6.1. **Background**
6.2. **Need for and Significance of the Study**
6.3. **Statement of the Problem**
6.4. **Title**
6.5. **Objectives**
6.6. **Methodology**
6.7. **The Sample**
6.8. **Data Collection**
6.9. **Major Findings**

6.10. **Interventions Implemented**
   6.10.1. Distribution of Iodized Salt
   6.10.2. Intensive Training for Noon Meal Workers
   6.10.3. Awareness Programmes in Villages
   6.10.4. Focus Group Discussion on Child Development

6.11. **Intervention Strategies**
   6.11.1. Nutrition Rehabilitation Centres
   6.11.2. Consumption of Fruits and Vegetables
   6.11.3. Vitamin A Supplementation
   6.11.4. Fortification
   6.11.5. Deworming
   6.11.6. Effectiveness of Programmes
   6.11.7. Enrichment of Noon Meal Scheme
   6.11.8. Dietary Modification and Home Gardens
   6.11.9. Information, Education and Communication (IEC)
   6.11.10. Nutrition Education
   6.11.11. Integrated Assessment
   6.11.12. Nourishing RPS Children with Cognitive and Socio-emotional Development

6.12. **Conclusion**
6.1. Background

Children are the most valuable and precious asset of any nation. The child population of India is the highest in the world. Children’s health needs special attention and minute deficiencies like micronutrient malnutrition create an “iceberg” effect for the nation’s development. According to the UNICEF, India is home to one in three of the world’s malnourished children; nearly half of Indian children are undernourished. Malnutrition retards brain development, the capacity for learning and physical growth. Malnutrition is the largest risk factor in the world, causing disability and premature mortality, especially in developing countries, and is entirely preventable (Food and Nutrition Board, 2003). The vitamins and minerals in the diet constitute the micronutrients, i.e., nutrients below 100 micrograms (μg). Though required in small quantities, these nutrients govern many vital functions connected with metabolism, reproduction, immune mechanism and intelligence. The consequence of micronutrient deficiencies is termed micronutrient malnutrition (Wal, 2000).

6.2. Need for and Significance of the Study

Micronutrient malnutrition has serious impact on child development. Vitamin A deficiency affects children’s eyes resulting in irreversible blindness; anaemia causes stunting and poor learning ability; iodine deficiency causes goiter, cretinism and brain damage; and zinc deficiency contributes to growth failure and susceptibility to infections, and is associated with complications of childbirth. This study investigates the incidence of micronutrient malnutrition among the primary school children. It diagnoses the adverse effect of the micronutrients on the cognitive and socio emotional development. The normal growth of the children and their school particulars has also been examined.

6.3. Statement of the Problem

Poverty, illiteracy, unemployment, unhygienic environment and poor nutrients intake are the causes of malnutrition. Health is the first factor which is affected during these strains. Nutrition is the key to good health. If nutrients are not provided in enough amounts to the body, malnutrition emerges. Carbohydrates, proteins, fat and fatty acids and water help to withstand micronutrient malnutrition, but when the quality and the quantity of macronutrients decreases, there is definite prevalence of micronutrient malnutrition. In rural areas, children are regarded in terms of only whether they get their food but not in terms of its nutrient contents, which affect their overall development. Physical, cognitive and socio emotional developments are the main dimensions which
need special attention with regard to rural primary school children in the age group of 5-9 years.

6.4. Title

“Impact of Micronutrient Malnutrition on Child Development-A Diagnostic Study”

6.5. Objectives

* To assess the micronutrient status among the Rural Primary School Children;
* To study the impact of micronutrients on physical, cognitive and socio emotional development of children;
* To formulate intervention strategies for the elimination of micronutrient malnutrition; and,
* To create an awareness about the availability of micronutrient rich foods, their preparation and consumption of the same

6.6. Methodology

The present research has a 'methodological pluralism' wherein a number of tools and techniques are used to identify the impact of micronutrient malnutrition on child development as the study is diagnostic in nature. Eight schools from five villages of Athoor and Reddiyarchathram Block of Dindigul District, Tamil Nadu, were chosen as the research area and the time framework taken to complete the study was two years and one month. The micro nutrients were taken as the independent variables and the developmental status was taken as the dependent variable. Multistage sampling procedure was used for collecting data.

