NUTRITIONAL AWARENESS AMONG THE PARTICIPANTS OF NATIONAL NUTRITIONAL ANAEMIA PROPHYLAXIS PROGRAMME

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DECLARATION

I hereby declare that this thesis entitled **"Nutritional awareness among the participants of National Nutritional Anaemia Prophylaxis Programme"** is a bonafide record of research work done by me during the course of research and that the thesis of not previously formed the basis for the award of any degree, diploma, associate ship, fellowship or other similar title of any other University or society.

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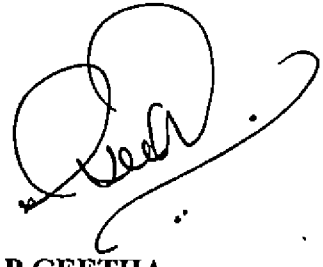

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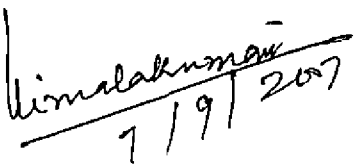

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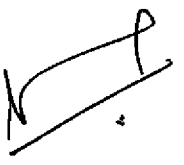

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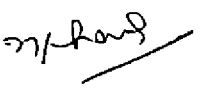

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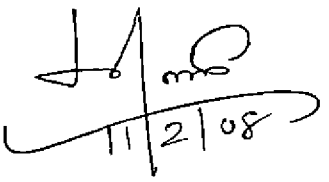

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LIST OF ABBREVIATION USED

ANM	Auxiliary Nurse Midwife
AWC	Anganwadi centre
AWWs	Anganwadi workers
BMI	Body Mass Index
EDTA	Ethylene diamine Tetra Acetic acid
ICDS	Integrated Child Development Services
ICMR	Indian Council of Medical Research
IDA	Iron Deficiency Anaemia
IDD	Iron Deficiency Disorder
JHI	Junior Health Inspector
JPHN	Junior Public Health Nurse
KAP	Knowledge, Attitude, Practice
NCHS	National Centre for Health Statistics
NFHS	National Family Health Survey
NNACP	National Nutritional Anaemia Control Programme
NNAPP	National Nutritional Anaemia Prophylaxis Programme
NNMB	National Nutrition Monitoring Bureau
NSI	Nutritional Status Index
PHC	Primary Health Centre
RDA	Recommended Dietary Allowance

INTRODUCTION

1. INTRODUCTION

Iron deficiency, the wide spread specific nutritional deficiency in the world, affecting about one out of every three inhabitants, is the most prevalent cause of anaemia. While accurate prevalence estimates are difficult to be obtained and periodically revised, all public health and nutrition experts agree that this is an alarming problem. Yet little attention has been paid to its prevention and control compared to other specific micronutrient deficiencies (WHO/UNICEF/UNO, 1998) and anaemia still continues to be a major health problem in the world, especially in the developing countries.

Studies conducted in India have reported alarming number of micronutrient inadequacies particularly nutritional anaemia during the critical period of growth and development. More over National Family Health Survey (2006) has reported that more than three quarters of Indian children under the age of three were anaemic. It has also been observed that there was no significant difference between rural and urban children. Unfortunately children and women of all ages are more susceptible to anaemia than men. Various estimates from all states of the country have indicated that 70-85 per cent infants and young children are anaemic. However the situation in Kerala is slightly better when compared to the other states as the estimates show a low percentage (44 per cent) of incidence of anaemia among infants and young children.

In India anaemia is the second most common cause of maternal deaths. Apart from the risk to the mother it is also responsible for increased incidence of premature births, low birth weight babies and perinatal mortality (Gautam et al., 2004). In preschool children iron deficiency anaemia is a major contributory cause of lowered resistance to infection, poor cognitive development, retardation of physical and mental development, fatigue, lowered physical activity, poor mental concentration and productivity. Iron deficiency and its anaemia steals vitality from the young and

old, and threatens the health of women especially pregnant women. Women of reproductive age need more iron than men because of the super-imposed requirements related to reproduction, menstruation, pregnancy and lactation.

Anaemia occurs when the iron balance in the body is disturbed. Deficient intake of iron or low absorption and bioavailability of iron from foods consumed are the principal causes of anaemia. In addition to dietary factors, conditions resulting in blood loss such as menstruation, helminth infestation (hook worm, round worm) and infections such as malaria wherein there is excessive breakdown of red cells would contribute to anaemia. Poor care of women and children and low status of women and poor environmental sanitation are the underlying causes of iron deficiencies.

Despite of various state, national and international activities to reduce iron deficiency among vulnerable population, the prevalence, seriousness and consequences of anemia continues to exist.

In this context the National Nutritional Anaemia Prophylaxis Programme (NNAPP) launched by the Government of India in 1970 deserves special attention. Through the programme iron and folic acid tablets are distributed to the high risk groups. Apart from the distribution of iron and folic acid supplementation the programme focuses on the following strategies: promotion of regular consumption of foods rich in iron and identification and treatment of severely anaemic cases.

The programme is implemented through the Primary Health Centres (PHC's) and its sub-centres. The multiple purpose workers and other paramedicals working in the Primary Health Centres are responsible for the distribution of iron tablets (adult and paediatric doses) to the beneficiaries. The functionaries of Integrated Child Development Services (ICDS) programme, under the Department of Women and Child Development are expected to assist in the distribution of iron tablets to children and mothers in the ICDS Blocks and also assist in imparting education to mothers on prevention of nutritional anaemia. For effective implementation the programme has been made an integral part of the Child Survival and Safe Mother hood programme

(CSSM) launched in 1992 and later merged with the RCH Programme in 1997. Despite the implementation of the NNAPP over the last 20 years the prevalence of anaemia continues to be high. Though the understanding of the consequences of iron deficiency has advanced significantly among the community the understanding of how to implement interventions, effectively on a large scale is still limited. Hence research in this area demands an utmost priority. Allied to this more effective advocacy and communication on the national importance prevention and control of iron deficiency are urgently required. Various evaluation studies conducted indicate that the prevalence of anaemia may be due to lack of awareness among the target population and poor counseling by health providers among the participants of the programme (Usha et al., 2006)

Hence the present study entitled "Nutritional awareness among the participants of National Nutritional Anaemia Prophylaxis Programme" is proposed with the objective of eliciting information on the existing awareness of the participants of NNAPP from the selected four PHCs of Neyyattinkara taluk of Thiruvananthapuram district, identify the lacunae in their knowledge and to suggest corrective measures through need based education programme and to study its impact.

REVIEW OF LITERATURE

2. REVIEW OF LITERATURE

The literature of the study entitled "Nutritional awareness among the participants of National Nutritional Anaemia Prophylaxis Programme'' is reviewed under the following headings.

2.1 Anaemia and its prevalence

2.2 Aetiology of anaemia

2.3 National Nutritional Anaemia Prophylaxis Programme

2.4 Preventive measures to control iron deficiency anaemia

2.5 Impact studies on Nutrition education programme

2.1 ANAEMIA AND ITS PREVALENCE

Anaemia is a condition, which occur when there is an abnormally low amount of haemoglobin in the blood. Iron deficiency anaemia is considered to be the commonest nutritional deficiencies of the world (Walker, 1998).

WHO (1998) has defined anaemia as a condition in which the haemoglobin content of blood is lower than normal as a result of one or more essential nutrients regardless of the cause of such deficiency.

According to Stoltzfus and Dreyfuss (1998) Iron Deficiency Anaemia (IDA) is typically diagnosed by low heamoglobin, accompanied by biochemical evidence of iron deficiency such as low serum ferritin concentration.

Anaemia in women is mainly due to deficiency of iron and also partly due to deficiency of folates and vitamin B12. (Renu Tyagi, 2000)

Nutritional anaemia is a world wide problem with the highest prevalence in developing countries. It is found especially among women of child bearing age, young children and during pregnancy and lactation. It is estimated to affect nearly two-thirds of pregnant and one-half of non-pregnant women in developing countries. (Park, 1997)

Yip (1997) has stated that an estimated 30 – 60 per cent of children and women of child bearing age in developing countries are anaemic – an indicator for iron deficiency.

WHO (2000) has estimated that about 40 per cent of the world's population suffer from anaemia. The prevalence of anaemia in developing countries is about four times that of developed countries. Current estimates for anaemia in developing and developed countries respectively are: for pregnant women 56 per cent and 18 per cent, school children 53 per cent and 9 per cent, preschool children 42 per cent and 17 per cent, men 33 per cent and 5 per cent.

The WHO has suggested the following classification of countries with respect to the level of public health significance of anaemia a prevalence of <15 per cent is low, 15-40 per cent is medium, and >40 per cent is high. Asia has the highest rates of anaemia in the world. About half of the world's anaemic women live in the Indian sub-continent and 88 per cent of them develop anaemia during pregnancy. (ACC / SCN, 2000).

Iron deficiency anaemia is a significant problem for pregnant mothers in developing countries (IOM, 2001). Increased maternal anaemia is associated with premature delivery, low birth weight, and increased prenatal infant mortality.

Devadas R.P (2001) has reported that anaemia affects 3.5 billion individuals in the developing world or well over two persons out of three. More than 320 million people in India suffer from iron deficiency anaemia with the highest prevalence among women and children. (40 – 80 per cent expectant women. 60 – 70 per cent children and 50 per cent adolescent girls).

According to Allen and Gillespie (2001) have reported that the groups with the highest prevalence of anaemia are: pregnant women and the elderly, about 50 per cent non pregnant women 35 per cent, adolescent's 30-55 per cent and preschool children 25 per cent.

Prevalence of anaemia among middle aged women and the elderly was quite high in developing countries when compared with industrialized countries (Ramakrishnan, 2003).

Vijayaraghavan (2004) has reported that in the developing countries alone 370 million women suffer from IDA. The average prevalence is higher in pregnant women (51per cent) than in the non-pregnant women (41per cent).

Iron deficiency is probably the most common nutritional deficiency disorder in the world. A recent estimate based on WHO criteria indicated that around 600 – 700 million people world over have marked iron deficiency anaemia and the bulk of these people live in developing countries (FAO / WHO 2004).

Iron deficiency anaemia is a major global nutritional problem and is prevalent in 50-80 percent of population in different parts of India (Vijayalakshmi, 2002).

It has been reported that 52 per cent of the women in India have some degree of anaemic, 35 per cent of women are mildly anaemic, and 15 per cent are moderately anaemic. Anaemia is slightly higher for rural women than for urban women. (NFHS, 2005-06).

A study conducted in a rural area of Delhi by Gautam et al (2004) on prevalence of anaemia among pregnant women has revealed that 96.5 per cent were anaemic. Their haemoglobin level was found to be below 11mg/dl.

Bently and Griffith (2004) in a study among middle aged women in Andhra Pradesh, has reported that 80.4per cent of women had mild to moderate anaemia. The report also stated that 52per cent of thin women 50per cent with normal BMI and 41per cent of over weight women and middle aged were anaemic.

The over all prevalence of anaemia was the highest among children in the aged group 12 to 23 months (77.7 per cent) as compared to children in the aged group 6 to 11 months (71.7 per cent) and 24 – 35 months (72 per cent) (Roy et al., 2000).

In a study conducted in KAU by Nirmala (2002) on the haemoglobin levels of the lactating women beneficiaries of Athiyanoor ICDS project it was observed that 55

per cent of them had mild anaemia. It was also observed the diet of the women lacked in iron rich foods and only 61 per cent of the total RDA was met by the respondents.

Study by Shanmuga Priya (2005) in KAU among Anganwadi workers in the Thiruvananthapuram has revealed that 29 per cent of the Anganwadi workers were both mildly and moderately anaemic and 10 per cent were severely anaemic. Only 22 per cent were found to be non anaemic.

Chandran (2005) in her study in KAU on nutritional profile of middle aged women of BPL families has found that 66 per cent of the subjects were having heamoglobin levels below 12g/dl which is an indicator of anaemia.

2.2.1 AETIOLOGY OF ANAEMIA:

There are several causes of anaemia such as nutritional causes and non-nutritional causes. The nutritional causes for anaemia are inadequate intake of iron, inadequate intake of Vitamin B12, inadequate intake of folic acid and malnutrition. The non-nutritional causes for anaemia are hook worm infestation, excessive loss of iron from the body, educational background, ignorance and poverty. (Sulabha, 1999).

Insufficient intake and poor absorption lead to body's running low on iron. In Indian condition since cereals form the major source of iron, poor bioavailability of iron from the habitual diets is an important cause of iron deficiency. Deficient intakes of iron from foods consumed are the principle causes of anaemia (Vir, 2000).

According to Nair (1999) insufficient intake of iron from the predominantly vegetarian diets of most people in developing countries are the primary causes of iron deficiency.

Deficiency of vitamin B12 is observed to result in abnormal haemopoiesis leading to megaloblastic anaemia (Carretti et al., 1998).

In addition to dietary factors conditions resulting in blood loss such as menstruation, helminth infestation (hook worm, round worm) and infections such as malaria wherein there is excessive break down of red blood cells also contribute to anaemia (Vir, 2000).

Infectious disease in particular malaria, helminth infection and other infectious diseases such as tuberculosis and HIV / AIDS are important factors contributing to the high prevalence of anaemia in many populations (Vanden Brock et al., 2000).

During pregnancy there is a continuous drain of iron and this is greater in teenage mothers due to natural increase in blood volume with easy pregnancy and child birth (Antia, 1995).

NFHS (1998-99) revealed that anaemia decreases steadily with increase in the level of educational attainment from 56 per cent among illiterate women to 40 per cent among women who have completed at least high school. The study also revealed that anaemia decreases steadily with increase in the standard of living index from 60 per cent among high status of women to 42 per cent among women who have low standard of living.

Various studies indicate that the high prevalence of iron deficiency is mainly due to low standard of living with a high prevalence of malnutrition, poor environment sanitation, high morbidity among children and unequal distribution of wealth. (Vir, 2000).

2.3 NATIONAL NUTRITIONAL ANAEMIA PROPHYLAXIS PROGRAMME:

Under the National Nutritional Anaemia Prophylaxis Programme of India all the children between 6 months and 12 years of age, all pregnant and lactating women and family planning acceptors are to receive iron (60mg) and folic acid (0.5mg) supplements for a period of 100 days every year. Most South East Asian countries have introduced a national nutritional anaemia control programme that is expected to deliver iron-folic acid tablets to pregnant women from early pregnancy till delivery or beyond (Seshadri et al., 1994).

Following the first national level of evaluation by the Indian Council of Medical Research (ICMR 1989) the Anaemia Prophylaxis Programme was reviewed and the focus of the programme was shifted from only 'Prevention to' 'Prevention

and Control'. The intervention strategy focused on both the provision of supplements and dietary improvement (Vir, 2000).

In the past most programmes to reduce anaemia have been aimed only at women during pregnancy and have involved mainly medicinal iron supplementation, interventions including iron fortification of commonly eaten foods, nutrition education other than during pregnancy are all needed (Michael, 1995).

Most South East Asian countries have introduced a national nutritional anaemia control programme that is expected to deliver iron-folic acid tablets to pregnant women from early pregnancy till delivery or beyond (Seshadri et al., 1994).

In developing countries where the prevalence of iron deficiency is very high and the severity of anaemia is marked studies on the distribution of haemoglobin in different population groups can provide important information that can then be used as a basis for action programmes (Vir, 1994).

The experience with current programmes of iron deficiency control is disappointing as evidenced by the persistent high prevalence of iron deficiency anaemia among vulnerable groups particularly in the developing world. (Viteri, 1998).

For preventing anaemia low iron dosage is adequate. This is the basis of the National Nutritional Anaemia Prophylaxis Programme. However the programme has not been successful due to lack of awareness and realization of the adverse consequences of anaemia in the community and irregular intake by the beneficiaries (Leela and Sharma, 1996).

Agarwal et al (1994) in a study reported that pregnant women who received supplementation through the Anaemia Prophylaxis Programme daily for 100 days showed significant increase in their haemoglobin levels.

An evaluation study on NNAPP conducted by National Institute of Nutrition by Vijayaraghavan et al (1990) in selected areas of Andhra Pradesh revealed that the programme had not achieved the objective with which it was initiated. The main

weakness of the programme was observed to be poor coverage, inadequate consumption by the beneficiaries and above all lack of effective health education. The study suggested the urgent need to strengthen the above components of the programme through proper measures.

Another study on NNACP (National Nutritional Anaemia Control Programme) conducted by Usha et al (2006) in selected areas of Dharwad taluk of Karnataka revealed that the iron and folic acid tablets were not distributed regularly by the ANMS and 10 per cent subject did not receive any tablets even once. The tablets supplied were not regularly consumed due to the side effects and blind beliefs. There is a need for nutrition education to enhance the iron intake through tablets and iron rich foods.

National Family Health Survey (2005-06) has revealed that only 43.2 per cent pregnant women from the target group had received the full dosage of IFA tablets and 56.8 per cent women received not even a single tablet, due to inadequate supply of IFA tablet and lack of compliance by functionaries to their work protocol.

A study conducted at Uttar Pradesh by Nigam (1996) revealed that only 2.3 per cent women had received the full dosage of IFA tablets the findings indicate that 36.9 per cent women had made no antenatal care visits while 50.7 per cent women received not even a single tablet. Poor quality and irregular supply of IFA tablets remains major constraint in implementation of the programme.

Nutrition Foundation of India (1998) has investigated the demand and supply of micronutrient supplements in two districts of Madhya Pradesh. The investigation observed that only 56.4 per cent pregnant women had received IFA tablets and 13.5 per cent received correct full recommended dose of 100 tablets. Even after receipt of IFA tablets a few beneficiaries did not consume them, due to blind beliefs and side effects.

In a study conducted by ICMR only 33 percent of pregnant women reported to have consumed more than 50 tablets. (ICMR, 1995)

The National Nutritional Anaemia control programme emphasizes promotion of regular consumption of foods rich in iron. Provision of iron and folate supplements in the form of tablets to the high risk groups, identification and treatment of severely anaemic cases (Kumar, 1999).

In Mumbai a large majority of pregnant women attend centers for antenatal care, and iron and folic acid tablets are provided for daily prophylaxis against nutritional anaemia as an integral part of maternal and child health activities in the Indian Family Welfare programme. It is recommended that women take 100 tablets of iron and folic acid during pregnancy and health workers are instructed accordingly (NFHS, 1998-99).

2.4 PREVENTIVE MEASURES TO CONTROL IRON DEFICIENCY ANAEMIA:

One of the low cost and easy to adopt interventions to reduce the prevalence of anaemia is dietary modification. Modifying peoples diet may involve imparting new knowledge and changing attitudes and practices of individuals, especially behavioural modification. The three recommended modifications are increasing the intake of haemoglobin iron, usually from meat although this may not be economically or culturally acceptable, increasing the intake of vitamin C along with foods which promote iron absorption and reducing the intake of inhibitors of iron absorption (e.g. Tannin in coffee and tea, phytates in legumes, some cereals and polyphenols) (UN, 1991).

Studies undertaken in Baroda by Seshadri et al (1994) have revealed that children who consume green leafy vegetables frequently (once a week or more often) tend to have higher haemoglobin levels than those who are infrequent or non consumers.

Daily supplementation of guava fruit with the two major meals to young anaemic women resulted in significant risk in heamoglobin of 2.2g/dl while the unsupplemented subjects group showed a small non significant risk of 0.3g/dl (Kannan and Agarwal, 1997).

Promoting household level food processing methods such as fermentation, germination, malting which increases iron absorption by lowering phytic acid or tannin or both (Chaudhury and Vir, 1994).

Dietary iron may be considered as being composed of two distinct pools haem iron and non-haem iron. Haem iron is highly available (20 per cent to 30 per cent absorbed) and is found in cereals, pulses, fruits, vegetables and dairy products and comprises the major source of dietary iron. Absorption of non-haem iron is highly variable (1 per cent to 40 per cent) depending on enhancing and inhibiting factors (Annaverster et al., 1995).

