information regarding the composition of the child’s weight.

When children’s growth is measured routinely, changes can be more quickly noted and problems corrected. Weight increasing at a rapid rate and crossing channels suggests the development of obesity. Lack of weight gain or loss of weight over a period of months may be result of under nutrition, a severe acute illness, an undiagnosed chronic disease or significant emotional or family problems.

**Types of growth**

Two basic types of growth responses can be monitored:
Linear growth

This function represents a process of growth which always adds the same relative growth and gets a straight line, which is said to be linear growth. Linear growth is when something grows the same exact amount in each time frame. Basically, if something is two feet today and a month later at the exact same time it is six feet. And then the next month at the exact same time, it is ten feet, then it is growing at a rate of four feet every month at the exact same time.

Wasting

Wasting refers to the process by which a debilitating disease causes muscle and fat tissue to "waste" away. Wasting is sometimes referred to as "acute malnutrition" because it is believed that episodes of wasting have a short duration, in contrast to stunting, which is regarded as chronic malnutrition. Wasting can be caused by an extremely low energy intake (e.g., caused by famine), nutrient losses due to infection, or a combination of low intake and high loss. Wasting is a strong predictor of mortality among children under five.

Further, these responses may be measured either in dynamic fashion as changes over time or statically at any one time. The most common measure of linear growth used is total body length (or height in older
children), and the most widely used measure of wasting is weight-for-length (or weight— for-height), though other measures of localized tissue reserves are often used (e.g., arm circumference, skin fold measurements). Weight, the single most common measure taken in developing countries, reflects the degree of adequacy of both linear growth and mass-to-length status.

**Growth Velocity or Rate of Growth**

It is increment in growth in a unit of time. The comparison of child’s height and weight with the growth-chart helps to determine if the particular child is within the expected normal range for his sex and socio-economic stratum. It does not show whether the child’s growth was normal in the recent past. Measurement of velocity of growth is more fruitful. It helps in early assessment of retarding factors of growth as well as prediction of ultimate growth.

**Growth Chart**

The growth chart is a visible display of the child’s physical growth and development. It is designed primarily for the longitudinal follow up (growth monitoring) of a child, so that changes over time can be interpreted.

It is important that in the weight-for-age chart, the height of the child is not taken into consideration. This is because weight is the most sensitive
measure of growth, and any deviation from “normal” can be detected easily by comparison with reference curves. A child can lose weight, but not height. In short, the growth chart offers a simple and inexpensive way of monitoring weight gain, and in fact child health over time.

**Growth chart is**

- Consist of a series of percentile curves that illustrate the distribution of selected body measurements in the study population.
- Used to track the growth of children from infancy to adolescence.
- Indicates the state of the child's health, nutrition and well being.

![Figure 1.1 (a) Growth chart](image)

A **growth chart** is used by paediatricians and other health care providers to follow a child's growth over time. Growth charts have been constructed by observing the growth of large numbers of normal children.
over time. The height, weight, and head circumference of a child can be compared to the expected parameters of children of the same age and sex to determine whether the child is growing appropriately.

Growth charts are different for boys and girls, due in part to pubertal differences and disparity in final adult height. In addition, children with diseases such as Down syndrome and Turner syndrome follow distinct growth curves which deviate significantly from children without these diseases. As such, growth charts have been created to describe the expected growth patterns of several genetic diseases.

There are many types of growth charts in common use in different countries. Some have only two reference curves, and others as many as five. The WHO in recent years has made an effort to unify the countless growth charts and curves used throughout the world.

**WHO suggests new Child Growth Standards**

World Health Organization (WHO) has suggested new WHO child growth standards for monitoring growth of children. The implementation of these standards results in change of current estimates of under nutrition as follows.

