

**IMPACT ASSESSMENT OF INTEGRATED CHILD DEVELOPMENT  
SERVICES (ICDS) PROGRAMME ON NUTRITIONAL STATUS OF  
CHILDREN AT TRIVANDRUM DISTRICT**

*By*

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(2018 - 16 - 001)**

**THESIS**

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## DECLARATION

I, hereby declare that this thesis entitled “**IMPACT ASSESSMENT OF INTEGRATED CHILD DEVELOPMENT SERVICES (ICDS) PROGRAMME ON NUTRITIONAL STATUS OF CHILDREN AT TRIVANDRUM DISTRICT**” is a bonafide record of research work done by me during the course of research and the thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society.



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Certified that this thesis, entitled “**IMPACT ASSESSMENT OF INTEGRATED CHILD DEVELOPMENT SERVICES (ICDS) PROGRAMME ON NUTRITIONAL STATUS OF CHILDREN AT TRIVANDRUM DISTRICT**” is a record of research work done independently by **Miss. Abhina, B. (2018 - 16 - 001)** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to her.



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## ABBREVIATIONS

APL	Above Poverty Line
AWC	Anganwadi Centre
AWH	Anganwadi Helper
AWW	Anganwadi Worker
BMI	Body Mass Index
BPL	Below Poverty Line
CAS	Clinical Assessment Score
CC	Chest Circumference
CCS	Chest Circumference Score
CVD	Cardio Vascular Diseases
GOI	Government of India
H	Height
HC	Head Circumference
HCS	Head Circumference Score
HS	Height Score
IAP	Indian Academy of Pediatrics
ICDS	Integrated Child Development Services
ICMR	Indian Council of Medical Research

MUAC	Mid Upper Arm Circumference
MUACS	Mid Upper Arm Circumference Score
NIN	National Institute of Nutrition
NSI	Nutrition Status Index
RDA	Recommended Dietary Allowance
SFT	Skin Fold Thickness
SFTS	Skin Fold Thickness Score
UNICEF	United Nations Children Emergency Fund
W	Weight
WC	Waist Circumference
WCS	Waist Circumference Score
WHO	World Health Organization
WS	Weight Score

## 1. INTRODUCTION

Children hold the future of our nation. Child wellbeing reveals how a country guards and feeds its vulnerable members. Globally, indicators of child well-being are used to know the developmental status of different countries (Kalitha and Deshpande, 2011).

Childhood years are the most significant years of a person's life. They are the basis of a man's character. It is a base for his personality. It impacts his whole future, his career, his boldness, his action and his confidence (Emiku, 2012).

Children from 0-6 years have a complex process in brain improvement. Brain development in early childhood is particularly important as it sets the stage for the rest of child's life. The information gain from the way the brain works in early childhood better support child's brain development and kind of activities for babies at every age (Bredekamp, 2017).

“The building up of nation depends on building men and women and the process of building men and women depends very considerably on what is done to children. It is therefore, of high importance that we pay attention to the well-being and growth of children.” So said India's first Prime Minister, late Sri Jawaharlal Nehru.

In 2018 an estimated 6.2 million children and adolescents under the age of 15 expired, commonly from preventable origins. 5.3 million Death happened in the first five years. Prominent sources of expiry in children under 5 years are preterm birth difficulties, underfeeding, pneumonia, birth asphyxia, congenital irregularities, diarrhoea, malaria etc. More than half of these early child deaths are preventable or can be preserved with modest, reasonable intermediations (UNICEF, 2019).

India grips the principal child inhabitants in the world. Children under six years of age make up nearly 20% of India's population (Sreelakshmi, 2019).

Because of the steep size of its population, it has the highest prevalence of child malnutrition in the world (Gragnolati, 2005). 42.5% of Indian children are underweight for their age. 43.1% of girls, 47.9% of children from Scheduled Castes and 54.5% of

children from Scheduled Tribes are malnourished. Same disproportions are seen in immunization. Only 43.5% of children in India have acknowledged a full set of immunisations. Only 39.7% of Scheduled Caste and 31.3% of Schedule Tribe children are fully immunized (WHO, 2018).

Nutrition Intervention Programmes targeted at establishment of food or nutrients straight to people who are at risk of rising malnutrition are pursued by health and social welfare sectors in many developing countries including India (Bamji, 2013).

The endowment of amenities delivered to women and children belonging to the lower strata of society are the biggest task in India as these sections of population are susceptible and mostly the victims of exploitation and abuse (Paul, *et al.*, 2011). One of the most significant attainments on the nutrition scene in our country has been the adoption of the National Nutrition Policy by the Government in 1993. It advocates a comprehensive, integrated and intersectional strategy for alleviating the multifaceted problem of malnutrition and achieving the optimum state of nutrition for the people (Sreelakshmi, 2018).

In achievement to the National Policy of Children in 2<sup>nd</sup> Oct 1975 GOI commenced a National Programme: Integrated Child Development Services (ICDS) to improve the health, nutrition and overall development of children among the deprived population of 33 blocks (including 4 rural, 18 urban and 11 tribal blocks) through network of Anganwadi Centres in India. UNICEF aided to launch the ICDS programme and continues to provide financial and technical assistance along with the World Bank (Tandon *et al.*, 1984). The focal point of convergence of these services is the Anganwadi Centres. The number of operational Anganwadi Centres in India was 1349091 as on 31.12.2015. The top 10 States/UTs in terms of the number of operational Anganwadi Centres were: Uttar Pradesh, West Bengal, Maharashtra, Madhya Pradesh, Bihar, Odisha, Karnataka, Assam, Rajasthan and Andhra Pradesh as on 31.12.2015 (WCD, 2015).

Kerala has an outstanding record in woman and child development and ICDS started here in the year 1975-76. Vengara project in the Malabar region was the first



project. There was a steady growth of the implementation of ICDS from the first project itself (Mani, 2002).

In a research study conducted by Joseph (2014), among the pre-schoolers in Kerala state pointed out that malnutrition was less among Anganwadi children (50.00% male and 58.00% female) when compared with those who are not attending anganwadi centres (75.00% male and 69.00% female). An exploratory study done by Anitha *et al.*, (2017), described that majority of the anganwadi children (94.10%) in Kerala state were fully immunised emphasizing the effect of regular follow up and motivation provided under Anganwadi system.

Kapil and Pradhan (2000), reported that anganwadi children have improved consumption Vitamin A under the scheme namely national anaemia prophylaxis programme and the national programmes for prevention of vitamin A inadequacy. Brown *et al.*, (2009), through his study accepted that, anganwadi children in Calicut have greater birth weight and initial CVD indicators compared with other children not attending anganwadi children.

However recent studies, accessing both the impact of ICDS and influence of Knowledge, Attitude and Practice of Anganwadi Workers and Helpers on the nutritional status of children are lacking. Hence this study entitled “Impact Assessment of Integrated Child Development Service (ICDS) Programme on Nutritional Status of Children at Trivandrum District” was undertaken with the following objectives:

1. To study the impact of ICDS programme on the Nutritional Status of Children attending Anganwadi Centers.
2. To study the effect of Knowledge, Attitude and Practice of Anganwadi staff on nutritional outcome of children.

This study hope to help the Integrated Child Development Services (ICDS) in the policy level decisions for the welfare of the children. To enlighten the importance of work output improvement among anganwadi children and helpers which will be significantly reflected in the overall development and empowerment of children.

## **2. REVIEW OF LITERATURE**

The review of literature pertaining to the research study entitled “Impact of Integrated Child Development Service (ICDS) on the nutritional status of children attending anganwadies in Trivandrum district” is presented in this chapter under the following headings

2.1. Malnutrition and its impact

2.2. Effects of Malnutrition in Children

2.3. Malnutrition - Global and Indian scenario

2.4. Integrated Child Development Services (ICDS)

2.5. ICDS in Kerala – Impact on child status

2.6. Knowledge and Performance of Anganwadi workers and helpers

### **2.1. Malnutrition and its impact**

Malnutrition is a state of nutrition in which an insufficiency or excess of energy, protein and other nutrients cause determinate impacts on body form, function and clinical outcomes (Muscaritoli *et al.*, 2010). According to WHO (2019) malnutrition symbolises absence, surplus, or imbalances in a person’s consumption of energy and nutrients.

United Nations System (2004), describes malnutrition as a “state in which the physical function of an individual or child is impaired to the point where he or she can no longer maintain a satisfactory bodily performance process such as growth, pregnancy, lactation and recovering from diseases”.

In a study conducted by Matrins *et al.*, (2011) on the long lasting effects of under nutrition revealed that, there is an irreparable physical and cognitive damage due to under nutrition. It is a major threat to human development. Malnutrition among mothers has its own undesirable consequences, like obstructed labour, a poor pregnancy outcome, postpartum haemorrhage and premature babies. Findings of Weiss (2016)

specify that the more nutrients the person is misplaced, the more likely it is that person will experience the health matters. The signs and indications of malnutrition depend on which nutritional deficiencies a person has.

## **2.2. Effects of Malnutrition on Children**

According to WHO (2005) reports malnutrition is one of the leading causes of morbidity and mortality in childhood world-wide. King (2010) reported that stunting is one of the main long term effects of malnutrition in children. Marasmus is a severe protein energy deficiency that can develop as a result of malnutrition. Kwashiorkor is an acute type of protein energy deficiency that is common in children who are malnourished.

Results of survey piloted by Glewwe *et al.*, (2001) revealed that children with higher nutritional status during the preschool years start primary school earlier. And also they have higher completion rates than malnourished children. Alderman's (2005) study on linkages between poverty reduction strategies and child nutrition explained that, malnutrition at any stage of childhood affects schooling and, thus, the life time earning potential of the child. It impedes motor, sensory, cognitive and social development. So malnourished children are less likely to be benefitted from schooling and will consequently have lower income as adults.

The rate of malnutrition was found to be more in the developing countries like India. And especially the urban poor the growth is vivid. On an average about 45.9% of children under the age of five are categorised under underweight children by NFHS (2000). Smith and Haddad (2000) identified that adults who have survived malnutrition as children are less physically and intellectually productive and suffer from higher levels of chronic illness. There is a synergistic relationship between under nutrition and morbidity (Olack, 2011). Malnutrition continues to be a major problem in children under six years of age (Silva and Silva, 2015). According to a study conducted by Sohi (2018), indicated that 44% of Indian children are suffering from protein energy malnutrition, 22% babies are born low birth weight, 43% of children under five are underweight, and 57% of preschool children are suffering vitamin A deficiencies. None of our Indian states are free from Iodine deficiency disorders. Malnutrition paves

children towards the danger of dying from common infections, increases the chances of occurrence and harshness of that infections and interruptions in its recovery (UNICEF, 2019).

### **2.2.1. Causes and Consequences of Malnutrition**

A framework developed by UNICEF (2000) demonstrated that the underlying causes of malnutrition are multifaceted, including economic, social and political factors. Poverty is recognised as both a cause and consequence of malnutrition. Kumari (2016) recognized that, the immediate causes that were found to influence malnutrition of children under five years of age were prevalence of childhood diseases and poor infant feeding practices.

UNICEF (2000) reported that, a poor dietary intake and disease (immediate causes), poor house hold food security, caring practices, health system and environmental sanitation (underlying causes), and economic factors, political factors and availability of resource (basic causes) are responsible for malnutrition in children under five years of age. Study conducted by Bhandari and Chhetri (2013) exposed that malnutrition is influenced by certain factors such as, poor socio economic status, mothers age less than 20 or greater than 35, gap less than two years between two pregnancies, late supplementary foods, incomplete immunisation and lack of timely care.

Calder and Jackson (2000) documented that infections contribute to malnutrition through a variety of mechanisms, including loss of appetite and reduced capacity to absorb nutrients. Children living in joint families are more prone to the risk of malnutrition, and also children whose mothers education are less than or equal to 6<sup>th</sup> standard and those of working mothers (Srivastava *et al.*, 2012).

Cross sectional study results conducted by Raj *et al.*, (2010) described that early marriages have a great impact on the child nutritional status and the mothers as well. They are more prone to malnutrition. A lack of education of the mothers, child marriage, lack of maternal autonomy, shortage of basic material needs and internal displacement showed independent and significant negative associations with child

health and nutritional variables (Mashal *et al.*, 2011). Edem *et al.*, (2016) conducted a study to learn social determinants of malnutrition and they stated that low family income, unmarried status and type of child care were the social determinants of malnutrition. There was a reduction in the number of other poor socio demographic characteristics in both the study and control groups compared to results from a previous study at the same centre, probably because of efforts toward attaining the MDGs

Malnutrition has both micro and macro level consequences. Micronutrient deficiencies impair individual cognitive capacity and lower national IQ scores; they weaken immune systems and increase national mortality rates, and they hinder individual productivity, lowering national income and inhibiting economic growth (Black *et al.*, 2008). According to Fazia (2015) consequences of malnutrition consists of any of the following conditions, improper energy intake, weight loss, loss of muscle mass and subcutaneous fat, localised or generalised fluid accumulation and diminished functional status.

A cross sectional study conducted by Sharma (2003) in the tribal communities of central India reported that low MUAC (50.4%), wasting (41.5%), stunting (46.3%) and underweight (37.4%) as well as different grades of malnutrition were highly prevalent. Boys are suffering more than girls. Malnutrition comprise scarce micronutrients (vitamins and minerals) along with the inadequate macronutrients. Vitamin and mineral malnutrition cause a collection of effects, depending on the definite micronutrient that is missing in the diet (King, 2010).

Mishra (2000) found that, social and educational status of mother, availability of food and safe water accessibility are significant as determinants that cause malnutrition among children directly or indirectly. Investigation study done by Chauhan (2015) concluded that, the chance for a child to become stunted in their growth are low among the educated mothers. In nutritional measures mother's education coefficient is highly and positively significant.

### **2.3. Malnutrition - Global and Indian scenario**

The World's most comprehensive report on nutrition highlights the worrying prevalence and universality of malnutrition. Global Nutrition Report provides a concrete overview of progress made and highlights solutions from around the globe calling on all stake holders to act now to address malnutrition. World-wide more than half of all child deaths are implicated due to malnutrition. South Asia occupies more than half of malnourished children (UNICEF, 2005)

UNICEF (2018) reported globally stunting among children under five years of age has fallen from 32.6% in 2000 to 22.2% in 2017. There has been a slight decrease in underweight women since 2000, from 11.6% to 9.7% in 2016. Even though there has progress, it was not at a faster rate. The 2018 assessment of improvement against nine target reveals only 94 of 194 countries are on track for at least one of the nine nutrition targets assessed. In 2018 just five countries such as India, Nigeria, Pakistan, Ethiopia and Congo had half of all child death under the age of five. About a third was accounted by India and Nigeria. Malnourished children are at higher risk for being affected with the diseases such as diarrhoea, pneumonia and malaria. About 45% of death under the age of five is contributed by nutrition related factors (UNICEF, 2019).

Maternal, infant and child nutrition play significant roles in the proper growth and development, including future socio economic status of the child. Reports of National Health and Family Survey, United Nations International Children's Emergency Fund and WHO have highlighted that rates of malnutrition among adolescent girls, pregnant and lactating women and children are alarmingly high in India. Factors responsible for malnutrition in the country include mother's nutritional status, lactation behaviour, women's education and sanitation (Narayan *et al.*, 2019).

Half of all malnourished children in the developing world are occupied in India, China and Bangladesh (UNICEF, 2005). Elizabeth (2010) opined that in India 65%, i.e., nearly 80 million children under 5 years of age suffer from varying degrees of malnutrition. Silva and Silva (2015) found that malnutrition is a leading contributor of infant and child mortality and morbidity in India. Rate of malnutrition differs in each states according to the region's developmental condition. Malnutrition was the dominant risk factor for death in children below the age of five in every sates of India

in 2017. 68.2% of death under five years, 706,000 deaths are due to malnutrition. It was also a leading risk factor of loss of health among all age groups (Kaur, 2019).

Jeyaseelan (1997) stated that household economic status has strong impact on child malnutrition. Mishra *et al* (2000) presented that when compared with more educated mother, children of non-educated mothers are more probable to have lower nutritional status. An epidemiological study conducted by Yadav and Yadav (2016) described that female children are more nutritionally deprived than males. Almost half of Indian children under five are underweight, and girls being affected more.

The official survey by IIPS (2007) detailed that in India malnutrition continues to influence morbidity and mortality rates in the country. 38.4% of children under three years were stunted, 19.1% wasted and 45.9% underweight. Victoria *et al.*, (2008) reported that India ranks among the worst performers included under commonwealth countries with respect to the rate of children under 5 years of age who are underweight. On average, a child who is severely underweight is 8.5 times more likely to die from infectious diseases than a well-nourished child (Pelletier, 2014).

Impact assessment study conducted by Ibrahim *et al.*, (2010), pointed that instabilities associated with malnutrition in micro biota of intestine subsidise to progress hesitance and deregulated irritation and immune function. Malnutrition results injurious influence on wound soothing (Mechanik, 2013). In a study commissioned by Angre (2013), among four developing countries including India elucidated that children who were suffering from malnutrition were found to be difficult in reading even simple sentences even at the age of eight years.

Malnutrition among under five is an important concern for the health authorities in India. Sahu *et al.*, (2015) explored that prevalence of under nutrition among under-five children was high and varied widely depending on the assessment methodology adopted. Malnutrition in preschool children ought to be considered as a community crisis. Paediatric under nutrition has always been a matter of concern on global as well as at national level. The Government of India has launched various vertical programme to tackle under nutrition in the community adequately.

According to Mishra (2007) in southern states of India except Karnataka prevalence of wasting has fallen from 20% to 17.9%. With an aim of reducing undernourishment in Indian children, future intervention programmes has to focus. Every children have their own right for health, nutrition, protection, care and education. There is an inter-generational impact for education on the poverty level (Ramachandran and Patni, 2009).

Child welfare programme were fragmented in India, and in 1972, a planning commission was formed to study the reason for fragmentation in India. It resulted in the formation of Integrated Child Development Services (ICDS). The Integrated Child Development Services (ICDS) is one of the world's largest Nutritional programme launched by the Government of India (PEO, 2011).

#### **2.4. Integrated Child Development Services (ICDS)**

In 2<sup>nd</sup> October 1975 GOI initiated: Integrated Child Development Services to improve the health, nutrition and overall development of children among the deprived population of 33 blocks (including 4 rural, 18 urban and 11 tribal blocks) through network of AWC in India. UNICEF helped to launch the ICDS programme and continues to provide financial and technical assistance along with World Bank (Tandon *et al.*, 1984).

ICDS is the foremost symbol of country's commitment to its children and nursing mothers, as a response to the challenge of providing preschool normal education on one hand and breaking the vicious cycle of malnutrition, morbidity, reduced learning capacity and mortality (WCD, 2009). Approval for funding of the project, District Child Development Plan is developed by the districts which is consolidated to prepare Annual Programmed Implementation Plan at the state level. A ratio of 75:25 is the cost borne by centre and state. Fund will be allocated only depending to the magnitude of problem. The fund will be released from the state to the AWC (NIPCCD, 2009)

Anganwadi centre is the central point for the delivery of services to children and mothers. Usually in an urban area 1000 population are covered under one anganwadi centre. Local community is expected to provide accommodation for anganwadi centre.



It is the beginning of participation of community. The premises should be clean and safe for the child and women to come easily and to be benefitted by the provided services.

They are the link of Indian health care. Anganwadi worker is the essential tool for India to fight against child malnutrition, lack of child education, health problems at the community and helps in prevention of preventable diseases. She will be assisted by an Anganwadi Helper (AWH) in growth monitoring (Sreelakshmi, 2018).

#### **2.4.1. Objectives and Services under ICDS**

To improve the nutritional and health status of children at six.

To lay the foundation for the proper psychological, physical and social development for the child.

To reduce the incidence of mortality, morbidity, malnutrition and school drop out

To achieve effective coordination of policy and implementation among the various departments promoting child development

To impart nutrition and health education among children (WCD, 2009).

In order to attain the objectives, ICDS delivers services directing nutrition, health and education. The particular services delivered under ICDS comprises:

**Supplementary Nutrition:** It includes supplementary feeding and growth monitoring and prophylaxis against Vitamin A deficiency and control of nutritional anaemia.

**Preschool Education:** Anganwadi provides a natural, joyful and stimulating environment contributing towards universalization of primary education.

**Immunization:** Immunization of pregnant women and infants against 6 vaccine preventable diseases.

**Health-check-up:** Health care of children less than 6 years of age, antenatal care of expectant mothers and post-natal care of nursing mothers. It will be provided by ANM.

Referral Services: Those who need medical attention will be referred to the primary health centre (Suriakanthi, 2010).

Nutrition and Health education: Provided by Anganwadi worker for the capacity building of women especially in 15-45 years of age, so that they can look after themselves of children. Health services are provided in collaboration with ASHA (PEO, 2011).