Iron is present in foods in two forms as haem iron which is derived from flesh foods (meat and fish) and as non-haem iron which is the inorganic form present in plant foods such as legumes, grains, nuts and vegetables (Hallberg et al., 1997).

Several dietary factors have been identified which positively or negatively influenced the absorption of the dietary iron (Hallberg and Hulthen, 2000). The absorption of non haem iron from a meal depends upon the net effect of factors enhancing iron absorption (ascorbic acid and organic acid, meat, chicken, fish and other sea food fermented vegetables, fermented soya sauces) and factors inhibiting iron absorption (phytates and polyphenols, calcium, soy proteins and vegetable proteins, tannins) (FAO / WHO, 2004).

Calcium consumed as a salt or in dairy products interferes significantly with the absorption of both haem and non-haem iron. However calcium is an essential nutrient it cannot be considered to be an inhibitor of iron absorption in the same meal (Gleerup et al., 1995).

Hallberg et al (1997) has observed that one consequence of consuming more calcium especially at meal time or with multi vitamin or mineral supplements is an inhibition approximately by half of iron absorption.

The simple addition of certain spices (e.g. Oregano) to a meal or the intake of a cup of tea with a meal may reduce the bio availability by one half or more (FAO / WHO, 2004).

Sufficient amounts of ascorbic acid can counteract this inhibition. In contrast, non-phytate containing dietary fibre components has almost no influence on iron absorption (Siegenberg, 1995).

Ascorbic acid is the most potent enhancer of non-haem iron absorption synthetic vitamin C increases the absorption of iron to the same extent as the native ascorbic acids in fruits, vegetables and juices. The effect of ascorbic acid on iron absorption is so marked and essential that this effect could be considered as one of vitamin C physiological roles. (FAO / WHO, 2004).

The addition of certain vegetables or fruits containing ascorbic acid may double or even triple iron absorption depending on the other properties of the meal and the amounts of ascorbic acid present (FAO / WHO, 2004)

Fruits and vegetables enhancing iron bioavailability by their vitamin C content are sometimes consumed in rather large quantities but vitamin C intake is largely seasonal and a sufficient amount must be provided for the enhancing effect to be produced (Hallberg, 1997).

Minerals such as iron and zinc are found in low amounts in cereal and tuber based diets. The addition of legumes slightly improves the iron content of such diets. However the bioavailability of this non-haem iron source is low. Therefore it is not possible to meet the recommended levels of iron in the staple based diets through a food based approach unless some meat or fish is included (FAO / WHO, 2004).

Food fortification approach is accepted as sustainable under most conditions and is often cost effective on a large scale when successfully implemented. Both iron fortification of wheat flour and iodine fortification of wheat flour and iodine fortification strategies that have produced excellent results. (Lotfi et al., 1996)

Food fortification with iron is recommended when dietary iron is insufficient or the dietary iron is of poor bioavailability which is the reality for most people in the developing world and for vulnerable population groups in the developed world. Moreover the prevalence of iron deficiency and anaemia in vegetarians and in populations of the developing world which rely on cereal or tuber foods is significantly higher than in omnivorous populations (FAO / WHO, 2004).

Staple foods around the world provide predominantly non-haem iron sources of low bioavailability the traditionally eaten staple foods represent an excellent vehicle for iron fortification. Examples of foods that have been fortified are wheat flour, corn flour, rich, salt, sugar, cookies, curry powder, fish sauce and soya sauce (Hallberg, 1997).

Of all of the strategies used to deliver additional iron to human's food fortification has the greatest potential to improve the iron status of the largest number of people. Refined cereals are iron-fortified in many developed countries (Manner, 2001).

In an efficacy trial 5mg of iron sodium EDTA per day was consumed as a soy sauce fortificant. It is significantly improved heamoglobin status. Double fortified salt fortified with both iron and iodine has been developed in Canada. The potassium iodine is encapsulated with dextrin to prevent it from interacting with the ferrous fumarate. The iron and iodine in the salt are both well absorbed. (Zlotkin, 1999).

FAO / WHO expert committee on food additives (1999) fortification with sodium iron (EDTA) enhances the absorption of iron and reduces the iron binding to phytic acid.

The National Institute of Nutrition in India has also developed iron and iodine fortified salt. The effectiveness of the salt was tested in school children and increases in heamoglobin and urinary iodine excretion were observed (Nair et al., 1998).

In an efficacy trial in Ghana iron and other micronutrients were added to "weanimix" (a cereal-legume blend) promoted by the government and by UNICEF. Infants almost all of whom were partially breast fed were given the foods between 6 and 12 months of age. Two levels of electrolytic iron were added (about 300mg/kg and 120mg/day) to cover the needs of those consuming smaller and larger amounts of the food respectively. Unfortified weanimix was used as a control. The foods were supplied weekly to the mothers, free of charge and feeding three times per day was encouraged. Many other vitamins and minerals were added including vitamin C (at 780 or 390mg/kg). The prevalence of low ferritin concentrations increased from 19per cent at 6 months to 55per cent at 12 months in the unfortified group but fell during this time from 18per cent to 11per cent for those receiving the fortified weanimix. (Lartey et al., 1999).

In 1993 the government started a national fortification programme in which precooked maize and wheat flour which together provided 45per cent of the daily energy of the low income population were enriched with 20mg and 50mg iron per kg respectively. Both flours contained added thiamine, riboflavin and niacin and the maize flour was also enriched with vitamin A, by 1994, the prevalence of anaemia in children age 7 to 15 years in Caracas had dropped from 19 to 9per cent and iron deficiency from 37 to 16per cent (Layrisse et al., 1996)

Other examples of national iron fortification programmes include, wheat and maize flour fortification in Chile, wheat fortification in Srilanka, iron fortification of noodles in Thailand and Indonesia and a national programme of fortification of maize flour with iron and zinc in Mexico which is seen as an appropriate strategy now that a larger proportion of the population lives in urban areas and purchases commercially produced tortillas and flour (Walter et al., 2001).

Uma devi and Parvatham (2006) the study clearly demonstrates the beneficial effects of 'Double fortified salt' in improving the iodine-iron status of the selected

groups and salt fortification would be the most effective means of addressing IDD and IDA at the community level.

Wheat flours and breakfast cereals are the most commonly fortified foods but maize flour and milk are also fortified in some developing countries. For wheat iron is most often added in an amount that restores the iron lost during milling (milling removes about two-third of the natural iron content of a cereal) or to enrich the flour. (INACG\WHO\UNICEF, 1998)

Iron fortification of food is generally considered to be the best long-term strategy to increase iron intake and has been reported to contribute to iron intake among those consuming fortified foods in developing countries, where it has been practiced for many years (Samuelson et al., 2005).

Several intervention studies carried out among pregnant women have shown that supplements of iron and folic acid consumed regularly for two months to four months during second half of pregnancy can sufficiently increase the haemoglobin level and reduce the prevalence of anaemia (ICMR, 1992).

Kavitha (1999) in her study had found that iron and vitamin supplementation either in the form of tablets or in the form of supplementary foods have profound effect on haemotological and biochemical indices related to iron nutritional status and growth and physical endurance of anaemic adolescent girls.

For universally reaching the pregnant mothers as well other beneficiaries, other modes of delivery system (women's group, youth groups, schools, factories, private sectors) must be considered. An alternative mechanism such as social marketing of IFA tablets could be launched, especially in urban sectors; such an innovative approach is currently being experimented in Delhi region by an NGO in collaboration with the state government and UNICEF. (PSS, 1998).

In a healthcare programme of matlab, Bangladesh that delivered iron supplements to pregnant and post partum women resulted in significant decrease in

the prevalence of anaemia an estimated reduction of 62 per cent (Stolzfus et al., 1997).

At the recent National Anaemia consultation it was recommended to provide 20mg elemental iron and 100µg folic acid in syrup form for universal coverage of children in the age group 6-24 months. The strategy recommends provision of two bottles of IFA Syrup (containing 100ml/100 doses each) to mothers. (MOHFW, 1998).

A study conducted by Mehta and Dodd (2001) concluded that higher doses of iron supplementation bring about better improvement in maternal haemoglobin. Maternal serum iron levels do not show linear relationship to the level of iron supplementation.

The WHO recommends that all pregnant women be supplemented with 60mg iron daily in a pill that also usually contains 400mg folic acid (Stoltzfus et al., 1998). This is the recommendation in most of the developing and many industrialized countries.

Iron supplementation trials that compared the efficacy of iron given daily or weekly concluded that daily supplementation was most effective for preventing anaemia especially severe anaemia during pregnancy (Beaton et al., 1999).

Haemoglobin and iron status improved with iron doses up to 60mg/day and supplementation of iron were more effective than short term larger doses (Mahomed, 1998).

In Bangladeshi pregnant women haemoglobin response per 60mg iron tablet was the same whether the dose was taken daily or weekly. Most of the Hb response was produced by the first 20 tablets and haemoglobin plateaued after 40 tablets (Ekstrom, 2001).

In Finland and Niger iron supplements during pregnancy increased maternal stores for 6 months post partum compared to controls. This could reduce the risk of anaemia during lactation and in a subsequent pregnancy (Preziosi et al., 1997).

In Indonesia, a home-based weekly supplement was effective for increasing Hb concentration and reducing anaemia from 37 per cent to 16 per cent .The supplements were 30mg iron given to children age 2 to 5 years once a week, by their mothers (Palupi, 1997).

If the prevalence of anaemia less than 40 per cent, the duration of supplementation should be from six months until 12 months of age for infants of normal birth weights and from two months until 12 months for low birth weights infants (12.5mg elemental iron plus 50g folic acid daily).If the prevalence is greater than 40 per cent all children should be daily until 18 months of age. (INACG\WHO\UNICEF, 1998)

A placebo-controlled trial on pre-school children in Vietnam (Thu et al., 1999) concluded that consumption of the iron supplement once a week would be sufficient to reduce anaemia and to improve vitamin A and zinc status.

In areas where hook worm, malaria and other conditions causing anaemia are known to be important public health problem, the prevalence of iron deficiency can be assumed and interventions to prevent and control these diseases should be integrated with those to address iron deficiency. However, the presence of any of these public health problems does not require a modified approach to the prevention of iron deficiency. (INACG\WHO\UNICEF, 1998)

Behavioral changes such as better faeces disposal and the wearing of shoes can also help eliminate hookworm infection as a public health problem. Deworming as an isolated programme is often difficult to promote and seldom has a high priority among health officials. It is believed that integrating helminth control in to iron deficiency anaemia prevention and control programmes can generate stronger support for such efforts. (Yip, 1997).

The recent INACG\WHO\UNICEF supplementation guidelines include recommendations for intestinal parasite control complementary to iron supplementation for pregnant women, children 6-24 months and other population

groups. They include a recommendation that where hook worms are endemic (prevalence more than20 percent), there should be universal antihelminthic treatment at least annually to children more than five years of age and adults as an important complement to supplementation and other programmes to reduce iron deficiency anaemia (Stoltzfus and Dreyfuss, 1998).

Iron deficiency anaemia is prevalent in most areas of the world where malaria transmission is endemic. There has been concern expressed about the interactions between iron status and malarial infections that have, in some cases constrained development of programmes to prevent and control iron deficiency anaemia (INACG, 1998).

In developing countries where blood transmitted diseases, such as HIV\AIDS or hepatitis is public health problems, the blood supply is often contaminated. Prevention of anaemia is likely to reduce the need for blood transfusions and therefore the risk of infection transmission. (Vanden Brock et al, .2000).

2.5 IMPACT STUDIES ON NUTRITION EDUCATION PROGRAMME:

In a study conducted by Razeena (2000) it has been proven that the actual impact of educational programme was the adoption of the gained knowledge and it was found that teaching had significance effect on the adoption of practices.

Cicil Mary (2000) in her study reported that the impact of educational programme had significant positive role at all levels in terms of nutritional knowledge gained and change in attitude towards consumption of mushroom.

Mishra et al (2003) in a study has found that only a few women had rudimentary knowledge about nutrition, which could help the family to consume a low cost balanced diet. Impact of nutrition education programme assessed through survey revealed remarkable improvement in the dietary habits of women. It was a welcome change to note that the frequency of using soya bean in daily preparation had increased with nutrition education.

It was observed by Yegammai et al (2002) in a study conducted at the pre and post natal nutrition education to the mothers created much awareness on the feeding practices of the infants in the experimental group than the control group.

Kumar et al (2003) has reported that the study concluded the video film was an effective material for imparting nutrition education pertaining to vitamin A to middle school children which resulted in improving their knowledge.

Hemalatha (2002) in her study reported that nutrition knowledge assessment showed positive impact on education programme. She has concluded that nutrition education programme can be used as one of the effective tools to bring about dietary changes and there by nutritional status in the society.

The results of the Nutrition Education Programme imparted to a group of rural women by Deshpande and Bargale (2006) indicated that the women in the study area improved their dietary habits after the participation in the nutrition education programme. Analysis carried out for observing the frequency of soya based food intake before and after the education programme indicated that the intake is increased in the daily diet.

The study on impact of nutrition education and carbohydrate supplementation on performance of high school football players by Meti and Saraswathy (2006) has revealed that the nutrition education and carbohydrate supplementation help the players to improve their performance as revealed by nutrition knowledge and practice. The study has also revealed that the nutrition education has improved the overall intake of food stuffs and carbohydrate intake.

The study conducted at Ludhiana on the impact of nutrition education on nutrition knowledge of the parents of obese children by Sangha et al (2006) it was observed that significant difference was found in the scores of pre-test and post test of nutrition education of the parents.

Geetanjali et al (2006) in her study has revealed that there is a paucity of nutrition education intervention among Indian sports men. There is sports specific

variation in the food fads and practices indicating the strong influence of coaches, peers and tradition.)

(An evaluation of impact of nutrition councelling through pre and post test of KAP at risk coronary heart disease subject revealed a significant improvement in stores in the knowledge, attitude and practice among the subject. Retention studies revealed that the subject desirable practices for preparing food after the period of 2 month (Kaur & Chawla., 2006).

Cereal-based diets in India have high content of inhibitors and low concentration of enhancers. Promoting appropriate dietary habits through effective nutrition education have been reported to have a positive impact on reducing IDA in Indonesia (ICN, 1992) and in improving haemoglobin levels in India.

Knowledge, attitudes and practice (KAP) studies undertaken in 3 states of India (Orissa, Kerala, Madhya Pradesh) clearly indicate that the basic practices with reference to eating behaviour during pregnancy and childhood itself are incorrect and there is serious lack of awareness of appropriate dietary practices (MODE, 1996).

The KAP study undertaken in semi urban Delhi, as a part of the social marketing study revealed that about 30per cent health providers (Doctors, ANMS) were well informed regarding the dosage to be provided to pregnant mothers (PSS, 1998).)

MATERIALS AND METHODS

3. MATERIALS AND METHODS

The study entitled "Nutritional awareness among the participants of the National Nutritional Anaemia Prophylaxis Programme" was conducted among the participants of the programme to improve their nutritional awareness by means of an educational intervention. The impact of the educational programme was evaluated by the changes in the KAP of the participants. A general description of the methodology followed in the conduct of the study is presented in this chapter under the following subheads.

3.1 Locale of the study

3.2 Selection of the respondents

3.3 Conduct of the study

3.4 Statistical analysis

3.1 LOCALE OF THE STUDY

The study was conducted in Neyyattinkara Taluk of Thiruvananthapuram district, which was purposively selected as the area covers a cross section of the population. Since the National Nutritional Anaemia Prophylaxis Programme (NNAPP) is being mainly implemented through Primary Health Centers (PHC), four PHCs were selected (Viz-Pallichal, Vizhinjam, Balaramapuram and Pozhiyoor) for the study at random from the 18 PHCs functioning in Neyyattinkara taluk.

3.2 SELECTION OF THE RESPONDENTS

Twenty five women participants who were either mother beneficiaries (Pregnant or lactating mothers) or mothers of child beneficiaries of the National Nutritional Anaemia Prophylaxis Programme were identified from each of the four selected Primary Health Centres. Thus a total of 100 participants which included 30 pregnant women, 35 lactating mothers and 35 mothers of preschool children formed the respondents of the study.

The term "beneficiary" in the study refers to pregnant women, lactating mothers, and children below six years. The term "Participant" in the study refers

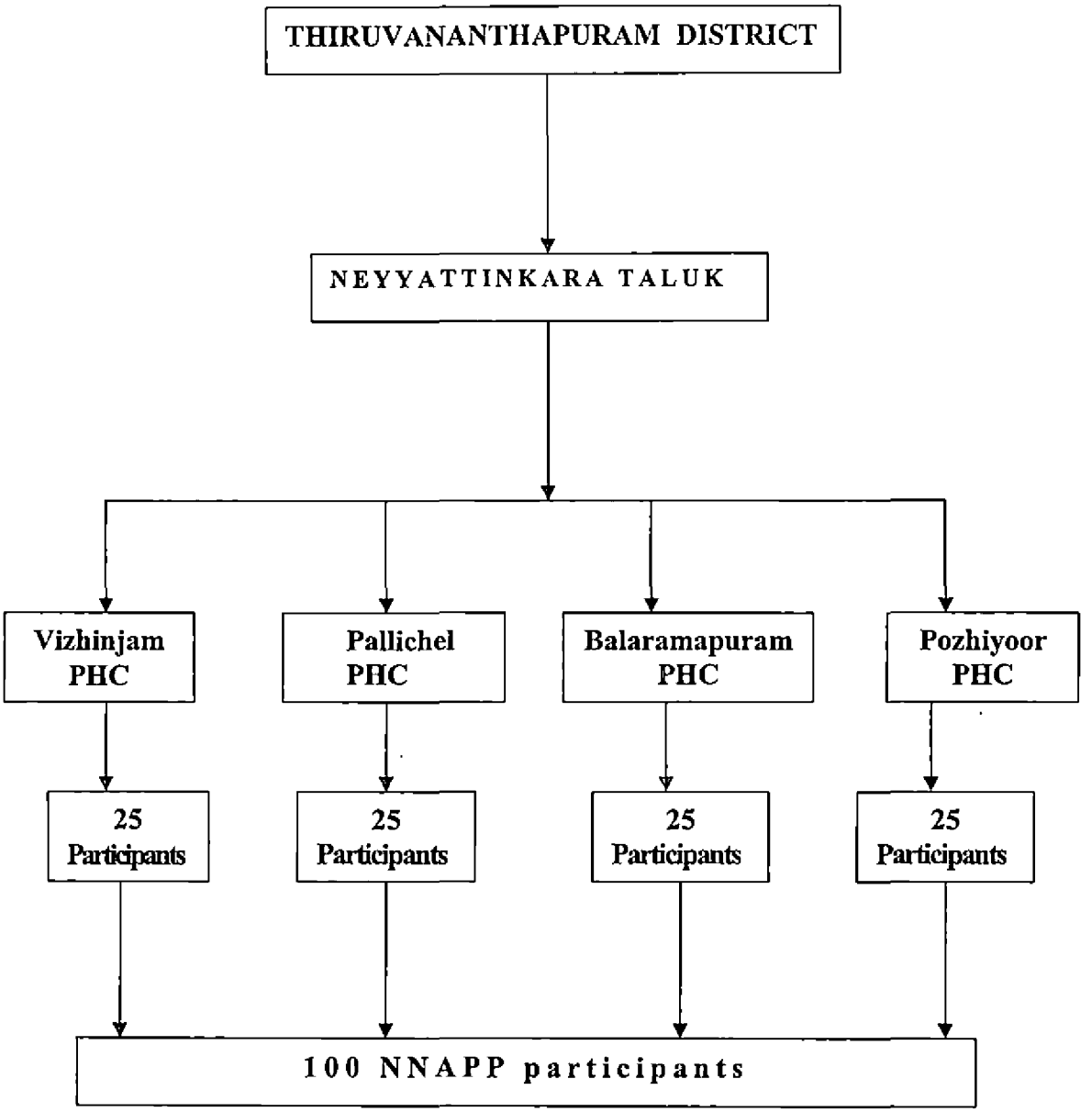


Fig.1 Flow chart showing Selection of participants

pregnant women, lactating mothers, and mothers of child beneficiaries as they are exposed for the intervention.