(a) Increase in total normal weight children,

(b) Increase in severely underweight children,

(c) Increase in underweight children (mild/moderate and severe) in age group of 0-6 months.
The government has adopted the new norms w.e.f. 15 August 2008 for monitoring growth of children under Integrated Child Development scheme, (ICDS) and National Rural Health mission (NRHM). The new WHO standards are based on breastfed infants while earlier National Centre for Health Statistics (NCHS) standards were based on breastfed as well as artificially fed children. Breastfed children provide the best standard for measuring healthy growth. The new standards show that all children across all regions can attain a similar standard of height, weight and development with correct feeding practices.

**STAGES OF GROWTH**

The stages or phases of growth have been classified in different manners by different researchers.

**Prenatal Period**

The prenatal period comprises, on the average, about 10 lunar months (there are 28 days in a lunar month), 9 calendar months, or 40 weeks. Prenatal growth has three distinct stages: the fertilized ovum (egg), or zygote (first 2 weeks); the embryo (from 2 to 8 weeks) and the foetus (from 2 to 10 lunar months). The human ovum at conception is about 0.1 mm in diameter. During the first part of this period (ovum), it is like a homogeneous mass. During the embryonic stage, though the rate of growth is slow, yet during this time the differentiation process in the mass to form various regions which later on give rise to different parts, like
head, arm, leg and others starts. By the eighth week the embryo becomes child-like in appearance. During foetus stage the rate of growth in length as well as weight is considerably high.

**Postnatal Period**

Postnatal growth is commonly divided into the following age periods.

**Infancy**

Infancy comprises the first year of life. This is a period of rapid growth in most bodily systems and dimensions and rapid development of the neuromuscular system.

Immediately after birth the rate of growth increases. During infancy growth is very rapid. More than 50 percent of birth length and 200 percent of birth weight take place during the first year of life.

**Childhood**

Childhood ordinarily spans from the end of infancy (the first birthday) to the start of adolescence. The infant attains childhood before reaching adolescence. It is often divided into early childhood and middle childhood. The early childhood is the period of eruption of milk teeth. The middle childhood (7 to 10 years) is the period of eruption of permanent teeth, though not all erupt. The late childhood starts from the pre-pubertal period and continues up to the time of puberty. Childhood is period of relatively steady progress in growth and maturation.
Adolescence

After childhood, comes adolescence period. The adolescence period extends from the time of puberty up to around 20 years.

PHYSICAL GROWTH

Physical growth usually refers to changes in size or mass; so it is correct to say that a child grows in stature (height) or body weight. Even though most people usually think of growth at the level of the whole child, the cells and internal structures that make up the child also grow primarily by increasing in number or size. Physical growth includes attainment of full height and appropriate weight and an increase in size of all organs (except lymphatic tissue, which decreases in size).

Growth from birth to adolescence occurs in 2 distinct phases. The 1st phase (from birth to about age 1 to 2 yr) is one of rapid growth, although the rate of growth decreases over that period. In the 2nd stage (from about 2 yr to the onset of puberty), growth occurs in relatively constant annual increment. Physical growth follows a predictable pattern although variations do occur (Elezabeth.B.Hurlock 1985).

Physical growth of children is reflected by different anthropometric measurements especially weight and height. On the other hand, child height and weight are good index for recognizing the nutritional status.

The ecological environment is responsible for the major differences observed in the growth of children. Although the physical growth is a
process abiding the same biological laws, it is difficult to define the normal growth because children belonging to the same age group by no means are uniform and constant in their growth pattern. Growth needs to be studied in the context of a given community. The physical growth is rapid for the purpose of comparison with a heterogeneous group, the reference standards for anthropometric measurements need to be evolved and used. Growth monitoring in children has been known as the best index for assessment of growth status among children.

Physical growth, development and well-being are directly related to the nutritional status. Chronic under-nutrition is considered to be the primary cause of ill health and premature mortality among children in developing countries (Nandy et al. 2005). Under-nutrition among children is prevalent in almost all the states in India (Som et al. 2006). Child malnutrition has risen in recent years in India (Chaterjee 2007). India accounts for about 40 percent of undernourished children in the world (James 1998). Children belonging to socially backward groups like scheduled castes (Uppal et al. 2005) and tribes (National Institute of Nutrition 2000) are highly susceptible to under-nutrition. Most of the tribal people of India have their own geographically isolated life style. Inadequate food habits along with traditional socio-cultural and biological activities may lead to a high proportion of under nutrition in their children that also interferes with their body growth and development (Balgir et al.
2002; Rao et al. 2006a). Therefore, the dietary intake is considered as one of the most important determinants of nutritional status (Grover and Singh 2006). Information of this pattern is an essential pre-requisite for planning food needs (Das and Biswas 2005; Malhotra and Passi 2007).