#### **2.4.2. Impact of ICDS on Children**

Research review done by Deolalikar (2005) documented that ICDS decreased five per cent of child malnutrition rates. In a study conducted by Lokshin *et al.*, (2005) using NFHS-1 and NFHS-2 revealed evidences that supported the positive effect of ICDS services on the nutritional status of children. Another study conducted by Bredenkamp and Akin (2004) also demonstrated similar results.

In a research study Kapil and Pradhan (2000) concluded that ICDS leads to decline in prevalence of severe grades of malnutrition, better utilization of national programme for prevention of nutritional blindness due to vit A and national nutritional anaemia prophylaxis programme. There is always a continuous modification of ICDS schemes to strengthen the programme. Study conducted by Mittal and Meenakshi (2012) indicated that utilization of multiple services translates an increase in the weight for age Z scores. 13% point's lower prevalence of underweight children were the results of multiple service utilization. Supplementary nutrition component were emphasised more. Even though a large part of budgetary allocation is not being used for supplementary nutrition (PEO, 2011).

A study was conducted by Merta (2011) on the impact of ICDS on the progress of underweight children revealed that knowledge of mothers on ORS, attending health sessions and children who got benefitted with deworming had improved. Though improvement was observed it was at a minimum range only. He suggests that it was necessary to move forward with the existing interventions till each child acquires normal weight. Emphasis should be laid on frequent health education and medical evaluation to mothers. In a study conducted by Alim and Jahan (2017) reviewed that

76.4% of children receive supplementary nutrition and out of that 62.7% of children are having normal weight for age. More than half of the children benefitted by ICDS services were normal who received supplementary nutrition.

Researches those who evaluated the supplementary nutrition programme (Chudasama *et al.*, 2013) in Gujarat showed that coverage of supplementary nutrition was more in pregnant mothers (88.3%), lactating mothers (91.7%) and adolescents (86.7%). One by fourth of the anganwadi centres were providing cooked food to 3-6 years of age. 38.3% of AWCs reported shortage of supplementary nutrition supply, more in rural (41.3%) and 28.6% in urban. According to Parasar and Bhavani (2018) translation of agricultural productivity into favourable nutritional outcome is being linked by supplementary nutrition programme. It also hold the capacity to maintain better nutrition outcomes in population at scale.

Ledlie (2011) in his study viewed that supplementary nutrition programme hold a positive impact on reducing malnutrition prevalence in developing countries. According to heterogeneous treatment results, in order to reduce prevalence of malnutrition quality of water plays a significant role. It points to the significance of investments in water and sanitation and making the public aware on the importance of hygiene, health knowledge and better child outcomes. These investments have the potential to make the feeding programme more effective.

According to Nandha (2009) the early childhood education provided under ICDS helped in the socialization of children, such as inculcation of good habits, stimulates learning process and increases overall personality development of the child. Especially in the poor sections, preschool education helps to cater physical, intellectual and emotional development. Also it influences indirectly for the enrolment of girls in primary schools by the provision of substitute care facilities for younger siblings. In these ways ICDS supports universalisation of primary education. In an investigation study conducted by Maity *et al* (2019) concluded that, early childhood care was used by two third of the child population, 73% of children were benefitted by supplementary food, immunisation was increased and was 45%, 65% of children received health check-up, and 70% of mothers received services during lactation.

Mukuria *et al* (2005) identified that, there is decline in the cases of stunting by mother's education in many developing countries. Devi and Padmavati (2006) confirmed that nutrition and health education provided by Anganwadi workers helps to improve the nutrition and health knowledge of rural mothers. Singh (2013), recommended that for the wholesome growth and development focus should be on child centred curriculum. Because in his study he found that only 3.33% children was able to identify 3 or 4 colours. And only 8.33% of children was able to identify 5-6 vegetable pictures. According to the study reports of Sahoo *et al* (2018) nutrition education and breast feeding initiatives will be helpful and can ensure as a significant factor in combating malnutrition.

RSOC (2014) reported that in Delhi 82.1% of children in rural areas and 83.9% of urban children were fully immunized and there was no drop out in vaccination. 23.4% and 29.4% of children were benefitted with preschool education in anganwadi in rural and urban areas respectively. In rural area 80.8% of rural children and 86.2% urban children got supplementary food from anganwadi centre. Health check-up at the rate of 46.5% and 54.7% in rural and urban areas. Referral services were providing to 24.9% in rural people and 36.2 in urban areas. Nutrition and health education were provided by anganwadi workers to 33.9% of rural women and 49.7% of urban women.

Sharma and Gupta (2000) pointed out that, children suffering from Grade II and IV malnutrition were fewer when compared with non ICDS area. Also they have more percentage of normal children. Prenatal services were used by 71.9% of the study population in ICDS areas and only 40% of them in non-ICDS group. Breast feeding practices within an hour of birth were more widespread in ICDS beneficiaries (PEO, 2011). Study conducted by Vaid and Vaid (2017) revealed that all ICDS centres were providing supplementary nutrition to the beneficiaries enrolled under Anganwadi centre. Those mothers who are not attending the anganwadies didn't have any knowledge on supplementary foods and nutritional needs of their children. It was not a matter of necessity for them. Good health and appearance were shown by ICDS children when compared with non ICDS children.

Results of a critical study conducted by Joseph (2014) revealed that in ICDS group malnutrition was found to be 50% in boys and 58.0% in girls. While in the case of non-ICDS children malnutrition rate was found to be 75% in boys and 69% in girls respectively. Mean weight of ICDS group was found to be more than that of non ICDS group. The main problem is even though the ICDS programme seems to be more attractive beneficiaries are not utilizing the services. In a cross sectional study Tyagi and Pradhan (2015) between urban and rural anganwadi concluded that rural children under ICDS was found to be under weight than their urban counter parts. Underweight children were found to be more in rural anganwadi centres which recommends the need for emphasis on nutritional care in rural children.

A comparative study done by Mani (2002) between ICDS and non ICDS peers first category differed significantly from the other counterparts in terms of memory ability, reasoning ability, numerical ability, reasoning, cooperative attitude, social development, physical development, leadership quality. But there was no significant difference observed in their competitive spirit.

NIPCC (2008) reported that on their survey across several districts the percentage of children who received supplementary food from anganwadies varied from 92%-98%. On daily or weekly or monthly scale 55% of children below the age of three years attended the anganwadi centres. Proper quantity of growth charts were unavailable at 8% of old anganwadi centres. Newly build anganwadies were devoid of any growth charts. Half of the respondents (53.7%) were unaware of the purpose of anganwadi centres. More than majority (60%) were aware that early child hood education provided under anganwadi helps in the overall development of their children. All of the respondents believe that it would be good for providing preschool education in their mother tongue itself. But they mentioned that English teaching will be helpful for the child in his or her future life. Half of the anganwadies are in need for adequate space for cooking. 83% of the anganwadies all over the countries were devoid of a proper toilet facility. Tamilnadu was considered to be best performing having good shape in providing all of the services.

Beegum (1990) in his research study on the impact of ICDS pointed that mothers have a different favour on the six services under the ICDS programme. There is a need to give stress on all of the services equally with proper supervision. ICDS schemes are well developed. Even though there are many gaps which can affect its implementation, marginalising its overall impact. In such a circumstance to increase the accessibility to these groups measures should be taken (Sinha, 2014).

Chudasama *et al.*, (2014) conducted an evaluation study on ICDS services in Gujarat and commented that all of the respondents in the study population were literate. 48.3% of children were benefitted with supplementary nutrition programme. In the case of preschool education only 20% of anganwadi centres had complete coverage among the children. Only 24.3% of the anganwadi centres had the habit of keeping immunisation records. 70% of the beneficiaries were not benefitted by the health check-up services. 92.7% of children did not referred to health centres. In a case study done by Joseph (2014) conveyed that, beneficiaries are not employing the ICDS services even though systems are gorgeous.

## **2.5. ICDS in Kerala– Impact on child status**

In a study conducted by Mani (2002) it is reported that Kerala has an excellent record in woman and child development. ICDS started in the year 1975-76. Vengara project in the Malabar region was the first project. There was a steady growth of the implementation of ICDS. In the first 5 years there was 18 projects. In the next 5 years 53 projects were added. By 1991 the number of project grew to 91. In April 96 Kerala had 120 projects sanctioned all of which are currently operational. Narayanan (2020) reported that Kerala is in first rank among the states for their children's wellbeing. He also pointed out that all the extra funds assigned towards nutrition in the budgetary is distributed below anganwadi centres.

A survey conducted by Mallika (2014) in Trivandrum district of Kerala state detailed that 90% of children from one to two years of age were fully immunised for age, 10% of children were partially immunised and there was no child who was unimmunised. In a cross sectional survey conducted by Anitha *et al* (2017) in Kannur district of Kerala, among the study population 94.1% of children were fully immunised,

5.5% of them were partially immunised and .4% of the children were not immunised at all. As stated by the respondents it was concluded that religious belief, personal engagements at immunisation time, and fear of fever after immunisation.

A study was conducted by Loyola college of Social science (2006) in Kerala highlighted that 92% of beneficiaries visited anganwadi centres on all days to receive food, to take preschool children and feeding their children in the age of 0-3 years. In Trivandrum urban area 95% of the beneficiaries were happy with their menu. There was no wastage of cooked food. In order to cook on their own taste 15% of respondents preferred raw food. There lies a positive correlation between preschool and cognitive development of children. Better quality of preschool education helps in the better cognitive development of children (Shishodia and Kumari, 2013).

In a case study Athira and Maneesh (2016), in the AWC of Kannur district of Kerala conveyed that ICDS facilitated enhancement in the nutritious and fitness status of adolescent girls. Most of the adolescent girls joined in the nourishment associated programmes. The adolescent services provided under ICDS has potential to help the under privileged youth in the country. An investigative study steered by Francis and Paul (2017) stated that, among the anganwadi centres of Kochi the services offered under anganwadi centres were not correctly utilised by the beneficiaries. An urgent need is obligatory to study the causes for the non-utilization of ICDS services.

In a study conducted by Dang and Sarangi (2020) revealed that Kerala and Tamil Nadu have prospered in construction of a sturdy anganwadi scheme through practical and cost operative clarifications and provision of favourable socio dogmatic atmosphere. They are model for all anganwadi centres across the country.

## **2.6. Knowledge and Performance of Anganwadi workers and helpers**

Sadhyarani and Usha (2013), reported that Anganwadi workers and helpers are responsible to perform certain duties in the ICDS scheme such as,

- a) To make the community aware of the programme.
- b) Recording the weight of all the children in each month and to record

- c) Maintenance of health cards below six years of age children to carry while visiting medical centres.
- d) Once in a year conduct surveys of the families around their respective place.
- e) Provide pre-school education to children in 3-6 years of age and help to make toys within the available indigenous materials in the anganwadi.
- f) Supplementary nutrition for children from 0-6 years of age, lactating and pregnant mothers.
- g) Health and nutrition education and counselling.
- h) Assisting primary health centre staff to provide health services under the scheme.
- i) Guiding the ASHA worker for the delivery of health services and to maintain records in the programme.
- j) To make awareness classes and nutritional programmes for adolescent girls and provide assistance in the implementation of KSY.
- k) Providing support for organisation of PPI drives.
- l) Informing auxiliary nurse mother (ANM) in diseased condition like diahorrea, cholera etc.

An intervention study was conducted by Prabha *et al.*, (2016) on the knowledge of anganwadi workers in the field of growth monitoring of children. The base line survey revealed that almost all anganwadi workers have good level of knowledge on growth monitoring. 48.5% of anganwadi workers in Chiraigaon block of Mysore had excellent knowledge on growth monitoring. More than half of the study population (62.1%) had correct knowledge about the cut off value <2.5kg as per World Health Organisation for low birth weight. The need of making the weighment measure to zero value were carried out by 70% of the respondents. Majority of the respondents in the study population were sure to determine malnourished children with the help of a growth chart. Half of them consider this as a helpful measure in order to find and get solution at the early stages of malnutrition. 100% of the respondents knows the importance of green and red colours



in the growth chart. 80 of the anganwadi workers in the study area were aware of the colour yellow and its significance, among 70% of them. Choudary and Sharma (2017) in their investigation study reported that insufficient wages (80%), heavy work (70%) and improper infrastructure were the constraints faced by Anganwadi worker in the study population. Less than half of the respondents (40%) complained in the load of maintaining too many records along with the surveys and have to assist health activists in case of any programmes in the corporation.

The observations of Tulenko *et al* (2013) exposed that there is a reduction in the quality of work done by anganwadi workers due to the over work as a result of other programmes under government. Funds are not provide at the needful time. There is only little place for the children to play outdoors. For placing posters related to preschool education there is a lack of space (Tripathy *et al.*, 2014). Parmar (2015) opined that anganwadi workers were unable able to explain the importance of ICDS services even though they know about the nutritional services. The study conducted by Thakur *et al* (2015) to assess the knowledge and practice of anganwadi workers and helpers in Himachal Pradesh presented that when they are asked questions in the knowledge parameter they were unable to answer properly. Unlikely all of the anganwadi workers and 97% of the helpers were trained. 27% of the anganwadi helpers and workers where unsatisfied with the given salary. Increasing the remuneration will be a motivation to have a good interest in looking after the children.

Komala (2016) in her study on awareness among anganwadi workers about children with developmental delays stated that anganwadi workers are well educated and are not satisfied with their remuneration. They have enough knowledge about development delays in children. And their knowledge is found to be not influenced by age, educational status, work experience etc. He suggested that there is a need for training to anganwadi workers to become aware of the development delays at the early stages and screening since they are appointed to deal with earlier life stages of child.

Mahto (2015) identified that lack of knowledge of anganwadi workers are due to the improper training. In order to provide information to the mothers of children about the consequences and long terms effects anganwadi workers are not able. According to

the expectation levels nutrition and health education, health counselling, and community discussion are not carried out.

The survey conducted by Asha (2014) to find the efficiency of anganwadi centres in Trivandrum demonstrates that more than half of the anganwadies were efficient (63.5%), only 5% of the anganwadies are highly efficient. Factors associated with the efficiency of AWC were educational qualification, job status, infrastructure facility, and participation of community. According to the Sarkar and Ghosh (2017) educational status can increase the knowledge of anganwadi workers. He also found a relation between the knowledge and working experience of respondents. In the study population all of the respondents correctly replied for the questions related to immunisation. Nutrition and health education was aware for more than half of the study population. 58.66% of the respondents have correct knowledge regarding health check-up. Calorie and protein requirement for a malnourished child was unaware for the anganwadi workers.

Findings of Sandhyarani and Usha (2013) indicates that regarding health check-up of children only 36% have the complete knowledge. Supplying of food in once a month was aware for 60% of the anganwadi workers. 81% of anganwadi workers had the knowledge of taking weight for expectant mothers in every month. Bhatnagar and Bhadra (2015) reported that anganwadi workers are not satisfied with the present wages given to them. It will reflect in their duty performance and inactiveness. They cause negative effects on the proper care for the beneficiaries. Operational changes are needful in the programme for the wellbeing of children.

A study conducted by Datta (2001) among anganwadi workers in Mumbai, Maharashtra reported training on measuring of height and weight of children provided highly helpful for 97% of the study population. To have knowledge regarding immunisation, distribution of nutritious food and giving nutrition and health education training was useful to 98% of the anganwadi workers. Some of them said that parents send their children only after seeing the environment and services in the AWC. Satisfactory information to take anthropometric measurements of children and full teaching were enclosed by 81% of the study population. Half of the anganwadi workers

were providing individual attention to children. 58% of them were following the syllabus exactly.

A study conducted by Parikh and Sharma (2011) in Gujarat exposed that anganwadi workers had a poor knowledge regarding the significance of breast feeding and complementary feeding. He also reported that there was also a need to make the anganwadi workers about the consequences of malnutrition in children and the need for special considerations. Malik *et al.*, (2015) led a cross sectional study to assess the facilities and services at the anganwadi centres of Delhi and commented that facilities provided were not enough for the proper functioning of anganwadi centres and there is lack of proper knowledge among the anganwadi workers. They reported that they have improper knowledge on the revised calorie and protein norms. Only 19.5% know about the revised norms for pregnant and lactating women, 4.9% are aware about the revised calorie norms for children 0-6 years and for a malnourished child, but they were having better knowledge on the indications on the medical kit (65-90%). They have to be updated timely and services provided should be quality assured, and the constraints faced by the anganwadi workers should be monitored and reported, so as to motivate them to perform their duties better

In a critical study conducted by Chudasama *et al.*, (2014) documented that, majority of the anganwadi workers put forward certain issues such as lack of storage facility, improper space for children to play out door, lack of availability of separate kitchen. There is a need for improvement in all of the anganwadies and services. It was found that there remains a gap between what is said and what being done.

NIPCC (2008) reported that more than half of the anganwadi workers were between 30-40 years of age. Majority of the respondents are educated up to secondary level. It is significant in the performance of their role and responsibilities under the service. Due to lack of interest and improper infrastructure facilities they are not utilising their knowledge properly.

Chattopadhyay (2009) studied on the knowledge and skill of anganwadi workers in West Bengal and observed that 88.2% of the respondents were not able to properly define fever. 9.8% don't know to prepare ORS and 6.5% don't know the causative

vector for the malarial disease. Related to the components of child care 3.9% do not know about the disease prevented by vitamin A supplementation and 20.6 don't know the target group of vitamin A prophylaxis programme. More than majority 83.4% were unaware of the age group for exclusive breast feeding. 18% do not know the source of vitamin D. The minimum number of antenatal check-ups adequate for a expectant mother was replied by less than half (41.2%) of the population. While taking the measurements of the child in the weighing scale 39.1% of anganwadi workers did not adjust it to the zero level and none of them taken the weight two times to get the average value. Food was distributed uniformly using a spoon to children by 65% of the anganwadi workers.

An independent study conducted by Sravani (2012) indicated that there is no vibrant relation between education and age of AWW with their knowledge and practices. Sinha (2014) revealed that there is a need for targeting children with special needs. In addition anganwadi workers and helpers should be well trained specially to care these children.

Manhas *et al.*, (2011) conducted a study on the knowledge and perception of anganwadi workers on gender inequality and reported that all of the anganwadi workers were about various sex determination tests. Respondents suggested various measures to combat the declining gender ratio. 44% mentioned the need of making people aware of the decline in the gender ratio. 49% asked for making the public aware of the value of a girl child and to ban the sex determination tests. Anganwadi workers at the grass root level will be highly able to influence the public through health education and family meeting. Oomen and Shetty (2017) conducted a research study on the attitude and knowledge of anganwadi workers of Mangalore on the earlier dental caries among children and found that 67% of the anganwadi workers are unaware of the age on which a child should visit a dental doctor. Only 11% of the anganwadi workers do not know about fluorides. Overall knowledge was better for anganwadi workers, but only 24% was aware that problems in milk teeth will affect the permanent teeth. All of the respondents were having a positive attitude on health education related to oral health. Anganwadi workers have significant link in development of good oral hygiene habits and to prevent the dental problems of children visiting anganwadi centres.

Oral health knowledge of anganwadi workers should be improved and increased in order to educate the public who will be representing a huge population of young people (Ashcroft *et al.*, 2008). Studies of Vijayavardhini and Kumari (2016) on the job satisfaction of anganwadi workers shown that none of the anganwadi workers given statement on high level of job satisfaction. Variables such as year of experience and age of the anganwadi workers were not influencing their job satisfaction levels. But the educational qualification of the respondents had highly influence the job satisfaction.

Kant *et al.*, (1994) observed that only 8.3% of the anganwadi workers were aware that ICDS stands for Integrated Child Development Services. But Tandon (1997) reported that anganwadi workers had enough knowledge, attitude, and practice in relation to growth monitoring. In contrast to other states Kerala has better health pointers compared to other states. Even though there are no much surveys to measure ICDS service utilization in Kerala (Athira and Maneesh, 2016).

### **3. MATERIALS AND METHODS**

The methods and measures employed in the different segments of the study are explained in this chapter under the following headings.

3.1. Location of the study

3.2. Selection of the respondents

3.3. Design of the study

3.4. Development of tools and conduct of the study

3.5. Development of Nutrition Status Index

3.6. Assessment of the Knowledge, Attitude and Practices of the anganwadi workers and helpers towards the programme

3.7. Constraints faced by the AWW and AWH.

3.8. Statistical analysis and interpretation of data

#### **3.1. Location of Study**

The present study was conducted in Trivandrum Urban Project II. 175 anganwadi centers are there in this project which is further subdivided into five sectors. From the five sectors under the Urban Project No: II, sector I and IV was selected randomly. Impact of the programme on the nutritional status of preschool children had not been systematically evaluated earlier in these areas.

#### **3.2. Selection of the respondents**

90 preschool children in the age group of 2-6 years were selected purposively from the two sectors under the urban project center II for assessing the nutritional status and food consumption pattern.