3.3 CONDUCT OF THE STUDY

For the conduct of the study the selected PHCs were visited. The participants were selected from the registers maintained in the PHCs and the list was finalised in consultation with the PHC officials. The selection of participants is illustrated in Fig (1).The respondents were interviewed with the heip of structured schedules.

The conduct of the study is presented under the following headings.

1. Elicitation of the personal and socio economic characteristics of the participants
2. Assessment of nutritional profile of the beneficiaries through
    1) Anthropometric measurements
    2) Haemoglobin estimation and
    3) 24hours food recall
3. Assessment of the extent of participation of the participants/beneficiaries in the NNAPP by eliciting information regarding their a) participation in the educational activities related to the programme at the PHC, b) liaison with field level functionaries and c) regularity in the consumption of iron and folic acid supplements by an inventory for one month.
4. Assessment of the existing awareness of the participants about NNAPP through knowledge, attitude and practice studies.
5. Formulation of the education programme
6. Conduct of Nutrition education programme
7. Evaluation of the programme

3.3.1 Personal and socio economic characteristics of the participants

Information on age, religion, type and size of the family, family composition, family income and educational status of the participants and the family members, the social participation and the mass media exposure of the participants were elicited using a standardized interview schedule. Details on Physical facilities of

their household of the participants were also elicited. Scores were assigned and sum of scores was found out for arriving at educational status of the family members. Schedule used for the purpose is given in Appendix (I).

3.3.1 Assessment of nutritional profile of the beneficiaries

3.3.2.1 *Anthropometric measurement*

Nutritional anthropometry is measurement of human body at various ages and levels of nutritional status, which provides information on the nutritional status of individuals. The following anthropometric measurements were taken

3.3.2.1.1 Height

The height of individual is influenced both by genetic and environmental factors. Height is affected only by long-term nutritional deprivation and it is considered as index of chronic or long duration malnutrition. (Sri Lakshmi, 2003).

In the present study height of the 100 beneficiaries was measured using a stadio meter. The beneficiary was asked to stand erect looking straight with heels, buttocks, shoulders and back of the head upright. The head was held erect with the arms hanging at the side in a natural manner. The moving headpiece of the stadio meter was lowered to rest flat on the top of the head and the measurement was taken. Height was read to the nearest 0.5 cm. An average of three measurements was recorded as the height of the beneficiary.

3.3.2.1.2 Weight

Body weight is the most widely used sensitive and simplest reproducible anthropometric measurement. It indicates the body mass and is a composite of all body constituents like water, mineral, fat, protein and bone. It reflects more recent nutrition (Sri Lakshmi, 2003).

For ascertaining the weight of the beneficiary a platform- weighing balance was used, as it was portable and convenient to use in the field. The weighing scale was adjusted to zero before taking each measurement. The beneficiary was asked to stand on the platform of the scale with the slippers removed without touching

anything and looking straight ahead. The weight was recorded to the nearest 0.25 kg. Each reading was taken thrice and the average was taken as the actual weight.

3.3.2.1.3 Computation of body mass index

Body Mass Index (BMI) of the mother beneficiaries were computed using the weight and height measurements. Body mass index of the participants was computed using the formula

BMI = Weight (kg)/Height (m2)

Based on the BMI the respondents were graded following the procedure cited by (Bamji et al., 2003).

This index was worked out as an indicator of general obesity which also gives the magnitude of protein calorie malnutrition as observed by (WHO, 1998).

3.3.2.1.4 Comparison of weight for height of the child beneficiaries with the standard

With regard to the child beneficiaries weight for height was compared using the weight for age and height for age. For this standard developed by National Center for Health Statistics (NCHS) was used as reference.

Weight for height is reported to be a good prognostic indicator, particularly of severe malnutrition. It has often been considered as a good index for the evaluation of current nutritional status, as reported by Rao and Vijayaraghavan (1996). The data on weight for height was further used to amplify the effect of malnutrition on the overall nutritional status of the children, as per the categorization suggested by Water low (1987). Using this classification children with low weight for height was categorized as 'Wasted' and those with height deficit were labeled as 'Stunted'.

3.3.2.2 *Haemoglobin estimation*

In the present study haemoglobin was estimated in order to assess the extent of iron deficiency among the beneficiaries.

Park and Park (1991) have stated that hemoglobin level is a useful index of the overall state of nutrition irrespective of its significance in anaemia. The

hemoglobin level of 100 beneficiaries was estimated by cyanmethaemoglobin method. The procedure is given in Appendix (X). Based on the haemoglobin level the subjects were classified into different categories indicating the severity of iron deficiency anaemia, as specified by WHO (2001).

3.3.2.3 ***Measurement of food intake by recall method***

In order to collect information on the dietary intake of the beneficiaries the 24hour recall method was used. The dietary intakes were assessed in terms of cooked food with the help of 'standardized cups' suited to local conditions. The individuals interviewed were asked a systematic series of questions to ensure recollection and description of all food and drink consumed during the past 24 hours. The schedule used for recording the food intake is presented under Appendix (II). From the food intake data nutrient intake was calculated.

3.3.2.4 ***Developing Nutritional status Index***

Nutritional Status Index (NSI) of all the beneficiaries was computed individually using the parameters such as height, weight, haemoglobin level and energy intake of the beneficiaries.The intake of iron and folic acid was also taken as one of the parameters for assessing the NSI. Since the study was conducted among the beneficiaries of the National Nutritional Anaemia Prophylaxis Programme. The formula of NSI developed for

$$NSI_j = \frac{\sum_{f=1}^{k} w_i X_{ij}}{\sum_{i=1}^{n} w_i}$$

$$w_i = \frac{1}{s_i^2}$$

s_i^2 =Varience of the i^{th} variables

Xij i =1,2,.....n n =no of variables

j =1,2.....k k =no of respondents

3.3.3 Extent of participation of beneficiaries in the NNAPP

Extent of participation of NNAPP in the beneficiaries/participants was operationalised as their involvement in the programme at the primary health center level. It was assessed by asking certain relevant questions to the participants. Further a scale was constructed to assess the participation of the beneficiaries. For this the following activities which involves the participation of the beneficiaries/participants were taken in to account

a) liaison with field level functionaries for which the frequency of their participation was assessed by marking on a three point continuum of "never", "occasionally" and "always" for which scores were assigned as 0,1,and 2 respectively.

b) Participation in the educational activities related to the programme at the primary health centre level during the previous three months which was assessed from the frequency of their participation in various programmes organised at the PHC level and were categorized under the heading always, occasionally and never. When they attended almost all the programmes (above 80 per cent) it is treated as "always" and if they attended less programmes (below 80 per cent) it is entered under "occasionally" and if they never attended any it is entered under "never".

c) Monitoring the regularity in the consumption of iron and folic acid supplements by the beneficiaries for one month. The regularity in the consumption of IFA tablets (item c) which was assessed by marking on three point continuum of partially irregular (those who consume >15days a month), irregular (those who consume <15 days) and never (those who never consume at all) for which scores were assigned as 2, 1 and 0 respectively. Individual scores were summated to get the total score of each subject and the participation index was calculated using the formula

$$\text{Participation index} = \frac{\text{Total participation score}}{\text{Maximum score possible}} \times 100$$

Based on mean and standard deviation of the participation index, the participants/beneficiaries were classified into three groups as those having high level of participation, medium level of participation and low level of participation.

The constraints faced by the participants/ beneficiaries in participating in the programme were also documented.

3.3.4 Awareness of the participants about NNAPP

Awareness of the participants about NNAPP was elicited through Knowledge, Attitude and Practice studies.

Knowledge of the participants about the need of NNAPP was measured using a suitably structured and pre tested checklist.

The attitude of the participants towards NNAPP was measured using an attitude scale specially designed for the purpose following the summated rating technique suggested by Likert (1932).

The existing dietary practice of the participants with reference to the frequency of use of iron rich foods and iron enhancers were measured by adopting Reaburn's method (1979).

3.3.5 Formulation of the education programme

Based on the existing knowledge, attitude and practice gathered the lacunae in the knowledge, attitude and practice was ascertained and a need based education programme was formulated. The schedule followed is given in Appendix (IV).

3.3.6 Conduct of Nutrition education programme

Based on the existing knowledge, attitude and practice of the participants, obtained from the survey, education modules were prepared. Accordingly three topics were formulated viz 1) Anaemia and its prevalence 2) Role of iron and dietary modification 3) Anaemia Prophylaxis Programme objectives. Education module was formulated after review of related literature and consultation with experts in the field. The modules were comprised of lecture cum discussion classes with adequate support of suitable visual aids such as charts, posters, flashcards and flannel graph which

Plate 1. Conduct of Education Classes

Plate 2. Haemoglobin assessment

Plate 3. Measurement of body weight

were prepared specially for the education programme. A folder on anaemia and its prevention through NNAPP was prepared in local regional language (Malayalam) and this was distributed among all the participants (Appendix -XVI).

For the conduct of the education programme the selected 100 participants were grouped in to four clusters. Each group consisted of 25 participants. The date, time and venue for conducting the education programme in each group were finalized in consultation with the groups to suit their convenience.

While handling the classes, care was also taken to see that the audience could get a clear view of the visual aids used. To enable this, there was a time gap between the presentations. The education programme began with a self introduction by the participant, building up a rapport. Familiar communication strategies were applied during the education programme.

3.4 EVALUATION OF THE EDUCATION PROGRAMME

One of the main objectives of the study was to improve the nutritional awareness of the participants of the NNAPP through a need based education programme. Hence the impact of education programme with respect to gain in knowledge, change in attitude and adoption of better practices by the participants after the education programme was assessed.

3.4.1 Gain in knowledge

For the measurement of gain in knowledge a simple teacher made test was used following the procedure adopted by sheela (2004) with necessary modifications.

A total of 50 statements on various aspects related to the programme and its components were prepared through literature review and discussion with experts in the field. These statements were a mixture of positive and negative statements. The final list of statements was arrived at after a pilot study conducted among a non-participant group. Twenty statements were finally selected for the purpose of the study. The checklist is presented in Appendix (V). The test was administered to the

participants before the education programme and immediately after the education programme.

The responses were collected in a dichotomous pattern (Yes or No). Each correct response was given a score of one and the incorrect response was given a score of zero. The total score of each respondent was obtained by summing up the correct responses. The possible score of this test ranged from a minimum of zero to a maximum of twenty. The knowledge test was administered to the respondents

1. Before the education programme (Pre test-Ko)
2. Immediately after the education programme (Post test-K1)

The difference is the knowledge score of the respondents between the pre test and post test indicated a measure of gain in knowledge. Percentage gain in knowledge was computed using the formula

$$\text{Percentage gain in knowledge} = \frac{K1-K0}{K} \times 100$$

Where

K0 – Pre test knowledge score

K1 –Posttest knowledge score (immediately after the training).

K –Maximum score

3.4.2 Change in attitude

Thurston (1946) defined attitude as the degree of positive or negative effect associated with some psychological object towards which people can differ in varying degrees.

Results of research and experience of extension scientists and workers indicated that the attitude that an individual holds towards an innovation exercise significant influence on his /her accepting or rejecting that innovation (Prema et al 1990).

The change in attitude of the participants about NNAPP was measured using an attitude scale following the summated rating technique suggested by Likert (1932).

For this a total of 45 statements on various aspects related to the programme and its components were prepared through literature review. Responses for each item were obtained in a five-point scale ranging from strongly agree to strongly disagree. The scores assigned were strongly agree-4, Agree-3, Undecided -2, Disagree-1, Strongly Disagree-0.Negative statement were scored in the reverse manner. The final list of statements was arrived at after a pilot study conducted among a non participant group 19 statements was selected. Care was taken to see that the statements were worded to express positive and negative attitudes. The attitude score of the respondent were obtained by adding up the score corresponding to the response for each statement. The attitude scale is appended in Appendix (VI). The test was administered to the participants before the education programme and immediately after the education programme.

Change in attitude was computed using the formula $= \frac{A1-A0}{A} \times 100$

Where

A0- Pre test score

A1-Post test score

A –Maximum score

3.4.3 Extent of adoption

For the measurement of the level of adoption of dietary practices of the beneficiaries with reference to the frequency of use of iron rich foods/iron enhancers, food use frequency scores were calculated based on the frequency of use of iron rich foods/iron enhancers following the method suggested by Reaburn et al, (1979) as given below

$$\text{Percentage of total score} = \frac{R_1S_1 + R_2S_2 \ldots\ldots + R_nS_n}{n}$$

S_n = scale of rating given for frequency of use of food

R_n= percentage of beneficiaries coming under each frequency group

n= Maximum scale rating.

The extent of adoption of better dietary practices was assessed based on the changes in the frequency scores 15 days after the education programme.

3.5 STATISTICAL ANALYSIS

The statistical analysis such as frequency and percentage, mean, standard deviation, correlation analysis and paired't' test were used.

RESULTS

4. RESULTS

The results of the present study entitled "Nutritional Awareness among the participants of National Nutritioal Anaemia Prophylaxis Programme" are presented under the following heads

4.1 Personal and Socioeconomic characteristics of the participants

4.2 Nutritional Status of the beneficiaries

4.3 Level of participation of the participants in the National Nutritional Anaemia Prophylaxis Programme.

4.4 Situational analysis of the participants of National Nutritional Anaemia Prophylaxis Programme

4.5 Impact of education programme on variation in knowledge, attitude and practices of the participants

4.6 Correlation between the knowledge and attitude of the participants with the selected independent variables.

4.7 Comparison of the knowledge, attitude and practice scores of the participants.

4.1. PERSONAL AND SOCIOECONOMIC CHARACTERSTICS OF THE PARTICPANTS

Personal and socioeconomic characteristics of the selected 100 participants which included 30 pregnant mothers, 35 lactating mothers, and 35 mothers of preschool children were assessed in order to elicit information regarding their age, religion, type of family, family size, family income educational status of the participants and family member, their mass media exposure and their extent of social participation. Details on the physical amenities in their house hold were also elicited. The distribution of the participants based on their personal and socioeconomic characteristics is shown in Table I, II, III and IV

4.1.1 Age of the Participants

Table 1 shows that among the participants surveyed, 4 per cent belonged to the age group of below 20 years, 36 per cent were in the age group of 21-25

years, 48 per cent of participants belonged to the age group of 26-30 years, and 12 per cent of the participants were above 30 years of age.

4.1.2 Religion

Religion plays a dominant role in the process of socialization and it helps to maintain the stability of social system and social relationships. Table 1 depicts the religion wise distribution of the participants. Majority of the participants (59 per cent) were Hindus, while 30 per cent belonged to Christian community and remaining 11 per cent were Muslims.

Table 1. Percentage distribution of participants based on their personal and socioeconomic characteristics (n=100)

SI. No	Variables	Category	Percentage of Participants
1.	Age of Participants	<20 years	4
		21-25 years	36
		26-30 years	48
		>30 years	12
2.	Religion	Hindu	59
		Christian	30
		Muslim	11
3.	Type of family	Joint	38
		Nuclear	62
4.	Family size	Small (1-4 member)	67
		Medium (5-8 member)	32
		Large (>8 member)	1
5.	Educational status of the participants	Illiterate	5
		Lower primary	30
		Upper primary	35
		High school	24
		College	6
6.	Educational status of the family members	Low	14
		Medium	70
		High	16
7.	Family income	<Rs 5000	75
		Rs 5001-10000	22
		>Rs 10000	3

4.1.3 Type of family

Majority (62 per cent) of the participants belonged to nuclear families and the remaining 38 per cent hailed from joint families.

4.1.4 Family size

Table 1 indicated that majority (67 per cent) of the participants belonged to small family category with 1 to 4 members. Thirty two per cent of the participants belonged to the medium sized families with 5 to 8 members and only 1 per cent had more than 8 members in the family.

4.1.5 Educational Status of the Participants

With respect to educational status it was found that out of the 100 participants selected, only 5 per cent were illiterates, 30 per cent had lower primary level education, 35 per cent had upper primary level of education, and 24 per cent had high school level and the remaining six per cent were having college level education.

4.1.6 Educational Status of the family members

Family educational status was ascertained to find out the status of education of the different family members other than children below 5 years of age. Table 1 depicts that majority (70 per cent) of the families had "medium" level of education. While 16 per cent had "high" level education and the remaining 14 per cent had "low" level education.

4.1.7 Family income

From Table 1 it can be seen that a great majority of the participants (75 per cent) were having a family income below Rs 5000 per month, While 22 per cent were having a family income in the range Rs 5001-Rs 10000 the remaining 3 per cent were having a family income above Rs 10000.

4.1.8 Mass media exposure

Table 2. Percentage distribution of the participants based on Mass media exposure

Mass media	Percentage of the participants				
	Daily	Twice or more in a week	Once in a fortnight	Once in a month	Never
Radio	33	43	2	-	22
Television	83	2	9	1	5
Newspaper	14	1	13	24	48

It can be observed from Table 2 that the participants ere exposed to different types of media like radio, television and newspaper. Table also shows that television was watched by 83 per cent of the participants daily. Radio was listened to 33 per cent on a daily basis and 43 per cent listened to radio twice or more in a week, Newspapers were read daily by 14 per cent of the participants.

4.1.9 Social participation

Table 3. Percentage distribution of the participants based on their social participation

Social participation	Percentage of the participants
As member	72
As office bearer	3
No member	25

From Table 3 it can be seen that with respect to social participation majority of the participants (72 per cent) functioned as members, while only 3 per cent functioned as office bearers of social organizations, and 25 per cent of the participants did not have membership in any of the social organizations.

4.1.8 Physical amenities at the house hold level

Table 4 depicts the physical amenities at the house hold level of the respondents. It has been revealed that 78 per cent had own housing facilities whereas 22 per cent resided in rented houses.

With regard to type of roofing in their houses 21 per cent had terraced roofing, 40 per cent had tiled roofing, 34 per cent had sheeted roofing and only five per cent had thatched roofing.

Regarding the type of wall, 51 per cent of the participants had brick walls, two per cent had mud walls, 45 per cent had raw brick, and the remaining two per cent had semi permant walls made of plaited coconut palw leaves.

It was also noted that nine per cent of the participants had flooring with tiles in their houses. Seventy per cent of the participants had cement flooring and

the remaining 21 per cent had mud flooring coated with cow dung. It is evident from Table 4 that 22 per cent of the participants had kitchen + 2 rooms, 54 per cent had kitchen + 3 rooms, 19 per cent had kitchen + 4 rooms, and only 5 per cent had above 5 rooms in their houses.

Table 4. Percentage distributions of the participants based on their total physical facility at the household level

(n=100)

SI. No.	Physical facilities	Category	Percentage of participants
1.	Nature of house	Own	78
		Rented	22
2.	Type of roofing	Terraced	21
		Tiled	40
		Sheeted	34
		Thatched	5
3.	Type of wall	Brick	51
		Mud	4
		Raw brick	45
		Coconut leaves	2
4.	Type of flooring	Tiles	9
		Cement	70
		Cow dung	21
5.	Number of room	Kitchen + 2 rooms	22
		Kitchen + 3 rooms	54
		Kitchen + 4 rooms	19
		Kitchen +5 rooms	5
6.	Laterine facility	Yes	61
		No	39
7.	Drinking water	Well	45
		Pipe	65
8.	Fuel used for cooking	Gas	38
		Kerosene & fire wood	5
		Fire wood	57

It was also found that 61 per cent of the participants had their own toilet facilities, where as 39 per cent had no toilet facilities and they depended either on facilities provided by the panchayat or used the open grounds for the purpose.