1.2 EMPIRICAL STATUS OF GROWTH

Growth and socio economic status

Robert H. et al (2002) showed that socio economic status is associated with a wide array of health, cognitive, and socio emotional outcomes in children, with effects beginning prior to birth and continuing into adulthood. For children socio economic status impacts well-being at multiple levels, including both family and neighbourhood. Its effects are moderated by children’s own characteristics, family characteristics, and external support systems.

C.Venketeshwarlu et al (2004) studied the effect of income level and seasonal variation of growth pattern of preschool children and found that growth faltering was high in summer (41%) followed by Autumn(29%) Rainy (15%) and winter seasons (14%). The percentage distribution of normal’s (other cast) was decreasing and malnutrition grade I and II was increasing when income levels were decreasing.

Shashi Singh et al (2005) studied about trend of growth in mid-arm circumference and head circumference of female children and found that
poor environmental factors, low socio-economic status and inadequate nutrition of the child etc. were responsible for these low anthropometric values.

Oliveira VA et al (2006) studied determinants of weight and linear growth deficits in children under two years of age. Result shows that Children's weight and linear deficits were accounted for the overlapping of poor material living conditions, limited access to health care and disease burden.

Manish Kumar Tiwari (2007) et al studied Growth and nutritional status of Bharia (Tribe) of Madhya Pradesh. In this study it can be attributed that the poor growth pattern of the Bharia children in comparison to the international standard may be due to the poor socio economic condition of that tribe.

Prekshi, et al (2008) studied about effect of socio-economic factors on anthropometric measurement and found that height and weight of children were affected by caste, income, and size of family, landholding and father’s occupation.

Ashraf Mohammadzaden et al (2010) studied effect of birth weight and socio economic status on children’s growth in Iran and found that birth weight, economic status and education of parents of neonates have directly significant effect on growth during childhood period.
Growth and education

El-Nofely et al (2009) found that children of educated parents have significantly low number of siblings size in comparison to those of uneducated parents. Also children of educated parents are significantly more in number in urban areas than in rural areas, and vice versa. The interdependence between parental education and locality shows the highest level of significance in both sexes and at all ages.

Anupama Hazarika (2010) studied effect of maternal education and maternal mental health on Childs growth and result of this study illustrates the pivotal role of a prospective design in identifying key factors affecting increases in child’s height and weight. Neither key factors of prior interest examined maternal education or maternal mental health – was found to be associated with child growth independent of other factors identified.

Growth and environment

Dautov FF et al (2001) studied influence of environmental factors on physical development of preschool children. The result showed that the harmony of the morphofunctional status was found to be significantly lower in the polluted areas than in the pure ones, showing an error probability of no greater than p < 0.05 to p < 0.001.

O.G.Eiben et al (2004) found that family size and population size of the place of residence showed consistent associations with the body measurements. Children from larger families tended to be shorter on
average, and have lower weight and skinfold thickness whereas children from Budapest were, on average, taller and heavier than children from elsewhere with bigger chest and calf circumferences and lower skin fold thicknesses. Paternal age, mother’s profession and birth order showed few associations with body measurements in both sexes and father’s profession did not associate significantly with any of the measurements in boys.

Effects of social factors on the growth rate of children were presented by P founder (1916) for the first time. They observed urban children were taller and grow faster than rural peers (Eiben OG, Mascie 2004).