25 Anganwadi workers and 25 Anganwadi helpers were selected randomly from the anganwadi centers under urban project II for assessing the knowledge, attitude

and practices regarding the nutritional status of children and implementation of the programme.

### **3.3. Design of the study**

In order to achieve the objectives, following action programs were envisaged and conducted.

3.3.1. Collecting details related to the socioeconomic status, demographic profile,

3.3.2. Determining the nutritional status of selected preschool children through,

3.3.2.1. 24 hour recall method

3.3.2.2. Anthropometric

3.3.2.3. Clinical assessment

3.3.3. Assessment of the knowledge, attitude of the anganwadi workers regarding the programme and practices related to the teaching method adopted through a well-structured questionnaire.

3.3.4. Assessing the knowledge of anganwadi helpers on their roles and responsibilities, their attitude and practices regarding the programme through a separate structured questionnaire.

3.3.5. Eliciting information on the constraints faced by the anganwadi workers and helpers.

### **3.4. Development of Tools and conduct of study**

Development of the research tools and the conduct of study is detailed under this section under various headings.

#### **3.4.1 Socio economic profile of the respondents**

The interview technique is reflected to be the most trustworthy method for data gathering due to the organized and fast happening style.

90 mothers of the child (2-6 years) beneficiaries were also interviewed using questionnaire to elicit information on the socio demographic profile and dietary methods.

The schedule was suitably structured after discussing with the advisory committee members, pretested at the field and was finalized. The schedules were presented in appendix I- III. Schedule for eliciting information related to nutritional status of children comprises of socio economic status, food consumption pattern and general food habits of the child.

In the hand of a researcher the tool can be well-defined as an apparatus for determining the variables relating to the study. The details related to socioeconomic status and food consumption pattern of the family were collected with the help of a structured questionnaire. The information on the socio economic variables of the respondents namely age, religion, caste, ordinal position, education and occupation of parents, monthly incomes, house condition etc. were collected using pretested questionnaire.

### **3.4.2. Food consumption pattern of the respondents**

A diet survey was conducted to assess food consumption pattern, frequency of having different food items and the meal timing. The pretested questionnaire is presented in the Appendix III.

### **3.4.3. Assessment of nutritional status**

The nutrition status of preschool children were assessed using standard techniques of anthropometric and clinical estimations.

#### **3.4.3.1. Anthropometric measurements**

Weight, height, body mass index, skin fold thickness, head circumference, chest circumference, MUAC, waist circumference, hip circumference and waist to hip ratio were taken under anthropometric measurements in this study and were collected using standardized techniques. Anthropometric measurements are useful in collecting the



qualitative information on the studies assessing nutritional status of children (Alim and Jahan, 2012).

#### **(a) Measurement of weight**

WHO (1995) reported that weight for age and height for age of a child are helpful in reflecting the long term health and nutritional status of the population. To measure the prevalence of malnutrition in children anthropometric indicators like height for age and weight for age are highly significant (Mishra, 2007).

Weight of children were measured using a digital weighing balance. They were classified into three categories as medium weight, minimum weight and less than minimum weight according to the table composed by Indian Pediatric Association and World Health Organization together (2015).

#### **(b) Measurement of height**

Height was measured using stadiometer. Children were asked to stand straight on the base of the device and without sandals. They were categorized into three classes as medium height, minimum height and less than minimum height according to the table composed by Indian Pediatric Association and World Health Organization (2015).

#### **(c) Body Mass**

Body Mass Index (BMI) was calculated using the formula, weight (kg)/height (meter squared) and were ordered. BMI of <5<sup>th</sup> centile for age and gender is considered as undernourished, between 85<sup>th</sup> and 95<sup>th</sup> centile as overweight and more than 95<sup>th</sup> centile considered as obese ( Cole *et al .*, 2000).

#### **(d) Measurement of skin fold thickness**

Skin fold thickness of the children were measured using a skin fold caliper. If a child is having skin fold thickness less than 10mm he or she is considered to be malnourished (Sreelakshmi, 2018). Hence children were classified into two categories like those who are having skin fold thickness less than 10mm and greater than 10mm.

#### **(d) Measurement of Mid upper arm circumference**

Mid Upper Arm Circumference measurements are helpful to evaluate impact of nutrition (Kumar *et al.*, 1996).

Mid upper arm circumference of children were taken using a measuring tape passing over the arm portion. In order to identify the mortality risk associated with malnutrition Mid Upper Arm Circumference is considered as a better indicator than weight for height. Children below 11cm indicates severe malnutrition, 11cm-12.5cm indicates moderate acute malnutrition, and 12.5-13.5cm indicates at risk of acute malnutrition and 13.5cm are well nourished child (IAP, 2015).

#### **(e) Measurement of head and chest circumference**

Head measurement of children were taken using a measuring tape passing through the most projecting through the head. Chest circumference were taken by asking the child to keep their hand up and passing the tape through the nipples.

According to Bamji *et al.*, (2013) head circumference greater than chest circumference in a child after two years indicates the child is at the risk of malnutrition. Hence children were classified accordingly, those who were having head circumference less than chest circumference and chest circumference less than chest circumference.

#### **3.4.3.2. Actual food and nutrient intake**

24 hour recall method was used to collect information on the food consumption practices details of quantity (gm) of each raw material in every day was weighed in the selected samples. Raw foods used for each meals by the child before cooking and after cooking weighed was recorded.

Frequency of using different food items were also examined under different heading as cereals, pulses, green leafy vegetables, other vegetables, roots and tubers, fruits, nuts and oilseeds, animal foods etc.

Nutrients available from the food intake was computed using Indian food composition table of NIN (2017). The schedule used for 24 hour recall method is presented under the heading Appendix III.

To evaluate the definite food and nutrient intake 24 hour recall method was employed and the nutrients present in their diets were calculated using the Indian food composition table of NIN (2017). Mean intake of RDA intake were compared with the actual RDA required to find the deviation from what is needed and what they actually consumes.

### **3.4.3.3. Clinical examination**

Reliable evaluation of nutritional status of human being can be assessed through clinical examination. Clinical judgment make researchers able to assess the nutrition status (Lupo *et al.*, 2003). Clinical examinations are helpful to assess the health levels of individual. Cooperation of subjects are easy since symptoms are observed externally. Age of the subjects need not be ascertained. Clinical symptoms are specific to a particular nutrient deficiency (Sreelakshmi, 2018).

Clinical assessment includes details related to general appearance of children like skin changes, changes in tongue, eyes, etc. were carried out among the respondents. The presence or absence of clinical deficiency symptoms which can be attributed to malnutrition was assessed by a qualified physician. Proforma suggested by Indian Council of Medical Research (ICMR) for clinical surveys was used as a model for preparing the schedule needed for assessing the clinical status. The schedule is presented in Appendix III.

### **3.5. Development of nutrition status index**

Nutritional status index of each child was calculated using selected anthropometric measurements and clinical assessment schedule. Scoring was given for each variable according to the standard values considering both age and gender of the children. Height and weight scales were given as 3 for medium height, 2 for minimum scale and 1 for less than minimum height standards according to IAP and WHO. Skin fold thickness was given as 3 for average values, 2 for ideal values and 1 for lean children. Ideal head circumference for children according to WHO (2011) is 45.5-51cm. Hence those this value range was given a score of 2 and less than 45.5 were given a score of 1. Head circumference greater than chest circumference is a sign of malnutrition. Those who are having head circumference less than chest circumference

was given as 2 and a score of 1 for the other children. Waist circumference greater than equal to curve reference values given a score of 2 and less than that given with a score of 1. Mid Upper Arm Circumference scales were given as 3, 2, 1 according to normal, at risk, and moderate malnutrition values. Total scores of children were taken according to the questions in clinical assessment schedule. A score of 2 for normal child and score of 1 for children having any deficiency in each question. Nutritional status of individuals were found using the formula given below.

$$NSI=W*WS+H*HS+SFT*SFTS*HC*HCS+CC*CCS+WC*WCS+MUAC*MUACS+CAS$$

W: Weight; WS: Weight Score

H: Height; HS: Height Score

SFT: Skin Fold Thickness; SFTS: Skin Fold Thickness Score

HC: Head Circumference; HCS: Head Circumference Score

CC: Chest Circumference; CCS: Chest Circumference Score

WC: Waist Circumference; WCS: Waist Circumference Score

MUAC: Mid Upper Arm Circumference;

MUACS: Mid Upper Arm Circumference Score

CAS: Clinical Assessment Score



Plate 1. Direct Interview with Mothers of children



Plate 2. Assessment of Nutritional status of children

Figure 1. Growth Chart for Girls

INDIAN GIRLS GROWTH CHART (0-18YRS)						
WEIGHT			Age	HEIGHT		
Min	Mid	Max		Min	Mid	Max
2.3	3.3	4	0	46	50	53
5.5	7.5	9.5	0.6	61	66	70
7	8.9	11.5	1	69	79	79
8	10	13	1.6	75	81	86
9	11.6	14.5	2	80	86	92.5
10	12.5	16.2	2.6	84	90.5	97.5
11	14	17.5	3	85.5	95	102
11.5	15	19	3.6	91	99	107
12.5	16	21	4	95	103	111
12.8	16.8	23	4.6	96.5	105.5	115
13	17.2	25	5	97.5	108	118
13.2	18	27	5.6	100.5	111	122
13.8	18.8	29	6	102	113.5	125.5
14	20	31	6.6	105	116.5	128.5
15	21	33	7	107	119	132
16	23	36	7.6	110	122.5	135
16.5	24	38	8	112.5	125.5	138
17.2	25.5	41	8.6	115	128	141
18.2	27.2	43	9	117.5	131.5	144.5
19.2	29	46	9.6	120.5	134	148.5
20.8	31	49	10	123.5	137	151
22	33	52.5	10.6	126	140.5	154
23	35.5	56	11	129	143	157
25	37.5	59	11.6	131.5	146	160
26	40	62	12	134	148	162
27.5	42	65	12.6	136	150.5	164
28.5	43	67	13	138	152	166
30.2	45	69	13.6	140	153.5	167
31.2	46	70.5	14	141	154.5	168
32.5	47.5	71	14.6	142.5	155.5	169
33	48.2	72	15	143.5	156	169.5
34	49	72	15.6	144	156.5	170
34.8	49.5	72.5	16	144.5	157	170
35.5	50.2	72.5	16.6	145.5	157	170
36	51	73	17	146	157.5	170.5
37	51.5	73	17.6	146.5	158	170.5
37.5	52	74	18	147	158	171

Weight in KG, Height in CM, Age in Year and Months

(WHO and IAP, 2015)

Figure 2. Growth Chart for Boys

INDIAN BOYS GROWTH CHART (0-18YRS)						
WEIGHT			Age	HEIGHT		
Min	Mid	Max		Min	Mid	Max
2.5	3.3	4.5	0	46	50	53.5
6	8	10	0.6	63	66	72
7.5	9.5	12	1	71	75	80
8.5	11	13.5	1.6	77	82	87
9.5	12	15	2	82	87	94
10.5	13	16.5	2.6	85	92	98
11.5	14	18	3	89	96	103
12	15.5	19	3.6	92	100	106
12.5	16	21	4	95.5	103	111
13	17	23	4.6	97	106	115
13.5	18	24.5	5	100	109	118.5
14	18.5	26	5.6	102	112	122.5
14.5	19	28	6	104	115	126
15.5	21	31	6.6	106.5	118	129.5
16	22	33.5	7	109	120.5	132.5
16.5	23	36	7.6	112	123	135.5
17.5	25	39.5	8	114	126	139
18.5	26	42	8.6	116	129	142
19	27	45.5	9	119	131.5	145.5
20	28	48.5	9.6	121	134.5	148.5
21	31	51.5	10	123.5	137	151.5
21.5	32.5	55	10.6	126	140	154.5
22.5	34.5	58	11	128	142	157
24	37	62	11.6	130.5	145.5	160.5
25	39	66	12	133	148	163.5
26	41	69.5	12.6	136	151	166.5
27.5	43	72	13	138	154.5	170
29	46	75.5	13.6	141	157	173
30.5	48	78	14	143	160	175.5
32.5	51	81	14.6	146	162	177.5
34.5	53	83	15	148	164	179.5
36	55	84.5	15.6	150	166.5	181.5
37	56.5	86	16	152	168	183
38.5	58	86.8	16.6	153	170	184
39.5	59	87.5	17	155	171	184.5
41	60.5	87.5	17.6	156.5	172.5	186
42	61.5	88	18	158	173.5	186.5

Weight in KG, Height in CM, Age in Year and Months

(WHO and IAP, 2015)



### **3.6. Assessment of the Knowledge, Attitude and Practices of the anganwadi workers and helpers towards the programme**

Knowledge and attitude of anganwadi teacher, and their teaching methods adopted for providing preschool education, knowledge of anganwadi helpers on their role and responsibilities, and their attitude and practices towards the beneficiaries, and the constraints faced by both of the groups were assessed through a suitably structured and pretested questionnaire.

Interview schedule using a questionnaire was used in the present study to assemble information on knowledge and attitude of 25 anganwadi worker and their teaching practices. Another questionnaire was used to elicit information from 25 anganwadi helpers on their knowledge about the roles and responsibilities and practices related to the programme. Knowledge and attitude of anganwadi teacher, and their teaching practices adopted for providing preschool education, knowledge of anganwadi helpers on their role and responsibilities, and their attitude and practices towards the beneficiaries, and the constraints faced by both of the groups were assessed through a suitably structured and pretested questionnaire.

At the primary stage for both anganwadi workers and helpers questionnaire were same. It consisted of 12 questions related to general awareness, 16 statements to assess their knowledge, 15 statements to assess attitude and 21 statements to assess their practice towards the programme. It was circulated among the academic staff and post graduate students. Then the questionnaire was modified to optional questions. While shown to an academic staff in extension and as per the suggestions the number of statements were planned to reduce. Questionnaire schedule were circulated again among the academic staff to rate the relevance of the multiple choice questions that need to be administered to assess the knowledge, attitude and practice of anganwadi workers and helpers with categories as very important, important, and average. Statements which got higher range where selected. As per the opinions put forward by the academic staff and post graduate students, questionnaire schedule for anganwadi workers and helpers were made separately. The rated questionnaire were collected from relevant literatures and were grouped accordingly.

In the light of all the suggestions interview schedule were made. Ten statements were given to the anganwadi worker to assess their nutritional knowledge, various schemes implemented under ICDS etc. Correct responses were given with a score of one and zero for wrong answers. Those who scored between 10-8 were categorized under high score, score of 6 and 7 in medium score and less than and equal to 5 under lower scores.

Anganwadi workers were provided with another 10 statements to assess their knowledge on their roles and responsibilities in the anganwadi centers. Positive responses were given a score of one and zero for negative responses. Those who are having a score of ten or nine were included under high score, score of eight and seven in the category of medium score and less than seven in the low score category.

12 statements were given to anganwadi workers to assess their attitude towards the beneficiaries. One mark was given for positive response and a score of zero for negative response. Those who are having a twelve and eleven were included under high score, score of ten and nine in the category of medium score and less than nine in the low score category.

To assess the attitude of anganwadi helpers, they were given with 10 statements. Those who scored between 10-8 were categorized under high score, score of 6 and 7 in medium score and less than and equal to 5 under lower scores.

In order to find the practices of anganwadi helpers they were given with 8 statements related to their practices which has to be followed in AWC. One mark for positive answer and zero for negative. Those who scored between 10-8 were categorized under high score, score of 6 and 7 in medium score and less than and equal to 5 under lower scores.



Plate 3. Direct Interview with Anganwadi Workers and Helpers



Plate 4. Kitchen Gardens in Anganwadi Centres.

### **3.7 Constraints faced by the Anganwadi Worker and Anganwadi Helper.**

There are many constraints faced by anganwadi workers and helpers in the anganwadi. Constraints faced by anganwadi workers and helpers were examined. Six main problems were given to them and asked to rate them as most important, important and less important.

### **3.8. Statistical analysis and interpretation of data**

Statistical analysis was carried out using descriptive statistics, percentage analysis, 't' test, and correlation analysis.

## 4. RESULTS

The results of the study entitled “Impact of Integrated Child Development Service (ICDS) on the nutritional status of children attending anganwadies in Trivandrum District “is presented in this chapter under the following headings.

4.1. Socio economic status of the children.

4.2. Food consumption pattern of children.

4.3. Nutritional status of anganwadi children.

4.4. Assessment of the knowledge, attitude and practices of the anganwadi workers and helpers towards the programme.

4.5. Constraints faced by the AWW and AWH.

Ninety children attending the anganwadies and 25 anganwadi workers and 25 helpers working in anganwadies were selected for the present study

### 4.1. Socio economic status of the children

Thomas *et al* (2006) reveals that questions on socio demographic parameters will be helpful to catch the basic level of information related to the study sample and help to analyze each person individually.

#### 4.1.1. Age and Gender

Age and gender wise distribution of children are presented in the Table 1.

As summarized in the Table1 ninety children in the study population attending anganwadies were classified gender wise into five age groups. 35 per cent of the children in the age group of 24-36 months were boys and 32 per cent were girls. In the age group of 37-48, 28 per cent were male children and 34 per cent were female children. 28 per cent male children and 34 per cent of female children came under the age group 49-60 months. Only 9 per cent male children were in the category of above 60 months.

**Table 1. Distribution of children according to age and gender.**

Age group (month)	Males	Females	Total
24-36	15 (35.00)	15 (32.00)	30 (33.30)
37-48	12 (28.00)	16(34.00)	28 (30.00)
49-60	12(28.00)	16(34.00)	28 (30.00)
Above 60	4 (9.00)	0	4(4.40)
Total	43 (100.00)	47 (100.00)	90 (100.00)

Values in parenthesis indicates percentage

#### **4.1.2. Socio demographic characteristics**

Details related to the socio demographic characteristics is presented in Table 2.

As revealed in the Table 2, children belonging to Hindu community were predominant (81.10%) and among them 20.00 percent were schedule caste, 22.20per cent were from other backward caste, and whereas major portion (38.80%) of children were from general category. 13.30per cent and 5.60per cent of children were under the Muslim and Christian community respectively. 66.67per cent of children were from the families in APL category and 33.30 per cent were categorized under BPL category. 65.60per cent of children were living in their own houses and the other 34.40per cent of children were in rented houses.

**Table 2. Socio demographic characteristics of the Anganwadi children.**

A. Religion and Caste	Number of children
Total Hindus	73 (81.10)
Scheduled caste	18 (20.00)
Other Backward Caste	20 (22.20)
General	35 (38.80)
Muslims	12 (13.30)
Christians	5 (5.60)
B. Possession of Public Distribution Card (Type of card)	
APL	60 (66.67)
BPL	30 (33.30)
C. Details of residence	
Own house	59 (65.60)
Rented house	31 (34.40)

Values in parenthesis indicates percentage

#### **4.1.3. Ordinal position of respondents**

Details related to the ordinal position of the children surveyed are presented in the Table 3.

Table 3 depicted that 29.00per cent of the children in the age group of 24-36 months, 33.00per cent of children in the age group of 37-48 months, 31.00per cent of the children in the age group of 49-60 months and 7.00per cent of the children above 60 months were the first children. 40.00per cent of children in the age group 24-36



months, 29.00per cent of children in the age group 37-48 months and 31.00per cent of children in the age group 49-60 months was second children.