6.7. The Sample

The universe of the study consisted of rural primary school children of 5-9 years from standard I to standard IV. The sample size was 1500 rural primary school children from whom basic details such as biographical information, developmental stages of RPS children, anthropometric measurements and clinical examination were conducted. There were 52.06 per cent male and 47.93 female respondents. A sub-sample of 1250 RPS children were selected after clinical examination for biochemical analysis of anaemia and further a sample of 30 each were considered for biochemical analysis of iodine and zinc deficiencies. Normal and micronutrient deficient RPS children subgroups were subjected further statistical analysis.
6.8. Data Collection

Anthropometric measurement, cognitive scales, Draw-A-Person Test, rating scales and checklists were used to collect the data on the developmental stages of children. The procedures used to assess their level of micronutrient malnutrition were clinical examination, biochemical analysis and diet survey. Interview schedule, focus group discussion and Participatory Rural Appraisal were also employed for data collection. The data processing was done using the SPSS package and the percentages, frequency distribution, correlation and t-test were the statistical tests used for the analysis.

6.9. Major Findings

**Incidences of Micronutrient Malnutrition**

**Anthropometric Measurement**

- Based on the NCHS standard values the levels of stuntedness and undernourishment of children were assessed. Of the total sample of 1500 RPS children, 47.20 per cent were found severely stunted, 30.86 per cent were moderately stunted and 6 per cent were mildly stunted according to height for age and sex.
- The RPS children were severely (40 per cent), moderately (33.86 per cent) and mildly (17.53 per cent) undernourished, according to weight for age and sex.
- Totally, only 15.93 per cent were normal according to height for age and 8.60 per cent were normal according to weight for age.

**Clinical Examination**

- From the clinical examination, 38.13 per cent of the RPS children were found to have vitamin A deficiency, 35.93 per cent anaemic, 11.33 per cent suffered from iodine deficiency and 6.00 per cent due to zinc deficiency.
- Skin defects were noticed among 21.73 per cent of the RPS children.
- 9.33 per cent had deficiency symptoms in their hair such as dry, thin etc., due to vitamin A deficiency.
- Eye impairment was found among 20.33 per cent due to vitamin A deficiencies.
- Mouth ulcers was reported among 31.13 per cent of the RPS children due to vitamin A deficiencies.
- Two per cent had spoon shaped nails, which is a symptom of severe anaemic condition.
- Goiter symptoms in their neck was observed for 4.93 per cent of RPS children.
• 2.13 per cent had pot belly and 13 per cent had other health hazards.

**Biochemical Analysis**

• The biochemical analysis indicated that 6 per cent of the RPS children were severely, 58.56 per cent moderately and 32.16 per cent mildly affected by anaemia.

○ Of the 30 selected samples for iodine and zinc deficiencies, all the respondents were found to be severely affected by both iodine and zinc deficiencies.

**Diet Survey**

The recall method revealed that 28.40 per cent of the households took food only once a day.

® Rice is the stable food in Tamil Nadu and 58.46 per cent of the RPS children consume only cooked rice and a side dish.

® 7.53 per cent and 62.33 per cent of RPS children respectively eat twice and thrice and 29.53 per cent were vegetarian.

• Nearly 63 per cent of the RPS children consume noon meal daily at school,

® Almost 46.13 per cent were not fed with milk daily but around 60 to 80 per cent reported consuming green leafy vegetables, fruits, eggs etc only occasionally.

• The RPS children did not consume evening tiffin or snacks as per the twenty four hour recall diet survey.

**Developments! Status of RPS Children**

® It is revealed that 8.60 per cent were below normal in vision, 8.13 per cent in hearing impaired and 11.26 per cent with speech disorders.