Freitas D, et al(2007) showed Significant differences between SES groups were observed for height, body mass and skin folds. Boys and girls from high SES groups were taller, heavier and fatter (sub scapular and triceps skin folds) than their peers from average and low SES groups. At some age intervals, the high SES group had larger skeletal breadths (girls) and girls (boys and girls) than low SES. Small SES differences were observed for physical activity (sport and leisure-time indices). SES was significantly associated with physical fitness. At some age levels, boys from the low SES group performed better for muscular and aerobic endurance whereas girls from the high SES group performed better for power.
Sutanu Dutta Chowdhury et al (2008), studied The upper arm muscle and fat area of Santal children and found that Growth curves of UAFA-for-age (Upper arm fat area) and UAMA (Upper arm muscle area) by height are good indicators of nutritional status in Santal children. UAMA and UAFA may not be similarly affected in undernourished children of every community.

Bharati p, et al (2009) studied growth and nutritional status of preschool children and result shows that the children are found to be lighter and shorter compared to International standards irrespective of age and sex. Boys are heavier and taller than girls. There is a significant rural-urban as well as gender difference in growth and nutritional status of Indian preschool children.

Nahid Fathizadeh and, M Yazdani, Ali Reza Usefi, Tayebe Mehrabi (year)studied Mother's attitude concerning parenting style and growth and development of primary school students and found that maternal attitude towards parenting style is related to child's cognitive development. They found a negative correlation between authoritarian maternal attitude and child's IQ. There was no relationship between authoritarian maternal attitude and child's physical growth.
**Growth and Nutrition**

The growth and development of a child is entirely dependent on their diet. Infections and infestations attack immediately when diet is poor in quality. So it is essential to provide them balance diet according to their requirements. Any major deviation in the nutrient intake either in quality or in quantity from its requirement can also affect growth and life span in a number of ways particularly in the later period/growth is more influenced by nutrition. (Gopalan et al., 1989.)

Many studies have shown that raising dietary intake through supplementary feeding can have beneficial nutritional consequences, including effects on outcomes such as growth, activity, cognitive development and compensation of energy lost during illness.

Nita Bhandari et al (2001) studied on effect of micronutrient supplementation on linear growth of children and found that Zinc & Iron seem to have a modest effect on linear growth in deficient populations. Vitamin A is unlikely to have an important effect on linear growth.

Paolo Fiore, et al (2002) studied the effect of nutritional intervention on physical growth in children at risk of malnutrition. The result of this study indicates that nutrition supplementation, together with nutritional counseling can improve food intake & growth in children at risk for malnutrition.
Juan A. Rivera et al (2003) studied the effect of Micronutrient Deficiencies on Child Growth and found that three micronutrients with the strongest relationship to growth, iron, zinc and vitamin A, are commonly deficient in low-income populations where dietary quality often is poor.

Assis AM et al (2005) studied growth faltering in childhood and the results of the study reinforce the concept of diarrhea burden as a major determinant of poor growth in children less than 5 year of age. Actions targeted to decrease the risk factors for the occurrence of diarrhea may represent an important component of interventions aimed to ensure satisfactory child growth.

Mitashree Mitra et al (2006) studied nutritional status of Kamar Tribal Children in Chhattisgarh and the results showed that because of inadequacy of nutrients; children (both boys and girls) suffer from under nutrition in the form of underweight, shunting and wasting.

Wamani H. Astrom AN et al (2006) studied about Predictors of poor anthropometric status among children under 2 years of rural Uganda and found hierarchical interrelationships of potential determinants of malnutrition, wasting and underweight turned out to be independently predicted by morbidity (proximal) factors. Stunting, however, was predicted by socio-economic (distal), environmental and health-care (intermediate) factors in addition to morbidity. Strategies aimed at
improving the growth of infants and young children in rural communities should address morbidity due to common childhood illness coupled with environmental and socio-economically oriented measures.

Habibollah Hosseini et al (2008) studied growth rate in children before and after supplementary diet and found that elements of birth weight, weight before and after supplementary diet, and mother scare of babies are important factors in the babies growth after taking supplements.