Majority of the participants (45 per cent) used well water for drinking purpose. The remaining 55 per cent used tap water as their water source.

Table 4 also shows that 38 per cent of the participants used gas as fuel for cooking purpose, 57 per cent used firewood as fuel where as the remaining five per cent used kerosene along with fire wood for cooking and none used firewood alone as a source of fuel.

4.2 NUTRTIONAL STATUS OF THE BENEFICIARIES

The nutritional status of the participants was assessed using anthropometry, biochemical parameters and nutrient intake.

4.2.1 Anthropometric measurements

In the present study anthropometric measurements recorded were weight and height of the beneficiaries. The body mass index of the mother beneficiaries is given in the Appendix (VIII).

Table 5. Percentage distribution of the mother beneficiaries (pregnant and lactating mothers) based on their BMI

BMI classification*	Pregnant women		Lactating mothers	
	No=30	Percentage	No=35	Percentage
<16 CED Grade III (Serve)	Nil	Nil	1	2.85
16.1-17 CED Grade II (Moderate)	2	6.6	3	8.60
17.1-18.5 CED Grade I (Mild)	2	6.6	5	14.30
18.5-20.0 (Low weight, Normal)	5	16.8	4	11.40
20.0-25.0 (Normal)	15	50.0	17	48.60
25.0-30.0 (obese – Grade I)	6	20.0	5	14.30
Total	30	100.0	35	100.00

*Source: Bamji et al., 2003

Body Mass Index of the mother beneficiaries (pregnant and lactating) was computed in order to classify them according to different categories like chronic energy deficit, normal and obese. Table 5 reveals that 20 per cent of the pregnant mothers and 14.3 per cent of the lactating mothers were 'obese grade I'. Fifty percent of pregnant mothers and 48.6 per cent of the lactating mothers belonged to the category of 'normal'. The pregnant mothers belonged to the category of low weight – normal were 16.8 per cent and lactating mothers 11.4 per cent, and those belonging to the class chronic energy deficit Grade I was

observed among 6.6 per cent of pregnant mothers and 14.3 per cent of lactating mothers. Chronic Energy deficit Grade II was found in 6.6 per cent of pregnant mothers and 8.6 per cent of the lactating mothers. Only 2.85 per cent of the lactating mothers were found to be in Chronic Energy Deficit Grade III

Table 6 Percentage distribution of child beneficiaries (Preschool children) based on classification suggested by Water low (1987)

Classification*	Preschool children (35)		Total in Percentage
	Boys	Girls	
Normal	5 (28)	6 (35)	11 (31)
Stunting	10 (55)	7 (41)	17 (49)
Stunting and wasting	3 (17)	4 (24)	7 (20)
Total	18 (100)	17 (100)	35 (100)

*Source: Bamji et al., 2003

The data presented in the Table 6 revealed that only 28 per cent of boys were normal. Among girls, 35 per cent were normal. Stunting was observed among 55 per cent of boys and 41 per cent of girls, which revealed that there was height deficit, which is an indication of previous events of malnutrition. It may also be noted that 17 per cent of boys and 24 per cent of girls had stunting along with wasting which indicates chronic malnutrition. The actual height and weight of the child beneficiaries is given in the Appendix (IX).

The result of the study as inferred from the above table also revealed that only 11 per cent preschool children were found to be 'normal' with respect to their weight/ height ratio. None of them had wasting grade.

4.2.2 Haemoglobin estimation

The biochemical assessment was conducted by estimating the hemoglobin level of the beneficiaries. Table 7 shows the distribution of beneficiaries based their hemoglobin level. The haemoglobin level of the beneficiaries is presented in Appendix (XI).Cut off used for defining a different degree of anaemia is presented in Appendix (XII).

Table 7 Percentage distribution of the beneficiaries based on their haemoglobin level

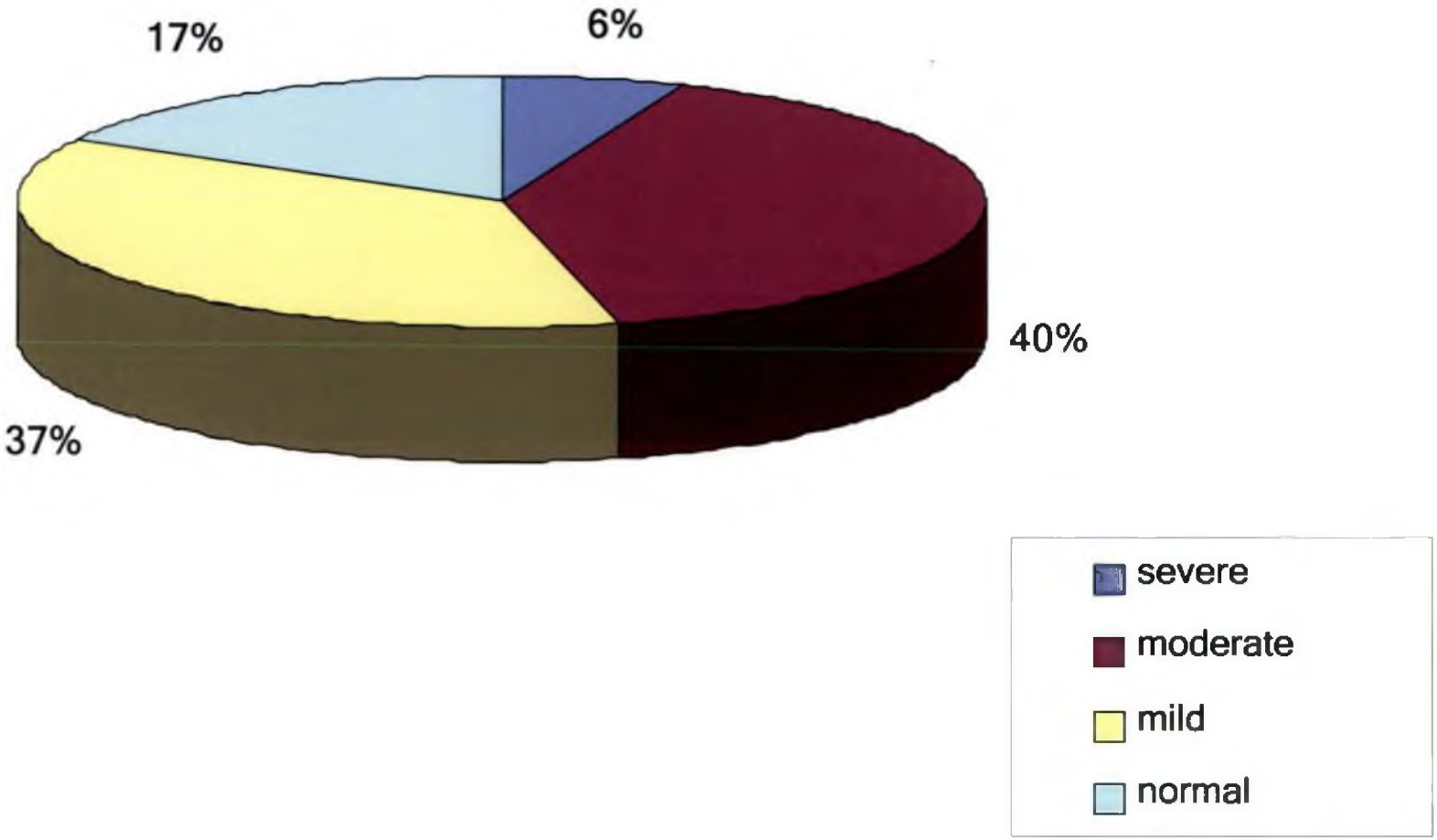
Haemoglobin Level (gm / dl) *	Percentage distribution of beneficiaries			Total in percentage
	Pregnant mothers (30)	Lactating mothers (35)	Preschool children (35)	
Severe	3 (10)	2 (6)	1 (3)	6
Moderate	15 (50)	14 (40)	11 (31)	40
Mild	10 (33)	12 (34)	15 (43)	37
Normal	2 (7)	7 (20)	8 (23)	17
Total	30 (100)	35 (100)	35 (100)	100

*Source: WHO (2001)

From Table 7 it can be seen that 50 per cent of the pregnant mothers and 40 per cent of the lactating mothers and 31 per cent of the preschool children were moderately anaemic. Thirty three per cent of the pregnant mothers, 34 per cent of the lactating mothers and 43 per cent of the preschool children were mildly anaemic. In this study only seven percent of the pregnant mothers, 20 per cent of lactating mothers and 23 per cent of preschool children were found to be non anaemic. However 10 per cent of the pregnant mothers, six percent of lactating mothers and three percent of the preschool children were severely anaemic.

On the whole six percent of the beneficiaries were found to be severely anaemic,while 40 per cent were moderately anaemic, 37 per cent were mildly anaemic and the remaining 17 per cent were found to be non anaemic,when all the three categories of beneficiaries were examined for anaemia on the basis of their haemoglobin levels.

Fig 2 Haemoglobin level of the beneficiaries



4.2.3 Mean food intake of the beneficiaries

Table 8. Distribution of beneficiaries (Pregnant mothers) based on their mean food intake

Food items	Mean food intake	RDA*	Percentage RDA met	Percentage RDA deficit/excess
Cereals	400	300	133	+33
Pulses	46	70	66	-44
Green leafy vegetables	23	100	23	-77
Roots and tubers	47	75	63	-37
Other vegetables	53	75	71	-29
Fruits	46	110	42	-58
Fats and oils	20	40	50	-50
Milk and milk products	200	450	44	-66
Sugar and jaggery	26	30	87	-13
Meat and fish	40	85	47	-53

*Source: ICMR, 1989

The actual quantity of food intake of the beneficiaries was determined and compared with the RDA and is presented in Table 8. Intake of cereals, pulses, roots and tubers were 66 and 63 per cent respectively of RDA. Percentage of RDA met by the consumption of other vegetables and green leafy vegetables about 71 and 23 per cent respectively. Fruit intake met about 42 per cent of RDA, while consumption of milk and milk products met only 44 per cent of RDA. Percentage of RDA met by sugar was 87 per cent and oil consumption met around 50 per cent. Meat and fish intake met about 35 per cent of RDA. On the whole deficit intake was observed in all the food items except cereals in the diet of pregnant women.

Table 9. Distribution of beneficiaries (lactating mothers) based on their mean food intake

Food items	Mean food intake	RDA*	Percentage RDA met	Percentage RDA deficit/excess
Cereals	430	400	108	+8
Pulses	46	50	92	-8
Green leafy vegetables	20	100	20	-80
Roots and tubers	48	75	64	-36
Other vegetables	52	75	69	-31
Fruits	42	110	38	-62
Fats and oils	26	60	43	-57
Milk and milk products	210	550	38	-62
Sugar and jaggery	28	50	56	-44
Meat and fish	45	100	45	-55

*Source: ICMR, 1989

From Table 9 it can be seen that among the various food items consumed by the lactating mothers, the intake of cereals, pulses, roots and tubers, were 92 and 64 per cent respectively of RDA. Percentage of RDA met by the consumption of other vegetables and green leafy vegetables about 69 and 20 per cent respectively. Fruit intake met about 38 per cent of RDA. While consumption of milk and milk products met 38 per cent of RDA.Percentage of RDA met by sugar was 56 per cent and oil consumption met around 43 per cent. Meat and fish intake met about 45 per cent of RDA.On the whole deficit intake was observed in all the food items except cereals in the diet of lactating mothers.

Table 10. Distribution of beneficiaries (Preschool children) based on their mean food intake

Food items	Mean food intake	RDA*	Percentage RDA met	Percentage RDA deficit/excess
Cereals	205	170	120	+20
Pulses	40	50	80	-20
Green leafy vegetables	30	75	40	-60
Roots and tubers	25	50	50	-50
Other vegetables	20	50	40	-60
Fruits	40	100	40	-60
Fats and oils	15	25	60	-40
Milk and milk products	200	400	50	-50
Sugar and jaggery	25	40	62	-38
Meat and fish	25	50	50	-50

*Source: ICMR, 1989

The actual quantity of food intake of the preschool children was determined and compared with the RDA and is presented in Table 10. Intake of pulses was 80 per cent of RDA met. Roots and tubers, meat and fish were 50 per cent of RDA met. There was a percentage of RDA shows of 40 per cent in green leafy vegetables when compared with RDA, only 40 per cent of RDA was recorded for other vegetables. While the per centage of RDA met cereals, fats and oils, milk and milk products and sugars were 60, 50 and 62 per cent respectively. However it was noticed that the consumption of cereals was more than the requirement suggested by ICMR (1989).

4.2.3 Mean nutrient intake of the beneficiaries

Table 11. Mean nutrient intake of pregnant mothers

Nutrients	Mean intake	RDA*	Percentage RDA met	Percentage RDA deficit/excess
Energy (kcal)	2424	2525	96	-4
Protein (g)	52	65	80	-20
Calcium (mg)	930	1000	93	-7
Iron (mg)	20	38	54	-46
Vitamin C(mg)	38	40	96	-4
Vitamin B_{12} (µg)	0.84	1	84	-16
Folic Acid (µg)	156	400	39	-61

*Source: ICMR, 1989

Table 11 depicts the mean nutrient intake of the pregnant mothers, which was compared with that of the recommended allowances for pregnant women engaged in moderate activity as suggested by ICMR 1989.

From Table 11 it can be observed that the mean energy intake of the pregnant mothers was 2424 kcals, which was found to meet about 96 per cent of their recommended allowance. The mean protein intake was 52 gm, which was 20 percent higher than the RDA. The mean intake of calcium was almost 930 mg, which was found to meet 93 per cent of the RDA.Nutrients, like iron, vitamin B_{12} and folic acid was 20 mg, 0.84 mcg, and 156 mcg respectively which met only 54 per cent, 84 per cent and 39 per cent of the RDA respectively. Thus from Table 8 it can be seen that the mean percentage RDA deficit for iron was 46 per cent, vitamin B_{12} was 16 per cent and folic acid was 61 per cent. The mean in take of vitamin C (4 per cent) was higher than the prescribed RDA.

Table 12. Mean nutrient intake of the lactating mothers

Nutrients	Mean in take	RDA*	Percentage of RDA	Percentage RDA deficit/excess
Energy (KCal)	2582	2775	93	-7
Protein (gm)	65	75	86	-14
Calcium (mg)	924	1000	92	-8
Iron (mg)	21	45	47	-43
Vitamin C (mg)	74	80	92	-8
Vitamin B12 (µg)	0.83	1.5	55	-45
Folic acid (µg)	119	150	79	-21

*Source: ICMR, 1989

From Table 12 it can be observed that the mean energy intake of the lactating mothers was 2582 kcals, which was found to meet about 93 per cent of the recommended allowance. The mean intake of protein was lesser than the prescribed RDA (14 per cent).Average intake of nutrients like calcium, iron, vitamin c, vitamin B12, and folic acid were 924mg 21mg, 74mg, 0.83mcg, and 119 meg respectively, which could meet only 92 per cent, 47 percent, 92 per cent, 55 per cent and 79 per cent of RDA respectively. Thus from Table 12, it can be seen that the mean percentage RDA deficit for calcium was 7.6per cent, iron was 43per cent, vitamin C and vitamin B12 was 8 per cent and folic acid was 20.8 per cent.

Table 13. Mean nutrient intake of the preschool children (3-5 years)

Nutrients	Mean intake	RDA*	Percentage RDA met	Percentage RDA deficit/excess
Energy (Kcal)	1538	1690	91	-9
Protein (g)	30	30	98	-2
Calcium (mg)	430	400	107	+7
Iron (mg)	10	1.8	57	-43
Vitamin C (mg)	35	40	86	-14
Vitamin B_{12} (µg)	0.8	0.2-1.0	100	Adequate
Folic acid (µg)	36	40	88	-12

From Table 13, it can be observed that the mean energy intake of the preschool children was 1538 kcals, which was found to meet about 91 per cent of the recommended allowance. Mean protein intake was 30gm, which was 98 per cent of RDA. The mean intake of calcium and vitamin B_{12} were higher than the prescribed RDA 7 per cent and 100 per cent respectively. Intake of nutrients like Iron, Vitamin C, and Folic acid were 10 mg, 35mg, and 36 mcg respectively. Thus it can be seen the deficit for iron were 43 per cent, vitamin C 14 per cent, and folic acid 12.5 per cent respectively.

4.2.4 Nutritional Status Index

The beneficiaries were classified as those with low, medium and high based on their Nutritional Status which was arrived from the mean scores and standard deviation.

Table 14. Distribution of beneficiaries based on their Nutritional Status Index

Nutritional status index	Pregnant mothers		Lactating mothers		Preschool children		Total in percentage
	No(30)	percentage	No(35)	percentage	No(35)	Percentage	
Low	5	17	8	23	6	17	19
Medium	19	63	23	66	23	66	65
High	6	20	4	11	6	17	16

The distribution of pregnant mothers based on their NSI is given in Table14.The NSI values are given in Appendix (XIII).

The mean value of NSI of the pregnant mothers was 22.0 and the standard deviation was1.52. The pregnant mothers were classified based on their NSI as those above mean+ S.D as high, those between ± S.D as medium and the pregnant mothers below mean – S.D as low NSI.

Table 14 depicts that 63 per cent of the pregnant mothers had medium NSI, while 20 per cent had high NSI and the remaining 17 per cent had low Nutritional Status Index.

The mean value of NSI of the lactating mothers was 30.7and the standard deviation was1.96. Table 14 depicts that 66 per cent of the lactating

mothers had medium NSI, 11 per cent of the lactating mothers had high NSI and 23 per cent of the lactating mothers had low Nutritional Status Index.

The mean value of NSI of the preschool children was 11.9 and the standard deviation was 1.10. It is evident from Table 14, 66 per cent of the preschool children had medium NSI, while 17 per cent of the preschool children had low and high Nutritional Status Index.

4.3 LEVEL OF PARTICIPATION OF THE PARTICIPANTS IN THE NATIONAL NUTRITIONAL ANAEMIA PROPHYLAXIS PROGRAMME

Participation of an individual in a programme is defined as the sum total of his/her involvement in the various activities of the programme. The participation in the programme was assessed by asking certain relevant questions to the participants. It was observed that only 26 per cent of the participants have heard of the National Nutritional Aneamia Prophylaxis Programme, while 74 per cent were not familiar with the programme. Though they receive the IFA supplements, they were not aware that the supplements were distributed as part of this particular programme. However it was found that only 48 per cent of the beneficiaries were receiving the IFA supplements supplied through the PHC. They collected it either through the anganwadi centre (20 per cent) or directly from primary health centre (28 per cent) and the remaining (52 per cent) were not receiving the supplements at all during the previous two months. It was observed that only 29 per cent of the beneficiaries were staying close to the PHC (less than one kilo meter) and 71 per cent were residing (more than one kilometer) away from the PHC.

More over regarding the receipt of the IFA tablets it was observed that 48 per cent of the beneficiaries received the supplements and consumed it, while 30 per cent did not receive the supplements at all. However 22 per cent of the beneficiaries received the supplements but did not consume the tablets.

4.3.2 Liaison with field level functionaries

Table 15.Distribution of participants based on their liaison with field level functionaries

Functionaries	Regularly	Occasionally	Never
Junior Health Inspector	2	48	50
Junior Public Health Nurse	40	40	20
Anganwadi worker	71	18	11

As shown in Table 15 the 48 per cent of the participants occasionally met the Junior Health Inspector of the primary health centre. Fifty per cent never met the Junior Health Inspector and only 2 per cent regularly met the Junior Health Inspector. Nearly 40 per cent of the participants met the Junior Public Health Nurse regularly/occasionally and remaining 20 per cent never met the Junior Public Health Nurse. From the table, it can be seen that 71 per cent of the participants maintained good liaison with anganwadi worker by meeting them regularly, where as 18 per cent met them occasionally and 11 per cent never met the anganwadi workers.