• RPS children were classified into reading, writing, arithmetic and expression, in which 24.2.6 per cent, 29.60 per cent, 27.33 per cent and 28.13 per cent were found to be ‘below normal’ on these dimensions. 19.20 per cent were inactive and 5.86 per cent wear spectacles.

® 29.40 per cent had learning disorders and 45.93 per cent were reported careless in their studies.

**Cognitive Development**

" 14.46 per cent and 3.04 per cent of standard I RPS children respectively were ‘very poor’ in story telling and rhyme recitation. All the standard I children performed well in outdoor play.
• 15.71 per cent, 20 per cent and 9.42 per cent respectively of standard I RPS children performed poorly in the tests conducted for them.

• 44.18 per cent and 32.24 per cent respectively were ‘poor’ in performance according to WAT conducted for standards III and IV.

• 23.25 per cent and 9.21 per cent respectively scored ‘poor’ in SCT conducted for standards III and IV.

• In the positive components of the Draw-A-Person Test, 72.26 per cent did not perform well and, in the negative components, 23.53 per cent made drawings with weak pencil impression.

• As for the cognitive functions of the RPS children, 33.06 per cent had short-term memory, 38.13 per cent had long-term memory, 30.06 per cent had application of knowledge all ‘below normal’; 6.80 per cent and 5.13 per cent respectively were ‘weak’ in social cognition and student-teacher relationship accordingly to the rating scale scores given by the teachers.

• 25.60 per cent of the RPS children bully other children, one fourth of them bite their nail, nearly 40 per cent cry and 32.86 per cent feel shy, which were reported as emotional problems of the RPS children by their teachers.

As for the behavioural problems, 47.80 per cent were talkative and 25 per cent gossiped.

• 37.73 per cent of the RPS children had a poor attention span and 46.80 per cent were slow learners.

• As for the social development aspects, 8.66 per cent were not friendly and 13.20 per cent did not spot a sense of humour.

• While 22.93 per cent id not take part in cultural programmes and 14.80 per cent failed to take part in sports / games actively,

Association Between Micronutrient Malnutrition and Developmental Status of RPS children

• On the consolidation of incidence of micronutrient malnutrition from the study sample through clinical examination, it was revealed that 38.13 per cent, 35.93 per cent, 11.33 per cent arid 6 per cent respectively were deficient in vitamin A, iron (anaemia), iodine and zinc and the biochemical analysis revealed that 96.72 per cent of the RPS children were anaemic.
While inter-correlating the micronutrient malnutrition, all the micronutrients were found positively correlated which denotes that there is every chance of getting affected by more than one kind of micronutrient malnutrition.

Vitamin A deficiency and anaemia were found to be positively correlated (0.469) and iodine and zinc were also positively correlated (0.618), both the coefficients being significant at 0.01 level.

Comparatively, iodine and zinc were substantially correlated than vitamin A and anaemia.

When compared with height for age and weight for age, 90.95 per cent of those who were stunted were also undernourished among male and 99.33 per cent among female RPS children.

When the height for age and weight for age were compared with the normal and deficient children, the results revealed that when Hb level was normal, the stuntedness was 79.20 per cent but when it was deficient, the stuntedness increased to 92.75 per cent.

As for iodine and zinc, when iodine was normal, stuntedness was 83.45 per cent but, with deficiency it showed 88.82 per cent; for zinc, the corresponding levels of stuntedness were 83.12 per cent and 98.88 per cent respectively among the RPS children.

**Correlation with Clinical Symptoms of Micronutrient Malnutrition**

Clinical deficiencies: Eye (0.314*), hair (0.242*), skin (0.427**), mouth (0.479**) symptoms showed low to moderate correlation to vitamin A deficiency. The results revealed that when there are symptoms in these body parts, there is every chance of getting affected by vitamin A deficiency.

Iodine deficiency showed negligible or no correlation to nail (0.204**) and substantial positive correlation to neck (0.627**) symptoms which was the highest clinical symptom correlation among the deficiencies. (When there is an enlargement of thyroid glands in the neck then it results in goiter, which was one of the major symptoms of iodine deficiency.