Kathryn G. Dewey, et al (2011) studied the evidence regarding this interaction between nutrition and infection with respect to child growth in low-income populations. The results show that adverse effects of certain infections (e.g. diarrhoea) on growth can be reduced or eliminated by improving nutrition. Interventions that combine improved nutrition with prevention and control of infections are likely to be most effective for enhancing child growth and development.

**Age and Growth**

Saraswati C.Hunshal et al (2010) studied physical growth status of school going children of Dharwad and found that age was significantly and positively related to height, weight and chest circumference at 0.01 level.
1.3 GOVERNMENT POLICIES FOR CHILDREN

The Government of India has launched several programs to converge the growing rate of under nourished children.

**Mid-day meal scheme in Indian schools**

The Akshaya Patra Foundation runs the world's largest NGO-run midday meal programme serving freshly cooked meals to over 1.2 million hungry school children in government and government-aided schools in India. This programme is conducted with part subsidies from the Government and partly with donations from individuals and corporate. The meal served by Akshaya Patra complies with the nutritional norms given by the government of India and aims to eradicate malnutrition among children in India. The hygiene standards and quality of food cooked are maintained at a very high level and food is cooked through state-of-the-art mechanized kitchens in 18 locations in India.

**National Children's Fund**

The National Children's Fund was created during the International Year of the Child in 1979 under the Charitable Endowment Fund Act, 1890. This Fund provides support to the voluntary organizations that help the welfare of children.
National Plan of Action for Children

India is a signatory to the 27 survival and development goals laid down by the World Summit on children 1990. In order to implement these goals, the Department of Women & Child Development has formulated a National Plan of Action on Children. Each concerned Central Ministries/Departments, State Governments/U.Ts. and Voluntary Organizations dealing with women and children have been asked to take up appropriate measures to implement the Action Plan. These goals have been integrated into National Development Plans. A Monitoring Committee under the Chairpersonship of Secretary (Women & Child Development) reviews the achievement of goals set in the National Plan of Action. All concerned Central Ministries/Departments are represented on the Committee.

The Department addressed the Chief Secretaries of States to prepare State Plans of Action (SPAs) on the lines of NPA, specifying their targets and spelling out strategies for holistic child development.

United Nations Children's Fund

Department of Women and Child Development is the nodal department for UNICEF. India is associated with UNICEF since 1949 and is now in the seventh decade of cooperation for assisting most disadvantaged children and their mothers. Traditionally, UNICEF has been supporting
India in a number of sectors like child development, women's development, urban basic services, support for community based convergent services, health, education, nutrition, water & sanitation, childhood disability, children in especially difficult circumstances, information and communication, planning and programme support.

**National Rural Health Mission**

This mission was created for the years 2005-2012, and its goal is to "improve the availability of and access to quality health care by people, especially for those residing in rural areas, the poor, women, and children."

The subset of goals under this mission is:

- Reduce infant mortality rate (IMR) and maternal mortality ratio (MMR)
- Provide universal access to public health services
- Prevent and control both communicable and non-communicable diseases, including locally endemic diseases
- Provide access to integrated comprehensive primary healthcare
- Create population stabilization, as well as gender and demographic balance
- Revitalize local health traditions and mainstream AYUSH
- Finally, to promote healthy life styles
• The mission has set up strategies and action plan to meet all of its goals.

**Integrated child development scheme**

The Government of India has started a program called Integrated Child Development Services (ICDS) in the year 1975. ICDS has been instrumental in improving the health of mothers and children under age six by providing health and nutrition education, health services, supplementary food, and pre-school education. The ICDS national development program is one of the largest in the world. It reaches more than 34 million children aged 0–6 years and 7 million pregnant and lactating mothers.