**Table3. Ordinal position of Anganwadi children.**

<b>Age group (month)</b>	<b>I st child</b>	<b>II nd child</b>
24-36	16 (29.00)	14 (40.00)
37-48	18 (33.00)	10 (29.00)
49-60	17(31.00)	11(31.00)
Above 60	4 (7.00)	0
Total	55 (100.00)	35 (100.00)

Values in parenthesis indicates percentage

Figure 3. Distribution of Anganwadi children according to age and gender

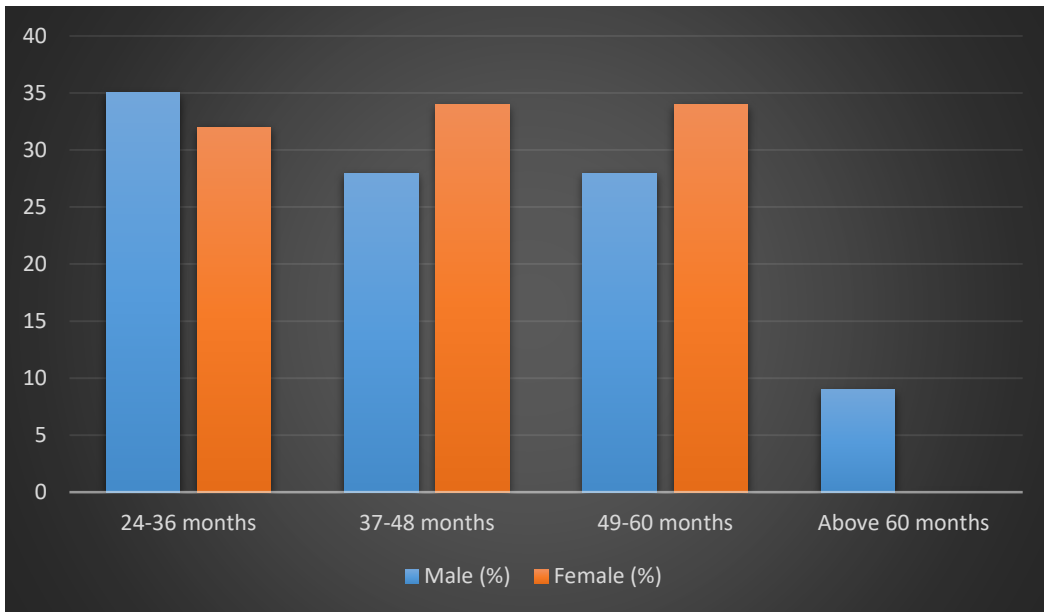
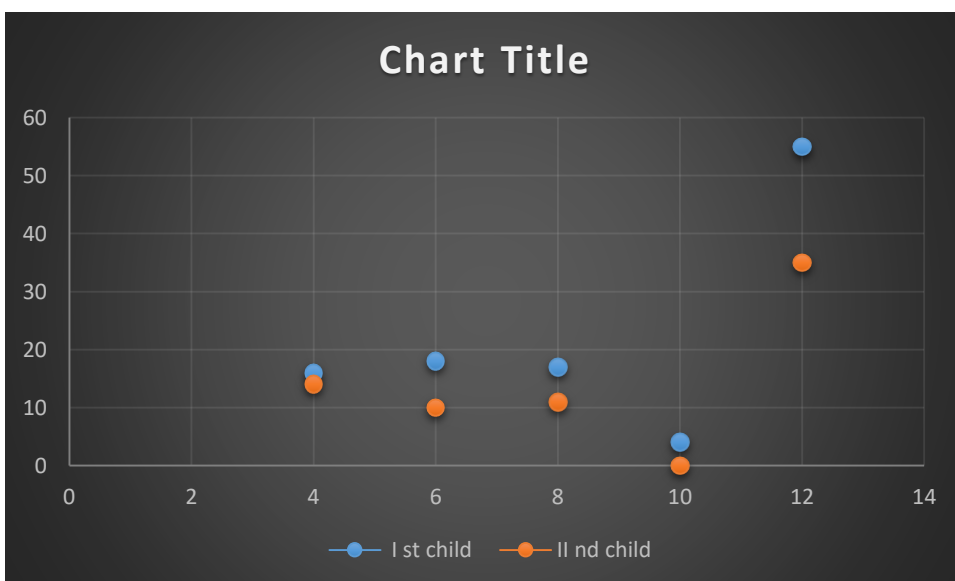


Figure 4. Ordinal position of Anganwadi children.



#### 4.1.4. Birth weight of children

Birth weight wise classification of anganwadi children are presented in the Table 4.

**Table 4 Classification of Anganwadi children based on birth weight**

<b>Birth weight</b>	<b>Boys</b>	<b>Girls</b>	<b>Total</b>
Normal (> or = 2500gm )	38(88.40)	41(87.00)	79 (87.80)
Low ( < 2500gm)	5 (11.60)	6 (13.00)	11 (12.20)
Total	43 (100.00)	47 (100.00)	90 (100.00)

Values in parenthesis indicates percentage

As revealed in the Table4, 88.40per cent of male children and 87.00per cent of female children were under normal category having a weight greater than or equal to 2500gm of weight. 11.60per cent of male children and 13.00per cent of female children had their birth weight less than 2500gm and hence they were categorized under low birth weight children.

#### 4.1.5. Mode of delivery

Distribution of children based on mode of delivery is presented in the Table5. As indicated in the table 5, 74.40 per cent of the mothers had normal delivery while 25.50per cent of the child deliveries were caesarean.

**Table 5. Mode of delivery of Anganwadi children**

Category	Number of children
Normal	67 (74.40)
Caesarean	23 (25.50)

Values in parenthesis indicates percentage

#### **4.1.6. Socio demographic details of the parents**

Socio demographic details of the parents surveyed is presented in the Table 6.

**Table6. Socio demographic profile of parents**

Parameters	Percentage distribution of parents	
	Father	Mother
A. Education		
SSLC	20 (22.20)	9 (10.00)
HS	27 (30.00)	24 (26.70)
Graduate	43 (47.78)	53 (58.90)
Post graduate	0	4 (4.40)
B. Occupation		
Laborer	22 (24.40)	0
Self-employment	11 (12.20)	2 (2.20)
Government job	28 (31.10)	3 (3.30)
Private job	29 (32.20)	7 (7.78)
Not working	0	78 (86.70)

C. Income (Rs)		
10,000-20,000	39 (43.30)	5 (5.60)
21,000-30,000	29 (32.20)	5 (5.60)
31,000-40,000	13 (14.40)	2 (2.20)
Above 40,000	9 (10.00)	

Values in parenthesis indicates percentage

Table 6 shows the educational status, occupation and income level of parents (both father and mother). As revealed in the table 22.20per cent of fathers and 10.00per cent of mothers were having SSLC as their higher educational qualification. 30.00per cent of fathers and 26.70per cent of mothers were having higher secondary education. Forty seven per cent fathers and 58.90per cent of mothers were graduates. Four per cent of mothers were having post graduate level as their educational qualification and no father comes under this category.

Regarding the occupation of fathers 24.40per cent were laborers, 12.20per cent were self-employed, 31.10per cent had government jobs, 32.20per cent had private jobs, and none of the fathers were reported to be jobless. About the occupational status of mothers 2.20per cent of mothers were self-employed, 3.30per cent were government workers, and 7.78per cent worked in private sectors. A significant percent of mothers (86.70%) were not working. Results on the income level of the family reveals that majority of the study population (43.30%) were having a monthly income of less than Rs 20,000.

#### **4.2. Food consumption pattern of children.**

Food consumption pattern of anganwadi children were assessed through the collection of details on the food habits, food consumption pattern, frequency of having different food items and the meal timing.

#### 4.2.1. Food habits of children

Details of food habit furnished in the Table7 indicates that more than 95.60 per cent of the beneficiaries are non-vegetarians and only 4.40per cent of the children were having a habit of avoiding non vegetarian foods in their diet.

Table 7. Food habits of children

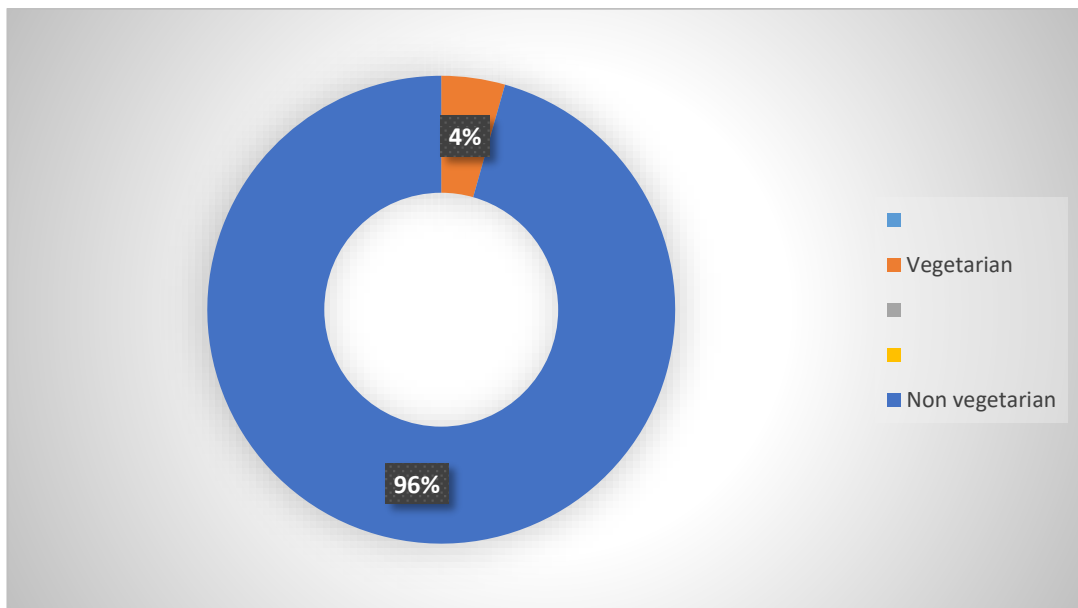
Category	No of children
Vegetarian	4 (4.40)
Non vegetarian	86 (95.60)

Values in parenthesis indicates percentage.

#### 4.2.2. Frequency of using Food Items

The frequency of use of different food items by the children were collected and are illustrated in the Table 8. All the children had the habit of consuming rice, green gram, curry leaves, ground nut coconut and jaggery daily. Green gram, rice, ground nut toffies along with jaggery were made and provided to children daily at the anganwadi center. All of them consumed wheat flour weekly thrice. 53.30per cent consume black gram weekly thrice and 46.70per cent twice, while 44.40per cent and 48.90per cent consumed dhal weekly thrice and weekly twice respectively. Highly perishable food product like fish were consumed daily by 81.10per cent, 11.10per cent weekly thrice and 3.30per cent twice a week. 86.87per cent of the children consumed tea or coffee daily during their tea time and only 13.30per cent of children do not have the habit of consuming tea or coffee in their diet. 63.00per cent of children never consumed amla in their diet. Majority of the population (96.70%) were not aware of the significance of sprouted pulses and never consumed them in their diet.

Figure 5. Food habit of respondents



**Table 8. Frequency of using different food items**

Food item	DAILY (%)	WEEKLY THRICE (%)	WEEKLY TWICE (%)	ONCE IN A WEEK (%)	ONCE IN A MONTH (%)	OCCASSIONALY(%)	NEVER(%)
<b>CEREALS</b>							
Parboiled rice	90(100)						
Wheat flour		90(100)					
Rice flakes			49(54)	28(31)	10(11)	2(2.2)	1(1.1)
Ragi			22(24.4)	53(58.9)	12(13.3)	3(3.3)	
<b>PULSES</b>							
Black gram		48(53.3)	42(46.7)				
Dhal		40(44.4)	44(48.9)	6(6.7)			
Bengal gram							
Green gram	90(100)						
Sprouted pulses						3(3.3)	87(96.7)
<b>GLV</b>							
Amaranthus		43(49.8)	36(40)	11(12.2)			
Coriander leaves		47(52.2)	30(31.3)	13(14.4)			
Drumstick leaves		41(45.5)	26(28.9)	20(22.2)		3(3.3)	
Curry leaves	90(100)						
<b>OTHER VEG</b>							
Cucumber		82(91.1)	8(8.9)				
Lady's finger		72(80)	14(15.6)	4(4.4)			
Plantain green		5(5.5)	36(40)	40(44.4)	9(10)		
Brinjal		25(27.8)	24(26.7)	41(45.6)			
Tomato		63(70)	20(22.2)	7(7.8)			
<b>ROOTS &amp; TUBERS</b>							
Onion	72(80)	10(11.1)	8(8.9)				



Carrot	69(76.7)	19(21.1)	2(2.2)				
Beetroot		63(70)	24(26.7)	3(3.3)			
Potato		6(6.6)	54(60)	30(33.3)			
Tapioca			61(67.8)	25(27.8)		4(4.4)	
FRUITS							
Mango		5(5.5)	72(80)	10(11.1)		2(2.2)	1(1.1)
Orange			61(67.8)	9(10)	20(22.2)	2(2.2)	
Jack fruit			68(75.6)	20(22.2)			
Amla			12(13.3)	15(16.7)			63(70)
Guava			19(21.1)	35(38.9)	5(5.5)	31(34.4)	
Papaya	1(1.1)		28(31.1)	13(14.4)	39(43.3)	5(5.5)	5(5.5)
NUTS & OIL SEEDS							
Groundnut	90(100)						
Coconut	90(100)						
Other items				31(34.4)		59(65.6)	
ANIMAL FOODS							
Egg		54(60)	23(25.6)	9(10)			4(4.4)
Meat				53(58.9)	33(36.7)		4(4.4)
Fish	73(81.1)	10(11.1)	3(3.3)				4(4.4)
OTHER							
Jaggery	90(100)						
Tea or coffee	78(86.87)						12(13.3)

### 4.2.3. Daily Meal Pattern

Table 9 gives the details of daily meal pattern of the family surveyed.

**Table 9. Distribution of children with respect to time of consumption of meals**

	Time	Working days	Holidays
Breakfast	08:00-09:00 am	73(81.00)	19(22.00)
	09:01-10:00 am	17(19.00)	71(78.00)
Lunch	12:00-01:00 pm	90(100.00)	28(31.00)
	01:01-02:00 pm	0	62(69.00)
Tea time	04:00-05:00 pm	45(50.00)	42(47.00)
	05:01-06:00 pm	38(42.00)	39(43.00)
	06:01-07:00 pm	7(8.00)	9(10.00)
Dinner	08:00-09:00 pm	79(88.00)	71(78.00)
	09:01-10:00 pm	11(12.00)	19(22.00)

Values in parenthesis indicates percentage

It is depicted in the Table 9 that 81.00% and 22.00% of the respondents had their breakfast before 9.00 am in the morning during working days and holidays respectively. On working days 19.00per cent had their breakfast between 9am and 10 am and 78.00 per cent had their breakfast at same time on holidays. All of the children had their lunch before 1pm since the meal time in anganwadi centres was 12.30pm. In holiday's

31.00per cent children had their lunch before 1pm and 69.00per cent children had between 1 to 2 pm. Tea was consumed by 50.00per cent of the respondents before 5pm in working days and 47.00per cent in holidays. On working days 42.00per cent had their tea by 5-6 pm. 8.00per cent had their dinner before 9pm on working days and 78.00 per cent on holidays. Twelve per cent and 22.00per cent had their dinner after 9pm on working days and holidays respectively.

### **4.3. Nutritional status of anganwadi children.**

Nutritional status of selected anganwadi children was done by 24 hour recall method, anthropometric measurements and clinical examination. The results are detailed in this section.

#### **4.3.1. Food intake of children assessed by 24 hour recall method**

Food intakes of anganwadi children were assessed through 24 hour recall method and the nutrients present in their diets were calculated using the Indian food composition table of NIN (2017).

Mean intake were compared with the actual RDA required to find the deviation from what is needed and what they actually consumed. Table 10 details the mean nutrient intake of children in the age group 1-3 years.

**Table 10. Mean nutrient intake of children (1-3 years)**

<b>Nutrient</b>	<b>RDA</b>	<b>Intake</b>	<b>Deviation</b>
Energy (k Cal)	1060.00	1068.00	+8.00
Protein (g)	16.70	20.81	+4.11
Vitamin A(µg)	3200.00	2044.70	-1155.30
Iron (mg)	9.00	8.96	-0.04

As furnished in Table 10 the mean intake of energy in the age group of 1-3 years was 1068 k cal with an increase of 8kcal than their required. Intake of protein was also found to be excess (4.11g) than required RDA. But the diet shows a serious deficit in the intake of Vitamin A and iron.

The results of mean nutrient intake of anganwadi children in the age group of 4-6 years are depicted in the Table 11.

**Table 11. Mean nutrient intake of children (4-6 years)**

<b>Nutrients</b>	<b>RDA</b>	<b>Intake</b>	<b>Deviation</b>
Energy (k Cal)	1350.00	1268.00	-82.00
Protein (g)	20.10	29.32	+9.32
Vitamin A( $\mu$ g)	3200.00	2154.00	-1046.00
Iron (mg)	13.00	10.45	-2.55

As revealed in the Table 11, the intake of calorie from the diet was found to be had a deficit of 82.00 k cal than the actual requirements. The protein intake of 29.32 g was noted to be higher than their required recommended daily allowances. The diet was found to be deficient in Vitamin A and Iron.

#### **4.3.2. Anthropometric Measurements**

Anthropometric measurements such as weight, height, skin fold thickness, mid upper arm circumference, head circumference, chest circumference, waist circumference and hip circumference of the anganwadi children was collected through appropriate techniques.

According to their weight and height children were classified into medium minimum and less than minimum according to the standards given by IAP and WHO (2015). Regarding skin fold thickness those who are having SFT less than 10mm would be considered as malnourished (Bamji *et al.*, 2013). Hence children were classified into

two categories as those having less than 10mm and greater than 10 mm skin fold thickness. Mid upper arm circumference was classified according to the Mother and Child Health and Education Trust (2020). Children were classified into those having head circumference less than chest circumference and another category of children having their head circumference greater than chest circumference. Those who were having chest circumference less than head circumference are considered to be malnourished child. For children below the age of 20 years percentile BMI values are determined to find the prevalence of malnutrition. Those who were below the category of less than 5<sup>th</sup> percentile are considered as malnourished child. Hence the anganwadi children's BMI were calculated and categorized in to those who were having the BMI values greater than 5<sup>th</sup> percentile and less than 5<sup>th</sup> percentile.

#### **4.3.2.1. Height of anganwadi children**

Height for age profile of the anganwadi children is presented in the Table 12. They were classified into three categories as medium height, minimum height and less than minimum height according to the standard given by Indian Pediatric Association and World Health Organization (2015).

As revealed in the Table 12. 53.30per cent of male children and 66.70per cent of female children in the age group of 24-36 months were having the medium height required according to their age. Twenty six per cent of the male and 33.30per cent of the female children were having minimum height requirements. Twenty per cent of male children did not have even the minimum height required. No female child was found to be below the minimum height requirements. In the age group of 37-48 months 33.30per cent of male children and 68.80per cent of female children were having medium height, minimum height requirements were met by 41.70per cent of males and 6.20per cent of female children, 25.00per cent each both of the male and female children are less than the minimum height requirements. Fifty eight per cent of male and 56.00per cent of female children in the age group of 49-60 months were having the minimum standard height. 16.70per cent of male and 12.40per cent of female children were having less than the minimum height requirements. Half of the children above the

age of 60 months were having minimum height requirements. While 25.00per cent of children are having less than minimum height requirements.

**Table 12. Distribution of anganwadi children according to their height for age group.**

Age group (Month)	Sex	Number	Mean value (.99m) $\pm$ SD	Medium height	Minimum height	< Minimum Height
24-36	M	15	$\pm$ .03	8 (53.30)	4 (26.70)	3 (20.00)
	F	15	$\pm$ .07	10 (66.70)	5 (33.30)	-
37-48	M	12	$\pm$ .003	4 (33.30)	5 (41.70)	3 (25.00)
	F	16	$\pm$ .01	11 (68.80)	1 (6.20)	4 (25.00)
49-60	M	12	$\pm$ 0.03	3 (25.00)	7 (58.30)	2 (16.70)
	F	16	$\pm$ 0.04	5 (31.30)	9 (56.30)	2 (12.40)
Above 60	M	4	$\pm$ .1	1 (25.00)	2 (50.00)	1 (25.00)
	F	0		-	-	-

Values in parenthesis indicates percentage

#### **4.3.2.2. Weight of anganwadi children**

Table 13 depicts the Weight for age profile of anganwadi children. They were classified according to the age for weight standards proposed by Indian Pediatric Association and WHO. Study population were having only up to the maximum values of medium weight requirements and hence categorized mainly into three classes medium weight, minimum weight and less than minimum weight.

**Table 13. Distribution of anganwadi children according to their weight for age group.**

Age group (Month)	Sex	Number	Mean Value (13.6kg) $\pm$ SD	Medium	Minimum	< Minimum
24-36	M	15	$\pm$ 2.04	5 (33.30)	6 (40.00)	4 (26.70)
	F	15	$\pm$ 2.34	5 (33.30)	7 (46.70)	3(20.00)
37-48	M	12	$\pm$ .40	3 (25.00)	7 (58.30)	2 (16.70)
	F	16	$\pm$ .60	4 (25.00)	7 (43.80)	5 (31.20)
49-60	M	12	$\pm$ 2.70	5(41.70)	5 (41.70)	2 (16.60)
	F	16	$\pm$ 1.80	4 (25.00)	10 (62.50)	2 (12.50)
Above 60	M	4	$\pm$ 4.70	1 (25.00)	3 (75.00)	-
	F	0		-	-	-

Values in parenthesis indicates percentage

Table 13 indicates that 33.30per cent of male and female children in the age group of 24-36 months were having medium weight requirements, 40.00per cent and 46.70per cent of children are having minimum height requirements and 26.70per cent male and 20.00per cent of female children are below the minimum weight requirements. 25.00per cent of male and female children in the age group of 37-48 months were having medium weight requirements, 58.30per cent of male and 43.80per cent of female children have minimum weight requirements while 16.70per cent of male and 31.2per cent of female children were having weight less than the minimum weight requirements. 41.70per cent of male and 25 of female children in the age group of 49-60 months were having medium weight, 41.70per cent and 62.50per cent were having minimum weight and 16.60per cent male and 12.50per cent female children having less than the minimum

weight requirement. 75.00per cent of children in the age group of above 60 months are having minimum weight and no one is having less than the minimum weight requirements.