Nail (0.124**), neck (0.305**) and abdomen (0.138**) symptoms showed positive correlation to zinc deficiency.
Correlation with Micronutrient Malnutrition and Cognitive Development and Functions

- Child learning disorders and child learning abilities were taken into consideration for measuring the cognitive development of the RPS children.
- Vision and zinc deficiency had negligible negative correlation (-0.056 significant at 0.05 level).
- Cognitive development and cognitive functions showed high positive relationship.
- Short-term memory had a substantial positive relationship with arithmetic (0.670**) and expression (0.651**) and application of knowledge had the high correlation with arithmetic (0.753**) and expression (0.750**).
- Long-term memory had substantial positive correlation with reading (0.610** i m i d writing (0.631**).
- Response and recognition had substantial positive correlation with expression (0.752**).
- Hearing had a low positive correlation with short-term memory (0.294**) and long-term memory (0.214**).
- Speech had a low positive correlation with social cognition (0.287**) and peer group relationship (0.387**).

T-test for Micronutrient Malnutrition and Child Development

- On comparing vitamin A and the developmental status of RPS children, there in a significant difference in the social development of RPS children when there is a deficiency in vitamin A.
- On comparing anaemia and child development, a significant difference was observed in the physical and emotional development among the anaemic prone and normal RPS children.
- On comparing iodine and developmental status of RPS children, there is a significant difference in the social development of iodine normal and deficient children.
- Emotional development has a significant difference on zinc normal and deficient level of RPS children.
6.10. **Interventions** implemented

Planning for children is an integral part of the development process the world over. Recognizing the special needs of children, almost all countries in the world have introduced legislation and have also started a variety of supportive measures to promote their growth and development.

Malnutrition may not always be due to deficiency of food. Almost all researchers agree that malnutrition arises from a common group of adverse social conditions, including poverty, ignorance, poor hygiene, over-crowding and lack of education, parasitic and communicable diseases. Unbalanced diet, unhygienically prepared food, lack of cleanliness, united surroundings, lack of timely medical care are some of the factors that lead to recurrent infections, chronic diseases of liver, bronchial trouble and blindness amongst deprived children. Cumulative nutritional deprivation results in severe malnutrition which interferes with optimal development of cognitive functioning and may have severe implications for learning in later years. Based on the situation analysis, certain possible intervention strategies were adopted and discussed in this section.

6.10.1. **Distribution of Iodized Salt**

The oldest and commonest control measure for Iodine Deficiency Disorders have been fortification of common salt with potassium iodate. As iodine is one among the important micronutrients, to start with, iodized salt was distributed to the selected eight schools to be used in the noon meal centres in order to give a focused importance in the preparation of food. The storage of iodized salt is very important because when it is let open in air, the fortified iodate may get evaporated. Storage methods like keeping the iodized salt in a dry place with the lid of the container closed tightly were informed during the distribution of iodized salt to the adopted rural primary schools and children.

6.10.2. **Intensive Training for Noon Meal Workers**

Including green leafy vegetables daily which are rich in vitamin A and iron can enrich the food value with micronutrients. Fresh vegetables, cutting and washing of vegetables just before cooking, method of cooking, the need for maintaining sanitary condition of the noon meal centre, keeping hygiene regularly, covering the head completely before entering into the kitchen, maintaining and preserving nutrient content by not over cooking were discussed with the noon meal workers during the intensive training conducted to them regularly during field visit to the study area of rural primary schools. Recently, the Government of Tamil Nadu had started issuing two eggs per child
in a week in their noon meal to all government schools. The effective supply of two eggs per week for each child was also enforced to follow in all the schools.

6.10.3. Awareness Programmes in Villages

As a part of the research, an awareness skit on "Micronutrient Malnutrition and its Impact" was prepared. The skill was enacted into a play by the RPS children. They enunciated the importance of micronutrients and their importance in child development. The school teachers as well as the RPS children involved themselves and performed the skit. The villagers also watched it, during the school day programme. This created an impression on their minds of the importance of micronutrients in the diet of their children. An awareness song on micronutrients was also taught to them especially on vegetables, rich in nutrients. Also, while collecting village profile details, the villagers were approached through the PRA method for rapport building. During that time, the importance of micronutrients was explained which was well received by the villagers in the study area.