**INTEGRATED CHILD DEVELOPMENT SCHEME:**

Preschoolers (0-6 years) in India constitute 15% of total population as against 7% in the developed countries to the world. (Bhat and Dahia 1985). The preschool children are extremely vulnerable segments of the population which by virtue of being in the rapid growth phrase succumb easily where diet is poor in quality and quantity. Preschool children especially from lower economic families are undernourished. Ignorance, lack of time, unhygienic conditions lead to additive effects of malnutrition. Poor nutritional status and its concomitant problem of poor growth, poor healths are the primary underlying causes of infant and child mortality.
Malnutrition is post prevalent in the vulnerable young child when the synergetic relationship between malnutrition and disease can result in mortality. The main cause of morbidity and mortality were malnutrition, acute chronic infections poor environmental hygiene (Balgopal et. al 1970). So, for prevention of malnutrition it is essential to provide them better health services and adequate diet, knowledge of nutrition hygiene and sanitation, and regular health check up.

Nutritional status plays a vital role in deciding the health status particularly in children. Nutritional deficiencies give rise to various morbidities, which in turn, may lead to increased mortality. Nutritional security for these children is a social challenge and an investment in the future of nation.

Against such a grim background the minister of planning proposed a programme of integrated services for the most disadvantaged children to be designed and implemented nationwide (Habeer kochar 1988). The foremost symbol of nation’s commitment to the child and major programmes for the reduction of maternal and child malnutrition is the Integrated child development scheme. The scheme was launched in 1975 in pursuance of the national policy for children (Kapil U.2002).

Integrated child development services (ICDS) is the largest, perhaps one of the most imitative, progressive and ambitious programmes for
human resource development to be attempted by any developing country. The programme is designed to facilitate and promote the ‘total development’ of the child by making available, at the doorstep of poor communities, a coordinated package of child services comprising mutually reinforcing components of health, nutrition and educational inputs. The emphasis is on the two most crucial stages of child development – the intrauterine phase and early childhood (0-6 years).

ICDS aims at improving growth and development during critical intrauterine period, infancy and early childhood by providing an integrated package of the nutrition, health and education services right in the vicinity of their houses to both rural and urban population (Prema Ramachandran 2005). This policy reaffirms the constitutional provision and declared that it shall be the policy of the state to provide adequate services to the children both before or after birth and throughout the period of growth to ensure their full physical mental and social development.

**Objectives of ICDS:**

The main objectives of the scheme are (Sachdev y, et al 1995)

- Improvement in the health and nutritional status of children 0-6 years and pregnant and lactating mothers.
- Reduction in the incidence of their mortality and school drop out
Provision of a firm foundation for proper psychological, physical and social development of the child.

Enhancement of the maternal education and capacity to look after her own health and nutrition and that of her family

Effective co-ordination of the policy and implementation among various departments and programmes aimed to promote child development.

**Beneficiaries:** The beneficiaries under the programme are:

i) Children below 6 years,

ii) Pregnant and lactating women,

iii) Adolescent Girls

iv) Other women in the age group 15-45 years

**Services:** Towards achieving the above objectives, a package of integrated services comprising Supplementary Nutrition, Immunization, Health Check-up, Referral Services, Nutrition and Health Education and Non-formal Education is provided in a comprehensive and cost effective manner to meet the multi-dimensional and interrelated needs of children. Anganwadi Centre is the focal point for delivery of services. Immunization and health-check up are provided at the Anganwadi through the net work of health services in the project area. The beneficiaries and services under the ICDS Scheme are given in Table-
Table-1.3 (a): Services and Beneficiaries under ICDS

<table>
<thead>
<tr>
<th>Services rendered by</th>
<th>Services</th>
<th>Beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anganwadi Worker and Helper</td>
<td>i)</td>
<td>Children (6 months to 72 months); Pregnant and Lactating mothers.</td>
</tr>
<tr>
<td>ANM/ MO</td>
<td>ii)</td>
<td>Children below 6 years; Pregnant and Lactating mothers.</td>
</tr>
<tr>
<td>ANM/ MO/ AWW</td>
<td>iii)</td>
<td>Children in the age group of 3-6 years</td>
</tr>
<tr>
<td>ANM/ MO/ AWW</td>
<td>iv)</td>
<td>Women in age group of 15-45 Years</td>
</tr>
<tr>
<td>AWW</td>
<td>v)</td>
<td></td>
</tr>
<tr>
<td>AWW/ ANM/ MO</td>
<td>vi)</td>
<td></td>
</tr>
</tbody>
</table>

@Adolescent Girls under Kishori Shakti Yojana (KSY) are also eligible.