4.3.3 Participation in health and nutrition programmes through PHC

Table 16.Distribution of participants based on participation in health and nutrition programmes through PHC (n=100)

Programmes	Participation in percentage		
	Always	Occasionally	Never
Meetings	12	52	36
Campaign/ medical camps	18	42	40
Education classes	25	45	30

The participants were asked to report the number of times they participated in the various programmes and were categorized under the heading always, occasionally and never. When they attended almost all the programmes (>80per cent) it is treated as 'always' and if they attended less programmes (<80per cent)

it is entered under 'occasionally' and if they never attended any it is entered under 'never'

From Table 16 it can be seen that only 12 per cent of the participants had attended in the various meetings, 52 per cent occasionally and 36 per cent reported that they never participated in any one of the meetings. With regard to the participation in campaign, 18 per cent came under 'always' category and 42 per cent came under 'occasionally' and the remaining 40 per cent never participated in the campaigns/camps. In education classes, 25 per cent came under 'always' and 45 per cent had involved 'occasionally' and remaining 30 per cent of the participants never involved in the programme.

4.3.4 Regularity in the consumption of Iron Folic Acid tablets

The regularity in the consumption of IFA tablets by the beneficiaries was assessed by administering an inventory schedule to study the consumption for one month and the number of tablets consumed by the beneficiaries was ascertained. Based on the consumption of IFA tablets the beneficiaries were classified in to three as partially regular, irregular and never. If they consumed more than 50 per cent treated as 'partially regular'. If the consumption was below 50 per cent the beneficiaries were considered as 'irregular' and those who had never consumed were considered under 'never'.

Table 17. Distribution of participants based on their regularity in the consumption IFA tablets (n=100)

Regularity in the consumption IFA tablets	Percentage
Partially regular	22
Irregular	26
Never	52

From Table 17 it was observed that none of the beneficiaries were regular in the consumption since they did not receive not consume the complete dosage of the iron and folic acid tablets provided through the PHC.Twenty two per cent of the participants were found to be consuming the tablet on partially regular basis

and 26 per cent were consuming the tablet on irregular basis and the remaining 52 per cent never consumed the tablet at all.

4.3.5 Distribution of the beneficiaries based on participation index

Participation of beneficiaries in the 'National Nutritional Anaemia Prophylaxis Programme' beneficiaries was operationalised as the involvement of the beneficiaries in the programme related activities. A scale was constructed to assess the rate of participation of the beneficiaries. For this the different activities which involves the participation of the beneficiaries, such as their liaison with field level functionaries, participation in the educational programmes by the beneficiaries / participants during the previous three months and regularity in the consumption of iron supplements by the beneficiaries were taken in to account. The frequency of their participation in these activities was assessed by marking on a three point continuum of never, occasionally and always for which scores were assigned as 0, 1 and 2 respectively. These scores were finally summed up to obtain an index. Based on the mean and standard deviation the participants/ beneficiaries were classified as having high rate of participation, medium participation and low participation. The participation Index values are presented in Appendix (XIV).

The distribution of participants based on their participation index is given in Table 18.The mean value of participation index of the participants was 48 and the standard deviation (S.D) was 1.98. The participants were classified based on their participation Index as those above means + S.D as high, those between mean ± S.D as medium, and below mean –S.D as low participation Index.

Table 18.Distribution of participants based on their participation Index (n=100)

Participation Index	Percentage	Mean ± S.D
High	26	>(48 + 1.98)
Medium	58	Between (48 ± 1.98)
Low	16	<(48 – 1.98)

Table 18 depicts that 58 per cent of the participants had medium level of participation, 26 per cent had high Participation and 16 per cent had low participation.

4.3.7 Constraints faced by the beneficiaries

In the present study the constraints faced by the participants/beneficiaries with respect to participation in the National Nutritional Anaemia Prophylaxis Programme were enquired and data pertaining to the constraints are presented in Table 19

Table 19.Percentage distribution of beneficiaries based on the constraints

(n=100)

SI. No	Constraints	Distribution of beneficiaries in percentage
1.	Lack of awareness	10
2.	Forgetfulness to consume	16
3.	Misconcepts	3
4.	Gastro intestinal side effect (Diarrhoea, constipation, gastritis)	20
5.	Un acceptable color, taste of the supplement	12
6.	Lack of proper guidance	9
7.	Irregular supply of supplements	30

When the participants were enquired if they had any constraints in participating in the programme and consume the tablets 10 percent reported that they were not aware of the programme as evident from Table 19. Sixteen per cent reported that they forget to consume the tablets where as 3 per cent had mis concepts such as a) the consumption of the tablet might increase the size of the baby and there by making the delivery difficult, b) the child would become black complexioned, which prevented them from consuming the tablets. Twenty per cent reported that they experienced gastro intestinal side effects. While 12 per cent were of the view that the supplement was unacceptable to their consumption, nine per cent reported that they were not given proper guidance by the functionaries as to how and when to consume the tablets. Thirty per cent reported that the supplements were not regularly distributed to them.

4.4 SITUATION ANALYSIS OF THE PARTICIPANTS OF NATIONAL NUTRITIONAL ANAEMIA PROPHYLAXIS PROGRAMME

Situational analysis in this study refers to the existing knowledge, attitude and the existing dietary practices followed by the participants in the programme.

The existing Knowledge, attitude and practice of the participants were assessed and from the information generated, lacunae in their knowledge were identified and an education programme of three days duration was planned and carried out. The knowledge gain and the attitudinal changes were assessed immediately after the intervention and adoption of better practices were studied 15 days after the education programme.

4.4.1 Participants based on the existing knowledge towards NNAPP components

The content matter of the education programme for NNAPP participants was divided in to three modules viz, Anaemia and its prevalence, Role of iron and dietary modification, and statements related to Anaemia Prophylaxis programme objectives. Twenty statements from the three modules were included for testing the knowledge level of the participants in the order of six under anaemia and its prevalence, nine under role of iron and dietary modification and five under Anaemia Prophylaxis Programme Objectives. Table 20 reveals the distribution of participants based on the Pre-test knowledge score for different modules.

Table 20. Distribution of participants based on the existing knowledge towards NNAPP components (n=100)

Module	Total statements	Knowledge score	
		Correct	Wrong
Anaemia and its prevalence	6	52	48
Role of Iron and Dietary modification	9	45	55
Anaemia Prophylaxis Programme Objectives	5	26	74

It was seen that only 52 per cent of the participants had correct knowledge about the statements included under 'Aneamia and its prevalence' and 45 per cent of the participants had correct knowledge on the 'Role of iron and dietary modification'. Compared to these two modules their knowledge to 'Anaemia Prophylaxis Programme Objectives' was found to be low, since only 26 per cent had correctly responded to the statements related to this aspect.

4.4.2 Participants based on their existing attitude towards NNAPP components

Table 21. Distribution of participants based on their existing attitude towards NNAPP components (n=100)

Module	Total statements	Attitude scores		
		Favourable	Neutral	Unfavourable
Anaemia and its prevalence	4	38	3	59
Role of iron and dietary modification	7	43	12	45
Anaemia prophylaxis programme objectives	8	50	20	30

Table 21 reveals the distribution of the participants based on their pre test attitude scores towards NNAPP. There were four statements under the module 'Anaemia and its prevalence'. Thirty eight per cent of the participants were observed to have favourable attitude, while 59 per cent of the participants were showing unfavourable and 3 per cent participants were found to maintain a neutral attitude towards the module 'Anaemia and its prevalence'.

Seven statements were related to the module 'Role of iron and dietary modification'. Forty three per cent of the participants were found to have favorable attitude, while 45 per cent of the participants were placed under unfavourable attitude group and 12 per cent were observed to maintain a neutral attitude towards the statements under 'Role of iron and dietary modification'.

Eight statements were related to the module 'Anaemia prophylaxis programme objective'. Thirty per cent of the participants were found to have an unfavourable attitude, while 50 per cent of the participants were observed to have

a favourable attitude and the remaining 20 per cent of the participants were noted to possess a neutral attitude.

4.4.3 Distribution of participants based on the frequency of use of iron rich foods/iron enhancers in the diet (before education programme)

Consumption of iron rich foods can reduce the prevalence or severity of anaemia, and the absorption of iron from the diet can be enhanced (for example, vitamin C) or inhibited (for example by tea or coffee) if particular items are consumed around the time that a meal is eaten. Data regarding the distribution of participants based on their practice scores towards frequency of use of iron rich foods and iron enhancers in the daily diet is presented in Table 22

As may be seen parboiled rice is consumed daily by all the beneficiaries. Thirty six percent of the beneficiaries were found to be using rice flakes once in a month in their diet. Wheat was consumed once in a week by 58 per cent of the beneficiaries. Frequency of consumption of ragi, which is a good and cheap source of iron, was found to be low with 40 per cent consuming it occasionally.

Regarding the use of pulses it was noticed that green gram was included by 35 per cent, black gram by 45 per cent, peas by 30 per cent and cowpea by 20 per cent, once in a week in their diet. Soybean was unknown to them and majority of the beneficiaries (85 per cent) never included Soya bean in their diet. However it was interesting to note that none of them included sprouted pulses in their diet.

Table 22. Percentage distribution of frequency of use of iron rich foods /iron enhancers by the beneficiaries

Food items	Daily	Weekly thrice	Weekly twice	Once in a week	Fortnightly	Once in a month	Occasio nally	Never
Cereals								
Parboiled rice	100	-	-	-	-	-	-	-
Rice flakes	-	-	-	14	25	36	25	-
Wheat	-	10	22	58	10	-	-	-
Ragi	-	-	-	2	30	28	40	-
Pulses								
Green gram	-	-	45	35	20	-	-	-
Black gram	-	-	10	45	30	-	-	-
Cowpea	-	-	-	20	30	45	5	-
Peas dry	-	-	10	30	25	35	-	-
Soya bean	-	-	-	-	-	-	15	85
Sprouted pulses	-	-	-	-	-	-	-	100
Green leafy vegetables								
Amaranths	-	-	-	10	10	75	5	-
Drumstick leaves	-	-	-	22	20	58	-	-
Chekkurmanis	-	-	-	5	20	45	30	-
Other vegetables								
Cabbage	-	-	-	20	80	-	-	-
Bitter gourd	-	-	-	20	38	42	-	-
Snake gourd	-	-	-	55	45	-	-	-
Plantain green	-	-	-	50	30	20	-	-
Roots and Tubers								
Carrot	-	-	20	60	20	-	-	-
Beetroot	-	-	-	35	45	20	-	-
Onion	90	5	5	-	-	-	-	-
Potato	-	-	30	60	10	-	-	-
Fruits								
Dates	-	-	-	5	15	25	55	-
Sapota	-	-	-	-	10	10	80	-
Custard apple	-	-	-	-	-	15	40	45
Pinapple	-	-	-	-	-	25	65	10
Amla	-	-	-	-	15	25	60	-
Guava	-	-	-	-	5	45	50	-
Orange	-	-	-	5	10	25	60	-
Lemon	-	-	-	10	20	35	35	-
Watermelon	-	-	-	-	-	15	85	-
Nuts and oilseeds								
Groundnut	-	-	-	10	12	38	40	-
Gingellyseeds	-	-	-	5	15	30	50	-
Others								
Egg	-	-	5	35	45	15	-	-
Meat	-	-	-	5	15	25	45	10
Fish	60	20	20	-	-	-	-	-
Jaggery	-	-	-	-	20	45	35	-

Focussing on the use of green leafy vegetables it was observed that green leafy vegetables were not regularly included in their diet, and it was reported that amaranthus was used by 75 per cent, drumstick leaves by 58 per cent and chekkurmanis by 45 percent respectively once in a month in their diet.

Regarding the use of other vegetables, it was found that bitter gourd.snakegourd, and plantain (green) were consumed by 62 per cent, 55 per cent and 70per cent respectively once in a week in their diets.

Among the iron rich foods categorized under roots and tubers, carrot and potato was found to be frequently used by 60 per cent of beneficiaries followed by beetroot, which was consumed, by 35 per cent of the beneficiaries once in a week. Onion was included by 90 per cent of the beneficiaries daily in their diet.

Data pertaining to the frequency of use of iron rich fruits revealed that none of the beneficiaries included fruits daily or once a week in their diet, and fruits were included only occasionally. Among the nuts and oilseeds groundnut was consumed by 40 per cent and gingelly seeds by 50 per cent occasionally.

Frequency of the use of other food items such as egg, meat, fish and jaggery. It was observed that fish was included by 60 per cent of the beneficiaries in their daily diet. Egg was used by 45 per cent and jaggery by 20 per cent of the beneficiaries once in a fortnight and meat by 45 per cent occasionally in their diet.

Based on the above data the food use frequency scores were calculated as suggested by Reaburn et al (1979) and is presented in Table 23

Table 23.Frequency scores obtained for iron rich foods / iron enhancers

Food items	Average scores	Percent of total scores
Cereals		
Parboiled rice	7.00	100
Rice flakes	2.28	32.57
Wheat	4.32	61.71
Ragi	1.94	27.71
Pulses		
Green gram	4.25	60.71
Black gram	3.60	51.43
Cowpea	2.65	37.85
Peas dry	3015	45.00
Soyabean	0.15	2.14
Sprouted pulses	-	-
Green leafy vegetables		
Amaranthus	2.64	32.14
Drumstick leaves	2.64	37.71
Chekkurmains	2	28.57
Other vegetables		
Cabbage	3.80	54.28
Bitter gourd	3.02	43.14
Snake gourd	3.55	50.71
Plantain green	3.30	47.14
Roots and Tubers		
Carrot	4.00	57.14
Beet root	3.15	45.00
Onion	6.85	97.85
Potato	4.20	60.00
Fruits		
Dates	1.70	24.28
Sapota	1.30	18.57
Custard apple	0.70	10.00
Pineapple	1.15	16.43
Amla	1.55	22.14
Guava	1.55	22.14
Orange	1.60	22.85
Lemon	2.05	29.28
Water melon	1.15	16.42
Nuts and Oilseeds		
Groundnut	1.92	27.42
Gingellyseeds	1.75	25.00
Other		
Egg	3.30	47.14
Meat	1.60	22.85
Fish	6.40	91.42
Jaggery	1.85	26.43

Based on the percentage frequency scores, foods consumed by the beneficiaries were classified as most frequently used (Percentage scores above 80), medium frequently used (Percentage scores between 80-50), less frequently used (Percentage scores between 50-30) and least frequently used foods (Percentage scores below 30) and the details are shown in Table 24

Table 24. Classification of iron rich foods/iron enhancers based on food use frequency scores

Most frequently used (>80)	Medium frequently used (between 80-50)	Less frequently used (between 50-30)	Least frequently Used (below 30)
Par boiled rice Onion, Fish	Wheat, Green gram, Black gram,Cabbage, Snakegourd, Carrot,Potato	Rice Flakes, Cowpea Peasdry,Amaranthus Drumstick leaves Bittergourd, Plantaingreen, Beetroot Egg.	Ragi, Soybean, Chekkurmanis, Dates, Sapota Custard apple, Pineapple,Amla, Guava,Orange, Lemon, watermelon,Groundnut, Gingelly seeds, Meat, Jaggery

From Table 24 it can be seen that parboiled rice, onion and fish were the iron rich foods most frequently used by the beneficiaries. Use of wheat, green gram, black gram, cabbage, snake gourd, carrot and potato were found to be medium frequency. Rice flakes, cowpea, peas (dry), amaranthus, drumstick leaves, bitter gourd, plantain (green), beetroot and egg were found to be less frequently used. Ragi, soya bean, chekkurmanis, dates, sapota, custard apple, pineapple, amla, guava, orange, lemon, watermelon, ground nut, gingelly seeds, meat and jaggery were found to be the least frequently used food items in their diet. None of them used the sprouted pulses in their diet.

4.4.4 Frequency of use of iron inhibitors along with meals by the beneficiaries

Iron inhibitors have an inhibiting role on the absorption of iron from the diet. Regarding the use of iron inhibiting foods along with meals, it was observed that 65 percent of the beneficiaries were in the habit of consuming tea / coffee / milk along with meal, where as the remaining 35 per cent were not consuming them along with meals. On working out the percentage scores, it was found that tea / coffee / milk were the foods used in moderation by 65 per cent (scores between 80-50) of the beneficiaries.

4.5 IMPACT OF EDUCATION PROGRAMME ON VARIATION IN KNOWLEDGE, ATTITUDE AND PRACTICES OF THE PARTICIPANTS

The scores of knowledge, attitude and practice were categorized in to three viz. low, moderate and high, based on the mean scores and standard deviation. It was assessed by calculating standard deviation (σ) and mean (X).

4.5.1 Participants based on knowledge scores

The data on the distribution of participants based on knowledge scores are presented in Table25.A pre-post experimental design was used to study the impact of education on the knowledge gain of the participants. Gain in knowledge was found out by working out the pre and post mean knowledge score

Table 25. Distribution of the participants based on knowledge score (n=100)

Category	Distribution of participants in percentage	
	K_0	K_1
Low	19	11
Medium	66	69
High	15	20

Pre test (K_0) – mean ± S.D (6.37 ± 1.21)

Post test (K_1) – mean ± S.D (15.94 ± 1.41)

Based on mean and standard deviation the results of pre test knowledge (K0) score, it can be seen from Table 25 depicts that 66 per cent of the participants had medium level of knowledge scores, while 19 per cent had low knowledge scores and 15 per cent of the participants had high knowledge scores before participating in the education programme.

The results of posttest knowledge (K1) scores indicated that 69 per cent of the participants had medium scores, 20 per cent had high scores and only 11 per cent had low scores after the education programme.

4.5.2 Distribution of participants based on attitude score

Table 26. Distribution of the participants based on attitude score (n=100)

Category	Distribution of participants in percentage	
	A_0	A_1
Low	15	11
Medium	66	64
High	19	25

Pre test (A_0) – mean ± S.D (21.36 ± 3.50)

Post test (A_1) – mean ± S.D (49.82 ± 3.04)

Based on mean and standard deviation it is evident from the Table 26 that the majority of the participants (66 per cent) had medium attitude score before the education programme. However 15 per cent had low pre attitude score and 19 per cent had high pre attitude score.

Data collected after the education programme on the attitude scores (A_1) revealed that 64 per cent had medium attitude score, 11 per cent had low post attitude scores compared to pre test, it was reduced after the education programme, and 25 per cent had high attitude score.

4.5.3 Distribution of participants on the adoption of better practices based on frequency of use of iron rich foods / iron enhancers in the diet after the intervention

Fifteen days after the implementation of the education programme, the extent of adoption of better dietary practices was studied with regard to the frequency of use of iron rich foods / iron enhancers in the similar manner as done for before intervention presented in Appendix (XIV) and the frequency scores obtained were assessed and the details of the score before and after the education programme is presented below.

Table 27. Frequency scores obtained for iron rich foods / iron enhancers before and after the education programme.