#### 4.3.2.3. BMI of anganwadi children

Age and gender specific centiles of Body Mass Index (BMI) were recommended for use in children (Sreelakshmi, 2019).The ratio of weight (in kg)/height\*height (m) is referred to as BMI. BMI of <5<sup>th</sup> centile for age and gender is considered as undernourished, between 85<sup>th</sup> and 95<sup>th</sup> centile as overweight and more than 95<sup>th</sup> centile considered as obese ( Cole *et al .*, 2000).BMI of children classified according to their age and sex specific centile values are presented in the Table 14.

**Table 14. Distribution of children according to their BMI in each age group**

Age group (Months)	Sex	Number	Mean Value (13.7kg/m <sup>2</sup> ) ±SD	No of children having their BMI > or = 5 <sup>th</sup> percentile	No of children having their BMI < 5 <sup>th</sup> percentile
24-36	M	15	±1.06	4 (26.70)	11 (73.30)
	F	15	±.86	7 (46.7)	8 (53.30)
37-48	M	12	±.14	6 (50.00)	6 (50.00)
	F	16	±.66	6 (37.50)	10(62.50)
49-60	M	12	±2.20	9 (75.00)	3 (25.00)
	F	16	±.74	9 (56.40)	7 (43.60)
Above 60	M	4	±1.20	2 (50.00)	2 (50.00)
	F	0		0	0

Values in parenthesis indicates percentage



As depicted in the Table 14. 73.30per cent male children and 53.30per cent female children in the age group of 24-36 months are under nourished. In the age group of 37-48 months half of male children and 62.50per cent of female children were under nourished. One by third of male children and 43.60per cent of female children in the age group of 49-60 months were under nourished. Half of the children in the age group of above 60 months were well-nourished while the other halves were under nourished.

#### 4.3.2.4. Skin fold thickness of anganwadi children

If a child is having skin fold thickness less than 10mm he or she is considered to be malnourished (Sreelakshmi, 2018).

**Table 15. Percentage distributions of Anganwadi children according to their skin fold thickness**

Age group (Months)	Sex	Number	Mean value (11.3mm) $\pm$ SD	No of children having SFT >10 mm	No of children with SFT<10 mm
24-36	M	15	$\pm$ 1.10	9 (60.00)	6 (40.00)
	F	15	$\pm$ 1.40	8 (53.3.00)	7 (46.70)
37-48	M	12	$\pm$ .8	8 (66.70)	4 (33.30)
	F	16	$\pm$ 1.00	11 (68.70)	5 (31.30)
49-60	M	12	$\pm$ 2.50	10 (83.30)	2 (16.70)
	F	16	$\pm$ .73	13 (81.30)	3 (18.70)
Above 60	M	4	$\pm$ .90	4 (100.00)	0
		0		0	0

Values in parenthesis indicates percentage

Hence children were classified into two categories like that who are having skin fold thickness less than 10mm and greater than 10mm and is presented in the Table 15.

As revealed in the Table 15, under nourished children in the age group of 24-36 months included were 40.00per cent male and 46.70per cent female children were under nourished. Thirty per cent of male children and 31.30per cent of female children in the age group of 37-48 months were found to be malnourished. Eighty three per cent of male children and 81.30 per cent of female children in the age group of 49-60 months were found to have skin fold thickness above 10.00mm. And the children above the age of 60 months were well nourished in the study sample.

#### **4.3.2.5. Mid Upper Arm Circumference of anganwadi children**

In order to identify the mortality risk associated with malnutrition Mid Upper Arm Circumference is considered as a better indicator than weight for height (Sreelaksmi, 2019). MUAC of children below 11.00cm indicate severe malnutrition, 11.00cm-12.50cm indicates moderate acute malnutrition, and 12.50-13.50cm indicates at risk of acute malnutrition and 13.50cm are well nourished child (IAP, 2015).

Classification of anganwadi children according to their MUAC measurements are explained in the Table 16.

Results of Table 16, indicates that 46.70per cent of male and female children in the age group of 24-36 months were normal, 46.70per cent of male children and 33.30per cent of female children were at risk and 6.60per cent of male children and 20.00per cent of female children are at moderate level of malnutrition. Majority of children in the age group of 37-48 months are normal and 6.30per cent of male children are at moderate nutrition, while none of the female child are at moderate malnutrition. Majority of children in the age group of 49-60 months are normal and no one was found to be coming under the category of moderate malnutrition. All of the children in the age group of above 60 months were normal and no levels of malnourishment were found.

**Table 16. Distribution of children according to their Mid Upper Arm Circumference.**

Age group (Month)	Sex	Number	Mean value (15.2cm) $\pm$ SD	Normal	At risk	Moderate malnutrition
24-36	M	15	$\pm$ 1.50	7 (46.70)	7 (46.70)	1 (6.60)
	F	15	$\pm$ 1.80	7 (46.70)	5 (33.30)	3 (20.00)
37-48	M	12	$\pm$ .38	10 (83.40)	1 (6.30)	1 (6.30)
	F	16	$\pm$ .08	13 (81.30)	3 (18.70)	0
49-60	M	12	$\pm$ 1.20	11 (91.60)	1 (8.40)	0
	F	16	$\pm$ .91	15 (93.70)	1 (6.30)	0
Above 60	M	4	$\pm$ 3.70	4 (100.00)	0	0
	F	0				

Values in parenthesis indicates percentage

#### 4.3.2.5. Head and Chest Circumference

According to Bamji *et al.*, (2013) head circumference greater than chest circumference in a child after two years indicates the child is at the risk of malnutrition. Hence children are classified accordingly, those who were having head circumference less than chest circumference and head circumference greater than chest circumference were assessed and presented in the Table 17.

**Table 17. Distribution of children having head circumference greater than their chest circumference.**

Age group (Months)	Sex	Number	Mean value (50.2 cm) $\pm$ SD	No of children having head circumference < chest circumference	No of children having head circumference > chest circumference
24-36	M	15	$\pm$ .97	13 (86.70)	2 (13.30)
	F	15	$\pm$ .87	14 (93.30)	1 (6.70)
37-48	M	12	$\pm$ .67	12 (100.00)	0
	F	16	$\pm$ .77	15 (93.70)	1 (6.30)
49-60	M	12	$\pm$ 1.50	11 (92.00)	1 (8.00)
	F	16	$\pm$ .86	15 (93.70)	1 (6.30)
Above 60	M	4	$\pm$ 4.20	4 (100.00)	0
	F	0		0	0

Values in parenthesis indicates percentage

Table 17, shows that 13.30per cent of male children and 6.70per cent of female children in the age group of 24-36 months were having their head circumference greater than their chest circumference indicating malnourishment. 6.30per cent of female

children in the age group of 37-48 months and 49-60 months were having head circumference less than chest circumference. 8.00per cent of male children in the age group of 49-60 months are malnourished. No one in the age group of above 60 months is having chest circumference less than their head circumference.

### 4.3.3. Clinical signs and symptoms

Clinical examinations are helpful to assess the health levels of individual. Clinical symptoms were specific to a particular nutrient deficiency (Sreelakshmi, 2018). Clinical assessment includes details related to general appearance of children like skin changes, changes in tongue, eyes, etc. The details collected through clinical assessment schedule are presented in the Table 18.

As revealed in the Table 18, 4.40per cent of children were suffering from dental caries, 2.20per cent of children have dry and rough skin and 2.20per cent have wrinkled skin with diminished elasticity. 5.60per cent of children were having the eating disorder anorexia.

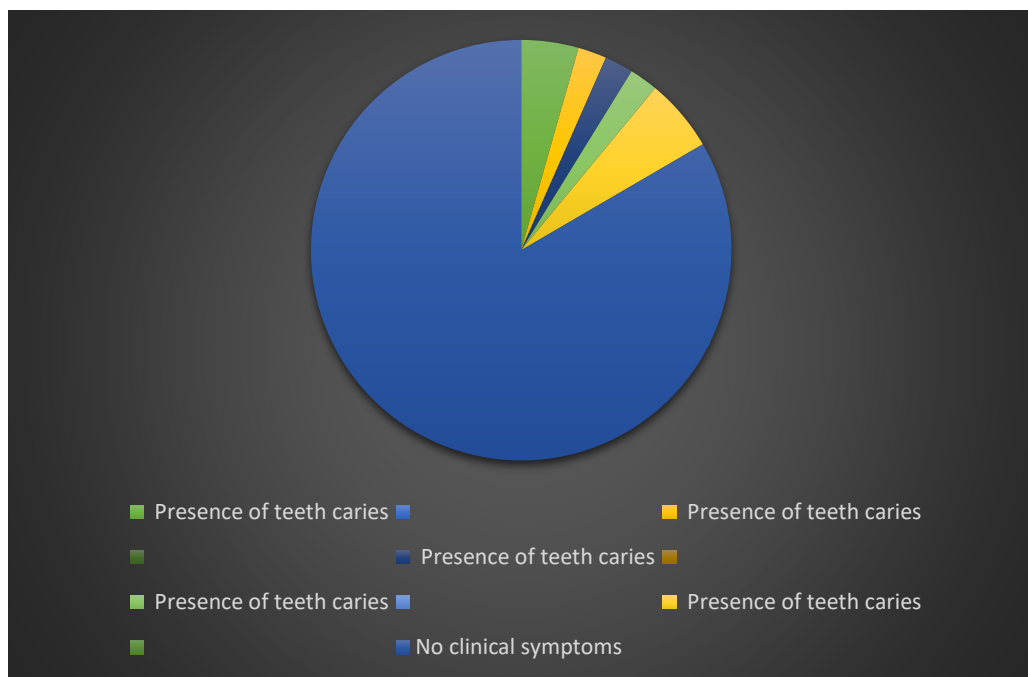
**Table 18. Percentage of children having clinical deficiencies**

Clinical signs	No of children
1. Poor general appearance	0
2. Slight dry conjunctiva on exposure	0
3. Dry conjunctiva and presence of bitot's spot	0
4. Presence of angular conjunctivitis signs	0
5. Abnormal pigmentation in eyes	0
6. Presence of night blindness	0

7. Abnormal lip condition	0
8. Red and raw color in tongue	0
9. Presence of teeth caries	4 (4.40)
10. Dry and rough skin	2 (2.20)
11. Wrinkled skin with diminished elasticity	2 (2.20)
12. Collar pigmentation around neck	2 (2.20)
13. Moon face	0
14. Oedema on face and dependent parts	0
15. Anorexia	5 (5.60)
16. Palpable spleen	0
17. Presence of calf tenderness	0
18. Palpable Liver	0
19. Rickets	0

Values in parenthesis indicates percentage

Figure 6. Prevalence of Clinical symptoms among children.



#### 4.3.4. Prevalence of infections and diseases.

Fifty per cent of deaths in children under five years of age with infections are associated with malnutrition (Bamji *et al.*, 2013). Prevalence of infections and diseases among anganwadi children are represented in the Table 19.

**Table 19. Distribution of children having various infections and diseases.**

Infections and diseases	No of children
Viral Fever	90(100.00)
Chicken pox	4(4.40)
Measles	0
Mumps	0
Common cold	90(100.00)
Throat infections	58(64.40)
Influenza	2 (2.20)
Conjunctivitis	9 (10.00)
Diarrhoea	48 (58.30)
Dysentery	5 (5.60)
Typhoid	2 (2.20)
Pneumonia	0
Jaundice	0
Whooping cough	0
Skin infections	8 (8.90)



Cough	69 (76.70)
Eosinophilia	5 (5.60)
Asthma	4 (4.40)
Kidney diseases	0
Heart problems	0
Gastric problems	3 (3.30)
Urinary Infections	0
Dental problems	6 (6.70)
Malaria	0
Tuberculosis	0

Values in parenthesis indicates percentage

As revealed in the Table 19, none of the children were free from viral fever infection and common cold. 4.40per cent of the children were affected with chicken pox and asthma problems. 64.40per cent were affected with throat infections. 2.20per cent of children suffered from influenza and typhoid. 58.30per cent children suffered diarrhea, 5.60per cent had dysentery, 8.90per cent had skin infections, 5.60per cent had eosinophilia, 3.30per cent had gastric problems and 6.70per cent were having dental problems. Majority of children were having cough. Luckily none of the study population was having the diseases like measles, mumps, pneumonia, jaundice, whooping cough, kidney diseases, heart problems, urinary infections, malaria and tuberculosis etc.

#### **4.3.5. Nutrition Status Index**

Nutritional status of each child was calculated using selected anthropometric measurements and the clinical assessment schedule. Scoring was given for each variable

according to the standard values considering both age and gender of the children. Height and weight scales were given as 3 for medium height, 2 for minimum scale and 1 for less than minimum height standards according to IAP and WHO. Skin fold thickness was given as 3 for average values, 2 for ideal values and 1 for lean children. Ideal head circumference for children according to WHO (2011) is 45.50-51.00cm. Hence those value ranges was given a score of 2 and less than 45.50 were given a score of 1. Head circumference greater than chest circumference is a sign of malnutrition. Those who are having head circumference less than chest circumference was given as 2 and a score of 1 for the other children. Waist circumference greater than equal to curve reference values were given a score of 2 and less than that were given with a score of 1. Mid Upper Arm Circumference scales were given as 3, 2, 1 according to normal, at risk, and moderate values. Total scores of children were taken according to the questions in clinical assessment schedule. A score of 2 for normal child and score of 1 for children having any deficiency in each question. Nutritional statuses of individuals were found using the formula given below.

$$NSI=W*WS+H*HS+SFT*SFTS*HC*HCS+CC*CCS+WC*WCS+MUAC*MUACS+CAS$$

Average value of NSI for the 90 children was found as 406.15. 49.00per cent of children were above the average values of nutrition status index.

#### 4.3.5.1. Nutrition Status Index

Table 20, illustrates the distribution of anganwadi children according to their NSI values

**Table 20. Distribution of children according to their NSI**

NSI range	No of children
Normal (>400)	45 (50.00)
Moderate (300-400)	43 (47.80)
At risk <300	2 (2.20)

Values in parenthesis indicates percentage

Results of the Table 21, indicates that majority of children (50.00%) were included under normal range with NSI values above 400. 47.80per cent of children are in the moderate category in the NSI range of 300-400. In the category of at-risk that is less than 300 NSI values 2.20per cent of children were present.

#### 4.3.5.2. Correlation between NSI and other variables

Table 21 depicts the correlation of Nutrition Status Index with various variables.

Table 21. Correlation between NSI and variable.

	NSI
NSI	1
Age	.52
Height	.30
Weight	.69
SFT (mm)	.77
HC	.56
CC	.81
MUAC	.73
WC	.76
CA	.13
BMI	.49
Ordnl pstn	.12
Birth weight	.28
HC	.74

As revealed in the table 21, Skin fold thickness (.77), Mid Upper Arm Circumference (.73), Waist Circumference (.76) and Head Circumference (.74) were strongly correlated with the Nutritional Status Index of children.

#### **4.4. Knowledge, Attitude and Practices of the anganwadi workers and helpers towards the programme.**

Knowledge and attitude of anganwadi teacher, and their teaching practices adopted for providing preschool education, knowledge of anganwadi helpers on their role and responsibilities, and their attitude and practices towards the beneficiaries, and the constraints faced by both of the groups were assessed through a suitably structured and pretested questionnaire.

##### **4.4.1. Knowledge of Anganwadi Workers**

Ten statements were given to the anganwadi worker to assess their nutritional knowledge, various schemes implemented under ICDS etc. Correct responses were given with a score of one and zero for wrong answers. Those who scored between 10-8 were categorized under high score, score of 6 and 7 in medium score and less than and equal to 5 under lower scores.

**Table 22. Distribution of AWW with respect to knowledge.**

<b>Category</b>	<b>Number</b>	<b>Per cent</b>
High score	17	68.00
Medium score	6	24.00
Low score	2	8.00

(Minimum score: 0; Maximum score: 10 and Mean score 7.8)

As depicted in the Table 22. 68.00% of the anganwadi workers had high score, 24.00% had medium score and the other 8.00% had lower scores.

#### 4.4.2. Knowledge of Anganwadi helpers

Anganwadi helpers were provided with another 10 statements to assess their knowledge on their roles and responsibilities in the anganwadi centers. Positive responses were given a score of one and zero for negative responses. Those who are having a score of ten or nine were included under high score, score of eight and seven in the category of medium score and less than seven in the low score category.

**Table 23. Distribution of AWH with respect to knowledge**

Category	Number
High score	6 (24.00)
Medium score	1(76.00)
Low score	0

Values in parenthesis indicates percentage

(Minimum score: 0; Maximum score: 10 and Mean score 8.2)

Table 23, Shows that 24.00per cent of the anganwadi helpers are having high score with good knowledge on their roles and responsibilities. 76.00per cent got medium scores and there was no one to be included under the category of low score.

T test was done to analyze the difference between the knowledge of anganwadi workers and helpers. Results revealed that there was no significant difference in their knowledge status.

#### 4.4.3. Attitude of Anganwadi workers

12 statements were given to anganwadi workers to assess their attitude towards the beneficiaries. One mark was given for positive response and a score of zero for negative response. Those who are having a twelve and eleven were included under high score, score of ten and nine in the category of medium score and less than nine in the low score category.

**Table 24. Distribution of AWW with respect to attitude.**

<b>Category</b>	<b>Number</b>	<b>Per cent</b>
High score	24	96.00
Medium score	1	4.00
Low score	0	0

(Minimum score: 0; Maximum score: 12 and Mean score: 11.6)

Table 24, reveals that majority of the anganwadi workers scored high, only 4.00% scored medium score and no one scored low.

#### **4.4.4. Attitude of Anganwadi helpers**

To assess the attitude of anganwadi helpers, they were given with 10 statements. Those who scored between 10-8 were categorized under high score, score of 6 and 7 in medium score and less than and equal to 5 under lower scores.

**Table 25. Distribution of AWH with respect to attitude.**

<b>Category</b>	<b>Number</b>	<b>Percent</b>
High score	3	12.00
Medium score	16	64.00
Low score	6	24.00

(Minimum score: 0; Maximum score: 10 and Mean score 8.2)

As depicted in the table 25, 12.00 per cent of the helpers scored high, 64.00 per cent got medium scores and 24.00 percent of them had poor attitude towards the beneficiaries.

#### 4.4.5. Practice of Anganwadi workers

To access the teaching practices adopted by anganwadi workers 12 statements were given. One score for positive answers and zero for negative response. Those who are having a score of twelve and eleven were included under high score, score of ten and nine in the category of medium score and less than nine in the low score category.

**Table 26. Distribution of AWW with respect to teaching practices.**

Category	Number	Percent
High score	5	20.00
Medium score	16	64.00
Low score	4	16.00

(Minimum score: 0; Maximum score: 12 and Mean score: 9.5)

As revealed in the table 27, majority of the anganwadi workers scored in the category of medium score (64.00%). 20.00per cent of the anganwadi workers scored high and 16.00per cent scored low.

#### 4.4.6. Practice of Anganwadi helpers

In order to find the practices of anganwadi helpers they were given with 8 statements related to their practices which has to be followed in AWC. One mark for positive answer and zero for negative. Those who scored between 10-8 were categorized under high score, score of 6 and 7 in medium score and less than and equal to 5 under lower scores.

As depicted in the Table 27, majority of the anganwadi helpers scored medium (84.00%). Only 4.00per cent in the low score category and 12.00per cent in the high score category.

**Table 27. Distribution of AWH with respect to practices.**

<b>Category</b>	<b>Number</b>	<b>Percent</b>
High score	3	12.00
Medium score	21	84.00
Low score	1	4.00

(Minimum score: 0; Maximum score: 10 and Mean score: 6.9)

T test was used to analyze the attitude and practice score of AWW and AWH. There was significant difference between attitude and practice of AWW and AWH. Attitude and practice of AWH needs to be improved.

#### **4.5 Constraints faced by the AWW and AWH.**

There are many constraints faced by anganwadi workers and helpers in the anganwadi. Six main problems were given to them and to rate them as most important, important and less important.

As revealed in the table 28, 71 per cent anganwadi workers and 67 per cent helpers said that their remuneration is not satisfactory. It is the major constraint. 57 percent AWW and 39 per cent AWH felt difficulty in maintaining too much records. 54 per cent AWW and 47 AWH felt their duties as heavy. 29 per cent and 27 per cent of AWW and AWH found difficulty due to the improper infrastructure facilities. 31 percent AWW and 28 per cent AWH were having a lack of support from the community. 29 per cent AWW AND 38 per cent AWH were unable to perform their duties within the provided time.



Table 28. Constraints faced by the AWW and AWH.