*AWW assists ANM in identifying the beneficiaries.

**Supplementary nutrition**

ICDS supplementary feeding is supposed to provide support to all children 0-6 years old for 300 days in a year (25 days a month). ICDS supplementary nutrition program provides 300 calories and 8-10 gm of protein for all children from 0-72 months (below age six). For children 6-23 months of age, this covers 50-150% of the required complementary energy needs and 70-100% of the recommended protein needs. For children above age two, it is supposed to fulfill 20-30% of the energy requirements of children and 50-70% of their recommended protein needs. Under ICDS
supplementary food arrangements are generally different for children above and below the age of three. Children ages 3-6 are generally fed “on site” at the anganwadi, while children below age three receive “take home rations” that last for a week or a month depending on the frequency of distribution. There are two broad types of on-site feeding arrangements for children ages 3-6: cooked food and “ready-to-eat” items such as murmura, mungfali. Take-home rations also vary across states: some states like Tamil Nadu and Maharashtra provide fortified baby mixtures; others like Uttar Pradesh provide ready-to-eat panjiri; states like Chattisgarh provide simple wheat dalia with gur and oil.

**Health check-ups**

AWCs (Anganwadi centres), children adolescent girls, pregnant women and nursing mothers should be examined at regular intervals by the Lady Health Visitor (LHV) and Auxiliary Nurse Midwife (ANM). They should also diagnose minor ailments and distribute necessary medicines among them. They should act as a link between the villages and the PHC/SC.

**Immunization:**

Immunization of pregnant women and infants protects children from six vaccine preventable diseases—poliomyelitis, diphtheria, pertussis, tetanus, tuberculosis and measles. These are major preventable causes of child
mortality, disability, morbidity and related malnutrition. Immunization of pregnant women against tetanus also reduces maternal and neonatal mortality.

**Nutrition and Health Education:**

Nutrition, Health and Education (NHED) is a key element of the work of the anganwadi worker. This forms part of BCC (Behaviour Change Communication) strategy. This has the long term goal of capacity-building of women – especially in the age group of 15-45 years – so that they can look after their own health, nutrition and development needs as well as that of their children and families.

**Referral Services:**

During health check-ups and growth monitoring, sick or malnourished children, in need of prompt medical attention, are referred to the Primary Health Centre or its sub-centre. The anganwadi worker has also been oriented to detect disabilities in young children. She enlists all such cases in a special register and refers them to the medical officer of the Primary Health Centre/ Sub-centre.

The three services namely immunization, health check-up and referral are delivered through public health infrastructure viz. Health Sub
Centers, Primary and Community Health Centers under the Ministry of Health & Family Welfare.

A number of studies have been undertaken to determine the impact of ICDS services. Eminent among them are:

Renu and Rekha (1982) observed that nutritional status of the Children was improved as a result of the ICDS Centres. It was also found from the present study that the children who attending anganwadi Centres were taller and heavier as compared to the children not attending ICDS centres.

Vivek and Zaheer (1984) and Chaturvedi (1987), found that Children under ICDS scheme were received Better diet in better way.

L.N.Balaji,MD ,and Saroj Arya (1987) studied in Delhi and compares the physical and psycho-social development of preschool children ICDS and non ICDS both and found that children in the ICDS area were significantly better nourished( P<0.05 ),better in perception of forms color matching and scored better in total social maturity scores and social sphere of self direction, occupation, communication , specialization and occupation.

Neeru Bahal (1988) studied to evaluate the implementation and impact of non formal preschool education of ICDS scheme in Nagpur city and found that non beneficiaries scored better than beneficiary group on various cognitive abilities measured.
National Institute of Nutrition (1990) found that overall nutritional Status of children was better in ICDS centres than those children who were not attending ICDS Centres. Present study too reached on the similar Conclusion that ICDS children are better Nutritional status as compare to their non-ICDS Counterparts.