Food items	Average Scores		Percent of total scores	
	Before	After	Before	After
Cereals				
Parboiled rice	7.00	7.00	100.00	100.00
Rice flakes	2.28	3.83	32.57	54.76
Wheat	4.32	4.40	61.71	62.85
Ragi	1.94	3.63	27.71	51.90
Pulses				
Greengram	4.25	4.33	60.71	61.90
Black gram	3.60	3.86	51.43	55.24
Cowpea	2.65	3.73	37.85	53.33
Peas dry	3.15	4.03	45.00	57.61
Soyabean	0.15	0.20	2.14	2.85
Green leafy vegetables				
Amaranthus	2.25	3.33	32.14	47.61
Drumstick leaves	2.64	4.00	37.71	57.14
Chekkumanies	2.00	3.26	28.57	46.66
Other Vegetables				
Cabbage	3.80	3.60	54.28	57.42
Bittergourd	3.02	2.93	43.14	41.90
Snake gourd	3.55	3.33	50.71	47.61
Plantain green	3.30	3.46	47.14	49.52
Roots and tubers				
Carrot	4.00	3.90	57.14	55.71
Beetroot	3.15	3.26	45.00	46.66
Onion	6.85	6.80	97.85	97.14
Potato	4.20	5.00	60.00	71.42
Fruits				
Dates	1.70	3.23	24.28	46.19
Sapota	1.30	1.76	18.57	25.23
Custard apple	0.70	1.16	10.00	16.66
Pineapple	1.15	3.26	16.43	46.66
Amla	1.55	4.03	22.14	57.61
Guava	1.55	2.66	22.14	38.09
Orange	1.60	2.76	22.85	39.52
Lemon	2.05	3.00	29.28	42.85
Watermelon	1.15	1.00	16.42	14.28
Nuts and Oil seeds				
Groundnut	1.92	2.80	27.42	40.00
Gingelly seeds	1.75	2.83	25.00	40.47
Others				
Egg	3.30	4.06	47.14	58.09
Meat	1.60	2.40	22.85	34.28
Fish	6.40	7.00	91.42	100.00
Jaggery	1.85	2.83	26.43	40.47

Based on the food use frequency scores, foods consumed by the beneficiaries were classified as most frequently used (percentage scores above 80), medium frequently used (percentage scores between 80-50), less frequently used (percentage scores between 50-30) and least frequently used foods (percentage scores below 30) and the details shown in Table 28

Table 28. Classification of use of iron rich foods / iron enhancers by the beneficiaries before and after education programme

Particulars	Before education programme	After education programme
Most frequently used (Above 80)	Parboiled rice, onion, fish	Parboiled rice, onion, fish
Medium frequently used (between 80-50)	Wheat, greengram, black gram, cabbage, snakegourd, carrot, potato	Rice flakes, Ragi, wheat, greengram, blackgram, cabbage, carrot, potato, cowpea, peas dry, drumstick leaves, amla, egg
Less frequently used (between 50-30)	Riceflakes, cowpea, peasdry, amaranthus, drumstick leaves, bitter gourd, plantain green, beetroot, egg	Amaranthus, chekkurmanis, bittergourd, snakegourd, plantain green, beetroot, dates, pineapple, guava, orange, lemon, groundnut, gingelly seeds, meat, jaggery
Least frequently used (below 30)	Ragi, soyabean, chekkurmanis, dates, sapota, custard apple, pineapple, amla, guava, orange, lemon, watermelon, groundnut, gingelly seeds, meat, jaggery	Sapota, Custard apple, watermelon

From Table 28 it can be seen that parboiled rice, onion and fish were the iron rich foods most frequently used by the beneficiaries before and after the education programme. It also reveals that after education programme a shift of the

various iron rich foods had enhanced from the less frequently used to most and medium frequently used. It was observed that majority of the beneficiaries included ragi, rice flakes, and cowpea and locally available fruits more frequently than before education programme. However even after the education programme use of sprouted pulses was not adopted by the beneficiaries.

4.5.4 Frequency of using iron inhibiting foods along with meals by the beneficiaries

Before education programme regarding the use of iron inhibitors along with meals, it was observed that 65 per cent of the beneficiaries were in the habit of consuming tea / coffee / milk along with meal.

After implementation of the education programme, frequency of use of iron inhibitors along with meals was found to be reduced. Only 26 participants reported that they cannot avoid consuming tea/coffee/milk along with meals. However remaining 74 per cent were not consuming it along with meals.

4.6 CORRELATION BETWEEN THE KNOWLEDGE AND ATTITUDE OF THE PARTICIPANTS WITH THE SELECTED INDEPENDENT VARIABLES

The relationship of pre test knowledge and attitude scores of the participants with the selected independent variables viz. age, family size, educational status of the participants, family income, mass media exposure, social participation, participation index and nutritional status index. Correlation coefficient (r) was computed and the results are presented in Table 29

Table 29. Correlation between knowledge scores of the participants with selected independent variables

Sl. No.	Independent variables	Knowledge scores of the participants			
		Pregnant mothers (30)	Lactating mothers (35)	Mothers of pre school children (35)	Total participants (100)
1	Family size	-0.2225	0.2359	-0.1604	-0.0337
2	Age	0.0756	0.2066	-0.0729	-0.0516
3	Educational status	0.4696*	0.0827	0.0789	0.1981*
4	Family income	-0.0019	-0.0587	-0.0571	-0.0380
5	Mass media exposure	0.0520	0.1307	-0.0460	0.0607
6	Social participants	0.1509	-0.0945	-0.2666	0.0127
7	Participation index	0.1756	0.1410	0.3892*	0.2363*
8	Nutritional Status index	0.1094	0.1036	0.0090	-0.0493

*Significant at 5 percent level

With respect to knowledge scores positive correlation with educational status (0.4696*) at 5 per cent level in pregnant mother beneficiaries and participation index (0.3892*) at 5 per cent level in mothers of pre school children were observed. While the pretest knowledge scores were found to have significant positive correlation with educational status (0.1981*) and participation index (0.2363*) at 5 per cent level among total participants/beneficiaries.

Table 30. Correlation between the attitude scores of the participants with the selected independent variables

Sl. No.	Independent variables	Attitude scores of the participants			
		Pregnant mothers (30)	Lactating mother (35)	Mother of pre school children (35)	Total participants (100)
1	Family size	0.1792	0.1120	0.0612	0.0921
2	Age	-0.1622	0.4660**	0.0644	0.0676
3	Educational status	0.4609*	-0.1421	0.0782	0.0109
4	Family income	-0.1141	-0.1708	0.0103	-0.0897
5	Mass media exposure	-0.1500	0.1072	-0.1302	-0.0104
6	Social participants	-0.2518	-0.0387	-0.2362	0.1602
7	Participation index	-0.0704	0.2760	-0.2848	-0.0131
8	Nutritional Status index	-0.1688	0.0408	-0.1223	-0.1325

*Significant at 5 percent

** Significant at 1 percent level

Table 30 shows the results of correlation of pre test attitude scores of the participants with selected independent variables.

The attitude scores indicated a significant positive correlation with age (0.4660**) at one percent level among lactating mothers, and with educational status (0.4609*) at 5 per cent level among pregnant mothers. The table also clearly indicates that there is no significant correlation of pre test attitude scores of mothers of pre school children and also total participants/beneficiaries with the selected independent variables.

4.7 COMPARISON OF THE KNOWLEDGE, ATTITUDE AND PRACTICE SCORES OF THE PARTICIPANTS

4.7.1 Comparison of the Knowledge scores of the participants

Gain in knowledge is assessed from the difference between pre and post score Knowledge by estimating the't' value

Table 31.Comparison of the Knowledge scores among the participants

Knowledge	Mean Score	Estimated 't' value
Pre test	6.37	
Post test	15.94	50.97**
Gain (percentage)	47.85	

** Significant at 1% level

The estimated't' value is significant at one per cent, which indicated that the education programme on awareness about National Nutritional Anaemia Prophylaxis Programme had a significant effect on the knowledge of the participants. The percentage gain in knowledge score was 47.85.

4.7.2 Comparison of the attitude scores among the participants

Change in the attitude is assessed by the difference between the scores before and after the education programme

Table 32. Comparison of attitude scores among the participants

Attitude	Mean Score	Estimated 't' value
Pre test	21.36	
Post test	49.82	60.96**
Change (percentage)	37.44	

** Significant at 1% level.

Fig 3 Impact of education programme on Knowledge of the NNAPP participants (mean scores)

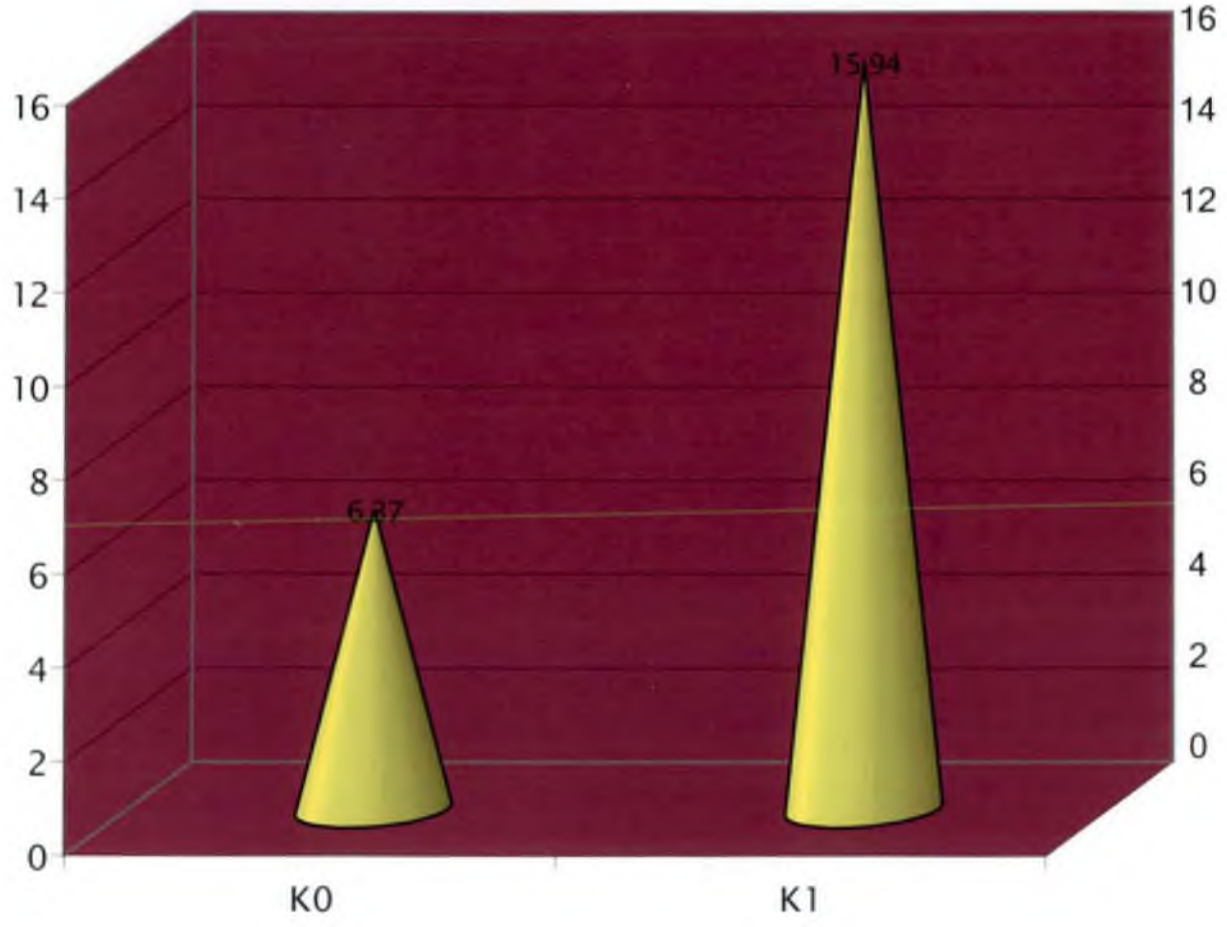
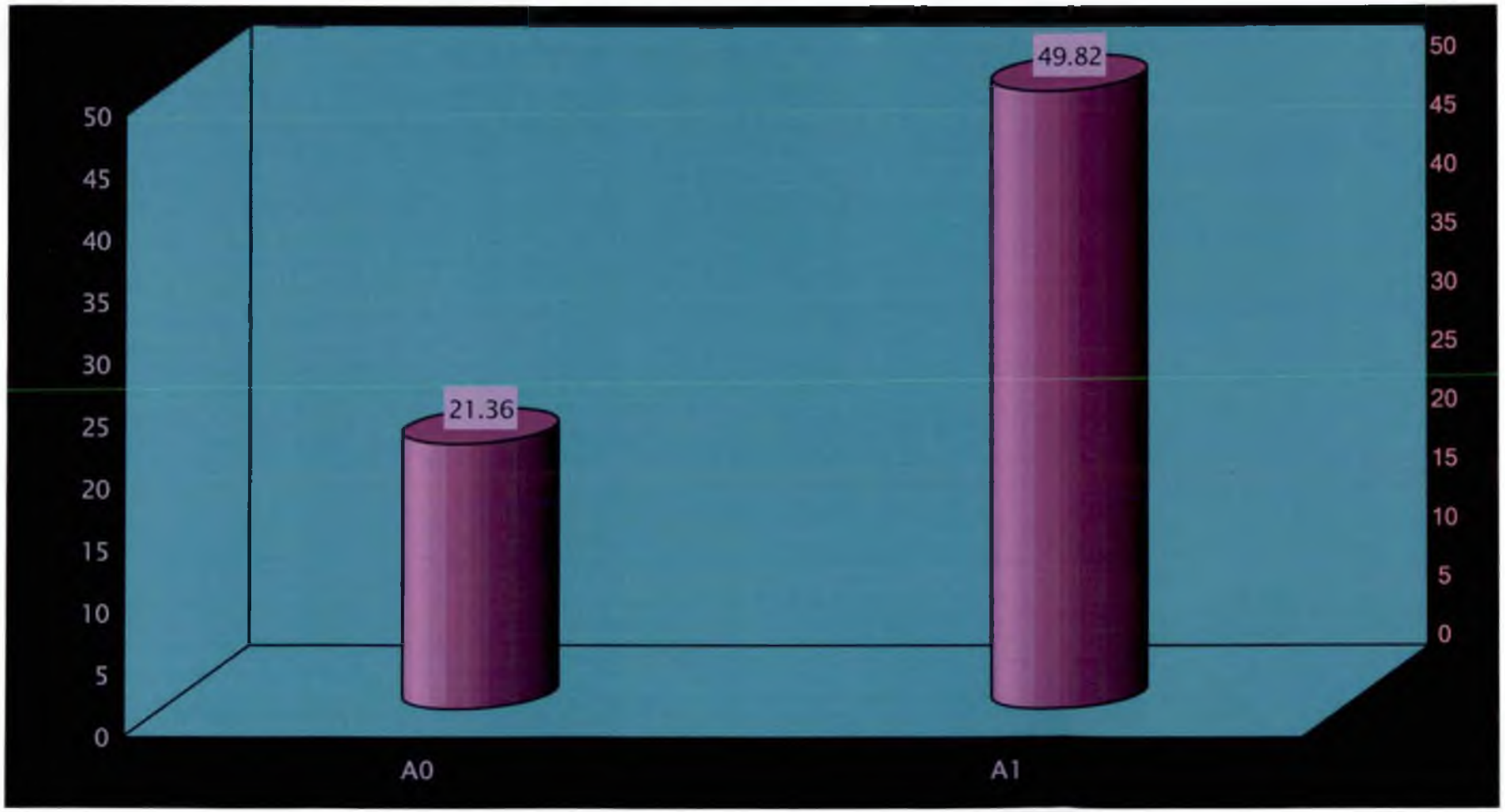


Fig 4 Impact of education programme on the attitude of the NNAPP participants (mean Scores)



A0-Pre test attitude score

A1-Post test attitude score

From the table it can be seen that, per centage change in attitude scores was 37.44 .Since the't' value obtained (60.96**) is significant at one per cent level it can be inferred that education programme had a significant effect on the attitude of the participants.

4.7.3 Comparison of the practice scores of the participants

Table 33. Comparison of practice is assessed by the difference between pre and post test practice score

Practice	Mean Score	Estimated 't' value
Pre test	24.8	49.45**
Post test	27.2	
Adoption (percentage)	34.2	

** Significant at 1% level

As presented in Table 33 the rate of adoption of the participants based on the post test practice score was found to be greater than pre test practice score. Estimated't' value of (49.45**) shows the significant effectiveness of the education programme on the rate of adoption. It can also seen that the percentage extent of adoption scores was 34.2.

DISCUSSION

5. DISCUSSION

The results of the study 'Nutritional awareness among the participants of National Nutritional Anaemia Prophylaxis Programme' are discussed under the following heads

5.1 Personal socioeconomic characteristics of the participants

5.2 Nutritional Status of the beneficiaries

5.3 Level of participation of the participants in the National Nutritional Anaemia Prophylaxis programme

5.4 Situational analysis of the participants of National Nutritional Anaemia Prophylaxis Programme

5.5 Impact of education programme on variation in knowledge, attitude and practices of the participants.

5.6 Correlation between the knowledge and attitude of the participants with the selected independent variables.

5.7 Comparison of the knowledge, attitude and practice scores of the participants.

5.1 PERSONAL AND SOCIOECONOMIC CHARACTERSTICS OF THE PARTICIPANTS

In the present study socio economic and personal variables such as age, religion, family size, type of family, educational status of the participants and family members, family income, mass media exposure, social participation and physical amenities of the house hold level were taken into consideration.

A majority of the participants (84 per cent) were in the age group 21 – 30 years, out of this 48 per cent fell into the age group 26 – 30 and 36 per cent account for the age group 21 – 25. However 4 per cent of the mothers were in the age group less than 20years. All the participants were found to be below 35 years and only 12 per cent were above 30 years. Study conducted by Nerlekar et al (1999) among pregnant women has also affirmed that 73 per cent of the respondents were below 25 years and 27 per cent were above 25 years. The results of the study are in

concurrence with the above reports. National Family Health survey (2005 – 2006) has reported that in Kerala only 6 per cent of the women were in the age group below 20 years at the time of their first delivery.

On assessing the social background of the participants it was found that 59 per cent belonged to Hindu Community. As per the census data (2001) vast majority of Thiruvananthapuram district is predominated by Hindu religion, followed by Christians and Muslims.

Regarding the family size it could be seen that 67 per cent of the participants hailed from small families (1 to 4 members). Kerala is a state with high literacy and people are exposed to the benefits of having small family. Regarding the family size Park (1997) had reported that average family size in India is four. This can be attributed to the fact that emphasis on the concept of small family has assumed greater acceptance during recent years due to change in life style imposed by various developments.

Saxena (2000) reported that the nuclear type families were considered to be generally better than joint type families for the healthy development of the children. In the present study it was found that 85 per cent of the participants were from nuclear type families. In Kerala joint family system is not very common now a days, even though 15 per cent of the participants were found to be from joint family. It is observed that the concept of nuclear family is becoming more common and the joint family system is on the eclipse.

The family educational status is an important aspect, which influences the family members outlook towards life and determines the quality of life its members. Assessment of family educational status of the participants in the present study revealed that 70 per cent of the participants had medium level of education. This shows that present generation is better educated than the older generation.

Majority of the participants in the study were found to be educated and only six per cent were found be illiterate. National Family Health Survey (2005 – 2006)

also has reported that four percent of the population in Kerala are found to be illiterates. This finding is in line with the present study. Educational status and literacy rate are powerful determinants of nutritional status (Park 1997), as it may influence the awareness about the importance of good nutrition, which can affect food choice. Moreover maternal education is a variable, which had influenced the awareness and adoption level of mothers (Neelma et al 1998).

Family income is considered as an important factor which determines the family status and the socio – economic position in the society to which they belong. In the case of total family income of the participants it could be seen from table that 75 per cent of the participants came under low-income strata. Dietary intake was found to be markedly influenced by income level as revealed in the diet survey conducted by NNMB (1996).

Mass media play a significant role in the spread of new ideas. In Kerala majority of the families had their own television sets and radio and 90 per cent of the participants had regular exposure to media (NFHS 2005– 2006). The present study also revealed that majority of the families (83 per cent) possess television sets and radio in their homes.

On assessing the social participation of respondents it was found that 72 per cent of the participants were members of social organizations. They were either member of ayalkottams or kudumbasree units. Now in Kerala since Kudumbasree units have come into existence which promotes opportunities for group working and self employment, most of the women especially those belonging to the poor socio economic background are members of such units.