<b>Constraints</b>	<b>AWW</b>	<b>AWH</b>
Less wage	71	67
Difficulty to maintain too much records	57	39
Heavy workload	54	47
Improper infrastructure facilities	29	27
Lack of community support	31	28
Unable to perform duties with in the given time	29	38

Values in given under the headings AWW and AWH indicates percentage

AWW: Anganwadi Worker; AWH: Anganwadi Helper

## 5. DISCUSSION

This chapter describes and discusses the results of the study, **Impact of Integrated Child Development Service (ICDS) on the nutritional status of children attending anganwadies in Trivandrum district**. The discussions are presented according to the heading given below.

5.1. Socio economic status of the children.

5.2. Food consumption pattern.

5.3. Nutritional status of selected anganwadi children.

5.4. Assessment of the knowledge, attitude and practices of the anganwadi workers and helpers towards the programme.

5.5. Constraints faced by the AWW and AWH.

### **5.1. Socio economic status of the children.**

Socio economic status of a person is important in his productive accomplishments (Karuppusamy and Karthikeyan, 2017). It is a significant determinant of health, nutritional status as well as mortality and morbidity (Gupta *et al.*, 2005). Socio economic status of 43 male and 47 female children in the age group of 2-6 years were assessed. A sizeable portion of male child (35.00%) were under the age category of 24-36 months and female child in age group of both 37-48 months and 49-60 months (34.00%). Majority of children (73.00%) were in the Hindu caste. Similar results were directed in the studies piloted by Anila (2014), Priya (2016), and Aiswarya (2017). Majority of children were living in their own house (59.00%) and are in APL category (60.00%).

55 children in the study population was first child, 35 children were second child and no child were there born after two kids. Related study conducted by Mishra and Rutherford (2005), proposed that parents care less towards first child when a new child is need. They may be in need of particular nutritional needs at that time. Availability of food also decreases. Children with more number of siblings in their families are more likely to be suffered from malnutrition.

Birth weight of children were collected from their mothers and found that 11.6% of male children and 13% of female children in the study population were having a lower birth weight i.e. less than 2500gm. Wang et al., (2020), reported that the risk of being underweight and malnourished is more for children with a lower birth weight. Data on the type of delivery of children shown that 25.5% of children have caesarean birth. Studies conducted by Larco *et al.*, (2015) observed that on the risk of caesarean birth and child nutritional status probability for the development of over weight is more for caesarean type of delivery. But proper care and consultations can prevent that through interventions. Low birth weight is an important contributor for infant mortality. They are more likely to suffer from growth retardation and illness throughout their life cycle (MCHET, 2019). Therefore they require special care and attention in the anganwadies.

More than half (58.9%) of the mothers of the children were graduate and a large percent of mothers were not working. In various studies conducted by Sheethal (2011), and Krishnedhu (2012) also observed higher educational status of woman. Only 13.3% of mothers were working women. Chauhan (2015), in his study pointed out that educational qualification of mother is important in the nutritional status of child. The chance to have under nourished children is less for a more educated mother than the other.

Majority of children (48.88%) were from the families having a monthly income of less than or equal to 20,000. A study conducted by Stefanie *et al.*, (2007), indicated that lower educational status of parents and lower family income affects food intake of children. Intake of fruits, cooked vegetables, milk etc. were diminished. Even though with an increase in the income the overall outcomes of children were also improving. Women's employment status increases the family income, and study done by Abbi *et al.*, (2011) suggested that job of mother and child nutritional status are positively related.

## **5.2. Food consumption pattern**

Assessment of food consumption pattern helps to find whether the study population are well nourished or malnourished. Nutritional status of children can't be assessed totally only by the food consumption pattern (Steven, 2011). Baig (2013),

ascertained that it is the result of so many constituents which are connected each other and is subjective to the quantity and quality of food taken by the individual

Ramachandran (2010), pointed out that assessment of food consumption pattern of the study population along with other assessments will increase the significance of nutritional assessment value.

Food consumption pattern of the beneficiaries were assessed through the collection of details on the food consumption pattern, frequency of having different food items and the meal timing. Regarding the food habit of the children 4.4% were vegetarians. Vegetable diet is devoid of animal hence, nutrient intake is based on lower levels of the food pyramid (Chandra and Arcot, 2019). Absorption of Iron from a pure vegetarian diet is harder. Choline is a nutrient found only in meat and poultry. It is important for the health and functioning of brain. Vegetarians are devoid of this nutrient (Kathleen, 2019). Hence they need to take special care on meeting the nutrient requirements.

Frequency of consumption of different food items by children were assessed. All of the beneficiaries consumes rice, green gram, curry leaves, ground nut coconut and jaggery daily. Green gram, rice, peanut chocolates made of ground nut and jaggery were made and provided to children daily at the anganwadi center. Adam and Hann (2009), reported that food preferences and food consumption of same foods are related each other. Through both of them dietary intakes can be predicted. Dietary intake can be used to predict the dietary intake and can provide an alternative to food frequency approach assessing dietary intake.

All of them consume wheat flour weekly thrice. Highly perishable food product like fish is consumed by 81.1% daily, 11.1% weekly thrice and 3.3% weekly twice. Fish is thought to be one of the healthiest foods. This is in line with the community based study conducted by Lane (2019), reported that approximately 85% of Keralites consumes fish. Addition of fish in the diet of a child is an excellent way to reel in a prize catch of important nutrients. Eating fish daily is likely to have a healthy brain. Fish is rich in omega-3 and diet with fish is good for proper brain functioning. Specifically, fish has been shown to reduce the risk of diabetes in both children and adults

A study conducted by Joseph (2014) found that vegetarian and non-vegetarian dishes consisting of fish, poultry and meat accompanied with rice compromises the diet plan of keralites. In majority of house hold, lunch will consists of rice, fish and vegetables. Another cross sectional study steered by Agarwal *et al.*, (2014), observed that one in five people in Kerala consume pesco vegan diet (dominated by fish).

86.87% of the children consume tea or coffee daily at their tea time only 13.3% of children does not have the habit of consuming tea or coffee in their diet. Majority of children were having the habit of consuming tea. It's not advisable and need to be replaced by milk. Virtanen (2007) recommended that due to the presence of caffeine content children should reduce intake of tea or coffee. Because it causes several side effects including nervousness, stomach upset, sleeping problems and improper development of children. A child who consume too much will be experiencing nausea, vomiting, diarrhoea, extreme restlessness etc.

Mainstream of children (63.00%) in the present study never consume amla in their diet. They have to be made aware about of its importance. Amla is rich in high amounts of Vitamin C. it contains antioxidants there by reduces the damage of cells. Amla played significant role in the reduction of blood pressure values. Gopa *et al.*, 2012, observed that regular intake of small amounts of amla aids digestive enzymes and make the child to feel hungry

Majority of the population (96.7%) are not concerned with the significance of sprouted pulses and consume never in their diet. They have to make aware about the significance of sprouted legumes. Legumes are sprouted to increase the digestibility and bioavailability of nutrients and hence they are significant in human nutrition. Increase in the protein content, vitamin C, in vitro protein digestibility and decline in phytic acid and trypsin inhibitor activity were observed after sprouting process (Devi *et al.*, 2015).

Daily meal pattern of the family were also assessed. 81% of the respondents and 22% of the respondents have their breakfast before 9am in the morning in working days and holidays respectively. All of the children have their lunch before 1pm since the meal time in anganwadi centres are 12.30pm. The digestive power of an individual is

stronger between 12 to 02.00pm. 88% of the respondents have their dinner before 9pm in working days and 78% in holidays.

Sengupta (2018), identified that meal timing and intervals between it is also significant part of dietary intake. Gap between meals should not be more than four hours. Sreelakshmi (2019), suggested that regularity of meal times leads to development of good eating habits

All children were having the habit of consuming tea. It's not advisable and need to be replaced by milk. For the first time Chhattisgarh government decided to provide egg to the children under Integrated Child Development Services (ICDS), since it is one of the best source of protein for growing child (Kaiser, 2019). It can be followed by other anganwadi centres also including our Kerala state. Presently vegetarian diet is provided in the anganwadi centres.

### **5.3. Nutritional status of selected anganwadi children**

UNS (2004) defined nutritional status as the state of an individual that is the relation between the intake of nutrients and need and ability of individual body for digestion, absorption and usage of nutrients can be defined as nutritional status. Nutritional status of selected anganwadi children were assessed using a combination of dietary (24 hour recall method), anthropometry and clinical examination.

#### 24 hour recall method

Real food consumption of the nominated anganwadi children were calculated through 24 hour recall method and the nutrients present in their diets were calculated using the Indian food composition table of NIN (2017) in order to determine quality and quantity of food consumed.

It is one of the most widely used method. This method consists of recall and quantity intake of food materials consumed in a day before the interview is scheduled, first intake from morning to the last food taken till night (Michels, 2003). Researchers suggest that this method is thorough and complete method till date to assess the food intake (Illner *et al.*, 2012).

Mean intake of RDA intake were compared with the actual RDA required to find the deviation from what is needed and what they actually consumes. Recommended Dietary Allowance (RDA) is the average daily dietary intake sufficient to meet nutrient requirement of nearly 97-98% healthy individuals. It will be periodically revised and updated (Sreelakshmi, 2018).

One of the important mandates of Anganwadi Centres is to provide supplementary nutrition to children under 6 years of age in the form of cooked food served at AWC on a daily basis or given in the form of take-home rations, along with the preschool education. Supplementary Nutrition is a boon to poor children. This initiative by the Government has benefited them a lot (Mukherjee and Rome, 2015).

The mean intake of children in the age group of 1-3 years were calculated and the results shown that, their diet except the quantity of energy and protein were deficient in Vitamin A and Iron in their diet. In the case of children in the age group of 4-6 years their diet were deficient in energy, vitamin A and Iron. 300 k Cal of energy and 10gm of protein is provide generally to children below the age of 6 years. An alarming finding from the study pointed out that this amount is not sufficient for the children above the age of three years.

The results of the study shows a positive energy balance. This is in line with the study conducted by Joseph (2014), to assess the nutritional level status of children found intake of energy by the child beneficiaries was greater than the RDA values.

Vitamin A and iron are two important interconnected nutrients. A study was conducted by Michelazzo *et al.*, (2013), to assess the impact of Vitamin A supplementation on Iron status. Results shown that usage of vitamin A supplements along with the simultaneous use of iron has more efficiency to prevent iron deficiency anemia than using any of the nutrients alone.

According to Andersson and Hurrell (2010), prevalence of iron deficiency in children is because of low dietary intake and bioavailability during higher iron requirement at the growth time.

## Anthropometric Measurements

Anthropometry is the study of size and shape of components of biological forms and their variations (Utkualp and Ercan, 2015).

From 19<sup>th</sup> century onwards anthropometry was used to assess the impact of environment influence on child growth (Ercan *et al.*, 2012).

Hedley *et al.*, (2004), documented that for the assessment of nutritional status in children and adults Anthropometry is suggested as a key component. Data's of anthropometric measurements reflects status of health, adequacy of dietary pattern, and helps in tracking their growth and development Height, weight, skin fold thickness and mid upper arm circumference are significant anthropometric measurements for assessment of nutritional status. Ogden, (2004) learned that additional measurements such as head circumference and chest circumference are taken for young children

Height of the study population were collected and were compared with the height for age according to the table put forward by WHO and IAP in 2015. Accordingly they were classified as medium height, minimum height and less than minimum height. 15 children in the study population were having less than their height requirements.

Weight of the study population collected were classified according to the age for weight table proposed by Indian Pediatric Association and World Health Organization. Study population were having only up to the maximum values of medium weight requirements and hence total sample was classified mainly into three categories medium weight, minimum weight and less than minimum weight. 18 children in the study population were having less than the minimum height. More than 80 %anganwadi children are having their required weight and height standards. Similar to this results of study conducted by NIPCC (2008), in Trivandrum district 78% of the children were included under the normal category.

Weight for age and height for age represents past and present nutritional status. It can also reflect health and nutritional experience of the study population (WHO, 2000). Children having less than their minimum height and weight requirements requires special attention.



According to Sreelakshmi (2018), serial measurements of weight and height in growth monitoring are more sensitive indicators of changes in nutritional status than a single measurement at a point of time.

Age and gender specific centiles of Body Mass Index (BMI) were recommended for use in children. The ratio of weight (in kg)/height\*height (m) is referred to as BMI. BMI of <5<sup>th</sup> centile for age and gender is considered as undernourished, between 85<sup>th</sup> and 95<sup>th</sup> centile as overweight and more than 95<sup>th</sup> centile considered as obese ( Cole *et al.* , 2000). Majority of the children in the study population were having their BMI ranges less than 5<sup>th</sup> percentiles. It indicates the need for correct growth monitoring.

Figure 7. Distribution of children according to their height

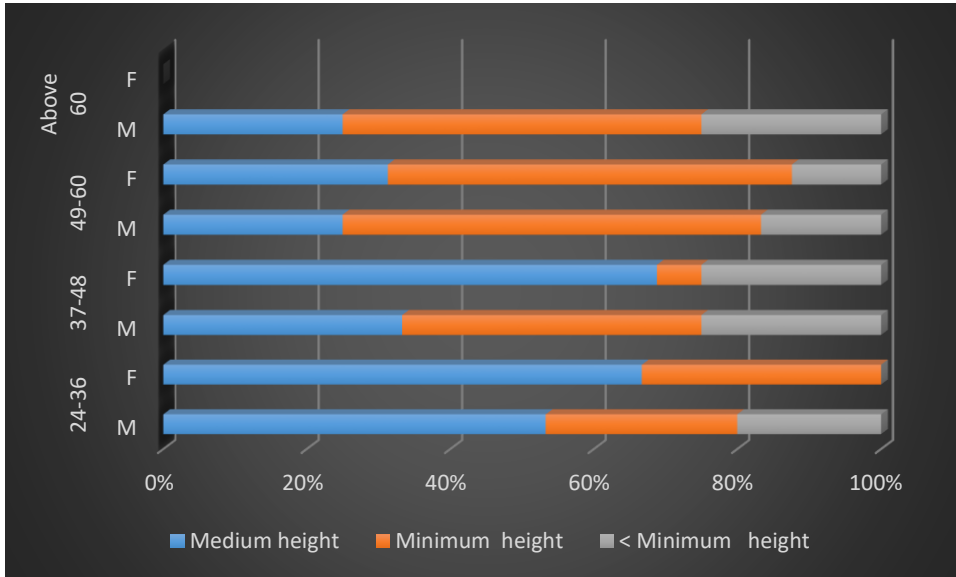


Figure 8. Distribution of children according to their weight

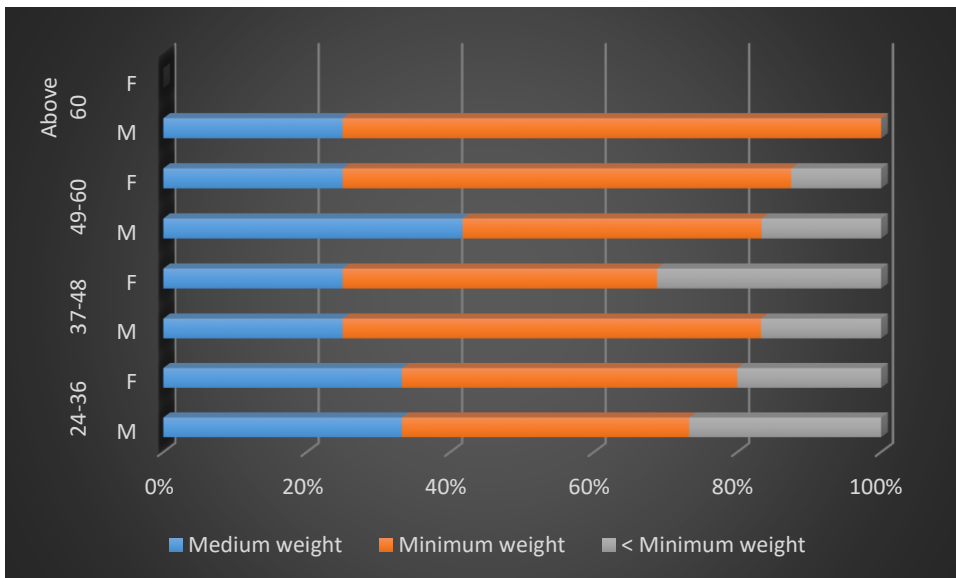
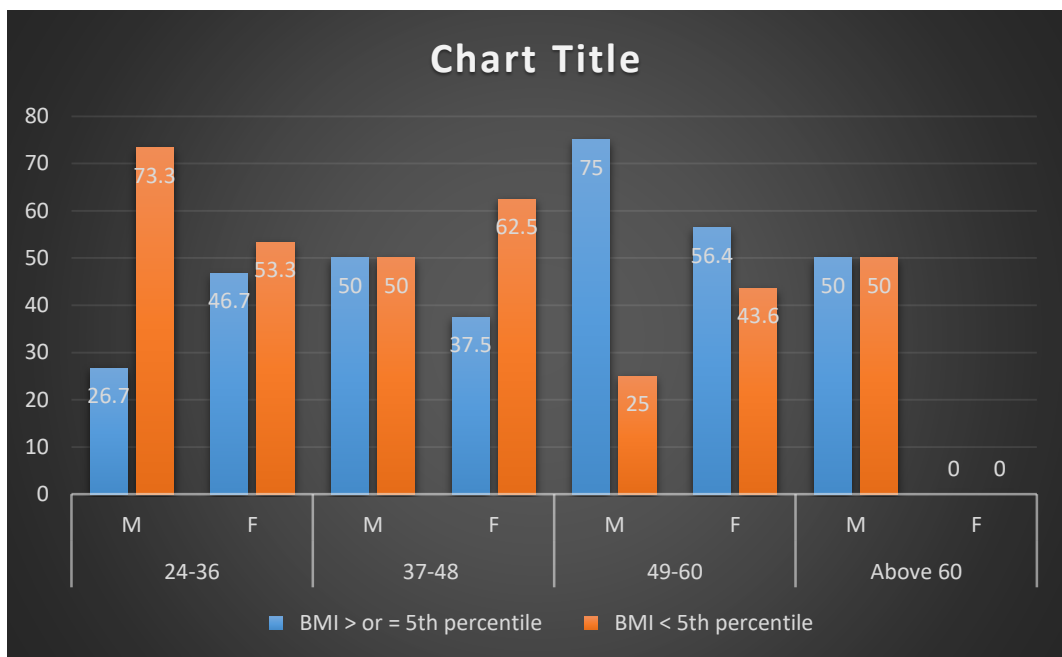


Figure 9. Distribution of children according to their BMI in each age group



Skin fold thickness of children were calculated to find the presence of malnourishment. It is a means of assessing the amount of fat in an individual. Value less than 10 mm is an indication of malnutrition. Brook (2001), reviewed that skin fold thickness is used to estimate lean body mass and total body fat in young children better than any other techniques.

Majority of children have their skinfold thickness measurements greater than 10 mm, even though 27 of the study population were having less than 10 mm.

In order to identify the mortality risk associated with malnutrition Mid Upper Arm Circumference is considered as a better indicator than weight for height. Children below 11cm indicates severe malnutrition, 11cm-12.5cm indicates moderate acute malnutrition, and 12.5-13.5cm indicates at risk of acute malnutrition and 13.5cm are well nourished child (IAP, 2015). Accordingly 5 children (3 girls and 2 boys) were under the category of moderate malnutrition.

Head circumference and chest circumference of children were also collected. According to Bamji *et al.*, (2013) head circumference greater than chest circumference in a child after two years indicates the child is at the risk of malnutrition.

The chest in a normally nourished child grows faster than head during the second and third years of life. Hence children are classified accordingly, those who are having head circumference less than chest circumference and chest circumference less than chest circumference. 6 children in the study population were having their chest circumference less than head circumference.

One of the significant advantage of anthropometry which make it different from other assessments scales is if a child is deficient in any food in their actual intake physical activity will be reduced to conserve energy and growth rates will be affected. If that stage continues clinical deficiencies will began to appear (Steven *et al.*, 2011)

#### Clinical examination.

It is a significant component in nutritional surveys since they are helpful in assessing the health status of individuals in connection with consumption of food (IIPS,

2010). Clinical examinations are helpful to assess the health levels of individual. Cooperation of subjects are easy since symptoms are observed externally. Age of the subjects need not be ascertained. Clinical symptoms are specific to a particular nutrient deficiency (Sreelakshmi, 2018).

Clinical assessment includes details related to general appearance of children like skin changes, changes in tongue, eyes, etc. Presence of two or more deficiency disease increases the diagnostic significance. In the study population 4.4% of children were suffering dental caries. According to Heba *et al.*, (2014), dental caries seems to be a public health problem among children, since commonly they are untreated. Results shown that it could affect anthropometric outcome of children. Higher incidence of untreated dental caries are associated with poorer growth in children. Intake of sugars and refined starch should be considered.

2.2% of children have dry and rough skin and 2.2% have wrinkled skin with diminished elasticity. 5.6% of children were having the eating disorder anorexia. These children need special consideration. Sinha (2014), suggested that anganwadi workers and helpers should be given special training to deal with children with special need among others.