Gupta (1988) and National Institute of nutrition (1990) Found that mean body weight and height in ICDS Area were higher, nutritional status of children were better than their non-ICDS counterparts. Similar conclusions were drawn by the previous Studies of Yegammai and Nivargi (1995) and Jayalakshmi and Naik (1996). It was also observed that dietary requirements to the Children who attending ICDS centres were higher as compare to the other children who not attending ICDS centres.


Garg et al (1997) in Ghaziabnad , Bhandari et al (1993) in Rajasthan found that prevalence of malnutrition in under five was higher in spite of the fact that these populations was being served by ICDS.
Bredenkamp and Akin (2004) find that children who live in villages with anganwadi centers are not significantly less likely to be underweight or ill than other children.

Das Gupta et al (2005) find that the programme appears to have a significant and positive effect on nutritional outcomes. Sumati vaid and Nidhi vaid (2005) studied on 15 ICDS and 15 non ICDS from rural area of Jammu and observed that ICDS children had good dietary intake as compared to the children who did not attend anganwadi centers.

From the review of literature it is concluded that some of the studies shows positive results of ICDS services on a child growth and development whereas some studies shows that there is no beneficial effect of ICDS.

Therefore an attempt has been made in the present endeavour to investigate and check the validity of ICDS in rural area of Durg city. Researcher also chooses the topic to investigate that either ICDS programme will be able to generate variance in physical growth of the beneficiarie as compare to non beneficiaries.
1.4 RATIONALE OF THE PROPOSED RESEARCH WORK:

Growth and nutritional studies are valuable as they provide information on the health status of a community, and also be helpful for improving the health conditions.

Numerous works related to growth studies are available from developed nations; however, studies from developing countries are meagre, particularly in India. It is thus important to reduce, or if possible to eliminate the differential in child health with regard to different socio-economic groups. During the last several years extensive growth studies have been carried out under the auspices of Indian Council of Medical Research (ICMR), in different parts of the country by biological anthropologists (Sharma, 1986). However, there are limited studies on physical growth, with reference to impact of ICDS centres. To fill these lacunae, an attempt has been made in the present study to assess the physical growth of preschoolers of ICDS centres and non ICDS children.

In the light of above mentioned studies it becomes obvious that so many factors are responsible for the physical growth and development of child. Most of the studies were conducted only in metro cities and urban areas of big cities in India. It shows that effect of ICDS on preschool
children has not been studied in Durg district although supplementary nutrition, immunization, health check up, has been considered as a potential factor for effecting the growth and development of child under Indian cultural set up.

Hence the present piece of research will be done to identify and compare whether (Services of ICDS) supplementary nutrition, immunization, health check up, are in a position to influence on dynamics of changes in physical growth of ICDS and non ICDS children, under the title **Comparative study on dynamics of changes in physical growth of ICDS and Non ICDS children of Durg District.** In order to serve the following specific objective:

1. To assess & compare the physical growth of preschool children of ICDS centre Experimental group I (beneficiaries of supplementary nutrition, immunization & health check up services) with control group V / Non ICDS children.

2. To assess & compare the physical growth of preschool children of ICDS centre, Experimental group II (beneficiaries of only supplementary nutrition) with control group V / Non ICDS children

3. To assess & compare the physical growth of preschool children of ICDS centre Experimental group III (beneficiaries of immunization) with control group V / Non ICDS children
4. To assess & compare the physical growth of preschool children of ICDS centre Experimental group IV (beneficiaries of health check up services) with control group V / Non ICDS children.

5. To compare the physical growth of preschool children of ICDS who were the beneficiaries of Supplementary nutrition, immunization and health check up services, with other experimental group i.e. beneficiaries of only SN services, only immunization services and only health check up services of ICDS centre.

**General objective**

To assess the effect of Supplementary nutrition, Immunization & health check up services of ICDS centers on physical growth of preschool children in the rural areas of Durg District and compare it with Non ICDS children /Control Group V.