Poor availability of assets and housing was reported to be a major problem faced by the families. However only 22 per cent of families were residing in rented houses and 78 per cent of families owned their houses. Housing condition would reflect the physical amenities and quality of life to a certain extent. The roofing pattern of the houses showed that the traditional thatched houses are disappearing

slowly and almost all are constructing terraced or concrete roofed houses. In the present study cement flooring was found in majority of the houses. Walls are being constructed with hallow bricks by 45 per cent of families instead of coconut leaves and mud. Maximum number of families reported to be having 3 rooms. Fifty seven per cent of households still depended on firewood as a fuel, where as the rest used kerosene. They opined that the high cost of LPG force them to buy firewood. Those who were using LPG as fuel also use kerosene along with it, which they get through Public Distribution System (PDS). As far as the source of drinking water was concerned only 45 per cent of families had their own well and rest of the families depended on tap water. In the present study 61 per cent had access to toilet facility and remaining 39 per cent had to depend on public comfort stations or open grounds for this purpose. For hygienic environment access to toilet facilities are indispensable. UNICEF (1990) has reported that lack of ready access to water and poor environmental sanitation are important underlying causes of various types of infection resulting in malnutrition.

5.2 NUTRTIONAL STATUS OF THE BENEFICIARIES

5.2.1 Anthropometric measurements

According to Park and Park (1991) anthropometric measurements are valuable indicators of nutritional status. BMI is an indicator of body's energy stores as reported by Chudhary and Solanki (1999). Experts from NIN are of opinion that BMI values between 18.6 and 25.0 can be considered as compatible with health for both men and women. In the present study height and weight measurements of beneficiaries were taken and BMI was computed for pregnant and lactating women and 50 per cent of the beneficiaries were found to fall in the normal range of BMI indicating that their current nutritional status is satisfactory. Sixteen percent of the beneficiaries surveyed had BMI above 25 and belonged to obese grade I category and 14 per cent of the beneficiaries belonged to CED grade I category. Earlier study done

by Ukkuru (1993) also reported similar results, which indicated that majority of the pregnant and lactating mothers had acceptable BMI.

Among children the weight for the height was worked out, and weight for height classified as per Water low (1987) classification. It revealed that 31 per cent of the children were normal, while 47 per cent were stunted, and remaining 20 per cent were found to be stunted and wasted. Similar result was observed in a study conducted by Sreeja (1999), which revealed that 24 per cent of children were normal, and the remaining was malnourished. The present study was found to be in concurrence with National Family Health Survey (2005-2006) which reported that 29 per cent of children in Kerala are normal, while 16 per cent were found to suffer from 'wasting' and 21 per cent were found to be victims of 'stunting'.

5.2.2 Haemoglobin levels

As per economic review of the Planning board of Kerala 50-55 per cent of women (pregnant and lactating) are anaemic and the prevalence of anaemia among children below three years is 34 per cent (Government of Kerala, 2005). In the present study it has been found that only six per cent of the beneficiaries were severely anaemic, while 40 per cent were moderately anaemic, and 37 per cent mildly anaemic. Only 17 per cent were found to be normal. This also is found to be in concurrence with the (NFHS 2005-2006) where it is reported that 52 per cent of the women in India have some degree of anaemia, 35 per cent are mildly anaemic and 15 per cent are moderately anaemic.

Many of the studies indicate that Kerala is better placed when compared to other states considering the high literacy level. Though severe anaemia has not been reported still, Kerala lags behind other states. However the present study has identified incidence of severe as well as moderate anaemic conditions among the vulnerable groups. This indicates that we have a long way to cover to achieve a reasonable level of anaemia free condition.

5.2.3 Mean food and nutrient intake of the beneficiaries

An adequate or balanced diet provides all the essential nutrients in sufficient quantities and in proper proportion to meet the needs of the body (ICMR, 1989). In the present study mean food intake of the mother beneficiaries revealed that the food group, which met the RDA least, was pulses, green leafy vegetables followed by fruits, milk and milk products. Similar observation have also been reported by Borrud et al (1993) revealed that many pregnant women consume less than recommended amounts of green leafy vegetables, fruits, milk and milk products. Studies conducted by Paul (1999) food intake among the pregnant women showed that, except in the case of cereals, the intake of all other food items were less than the recommended amounts.

Food intake of children beneficiaries revealed that their diets were grossly inadequate with respect to green leafy vegetables, fruits, milk and milk products, fat and oils and even sugar. This study is concurrence with that of Sreeja (1999).

In the present study mean nutrient intake of the pregnant mother beneficiaries revealed that the diet is deficient in calories, protein, calcium, iron and folic acid. Paul (1999) has reported in her study among pregnant women that their diet was deficient in calories, proteins, calcium and iron and was below the RDA.

Mean nutrient intake of lactating mother beneficiaries revealed that the intake of protein, iron, vitaminB12, and folic acid were found to be far below the RDA stipulated. During lactation, the requirement of vitamin C is doubled to compensate for the amounts secreted in milk, which was not found to be met from the diet. Fresh fruits and vegetables are the major sources of vitamin C and these foods were found to be included in limited quantities and hence their diets were observed to be deficient in vitamin C. Similar observations have also been reported by Nirmala (2002) on the mean nutrient intake of the lactating women beneficiaries.

Mean nutrient intake of the child beneficiaries revealed that calcium and vitamin B12 requirement were adequately met. The high calcium and vitaminB12

intake could perhaps be due to high intake of fish and milk. The above result is similar to the report published by NNMB (1994) where it was reported that the intake of calcium in Trivandrum was almost twice that of RDA. Gopalan (1999) had reported that the dietaries of poor Indian Preschool Children are deficient in iron, and vitamin C.The implementation of ICDS has brought about increase in intake of calories and protein through the supplementary programme. But only through constant education programmes to the mothers the diet can be made balanced with the available resources and there by micronutrient deficiencies especially iron can also be reduced.

5.2.4 Nutritional status index of the beneficiaries

The nutritional status index of the beneficiaries was computed based on the various parameters such as height, weight, hemoglobin levels, iron and folic acid intake. Majority (65 per cent) of the beneficiaries had medium level nutritional status index, While 16 per cent had high nutritional status index and 19 per cent had low nutritional status index.

Thus from the results of the study it was revealed that 80 per cent of the beneficiaries had nutritional status index above medium level and only 20 per cent had low nutritional status index. Earlier study done by Shanmuga Priya (2005) has also found similar results.

Another study by Chandran (2005) done among Nutritional profile of middle aged women of Below Poverty Line (BPL) families with special reference to micronutrients has also revealed that 61 per cent had low NSI, while 30 per cent had medium NSI and nine per cent had high-level of NSI.

5.3 LEVEL OF PARTICIPATION OF THE PARTICIPANTS IN THE NATIONAL NUTRITIONAL ANAEMIA PROPHYLAXIS PROGRAMME

High level of participation of beneficiaries in any programme is essential for the success of any developmental initiative. It was observed that only 26 per cent of the participants have heard of "NNAPP", while 55 per cent were not familiar with the

programme. Data on the distance of residence of beneficiaries from Primary Health Center revealed that only 29 per cent of them stayed at a distance less than one kilometer from the center. Better utilization of the facilities will definitely be more if access is near to the place of residence and in the present study also most of the beneficiaries who were staying close to the PHC were found to be participating in the activities through the PHC more than those who were staying far away from it.

Enquiry into the receipt of supplements by the beneficiaries during the past one month revealed that 48 per cent of them received the supplements. However 17 per cent received the supplements but did not consume them. National Family Health Survey (2005-2006) has reported that only 43 percent of pregnant women had received the full dosage of IFA tablets and 57 per cent women received not even a single tablet due to inadequate supply of IFA tablets. Another study on NNAPP conducted by Usha et al (2006) in Karnataka revealed that 38 per cent did not receive any tablet from functionaries. Only about 59 per cent women consumed all IFA tablets given to them. The result is almost similar in the present study.

It was observed in the present study that Junior Public Health Nurse and Anganwadi worker had good liaison with the beneficiaries. Majority (71 per cent) of the beneficiaries maintained good liaison with Anganwadiworker, and 40 per cent had liaison with Junior Public Health Nurse, while Junior Health Inspector was found have less contact with the beneficiaries. As part of NNAPP programme the field functionaries were expected to meet the beneficiaries frequently, which would definitely enhance their participation. The participation of the respondents in the programme and their cooperation can be achieved through such direct contacts. The role of Anganwadiworkers as per the programme objective is only to assist the PHC staff in the distribution of IFA tablets and to impart nutrition education. However in the present study it was observed that the participants relied more on the AWWs than the PHC staff since they had more opportunities to meet the anganwadi workers. The study conducted by Usha et al (2006) has revealed that the weak link between the

participants and the functionaries of PHCs as one of the constraints for the effective implementation of the programme.

The exposure of the beneficiaries to nutrition and health related programmes of the PHC was ascertained and in the present study only less than 25 per cent of the participants had participated in the meetings, campaigns, nutrition and health education classes consistently. Meetings, campaigns, nutrition and health education classes were attended occasionally by 45 per cent, 42 per cent and 48 per cent respectively. However the remaining 30 per cent of the participants never attended any of the programmes. Also another fact to be noted is that the involvement of the participants in the programme might have been low due to their engagement with household chores or their disinterest in attending the programmes. Inconvenience of time and place were some of the difficulties expressed by the participants. Ukkuru (1993) through her study on the participation of beneficiaries in the ICDS programme in Malappuram, found that only 63 per cent of the respondents regularly participated in the nutrition and health education classes.

Three aspects such as liaison with field level functionaries programme related to nutrition and health activities, regularity in the consumption of IFA tablets was taken to arrive at a participation index. The mean participation index was taken to classify he beneficiaries as those having high participation, medium participation and low participation. The results revealed that 58 per cent of the beneficiaries had medium participation index, 26 per cent had high participation index and 16 per cent had low participation index. Prasanna Kumari (2004) also found similar results in participation of ICDS beneficiaries in the nutrition and health education activities where majority came under medium level of participation while only 20 per cent had high participation rate and 18 per cent had low participation levels. The reduced participation in the programme by the participants may be due to their lack of awareness. However it was interesting to note in the study that majority of the participants did not maintain good liaison with the PHC staff but they maintained

good liaison with anganwadi workers in whom they had more confidence. This is evident from their participation in health and nutrition education programme related to the PHC, which is often conducted through the anganwadi center where 25 per cent of the participants always participated in the programme. It was also observed that many participants who were regular in the consumption of IFA tablets were regular participants in the nutrition and health education classes conducted by PHC/AWC. The above facts reveal that periodic interventions by the PHC will definitely create awareness among the participants, which would bring about attitudinal change leading to adoption of better dietary practices to reduce prevalence of anaemia.

Constraints faced by the participants

The participants were enquired if they had any constraints in participating in the programme or in the consumption of IFA tablets distributed to them. Ten per cent reported that they have not heard and are not aware of the programme at all. Leela and Sharma (1996) has reported that NNAPP has not been successful due to lack of awareness and realization of the adverse consequences of anaemia in the community which leads to irregular intake of the IFAsupplements by the beneficiaries In the present study it was observed that 20 per cent experienced gastro intestinal side effects (nausea, diarrhoea, constipation, gastritis) and 3 per cent had some taboos which prevented their regular consumption. Similar constraints have been observed in an evaluative study conducted by Usha et al (2006). Earlier study by NFI (1998) had also reported that even after receipt of IFA tablets a few beneficiaries did not consume them, due to misconcepts and side effects. In the present study 16 per cent reported that they forget to consume the tablet while 12 per cent reported that the supplement is unacceptable with respect to colour/taste. Nine per cent reported that they were not given proper guidance and 30 per cent reported irregular supply of the tablets as a constraint. Similarly National Family Health Survey (2006) reported that 57 per cent women received not even a single tablet and lack of compliance by

functionaries to their work protocol as the cause of lack of success of the programme. Nigam (1996) in his study has reported that 50 per cent women received not even a single tablet and irregular supply was mentioned as a cause and it remains as a major constraint. All the constraints mentioned by the participants in the present study may be due to their lack of awareness, which would definitely be improved through constant education programmes.

5.4 SITUATION ANALYSIS OF THE PARTICIPANTS OF NATIONAL NUTRITIONAL ANAEMIA PROPHYLAXIS PROGRAMME

NNAPP implemented through the PHCs and its sub centers aims at reducing the prevalence of anaemia among the vulnerable groups. The programme focuses on three initial strategies: promotion of regular consumption of foods rich in iron, provision of iron and folic acid tablets to the high risk groups and identification and treatment of severely anaemic cases. Even though the programme has been in existence for the past 31 years there is not much significant decline in the incidence of anaemia, whether the lack of awareness among the participants could be a reason that impedes the implementation of the programme.

5.4.1 Knowledge outcome of the beneficiaries/participation in NNAPP

In the present study 20 messages that aimed primarily at a knowledge outcome on awareness about NNAPP among the participants were grouped under three modules viz Anaemia and its prevalence, Role of iron and dietary modification and Anaemia Prophylaxis Programme objectives. Out of six statements included from the module on "Anaemia and its prevalence" 52 per cent of the participants were found to be aware about iron deficiency as a major public health hazard. The prevalence of anaemia and consequences anaemia prior to the intervention indicated that though they were aware about iron deficiency as major public health hazards their knowledge on the causes and consequences of anaemia was inadequate and needed to the strengthened. However more than 90 per cent of the participants were well aware that anaemia in pregnant women leads to premature delivery but could not

realize the fact that this could affect the health of the mother as well as the new born. Out of 19 statements five statements related to "Role of iron and dietary modification". All the participants were found to be well aware of the nutritive value of green leafy vegetables and the importance of fruits in the diet. However majority of the participants were not aware of the inhibiting foods especially tea and coffee if taken along with meals. The participants were not aware of the significance of the content of iron in the inexpensive and locally available foods such as guava, amla, lime and they were not included in their daily diet.

From the module on NNAPP and its objectives, ten statements were included. The participants were ignorant about the programme as majority of them had not even heard about it and its importance in protecting health. However they were aware of the availability of the IFA supplements channelised through the PHC, which they received either through PHC or AWC. The participants were not aware of the components of the programme and were not even aware that frequent deworming is an important component of the NNAPP.

5.4.2 Attitude outcome on NNAPP

Nineteen statements that aimed at the attitudinal outcome on NNAPP and its components were included in the attitude scale administered. These statements were also grouped under the three modules similar to the knowledge test. Thirty eight per cent of the participants were observed to have favourable attitude and seven per cent maintained a neutral attitude towards the module "Anaemia and its prevalence". A favourable attitude was maintained towards the statement anaemia is a threat to safe delivery by the participants and they considered anaemia as a serious threat to public health. A neutral attitude was maintained by the participants to the statement "Anaemia decreases the productivity of the women work force". However 43 per cent gave a positive approval towards the module role of iron and dietary modification. Attitude towards suggestion for the importance of sprouting of pulses, significance of using iron vessels for cooking and consumption of leafy vegetables by the lactating

mothers did not gain favour. Fifty per cent of the participants were observed to have favourable attitude towards the module "Anaemia prophylaxis programme objectives".

5.4.3 Frequency of use of iron rich food/iron enhancers by the beneficiaries before education programme

Data regarding the food consumption pattern of the beneficiaries indicated that all of them were habitual non-vegetarians. Consumption pattern of keralites as reported by Kerala Statistical Institute (2000) reveals that 98 per cent of the keralities are habituated to non-vegetarian foods.

On assessing the frequency of use of foods items by the beneficiaries it was found that rice were seen to be consumed daily since it is the staple food for Keralities. In this study about 60 per cent of the beneficiaries consumed fish daily. A similar observation was reported by Nirmala (2002). The reason for this may be that fish is comparatively cheap in Kerala and is available in plenty. Forty five per cent of the beneficiaries were seen to consume pulses daily. On the whole foods like green leafy vegetables and fruits, which formed the major sources of vitamins and iron, were rarely included in the diet. Green leafy vegetables obtained a frequency score of only 37 per cent indicating that they were not frequently used by the beneficiaries. With regard to the consumption of vegetables bitter gourd, snake gourd, plantain green were the iron rich vegetables commonly used in Kerala. Similar results were observed by Paul (1999).

Regarding the use of roots and tubers, it was observed that all the participants consumed carrot, beetroot, onion and potato more frequently. Augustine (2003) had also reported similar results. Most of the beneficiaries consumed iron rich fruits occasionally and once in a month. Fruits were almost absent in the diet. This might be due to high cost, non-availability and ignorance. This study is in line with the findings of Nirmala (2002). However even locally available fruits like guava, amla, had no place in their daily diet.

Iron rich nuts and oilseeds such as groundnuts and gingelly seeds were also found to be least frequently consumed by the beneficiaries. Ragi rich in iron and

other essential nutrients available at low cost was also not found to be included in their diet.

Egg and meat were seen to be the less and least frequently used items. This may be due to the preference for fish and high cost of other animal foods. Similar results were found by Shanmuga Priya (2005). In the present study sugar was found more common in use than jaggery despite less expensive and rich in iron.

5.4.4 Frequency of use of iron inhibitors along with meals by the beneficiaries

Milk is a calcium rich food, which interferes with the absorption of both haem and non-haem iron. However because calcium is an essential nutrient it cannot be considered to be an inhibitor of iron absorption (Gleerup et al, 1995). In the present study 65 per cent of the beneficiaries consumed tea/ coffee/milk along with meals. Hallberg et al (1997) has observed that one consequence of consuming more calcium especially at mealtime or with multi vitamin or mineral supplements is an inhibitor approximately by half of iron absorption. FAO/WHO (2004) report also stated that the intake of a cup of tea with a meal may reduce the bioavailability by one half or more.

5.4.5 Frequency of consumption of IFA tablets by the beneficiaries

Under the National Nutritional Anaemia Prophylaxis Programme of India all the children between months and 12 years of age all pregnant and lactating women are to receive iron (60mg) and folic acid (0.5mg) supplements for a period of 100 days every year (Seshadri et al., 1994). In the present study when the consumption of IFA tablets by the beneficiaries was monitored for the one month it was revealed that none of the beneficiaries were found to be regular since did not receive and consume the full dosage of the iron and folic acid supplements. Only 22 per cent of them were partially regular in consuming the tablets. Twenty six per cent of the beneficiaries were found to be irregular and of the remaining 52 per cent, 22 per cent received the supplements but did not consume and the rest 30 per cent never received them at all. However during the present study it was observed that there was regular supply of

IFA tablets in three of the selected PHCs and only in one PHC there was shortage of the tablets. In a study conducted by ICMR only 33 per cent of women were reported to have consumed above 50 per cent of the tablets (ICMR, 1995). Earlier study done by Usha et al (2006) has also reported that 50 per cent of the beneficiaries consumed the entire dose, and 25 per cent consumed half and 17 per cent never consumed the tablets.

5.5 IMPACT OF EDUCATION PROGRAMME ON VARIATION IN KNOWLEDGE, ATTITUDE AND PRACTICES OF THE PARTICIPANTS

5.5.1 Gain in knowledge

A knowledge test was administered to the participants before exposing them to the intervention and immediately after the exposure to measure increase in their knowledge levels. The participants were exposed to various aspects of the prevention and control measures of anaemia during the three days education programme. The present study has indicated the knowledge gained was increased after the education programme. This may be because of the effectiveness of education programme. Moreover the participants were exposed to various visual aids, which enabled them to understand the matter easily. The participants were also given a hand out on "Anaemia and its control" for further guidance and follow-up.

Earlier study conducted by Razeena (2000) has been proven that the actual impact of educational programme was the adoption of the gained knowledge and it was found that teaching had significance effect on the adoption of good practices.