There lies a relation between illness and appetite. In illness child won't be having normal appetite and consume less amount of food than what actually required. Nutritional deficiencies in the children increase chance of them to be affected with infectious diseases (Pelletier *et al.*, 2005).

#### Prevalence of infections and diseases.

55% of deaths in children under five years of age with infections are associated with malnutrition (Bamji *et al.*, 2013). None of the children were free from viral fever infection and common cold. 4.4% of the children had affected with chicken pox and asthma problems. 64.4% were affected with throat infections. 2.2% of children suffered influenza and typhoid. 58.3% children suffered diarrhea, 5.6% had dysentery, 8.9% had skin infections, 5.6% had eosinophilia, 3.3% had gastric problems and 6.7% were having dental problems. Majority of children were having cough. Luckily none of the

study population were having the diseases like measles, mumps, pneumonia, jaundice, whooping cough, kidney diseases, heart problems, urinary infections, malaria and tuberculosis etc.

Nutrition influences immune system of human, specifically nutrition can affect emergence of infectious diseases. Infection can also worsen malnutrition in human beings. Children were given food according to requirements and other children were given with vaccines for tuberculosis. Those who got enough good were less affected from tuberculosis than those who were vaccinated (Farhadi and Roman, 2018). Young children less than three years are most vulnerable to malnutrition. Due to greater susceptibility to infections and slow illness recovery child malnutrition is a biggest contributor to under five mortality rate (MCHET, 2019).

Nutrition and infection interaction called infection complex has been recognised as a major obstacle for health and development of an individual (Bamji *et al.*, 2013).

#### Nutrition Status Index

Nutritional status of each child was calculated using selected anthropometric measurements and clinical assessment schedule. Scoring was given for each variable according to the standard values considering both age and gender of the children. Height and weight scales were given as 3 for medium height, 2 for minimum scale and 1 for less than minimum height standards according to IAP and WHO. Skin fold thickness was given as 3 for average values, 2 for ideal values and 1 for lean children. Ideal head circumference for children according to WHO (2010) is 45.5-51cm. Hence those this value range was given a score of 2 and less than 45.5 were given a score of 1. Head circumference greater than chest circumference is a sign of malnutrition. Those who are having head circumference less than chest circumference was given as 2 and a score of 1 for the other children. Waist circumference greater than equal to curve reference values given a score of 2 and less than that given with a score of 1. Mid Upper Arm Circumference scales were given as 3, 2, 1 according to normal, at risk, and moderate values. Total scores of children were taken according to the questions in clinical assessment schedule. A score of 2 for normal child and score of 1 for children having

any deficiency in each question. Nutritional status of individuals were found using the formula given below.

$$\text{NSI} = \text{W} * \text{WS} + \text{H} * \text{HS} + \text{SFT} * \text{SFTS} * \text{HC} * \text{HCS} + \text{CC} * \text{CCS} + \text{WC} * \text{WCS} + \text{MUAC} * \text{MUACS} + \text{CAS}$$

Mean value for Nutrition Status Index of the 90 children was find as 406.15. 49% of children were above the mean values and 51% where having less than mean value score as their nutrition status index.

According to the NSI values study population where classified into three categories as normal, moderate, and at risk group. Half of the study population were included under normal category with a NSI value greater than 400. A similar trend was shown in the study conducted by Alim and Jahan (2012) were majority of children who were attending anganwadi centres were having normal nutrition status.

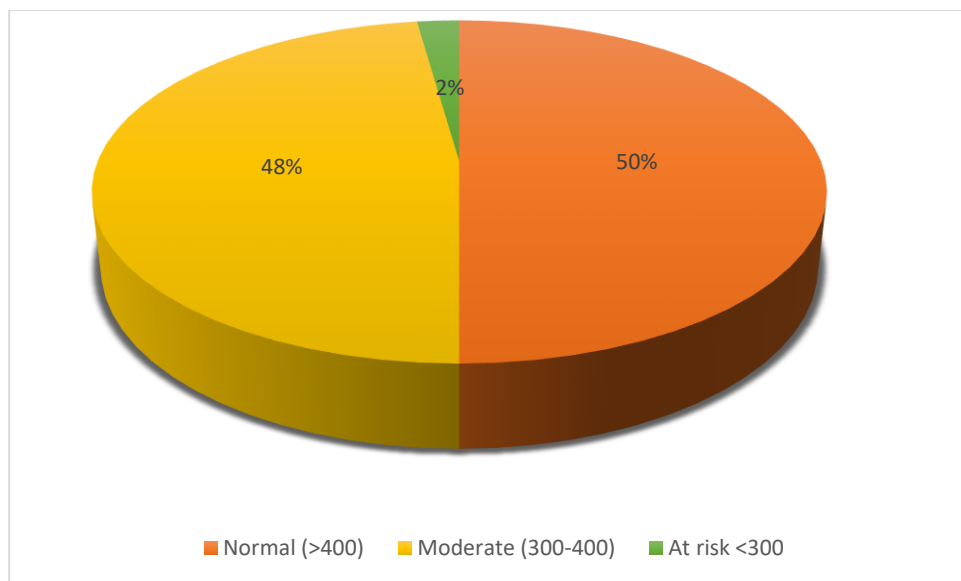
Beegum, (1990) reported that improved nutritional status of children is associated with an increased ICDS service utilization.

Children who are attending the anganwadi centres were having good health and appearance than their counterparts. They also had better dietary intake (Vaid and Vaid, 2017).

In this study noticeable difference were not found between the children according to their gender. This is in line with the reports of study conducted by Jayaseelan (1997) that proportion of nutritional status for both girls and boys were identical and there is no significant association between gender and nutritional status.

Supplementary nutrition programme under ICDS is a targeted food transfer programme with a potential to improve the nutritional outcomes of the child beneficiaries (Parasar and Bhavani, 2018).

Figure 10. Percentage distribution of children according to their NSI ranges





#### **5.4. Assessment of the knowledge, attitude and practices of the anganwadi workers and helpers towards the programme**

Knowledge and attitude of anganwadi teacher, and their teaching practices adopted for providing preschool education, knowledge of anganwadi helpers on their role and responsibilities, and their attitude and practices towards the beneficiaries, and the constraints faced by both of the groups were assessed through a suitably structured and pretested questionnaire. Minority of them were unwilling to respond honestly especially regarding their problems in anganwadi center.

68% of the anganwadi workers were having better knowledge on the ICDS programme. But their knowledge towards supplementary nutrition were not satisfactory and need improvement. They were unaware about the calorie of energy and protein given to children through the ICDS programme. Study results of Dogra (2013), is also in accordance with the same results. His study marks that knowledge of supplementary nutrition was not as expected from a trained person. They have to be given a quality training to make them aware of the relevance of supplementary nutrition in the proper development of a child. Lack of knowledge of anganwadi workers were as the contribution of poor training. Quality of training provide need to be enhanced. Study conducted by Sarkar and Ghosh (2017), revealed that anganwadi workers in West Bengal were not well informed about the protein requirements and calorie needs of malnourished children and pregnant woman. In a study conducted by Choudhary and Sharma (2017), to assess the nutritional knowledge of anganwadi workers 70.13% of them scored higher.

Sarkar and Ghosh (2017), identified poor training as a factor which contribute to the lack of knowledge among the anganwadi workers. Nutritional status of children were taken without marking malnourished children and hence there were no variation in the provision of food to them.

Majority of the anganwadi workers had good attitude towards the beneficiaries. Study conducted by Vaid and Vaid (2017), reported that anganwadi workers had positive attitude towards ICDS centers and after admitting into the anganwadi centers children had improvement in their overall nutritional status.

Only 12% had high score related to their practices in anganwadi centers. It reveals the need for improving the practices of AWW.

In the case of anganwadi helpers only 24% of them scored high in their awareness on roles and responsibilities. Government have to make them more aware of the responsibility in the society through providing more training services. Study conducted by Sandhyarani and Usha (2013) also supports the same and suggest that Department of Women and Child Development should provide accurate knowledge with regard to their responsibilities through organizing all of the anganwadi workers and helpers in one roof.

Only 12% had good attitude towards children and better practices in the anganwadi centers. It need to be improved for the proper wellbeing of the children.

Figure 11. Knowledge, Attitude and Practice of Anganwadi Worker

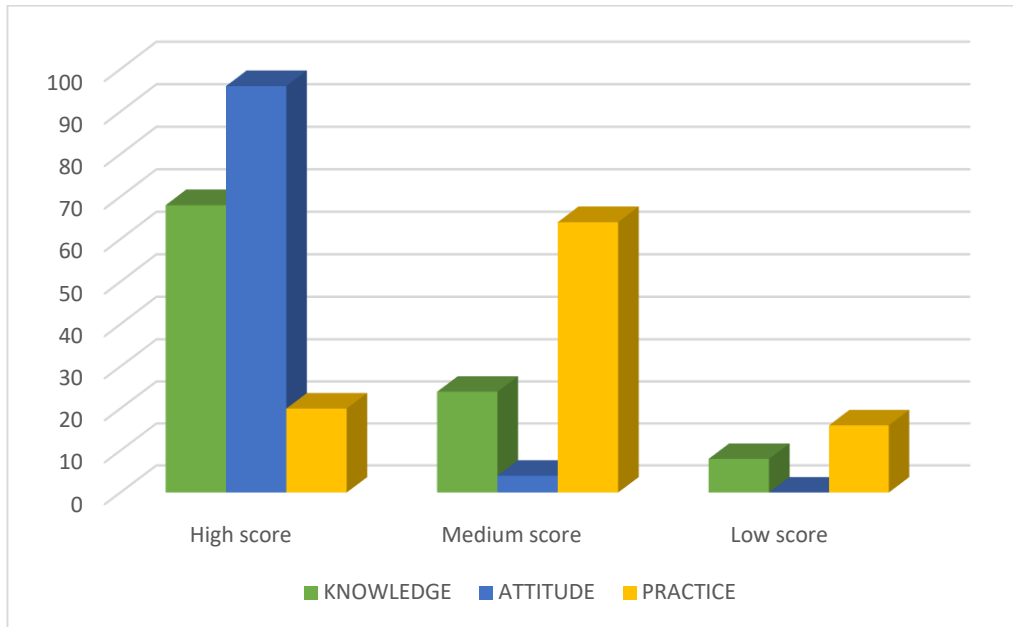
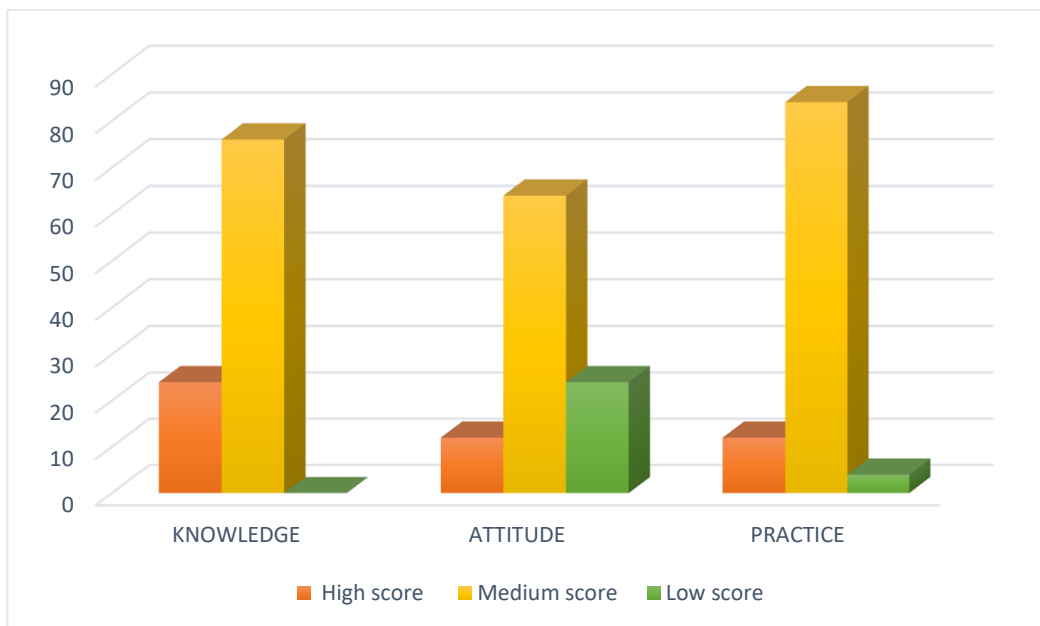


Figure 12. Knowledge, Attitude and Practice of Anganwadi Helper.



## **5.5. Constraints faced by the AWW and AWH**

There are many constraints faced by anganwadi workers and helpers in the anganwadi. Six main problems were given to them and to rate them as most important, important and less important. Less wage was the major problem for 71% of the anganwadi workers and 67% of the anganwadi workers. Unsatisfactory honorarium results in inactive performance of their duties which negatively affects the operational changes in the programs (Bhatnagar and Bhadra, 2015).

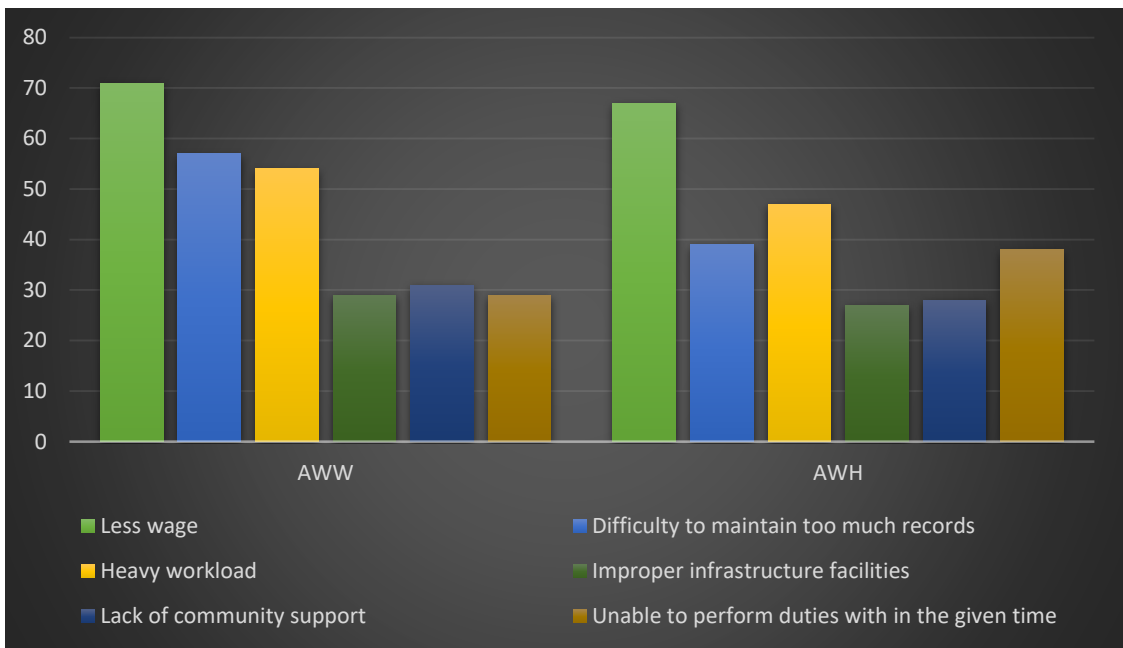
57% of the anganwadi workers find to be difficult in maintaining too much records and 54% experience a feel of heavy work load. In the case of anganwadi helpers 47% have heavy work load especially while the workers goes for surveys in their areas. Similar results were observed by Vijayavardhini and Kumari (2016), and suggest that in order to reduce their work load one more worker or teacher shall be incorporated to share the work.

An investigation study conducted by Choudhary and Sharma (2017) reported that inadequate remuneration is the main problem faced by anganwadi workers followed by work overload and improper infrastructure facilities. Many of them complained about maintenance of too much records because along with that they have to assist other health programs.

Results of a cross sectional study conducted by Asha (2014), shown that job status of anganwadi worker, infrastructure facilities, supervision and proper community support are significant components in the proper and efficient functioning of anganwadi centers.

The study documented that majority of the anganwadi centers are functioning in rented building. Anganwadi workers and helpers are forced to pay the rent. And they are not able to initiate kitchen gardens. According to Chauhan (2015), kitchen gardens have positive impact on the dietary diversity of child. Crop diversity practices will increase dietary diversity.

Figure 13. Constraints faced by AWW and AWH



Due to the limitations of available space only few anganwadi centers have Children's Park along with the anganwadi center. They need to be improved. Because, parks are safe place for children to exert energy, have fun and interact with peers. It provides a learning environment which helps in development of physical, social, emotional and cognitive skills.

Hygienic conditions were also unsatisfactory in many anganwadi centers. Kumar and Satya (2010), reviewed that if there is the lack of basic hygiene, then improved health and quality learning is impossible in anganwadi centers. One of the reasons for the under-five mortality rate is the lack of healthy environment.

If two anganwadi centers are nearby the number of children seem to be more in one and less in another. But in anganwadi centers with less number of children are getting more attention and care from the anganwadi helpers and workers. Children in the anganwadi with greater knowledge have better nutritional status than others. Findings of this study is in accordance with results observed by Vijayavardhini and Kumari (2016) in there study. There is a need to reduce the ratio between teachers and student. According to the number of children there is a need to increase the number of teachers, in order to provide individual attention to all of the children.

There is a need for improvement in the attitude of parents towards anganwadi centers. Anganwadi workers are complaining that only parents are in need of beneficiaries and they don't need to send children to the anganwadi centers. Community participation is essential for the successful functioning of anganwadi children. It is our collective duty to cooperate each other in this social welfare programme. Asha (2014), inferred in her study that community participation and cooperative work with other departments will be helpful in accomplishing the ICDS objectives.

A nation's children are its supremely important asset and the nation's future lies in their proper development. An investment in children is needed an investment in the Nation's Future. A healthy and educated child of today is the active and intelligent child of tomorrow. So they should be well-nourished.

## 6. SUMMARY

The present study entitled **“Impact Assessment of Integrated Child Development Services (ICDS) Programme on Nutritional Status of Children at Trivandrum district”** was conducted with the objectives to study the impact of ICDS programme on Nutritional Status of children attending Anganwadi Centres and to study the effect of Knowledge, Attitude and Practice of Anganwadi staff on nutritional outcome of children.

The impact of ICDS services on the nutritional status of children attending anganwadi of the age group 2-6 years was conducted among selected preschool children, anganwadi workers and helpers by assessing, socio demographic profile of the child, anthropometric methods, and clinical examination, dietary method and the knowledge, attitude and practices of the anganwadi worker and helper toward the ICDS program. Constraints faced by them were also studied.

The present study was conducted in Trivandrum Urban Project II, where it is divided in to five sectors including 175 anganwadi centres. Among the five sectors, sector I and IV was randomly selected for detailed study. Ninety children in the age group of 2- 6 years were purposely selected from the two sectors. Twenty five anganwadi workers and twenty five anganwadi helpers from different anganwadies were randomly selected for assessing their KAP regarding the nutritional out come and child monitoring parameters.

90 mothers of the child (2-6 years) beneficiaries were also interviewed using questionnaire to elicit information on the socio demographic profile and dietary methods. Interview with questionnaire was used to collect information on knowledge and attitude of 25 anganwadi worker and their teaching practices. Another questionnaire was used to elicit information from 25 anganwadi helpers on their knowledge about the roles and responsibilities and practices related to the programme. Constraints faced by anganwadi workers and helpers were also examined.

Socio economic status of 43 male and 47 female children in the age group of 2-6 years was assessed. More number of male child were under the age category of 24-36 months and more female child in age group of both 37-48 months and 49-60 months.

Majority of children were in the Hindu caste. More number of children were living in their own category and are in APL category. Birth weight of children were collected from their mothers and found that 11.60 per cent of male children and 13.00 per cent of female children in the study population were having a lower birth weight. More than half (58.90%) of the mothers of the children were graduate and a large percent of mothers were not working. Majority of children were from the families having a monthly income of less than or equal to 20,000.

Food consumption pattern of the beneficiaries were assessed through the collection of details on the food consumption pattern, frequency of having different food items and the meal timing. Regarding the food habit of the child family 4.40 per cent were vegetarians. Frequency of consumption of different food items by children was assessed. All of the beneficiaries consumes rice, green gram, curry leaves, ground nut coconut and jaggery daily. Green gram, rice, peanut chocolates made of ground nut and jaggery were made and provided to children daily at the anganwadi center. All of them consume wheat flour weekly thrice. Highly perishable food product like fish was consumed by 81.10 per cent daily, 11.10 per cent weekly thrice and 3.30 per cent weekly twice. 86.87 per cent of the children consume tea or coffee daily at their tea time only 13.30 per cent of children does not have the habit of consuming tea or coffee in their diet. Majority of children were having the habit of consuming tea. 63.00 per cent of children never consume amla in their diet. Majority of the population (96.70%) are not concerned with the significance of sprouted pulses and consume never in their diet.