6.10.4. Focus Group Discussion on Child Development

A focus group discussion was conducted among the parents and school teachers of the RPS children on the developmental status-physical, cognitive and socio-emotional. An enhancing and enabling environment can be created only by the parents and school teachers as almost for everything the children are dependent on them. Parents and teachers are the key role players in molding the children and qualitative improvement can be brought about at home, society and school levels by them. They were urged to provide ample opportunities to the children to develop their cognitive competencies. Encouraging exploration and maintaining stable relationship will help children to be normal socio-emotionally. Infrastructure like playground and enduring surroundings in schools will also nurture them physically. Causative factors that affect child development were discussed during the course of the focus group discussion.

6.11. Intervention Strategies

Starting prevention of micronutrient malnutrition from pregnant and lactating mothers and in breastfeeding, adequate home-based supplements, family support and love will lead to improvement in physical growth, mental development, social competence and academic performance of the child. Hence, nutritional rehabilitation, psycho-social and psychomotor development of the child should begin in infancy and continue throughout. It should at all levels be most important in family, school and community.
Based on the research results, applicable intervention strategies were proposed for a better way of combating micronutrient malnutrition and enhancing the quality of child development. The proposed intervention strategies are described here under:

6.11.1. Nutrition Rehabilitation Centres

Children suffering from moderate degrees of malnutrition are not usually considered ill enough for being treated in hospitals. At present, there are only a few centres for testing such cases. It is, therefore, proposed that Nutritional Rehabilitation Centres can be opened with a professionally qualified nutritionist cum dietician attached to outpatient departments of children's hospitals and MCH (Maternal and Child Healthy centres). The malnourished children attending these centres can be given roasted groundnut, puffed Bengal gram, multivitamin and iron tablets.

6.11.2. Consumption of Fruits and Vegetables

National programmes for prevention of anaemia, vitamin A deficiency and iodine deficiency disorders are being implemented in India for the last three decades. As a result of all these interventions, there has been a substantial reduction in severe grades of undernutrition and associated health hazards in children and some improvement in the nutritional status of all the segments of the population. Although India produces nearly 140 million tonnes of fruits and vegetables and is one of the largest producers, only 7 per cent of it is processed, while, in most of the industrialized countries, 60-70 per cent of the produce is processed. So, India is in need of an ‘Ever-Green Revolution (Swaminathan, 2004). In the present scenario, India is stepping towards a “Golden Revolution” and has made remarkable achievements in the production of horticultural crops, ranking second in both fruits (45.4 million tonnes) and vegetables (90.8 million tonnes). In this era of globalization, where in diet and eating habits are changing rapidly, it is important to understand the bioavailability of nutrients in food. Fruits and vegetables have been termed as functional foods, since they not only fulfill our physiological needs but also have health promoting capacity. They have become ‘star nutrients’. So, consumption of fruits and vegetables has significant health promoting effects and can reduce the incidence of micronutrient malnutrition among rural primary school children.

6.11.3. Vitamin A Supplementation

Vitamin A (retinol) is a fat-soluble compound stored principally in the liver. Six monthly administration of oral vitamin A concentrate to preschoolers, particularly to those aged between 9 months and 3 years, can be given under the supervision of the Medical Officer of the Primary Health Centre (PHC). Vitamin A distribution can be done
with the Universal Immunization Programme (UIP) and Integrated Child Development Service (ICDS), both of which have infrastructure and an in-built system of monitoring and supervision, and cover a very large population of children in the country.

6.11.4. Fortification

Addition of synthetic vitamins and minerals to the staple food such as vitamin A to sugar, iron or vitamins to wheat and corn flour, iodine to salt etc could be done for fortification of daily used foods. The possible methods of food fortification are explained hereunder.