Daily meal pattern of the family were also assessed. 81.00% of the respondents and 22.00 per cent of the respondents have their breakfast before 9am in the morning in working days and holidays respectively. All of the children have their lunch before 1pm since the meal time in anganwadi centres are 12.30pm. The digestive power of an individual is stronger between 12 to 02.00pm. 88.00 per cent of the respondents have their dinner before 9pm in working days and 78.00 per cent in holidays.

Food intake of anganwadi children were found through 24 hour recall method. Mean intake of RDA intake were compared with the actual RDA required to find the deviation from what is needed and what they actually consumes. Results of the mean



intake of children in the age group of 1-3 years reveals that diet is deficient in Vitamin A and iron. While in the age group 4-6 years energy, vitamin A and iron was deficient.

Anthropometric measurements were taken. 80.00 per cent of the study population were having normal weight and height. Majority of the children in the study population were having their BMI ranges less than 5<sup>th</sup> percentiles. It indicates the chance of malnutrition. Majority of children have normal skinfold thickness measurements i.e. greater than 10 mm. While calculating the mid upper arm circumference 3 girls and 2 boys were having moderate malnutrition. 6 children in the study population were having their chest circumference less than head circumference.

In the study population 4.40 per cent of children were suffering dental caries. 2.20 per cent of children have dry and rough skin and 2.20 per cent have wrinkled skin with diminished elasticity. 5.60 per cent of children were having the eating disorder anorexia.

Regarding the prevalence of infections and diseases none of the children were free from viral fever infection and common cold. 4.40 per cent of the children had affected with chicken pox and asthma problems. 64.40 were affected with throat infections. 2.20 per cent of children suffered influenza and typhoid. 58.30 per cent children suffered diarrhea, 5.60 per cent had dysentery, 8.90 per cent had skin infections, 5.60 per cent had eosinophilia, 3.30 per cent had gastric problems and 6.70 per cent were having dental problems. Majority of children were having cough.

Nutritional status of each child was calculated using selected anthropometric measurements and clinical assessment schedule. Mean value for Nutrition Status Index of the 90 children was found as 406.15. 49.00 per cent of children were above the mean values and 51.00 per cent were having less than mean value score as their nutrition status index.

Knowledge and attitude of anganwadi teacher, and their teaching practices adopted for providing preschool education, knowledge of anganwadi helpers on their role and responsibilities, and their attitude and practices towards the beneficiaries, and the constraints faced by both of the groups were assessed through a suitably structured

and pretested questionnaire. 68.00 per cent of the anganwadi workers were having better knowledge on the ICDS programme. Majority of the anganwadi workers had good attitude towards the beneficiaries. Only 12.00 per cent had high score related to their practices in anganwadi centers. It reveals the need for improving the practices of AWW. In the case of anganwadi helpers only 24.00 per cent of them scored high in their awareness on roles and responsibilities. Only 12.00 per cent had good attitude towards children and better practices in the anganwadi centers. It need to be improved for the proper wellbeing of the children.

Less wage was the major problem for 71.00 per cent of the anganwadi workers and 67.00 of the anganwadi workers. Fifty seven per cent of the anganwadi workers find to be difficult in maintaining too much records and 54.00 per cent experience a feel of heavy work load. In the case of anganwadi helpers 47.00 per cent have heavy work load especially while the workers goes for surveys in their areas.

Present study reveals that there is need to improve the dietary pattern of anganwadi children. Malnourished children are not given special attention. Nutritional status of all of the anganwadi children are not satisfactory. Children in the anganwadi with greater knowledge have better nutritional status than others. Anganwadies having lesser number of children are getting more attention than those with more number of children.

The results also reveals that, knowledge of both anganwadi workers and helpers are not as expected according to given training. Kitchen gardens are not present in majority of the anganwadi centers because of the lack of space and absence of owned building. In some anganwadies preschool education is given more emphasis than nutrition of children. Anganwadi staff are faced by many constraints such as less wage mainly, followed by over work load and difficulty in maintaining too many records.

Findings of the present study recommends that there is a need to improve the menu pattern in the anganwadi children. Quantity of items taken and given to children need to be improved, especially for children in the age group of 4-6 years. Anganwadi workers should be made aware of the need to provide special attention to malnourished children. There is need to maintain the ratio of child strength to number of teachers.

Anganwadi workers and helpers need qualified training to improve their knowledge and attitude towards the ICDS programme. Anganwadi centers need to be function in government owned building mainly for initiating kitchen garden, which adds dietary diversity to the diet of children. Honorarium given to anganwadi workers and helpers should be increased to satisfy them. Actually they are doing a herculean task.

A healthy and educated child of today is the active and intelligent child of tomorrow. So they should be well-nourished. It is the duty of the government and every citizen.

“History will judge us by the difference we make in the everyday lives of children”,  
Nelson Mandela

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## APPENDIX I

### QUESTIONNAIRE TO ELICIT INFORMATION ON SOCIO ECONOMIC STATUS OF ANGANWADI CHILDREN IN TRIVANDRUM URBAN PROJECT AREA.

#### 1. Personal Details

Name

Age

Sex

Religion:

Caste:

Ordinal position:

Birth weight

Type of delivery:

Category (APL or BPL)

Educational status of parents

Occupation

Monthly income

Residency : a) Own b) Rented

Type of community you live : a) Urban b) Semi urban c) Rural



Sprouted pulses  Other items								
<b>Green leafy vegetable</b>  Amaranthus Coriander leaves Drumstick leaves Curry leaves Other items								
<b>Other vegetables</b>  Cucumber Lady's finger Plantain green Brinjal Tomato Other items								





<b>Animal foods</b>								
Egg								
Meat								
Fish								
Other items								
<b>Others</b>								
Jaggery								
Tea/coffee								

**C. To assess the daily meal pattern/ timing of the respondents**

Foods	Time on working days	On Holidays
Breakfast		
Lunch		
Tea time		
Dinner		

APPENDIX III

QUESTIONNAIRE TO ELICIT INFORMATION ON THE NUTRITIONAL  
STATUS OF ANGANWADI CHILDREN IN TRIVANDRUM URBAN PROJECT  
AREA

**A. 24 hour recall method to assess the actual food intake of children:**

Meal pattern	Raw quantity of each ingredient(gm)	Total cooked amount(gm)
Early morning		
Breakfast		
Lunch		
Tea time		
Dinner		

**B. Anthropometric measurements**

Name

Weight

Height

BMI

Skin fold thickens

Fat fold thickness

Head Circumference

Chest Circumference

MUAC

Waist to Hip ratio

### **C. Clinical Examination**

#### **NUTRITION ASSESSMENT SCHEDULE (N.A.C.I.C.M.R)**

##### **GENERAL**

1. Appearance:

a) Fair b) Poor c) Very poor

2. Xerosis:

a) Absent, glistening and moist

b) Slightly dry on exposure for a minute, lack of lustre

c) Conjunctiva dry and wrinkled

4. Angular conjunctivitis

a) Present b) Absent

3. Pigmentation:

a) Normal color

b) Slight discoloration

c) Moderate browning

5. Night blindness

a) Present b) Absent

##### **MOUTH**

6. Lips condition:

a) Normal b) Mild angular stomatitis  
but coated c) Marked angular stomatitis

7. Tongue colour

a) Normal b) Pale  
raw

8. Teeth caries

a) Absent b) Slight

##### **HAIR**

9. Condition: a) Normal b) Loss of luster c) Discolored and dry d) Sparse and brittle

##### **SKIN**

10. Appearance:

a) Normal b) Loss of luster c) Dry and rough skin  
Diminished

11. Elasticity:

a) Normal b)

12. Trunk

- a) Normal b) Collar like pigmentation and dermatitis around the neck

OEDAMA

14. Distribution

- a) Absent b) Oedema on dependent parts
- c) Oedema on face and dependent parts

ALIMENTARY SYSTEM

15. Appetite:

- a) Normal b) Anorexia

17. Spleen:

- a) Not palpable c) Palpable

NERVOUS SYSTEM

18. Calf tenderness

- a) Absent b) Present

13. Face:

- a) Normal b) Moon face

16. Liver:

- a) Not palpable
- b) Palpable

BONES

19. Condition

- a) Normal b) Rickets

## APPENDIX IV

### QUESTIONNAIRE TO ACCESS THE KNOWLEDGE, ATTITUDE AND PRACTICE OF ANGANWADI WORKERS IN TRIVANDRUM URBAN PROJECT AREA.

#### A. TO ASSESS THE KNOWLEDGE

1. Specifications of energy (k cal) and protein (gm) for a 1-6 years old child in the programme:
  - a) 300 k cal and 8-10 gm
  - b) 500 k cal and 20-25 gm
  - c) 600 k cal and 16-20 gm
  - d) None of the above
2. A child must receive a total of 9 oral doses of vitamin A by the,
  - a) First birthday
  - b) Third birthday
  - c) Fifth birthday
  - d) None of the above
3. Services provided by ICDS (Tick relevant options)
  - a) Supplementary nutrition
  - b) Immunization
  - c) Health checkups
  - d) Referral services
  - e) Preschool education
  - f) Nutrition and health education
4. Who is an ASHA?
  - a) Accredited Social Health Activists
  - b) Anganwadi Social Health Activist
  - c) None of the above
5. Kishori Shakti Yojana (KSY) is implemented to
  - a) Motivate adolescent girls and their parents and community in general through community programmes
  - b) Motivate pregnant and lactating women through communication programmes
  - c) Motivate preschool children and their parents in general through community programmes
  - d) None of the above
6. What is meant by PPI drives:
  - a) Primary polio immunization
  - b) Pulse polio immunization
  - c) Public polio immunization
  - d) none of the above
7. UDISHA is an ICDS scheme for:
  - a) Adolescent girls
  - b) Pregnant woman
  - c) Lactating mother

8. Recommended dose schedule for vitamin A is as follows

✓ 6 – 11 months - one dose of 100000IU

✓ 1 – 5 years - 200000 IU / 6 month

a) Yes, I agree b) No, it's wrong

9. One big (adult) tablet per day for 100 days (each tablet containing 60mg/100mg of elemental iron and 500 mg folic acid is recommended for

a) Pregnant woman b) Lactating mother c) Preschool child d) Adolescent girl

10. Iron and folic acid tablets are given to a pregnant woman after:

a) The first trimester of pregnancy b) The second trimester of pregnancy c) The third trimester of pregnancy

#### **B. TO ASSESS THE ATTITUDE**

<b>STATEMENTS</b>	<b>YES</b>	<b>NO</b>
1. I enjoy my job at anganwadi		
2. I always try to provide individual attention to all of the beneficiaries;		
3. I am interested to teach children new songs and games;		
4. I am interested in conducting awareness classes to pregnant and lactating woman;		
5. I helps mothers to look after the normal health and nutritional needs of their child:		
6. This is not a job for me, instead I consider it as a service;		
7. I am well aware of the significance of ICDS in the society;		

8. I am healthy enough to look after the children in anganwadi		
9. I am able to do my work on time		
10. I am interested to solve the problems of anganwadi beneficiaries;		
11. I am not having any special considerations to any of the beneficiaries'		
12. I believe that my anganwadi is really useful to the beneficiaries		

### **C. TO ACCESS THE TEACHING PRACTICES**

<b>STATEMENTS</b>	<b>YES</b>	<b>NO</b>
1. Two way interaction method is used for teaching		
2. Whether all of the children interact properly		
3. Do you provide individual attention to the child in non-formal education		
4. Are you adopting effective play way methods according to the priorities		
5. Do you take the help of teaching aids for imparting education to the children		
6. Are you using any indigenous materials like puppets, vegetables, fruits etc		
7. Do you give more emphasis on nutrition than preschool education		

8. Are you able to improve the status of beneficiaries with the available aids		
9. Is the aids provided under anganwadies enough for the development of children		
10. Are you able to use the available aids properly		
11. Are you okay with the available aids to teach child properly		
12. Do you feel to add any new aids		



APPENDIX V

QUESTIONNAIRE TO ACCESS THE KNOWLEDGE, ATTITUDE AND PRACTICE OF ANGANWADI HELPERS IN TRIVANDRUM URBAN PROJECT AREA.

**A. To Access Knowledge of Anganwadi Helper on Their Roles And Responsibilities**

STATEMENT	YES	NO
1. Are you aware of your role in the anganwadi		
2. Do you cook and serve food to children and mothers		
3. Did you clean anganwadi premises daily		
4. Are you able to ensure proper availability of water in your anganwadi		
5. Do you fetch water from somewhere		
6. Do you collect small children from village to anganwadies		
7. Are you able to follow the duties which are entrusted by State government and the local panchayaths from time to time		
8. Do you inform local persons including parents to participate in the meeting organized at anganwadi centre		
9. Are you able to maintain proper cleanliness of children		

10. Do you provide good hygienic atmosphere in the anganwadi		
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**B. To Access the Attitude of Anganwadi Helper**

<b>STATEMENTS</b>	<b>YES</b>	<b>NO</b>
1. I am extremely happy with my job		
2. I am interested to look after the children in the anganwadies		
3. I don't have any special consideration to any of the beneficiaries		
4. I am committed to provide my best services to one and all		
5. This is not a job for me, instead I consider it as a service		
6. I am tired of doing my works		
7. I am irritated with the noise of children		
8. I feel angry if parents are admitting children before 3 years		
9. I feel stress due to the overwork at the anganwadi centres		
10. I am unable to do my work within the actual period of time		

### **C. To Access the Practice Of Anganwadi Helper**

1. I wash my hands properly before making food
  - a) Yes b) No
2. I help in growth monitoring
  - a) Yes b) No
3. We never give raw milk to children
  - a) Yes b) No
4. Food contact surfaces are cleaned before and after cooking
  - a) Yes b) No
5. Vegetables are washed before slicing
  - a) Yes b) No
6. ORS are provided to children strictly during diarrhea
  - a) Yes b) No
7. Is there any initiative for growing kitchen gardens
  - a) Yes b) No
8. Essential ingredients from cereals and pulses are used to make:
  - a) Salt items like upma b) Sweet items like payasam c) Both

APPENDIX VI

QUESTIONNAIRE TO ACCESS THE CONSTRAINTS FACED BY  
ANGANWADI WORKERS AND HELPERS IN TRIVANDRUM URBAN  
PROJECT AREA.

CONSTRAINTS	MI	I	LI
Less wage			
Difficulty to maintain too much records			
Heavy workload			
Improper infrastructure facilities			
Lack of community support			
Unable to perform duties with in the given time			

## APPENDIX VII

Table 29. NUTRITIONAL STATUS INDEX OF ANGANWADI CHILDREN

Sl no.	NSI	Mean value (406.15) SD
1	390	16.15
2	366.8	39.35
3	360.8	45.35
4	369.8	36.35
5	374.93	31.22
6	412.24	-6.09
7	438.86	-32.71
8	377.3	28.85
9	361.97	44.18
10	418.84	-12.69
11	363.5	42.65
12	344.41	61.74
13	323.26	82.89
14	390.2	15.95
15	367.2	38.95
16	373.18	32.97
17	408.76	-2.61
18	391.7	14.45
19	356.8	49.35
20	381.1	25.05
21	377.24	28.91
22	390.91	15.24
23	360.36	45.79
24	386.47	19.68
25	411.84	-5.69
26	418.15	-12
27	313.86	92.29
28	395.07	11.08

29	268.84	137.31
30	370.43	35.72
31	407.09	-0.94
32	419.86	-13.71
33	379.77	26.38
34	332.69	73.46
35	433.06	-26.91
36	384.03	22.12
37	443	-36.85
38	435.1	-28.95
39	405.15	1
40	357.38	48.77
41	316.03	90.12
42	361.53	44.62
43	400.98	5.17
44	429.06	-22.91
45	352.63	53.52
46	439.84	-33.69
47	438.84	-32.69
48	383.54	22.61
49	456.21	-50.06
50	417.9	-11.75
51	404.09	2.06
52	334.77	71.38
53	348.24	57.91
54	380.86	25.29
55	435.62	-29.47
56	382.18	23.97
57	461.42	-55.27
58	427.15	-21
59	377.62	28.53
60	429.58	-23.43
61	425.7	-19.55
62	440.38	-34.23

63	359.15	47
64	413.27	-7.12
65	261.91	144.24
66	482.48	-76.33
67	506.015	-99.865
68	381.27	24.88
69	471.36	-65.21
70	420.8	-14.65
71	473.5	-67.35
72	464.6	-58.45
73	406.3	-0.15
74	439.6	-33.45
75	387.64	18.51
76	366.1	40.05
77	440.93	-34.78
78	387.34	18.81
79	370.27	35.88
80	386.64	19.51
81	507.4	-101.25
82	509	-102.85
83	526.5	-120.35
84	438.6	-32.45
85	489.1	-82.95
86	485.96	-79.81
87	491.16	-85.01
88	532.77	-126.62
89	511.1	-104.95
90	536.28	-130.13

**IMPACT ASSESSMENT OF INTEGRATED CHILD DEVELOPMENT  
SERVICES (ICDS) PROGRAMME ON NUTRITIONAL STATUS OF  
CHILDREN AT TRIVANDRUM DISTRICT**

**By**

**ABHINA. B**

**(2018-16-001)**

**ABSTRACT**

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## ABSTRACT

The project entitled “**Impact Assessment of Integrated Child Development Services (ICDS) programme on nutritional status of children at Trivandrum district**” was carried out at the Department of Community Science, during 2018-2020. The objective of the research was to study the impact of ICDS programme on Nutritional Status of children attending Anganwadi Centres and to study the effect of Knowledge, Attitude and Practice of Anganwadi staff on nutritional outcome of children.

The study was conducted among 90 children in the age group of 2-6 years attending the anganwadies and 25 anganwadi workers and helpers working under the anganwadies. Children in the study population attending anganwadies were classified into 5 age groups under the heading male and female. 35% of the children in the age group of 24-36 months were male children and 32% were female children. In the 37-48 age group 28% were male children and 34% were female children. 28% male children and 34% of female children were included under the age group 49-60 months. In the category of above 60 months that is 5 years only male children were there (9%).

Birth weight of children were collected from their mothers and found that 11.6% of male children and 13% of female children in the study population were having a lower birth weight i.e. less than 2500gm. Majority of children (48.88%) were from the families having a monthly income of less than or equal to 20,000.

Food consumption pattern of the beneficiaries were assessed through the collection of details on the food consumption pattern, frequency of having different food items and the meal timing. 4.4% of the children were vegetarians. Food intake of anganwadi children were found through 24 hour recall method and the nutrients present in their diets were calculated using the Indian food composition table of NIN (2017). The mean intake of children in the age group of 1-3 years are having the required RDA. Protein intake is also more than RDA requirements. But their mean intake shows a serious deficiency in the intake of Vitamin A in their diet. Iron requirement is also less than actual RDA needs. The intake of calorie of children in the age group of 4-6 years

from the diet were less than the actual requirements. The diet was found to be deficient in Vitamin A and Iron.

Anthropometric measurements such as weight, height, skin fold thickness, mid upper arm circumference, head circumference, chest circumference, waist circumference and hip circumference of the anganwadi children was collected. More than 80% anganwadi children are having their required weight and height standards. Head circumference was greater than chest circumference for 7% of children. 52 % of children were having lesser percentile values of BMI than their actual standards. 30% of children have skin fold thickness less than 10 mm. Clinical deficiency symptoms like teeth caries, dry skin, pigmentations in skin and anorexia were found among 4.4%, 2.2%, 2.2% and 5.6% respectively among anganwadi children. Nutritional Status Index of children were calculated. 49% of children were having NSI values above the mean value. Nutrition status index of children were correlated with the variables and found that there is strong correlation between Skin fold thickness (.77), Mid Upper Arm Circumference (.73), Waist Circumference (.76) and Head Circumference (.74).

Knowledge, attitude and practice of anganwadi workers and anganwadi helpers were assessed through structured questionnaire. Scores were given according to their answers. Association of KAP of anganwadi helper and worker were correlated and found that there is no significant difference between the knowledge of anganwadi worker and helper. Anganwadi workers score were more than anganwadi helpers in their attitude and practice score. Children in the anganwadi with greater knowledge have better nutritional status than others. Anganwadies having lesser number of children are getting more attention than those with more number of children.

Findings of the study indicates that Anganwadi workers and mothers should be made aware of the nutritional needs and its significance among children. Knowledge of AWW and AWH should be improved to increase the nutritional status of children by providing better training programmes. Nutrition should be given more importance than preschool education in anganwadies. Children should be provided with better infrastructure facilities for their overall development especially the study kits. Kitchen

garden shall be maintained by all anganwadies in order to make the required vegetables in the anganwadi itself.

A nation's children are its supremely important asset and the nation's future lies in their proper development. An investment in children is needed an investment in the Nation's Future. A healthy and educated child of today is the active and intelligent child of tomorrow. So they should be well-nourished