- Salt, being an ideal carrier of micronutrients as it is consumed by all segments of the population, double fortification of salt with iron and additional iodine containing 25 mg iodine per kg salt (as potassium iodide) will prove effective. Fats and oils may serve as good vehicles for vitamin A because vitamin A is fat soluble.
- Powdered milk can be fortified with vitamin C, iron, copper and zinc.
- Intra-muscular injection of iodised oil can be used for tackling goiter and cretinism in rural primary school children.
- Iodised oil can also be given orally, which will be more acceptable than injection.

6.11.5. Deworming

Regular deworming of both mother and children will help prevent micronutrient malnutrition. Acceleration of progress towards prevention, early detection and appropriate management will help combat malnutrition. Despite with good nutritious food, if there are worms inside, the absorption of nutrients in the body will not take place unless deworming is done. During school health checkups, deworming can be advised once in two or three years for the young children in rural primary school as RPS children have more possibility of playing with mud, roadside dirt and so face a high risk of worm infection. As diseases due to infection and infestation by microorganisms and parasites are important factors involved in the causation of micronutrient malnutrition, these adversely affect the health of the rural primary school children. Hence, along with deworming, essential improvements in hygienic and sanitary conditions of the surroundings in the locality is also important.

6.11.6. Effectiveness of Programmes

The following programmes and institutions of India can be made effective in working towards reduction of micronutrient malnutrition. A constant monitoring and
consultancy team should be working for the betterment of the government health programmes.

National Anaemia Prophylaxis Programme (NAPP) to work on distribution of iron folic acid tablets to pregnant and lactating mothers and also to children
Indian Council of Medical Research (ICMR) on releasing constantly on the standardized measurements of human
National Goiter Control Programme (NGCP) working on shifting the fortified salt with iodine from production centres to the common public
Nutrition Foundation of India (NFI) in checking the quality of improvement in the marketing food products
Food and Nutrition Board (FNB) in imparting education and training in nutrition
Indian Council of Agricultural Research (ICAR) in establishing Krishi Vigyan Kendras (KVKs) or Form Science Centers (FSCs) to impart training to farmers in the latest agricultural technologies to improve horticulture production
National Institute of Nutrition (NIN) on clinical and laboratory studies on fortification, dietary diversification and supplementation.
Department of Women and Child Development in initializing new programmes on child development and strengthening the older programmes in new dimensions.
By making these government schemes and programmes more effective, the weaker sections of the society will be benefited and the incidences of micronutrient malnutrition can be reduced to a greater extent.

6.11.7. Enrichment of Noon Meal Scheme

In addition to the noon meal, a refreshment drink at 11.30 am during the interval will be highly encouraging. Every day the drink could be changed. Ragi porridge, carrot juice, mixed vegetable soup etc can be added which will enrich the diet of the rural primary school children to a great extent. The main objective behind the implementation of the Noon Meal Scheme was to increase the enrolment, retention and attendance of students at primary education level particularly students from the poorer sections of the population in rural areas. Now, on the health aspect also, providing the noon meal can be enhanced for betterment of nutrients in the diet.

6.11.8. Dietary Modification and Home Gardens

Dietary modification is required in order to increase the consumption of micronutrient rich foods and it is the safest and most sustainable long-term strategy. Food preferences and taboos of the community need behavioural modifications by
changing attitudes and practices of the rural society, iron, germinated pulse, whole
grams, non-vegetarian foods rich in zinc etc. can be added to the diet. Green leafy
vegetables, yellow/orange fruits and vegetables can be easily cultivated in the home
garden and training in home-scale preservation of fruits and vegetables should be
provided to the rural communities. Production of protective foods such as poultry units
on a cottage scale will encourage village egg production, which can be consumed and
the excess sold.

6.11.9. Information, Education and Communication (IEC)

Field programmes can succeed only when the community is well informed and
educated about the problems of nutrient deficiencies and the measures for their control,
and is motivated to utilize the available resources. This involves the use of the multi-
media approach, adoption of modem techniques of social marketing, development of
messages by formative research, and provision of simple audiovisual tools to the
functionaries. Information, education and communication are an absolute necessity for
control and prevention of any deficiency, especially on unknown hidden deficiencies like
micronutrient malnutrition.

6.11.10. Nutrition Education

Micronutrient malnutrition affects people in general, but its adverse effects are
more pronounced among the vulnerable groups of women and children in rural and
urban areas. Malnutrition is not exclusively due to non-availability of nutritious food but it
is also due to lack of knowledge about the value of foods in relation to the needs of the
individual. Ignorance and superstition play a great role in the rejection of locally available
cheap nutritious food. Food and nutrition problems continue to be formidable and
malnutrition is still one of the crucial problems in the process of development. The
magnitude of malnutrition and the ignorance about the relationship of food to health
among the majority of the population project the need for nutrition education and training
at all levels. Nutrition education in a broad sense is a life long process and it may bring
about changes in knowledge, attitudes and practices of individuals. The intervention
strategy in this context should be mindful of the slogan used by the international food
agencies. This may be paraphrased as “give a child a meal and you realize his
immediate hunger; teach his mother to feed him well and this will benefit him for years”.
It will also help the rest of his family and possibly his neighbors and the wider community
(Cutting, 1975).
6.11.11. Integrated Assessment

Many nutrition programmes in India, though in operation for over two decades, have not had a significant impact on the prevalence of nutrient deficiencies because of the use of a ‘vertical’ approach to control each deficiency, lack of co-ordination between the various implementary departments, resource and manpower constraints, inadequate and irregular supplies, lack of proper orientation and training to the functionaries, poor monitoring and supervision and weak education component. These constraints can be overcome with determination and perseverance and through integrated assessment.

An integrated assessment of the extent and distribution of all the four micronutrient problems should be adopted rather than the current approach of assessing individual deficiencies separately and independently. Assessment of vitamin A deficiency by using Bitot spots as criteria in preschool education, and IDD by the presence of goiter in various stages in 6-12 year old children is recommended. The extent of anaemia can also be assessed during these surveys by the estimation of hemoglobin. A well implemented integrated micronutrient surveillance system can be developed to continuously monitor the situation. Parents’ Awareness Campaign and workshop for school teachers exclusively on micronutrient malnutrition and its impact on child development will help combat both the parameters.

6.11.12. Nourishing RPS Children with Cognitive and Socio emotional Development

Strategies for helping RPS children develop their cognitive competencies are as follows:

- Provide opportunities to develop symbolic thought, so that they will engage in imagination and later end up in a new investigation.
- Apart from rigid paper-pencil exercises, encourage exploration which helps them to mould and innovate creativity in them.
- Become sensitive to the children’s zone of proximal development by monitoring their level of cognitive functioning.
- Early detection on cognition by identifying slow learners, children with poor attention span etc. helps prevent in further complications with the backward RPS children.
- Teachers and parents listening to the child’s emotional problems and giving moral support for avoiding simple mistakes helps them to come out of problems related to emotions.
6.12. Conclusion

Nutrition and national development are interrelated. Sustainable development can be achieved only when there is freedom from hunger and malnutrition, as declared by the Universal Declaration of Human Rights, which advocates a comprehensive, integrated and inter-sectoral strategy for alleviating the multifaceted problem of malnutrition in developing countries and to achieve the optimal state of nutrition for the people. The importance of eliminating micronutrient malnutrition has been recognized in the National Nutrition Policy. It has been observed that micronutrient deficiencies are a major impediment to the health, nutritional status and development of a significant proportion of India's rural primary school children.

In the present research, the intervention strategies were divided into interventions proposed and interventions implemented. In the first section, improvement in the quality of food preparation in houses, improvement in the quality of noon meals, distribution of iodized salt to primary schools, thorough health checkups in schools, treatment for cases with deficiencies, effectiveness of school administration to monitor children's health, etc were discussed and these interventions were implemented in the study villages. Further, on the proposed interventions, certain important points were discussed such as consumption of fruits and vegetables and nutritious; drink, effectiveness of government policies simplifying supplementation and fortification procedures, awareness about micronutrient rich foods that are locally available, compulsory intake of iodized salt, etc. were proposed.