It was observed by yegammai et al (2002) in a study conducted at the pre and postnatal nutrition education to the mothers created much awareness on the feeding practices of the infants in the experimental group than the control group. Annama Kumar et al (2003) has reported that video film was an effective material for imparting nutrition education pertaining to Vitamin A to middle school children which resulted in improving their knowledge.

In a study conducted on food safety measures among ICDS functionaries by Suresh (2001) it was revealed that majority of the respondents who had only moderate level of pretest knowledge before training showed a shift from the moderate to high level and there was reduction in the number of respondents who remained in low score level, afer the training. Similar trends were observed in the present study also.

5.5.2 Change in attitude

The present study indicated that the change in attitude towards the NNAPP programme was positively influenced by the education programme. Cicil Mary (2000) reported that the impact of educational programme had significant positive role at all levels in terms of nutritional knowledge gained and change in attitude towards consumption of mushroom. Ukkuru (1993) also revealed that there was much difference in the attitude of mothers in the aspects like hygiene, sanitation and deficiency diseases after training.

Data collected after a training programme by Suresh (2001) revealed that majority of respondents (64 per cent) had shifted to highly favorable attitude.

5.5.3 Extent of adoption of better dietary practices

In the present study there was an improvement in the intake of iron rich food/iron enhancers after education programme. This was similar to a study conducted by Mishra et al (2003) which revealed that education programme on nutrition among women enabled them to bring about remarkable improvement in the dietary habits. One of the low cost and easy to adopt interventions to reduce the prevalence of anaemia is dietary modification. Modifying peoples diet may involve imparting new knowledge and changing attitudes and practices of individuals, especially behavioral modification. The three recommended modifications were increasing the intake of haem iron, usually from meat although this may not be economically / culturally acceptable, increasing the intake of vitamin C along with foods which promote iron absorption and reducing the intake of inhibitors of iron

absorption (UN. 1991). After the education programme the frequency score on consumption of green leafy vegetable was found to increase studies undertaken in Baroda by Seshadri et al (1994) have revealed that children who consumed green leafy vegetable frequently (once a week or more often) tend to have higher haemoglobin levels than those who were infrequent or non consumers. The rate of consumption of locally available iron rich fruits and iron enhancers were increased after the intervention. Seasonally available fruits like sapota, custard apple and watermelon were used least frequently by the beneficiaries. Lisa (1996) reported that fruits are mostly included in the diet depending on the seasonal availability. After the education programme low cost and easily available iron rich foods like rice flakes, ragi, groundnut, gingellyseeds and jaggery were consumed reported to be more frequently than before. Though the consumption of meat and egg did not increase much after the education programme, which may be due to, the high cost fish was consumed by all the participants/beneficiaries. NNMB (1994) has stated that intake of flesh foods was high in Trivandrum and it constituted mostly of fish. The results of the study indicated that the education programme brought about positive impact on the adoption of better practices. The results of the study are similar to a study conducted by Deshpande and Bargale (2006) and Methi and Saraswathy (2006) which indicated improvement in the dietary habits after participation in an education programme.

In the present study after the education programme frequency of use of Tea / Coffee / Milk along with meals were reduced. Only 26 participants reported that they cannot avoid consuming Tea / Coffee / Milk along with meals. However remaining 74 per cent were not consuming it along with meals. More over it was observed during the survey that many of them (48 per cent) were found to be consuming the IFA tablets either in the morning or in the night. During the education programme the participants were advised to consume the tablets along with meals preferably with lunch, which might reduce some of the gastro intestinal disorders. After the education

programmes many of them reported that they had started consuming the tablets along with lunch, which they found to be more comfortable. However during the survey the supply of supplements was regular through the PHC. But it was reported from the PHC that when the supply of IFA tablets was insufficient or irregular it might affect the distribution and there will be a failure of uniform supply. So only if these are also regularized a total change can be brought about.

5.6 CORRELATION BETWEEN PRE TEST KNOWLEDGE AND ATTITUDE OF THE PARTICIPANTS WITH THE SELECTED INDEPENDENT VARIABLES

5.6.1 Correlation between the pre test knowledge of the participants and the selected independent variables

In the present study it can be seen that age and family size did not have any significant correlation with the knowledge of NNAPP beneficiaries. Prasannakumari (2004) also found that age and family size had no significant correlation with the knowledge of ICDS beneficiaries. With respect to knowledge score, a positive correlation with educational status (0.4696*) at 5 per cent level with respect to pregnant mothers was observed. Educational status of individuals will helps to increase one's knowledge, broaden one's out look and encourage adoption of new practices in one's life. This may be the reason for the significant relationship of education level of the participants with their knowledge. It has also been that the majority of the participants had high school level of education, which is a common feature of Kerala. In a study conducted by NFHS (1998-99), significant difference was noted in the percentage of literate mothers (76.4 per cent) provided with IFA tablets as compared to illiterate mothers (38.3 per cent) due to higher awareness amongst literate mothers who demanded IFA tablets.

Significant association of participation index (0.3892*) in mothers of preschool children and (0.2363*) in all participants at 5 per cent level with knowledge score. Prasanna Kumari (2004) also found similar results. The present study also revealed that selected independent variables such as family income, mass

media exposure, social participation and nutritional status index had no correlation with the knowledge of NNAPP beneficiaries.

5.6.2 Correlation between the pre test attitude of the participants and the selected independent variables

In the present study it can be seen that age (0.4660**) had significant correlation with the attitude of lactating mothers and educational status (0.4609*) had significant correlation with the attitude of pregnant mothers. Similar result was found by Prasanna Kumari (2004) where age and educational status had significant correlation with the attitude of ICDS beneficiaries. Family size, family income, mass media exposure, social participation, participation index and nutritional status index had no significant correlation with the NNAPP beneficiaries.

5.7 COMPARISON OF THE KNOWLEDGE, ATTITUDE AND PRACTICE SCORES AMONG THE PARTICIPANTS

Participants of NNAPP programme were observed to be more enthusiastic during the education programme and it was well reflected in their scores for knowledge gain, attitudinal changes and showed better rate of adoption of dietary practices. The paired't' test values indicated the impact of education programme among the participants. An evaluation of impact of nutrition councelling among coronary heart disease subjects through pre and post test of KAP at risk revealed a significant improvement in the knowledge, attitude and practice scores among the subjects after the nutrition councelling. (Kaur and Chawla 2006).

SUMMARY

6. SUMMARY

Nutritional anaemia is a worldwide problem with the highest prevalence in developing countries especially in India. It steals the vitality from the young and old, threaten the health of pregnant women and impair the cognitive development of children. Studies have reported that more than 320 million people in India suffer from iron deficiency anaemia with the highest prevalence among women and children. NNAPP has been fighting to control the ailment since 1970 but has not yielded much.

The present study entitled "Nutritional awareness among the participants of National Nutritional Anaemia Prophylaxis Programme" was conducted among selected 100 participants, which included 30 pregnant mothers, 35 lactating mothers, and 35 mothers of preschool children from four Primary Health Centres selected at random from 18 Primary Health Centres functioning in Neyyattinkara taluk of Thiruvananthapuram District. The programme involved KAP studies to improve the nutritional awareness of the participants by means of an education intervention and impact of the programme evaluated through change in Knowledge, Attitude and Practice of the participants.

Information on the personal and socio economic characteristic such as age, religion, type of family, family size, educational status of the participants, educational status of the family and family income, their social participation and mass media exposure, nutritional profile of the participants and the participation in the programmes related to NNAPP were ascertained. The existing knowledge, attitude and practice of the participants towards the programme were studied. Based on the pre test scores on knowledge, attitude and practice the lacunae in their knowledge was identified. Keeping this in view a need based education programme was planned and carried out and impact studied through the knowledge gain, attitudinal changes, and adoption of better practices. Relationship of the selected independent variables such as age, family size, educational status, family income, mass media exposure, social participantion, participation index and nutritional status index with the dependent variables (Knowledge, Attitude and Practice) were also studied.

The salient findings of the study are summarized and presented below

The assessment of the personal and socio economic characteristic revealed that majority of the participants (84 per cent) belonged to the age group 21-30 years. Analysis of the educational level of the participants revealed that 30 per cent of them were educated up to high school and above. However 5 per cent were found to be illiterate. Nearly 60 per cent of the participants belonged to Hindu community. Analysis of the family structure reveled that 62 per cent of the participants belonged to nuclear type of families and 67 per cent of the families had a family size of 1-4 members.

Regarding the educational status it was observed that 70 per cent families of the participants had family educational status in the medium level. Analysis of data on the family income revealed that 75 per cent of the participants had family income below Rs5000.Seventy eight per cent of the participants had own housing facilities, with moderate physical amenities. However it was found that only 61 per cent of the participants had own toilet facilities and remaining 39 per cent depended either on facilities provided by panchayat or open area for the purpose. Exposure of participants to mass media revealed that 83 per cent were found to be watching television daily and 33 per cent listening radio. Only 14 per cent were found to be reading newspaper daily. On assessing their social participation was found that 72 per cent of them were members of some or other organization and had good social participation.

Anthropometric measurement of the participants revealed that BMI of 50 per cent of the pregnant mothers, and 48.6 per cent of the lactating mothers were found to fall in the normal range. Weight for height of child beneficiaries was computed following the Water low classification and it was found that only 31 per cent were normal.47 per cent of the child beneficiaries were found to be stunted and remaining 20 per cent of the child beneficiaries belonged to the category 'stunted and wasted'.

Haemoglobin level of the beneficiaries revealed that only 17 per cent were normal.40 percent were moderately anaemic and 37 per cent mildly anaemic. However 6 per cent were found to be severely anaemic.Mean food intake of the beneficiaries revealed that the food group which met the RDA least was pulses, green leafy vegetables, followed by fruits, fats and oils, sugar and jaggery.Mean nutrient intake of the women beneficiaries revealed that iron, vitamin B12, vitamin C and folic acid were found to be far below the RDA stipulated. Mean nutrient intake of the child beneficiaries indicated that energy, protein, iron, vitamin C and folic acid were below the RDA.

The Nutritional Status Index of the beneficiaries was computed incorporating relevant parameters like height, weight, and haemoglobin level and energy intake. Medium and high Nutritional Status Index was found among 65 per cent and 16 per cent of the beneficiaries respectively and 19 per cent of the beneficiaries came in the low Nutritional Status Index.

Majority of the participants relied more on the anganwadi workers than the PHC staff for receiving the iron and folic acid supplements since they had more opportunities to meet the anganwadi workers. Only less than 25 per cent of the participants participated in the meetings, campaign, nutrition and health education classes consistently. Regularity in the consumption of IFA tablets was monitored and it was observed 22 per cent were partially regular and 26 per cent irregular. However out of the remaining 52 per cent.30 per cent of the beneficiaries never collected/received the tablets and 22 per cent received tablets did not bother to consume the same.

Participation Index of the beneficiaries in the programme related activities of PHC revealed that 58 per cent had medium level of participation index, 26 per cent had high level of participation index and 16 per cent had low level of participation index.

Data collected on the constraints faced by the beneficiaries revealed that irregular supply of supplements, gastro intestinal side effects, misconcepts such as a) the consumption of the tablet might increase the size of the baby and there by making the

delivery difficult, b) the child would become black complexioned, which prevented them from consuming the tablets and lack of awareness were the major constraints experienced by the participants.

The pre test scores revealed lack of knowledge of the participants about various aspects related Anaemia and its prevalence, Role of iron and dietary modification and Anaemia control programme objectives. Based on the pre test knowledge on education programme of three days duration was conducted for the benefit of the participants to impart required information on the above areas.

The education programme had significant effect on the gain in knowledge as well as change in attitude and extent of adoption of better dietary practices. Correlation of selected independent variables of participants on the knowledge, attitude and practice revealed significant positive correlation with educational status, participation index and knowledge. Significant positive correlation was observed with age, educational status and attitude.

Comparison of knowledge, attitude and practice scores among the participants revealed that the education programme had significant improvement in the awareness of the participants.

On the whole it was revealed that there was definite impact on the education programme in creating awareness among the beneficiaries. However awareness among the participants alone cannot make the programme fully successful. Attention must be paid to increasing awareness and knowledge among the health care providers, teachers, parents and the general public concerning the health. Regular supply of the supplements supported by constant motivation of the participants to participate in the programme and periodical monitoring by the health personnel can definitely bring about a change in the attitude which might help to adopt better dietary practices. All these factors brought together can reduce to a great extent the prevalence of anaemia among the vulnerable groups of the population.

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APPENDICES

APPENDIX – I

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE
VELLAYANI
DEPARTMENT OF HOME SCIENCE

Questionnaire to elicit information on the Socioeconomic and personal profile of the participants

PHC to which attached

1) Name of the respondent :
2) Address :
3) Type of the participation :
i) Mother beneficiary :
   a) Pregnant
   b) Lactating
ii) Mother of child beneficiary :
   a) Child
4) Religion : Hindu/ Christian/ Muslim
5) Family size : Small /medium/ Large
6) Type of family : Joint/Nuclear/Extended

7) House hold members and their demographic particulars

Sl. No	Name of the members	Sex	Actual age	Relation with the respondent	Education	Monthly income

8) Nature of House : Own / rented
9) Type of house : Terraced/ tiled/ sheeted/ thatched
10) Type of wall : Brick/ mud / raw brick/ coconut leaves /

11) Type of flooring : tiles / cement / cow dung

12) Number of room :

13) Availability of latrine facility : yes / no

14) Source of drinking water : well / pipe

15) Fuel used for cooking : Gas / kerosene and fire wood/firewood

16) Mass media Exposure

SI.No	Mass media	Daily	Twice or more in a week	Once in a fortnight	Once in a month	Never
1.	Radio					
2.	TV					
4.	News paper					

17) Social participation : Membership in social organization
- As member
- As office bearer
- No member

APPENDIX – II

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE
VELLAYANI
DEPARTMENT OF HOME SCIENCE

Questionnaire to elicit information on the

Health and Nutritional profile of the beneficiaries

1) Anthropometric measurement:

P/C	P/M
Height	Height
Weight	Weight

2) Bio chemical measurement

Haemoglobin –

3) 24 hour recall method

Meal pattern	Type of food preparation	Raw quantity of each ingredient (gm)	Total cooked amount (gm)
Early morning			
Break fast			
Mid morning			
Lunch			
Tea time			
Dinner			

APPENDIX – III

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE
VELLAYANI
DEPARTMENT OF HOME SCIENCE

Questionnaire to elicit information on the

Participation in the NNAPP (participants)

1) Have you heard the NNAPP programme? Yes / No

2) Are you a receipt of iron / folic acid supplements from PHC? Yes / No

3) How far is the primary health center from your home?

<1km. 1to 2km, >2km

4) How often do you visit the following functionaries?

Functionaries	Always	Sometimes	Never
Junior Health Inspector			
Junior Public Health Nurse			
Anganwadi worker			

5) Participation in Programmes related to primary health center

Programmes	Participation		
	Always	Sometimes	Never
a) Mothers meeting of ICDS/PHC b) Campaign at AWC/PHC C) Education classes at AWC/PHC			

6) Do you have any difficulty to consume the iron and folic acid supplements?

Yes / No

If yes mention the constraint

7) Do you have any suggestions for improvement?

If yes mention the reason

Appendix -IV

The education programme schedule for three days programme on National Nutritional Anaemia Prophylaxis Programme

SI.NO	Content	Method	Teaching aids	Evaluation
I.	**Anaemia and its prevalence**			
	1. Introduction to anaemia	Lecture	-	Post test
	2. Causes of anaemia	Lecture cum group discussion	-	Posttest
	3. Prevalence of anaemia	Lecture	Chart -1	Post test
	4. Symptoms of anaemia	Lecture	Chart-1	Post test
	5. Consequences of anaemia	Lecture	-	Post test
II.	**Role of iron and dietary modification**			
	1. Role of iron in the body	Lecture	-	Post test
	2. Recommended Dietary Allowances of iron for the target group	Lecture	Chart-1	Post test
	3. Sources of iron rich food	Lecture cum group discussion	Flashcard-5nos	Post test
III.	**Anaemia Prophylaxis Programme objectives**			
	1. What is mean by NNAPP?		-	Post test
	2. How is implemented through PHC?	Lecture cum group discussion	-	Posttest
	3. Supplementation of iron and folic acid to the target group	Lecture cum group discussion	-	Post test
	4. Imparting nutrition education to enhance			
	a) Consumption of iron rich foods		Flannel graph-1	Post test
	b) Inclusion of iron enhancers and reduce of iron inhibitors in the diet	Lecture cum group discussion		Post test
	c) Environmental sanitation to prevent diseases		Chart-1	Post test

APPENDIX-V

KERALA AGRICULTURAL UNIVERSITY
College of Agriculture, Vellayani
Department of Home Science

"Nutritional awareness among the participants of National Nutritional Anaemia Prophylaxis Programme"

Schedule to assess the knowledge of the participants towards the NNAPP

Given below are few statements related to National Nutritional Anaemia Prophylaxixs Programme.

Please indicate your response by putting a tick mark (✓) against the statements. If your answer is 'Yes' put tick against 'Yes' column and if it is 'No' put tick against 'No' column.
Name of Investigator:

Sl. No	Statements	Yes	No
1.	Iron deficiency is a major public health problem in India		
2.	Anaemia control programme promotes health care		
3.	Anganwadi worker assist the PHC staff in the implementation of the NNAPP		
4	Pregnant women need not consume iron and folic acid tablets		
5.	Periodic deworming is an important part in the Anaemia Prophylaxis Programme		
6.	Hook worm infestation has no role to prevent anaemia		
7.	Nutrition education is an integral part in the Anaemia Prophylaxis Programme		
8.	Consumption of germinated grains must be encouraged		
9.	Anaemia is not a deficiency disorder		
10.	Anaemia in pregnant women increases preterm delivery		
11.	Excessive bleeding during menstruation is not a cause for anaemia		
12.	Anaemic women have poor work capacity		
13.	Frequent consumption of tea enhances absorption of iron		
14.	Leafy vegetables are rich sources of iron		
15.	Locally available fruits like amla, guava enhances absorption of iron		
16.	Dried and powdered leafy vegetable incorporated in the weaning food should be encouraged		
17.	Milk is a good source of iron		
18.	Eating rice flakes with jaggery helps to increase the incidence of anaemia		
19.	Liver is a poor source of iron		
20.	The addition of fish to a meal increases iron absorption		

APPENDIX-VI

KERALA AGRICULTURAL UNIVERSITY
College of Agriculture, Vellayani
Department of Home Science

"Nutritional awareness among the participants of National Nutritional Anaemia Prophylaxis Programme"

Schedule to assess the attitude of the participants towards the NNAPP

A few statements to assess the attitude of the participants towards NNAPP are given below. There are five columns against each statement marked "Strongly Agree", "Agree", "Undecided", "Disagree", and "Strongly Disagree". Read each statement and record your valuable opinion by putting 'tick' mark against each statement in the appropriate column. Eg. If you "Strongly Agree" with the statement kindly put 'tick' mark against the statement in the column "Strongly Agree". Likewise with other columns. Kindly return the proforma to me after recording your valuable opinion at the earliest.

Name of Investigator:

Sl. No	Statements	S.A	A	U.D	D	S.D
1.	Anaemia is a serious threat to the public health					
2.	PHC staff do not act as an effective force in decreasing iron deficiency among women and children					
3.	Anaemia control programme has very little to contribute towards nutritional deficiency					
4	Anaemia control programme cannot ensure the recommended dietary allowance of iron for the beneficiary					
5.	Pregnant women should strictly adhere to the recommended dietary allowances of iron for maintaining health					
6.	NNAPP decreases the productivity of women work force					
7.	Lady Health Visitor (LHV) of PHC should advice reduced consumption of tea especially during pregnancy					
8.	Adolescent girls do not need any particular nutrition education programme					
9.	Distribution of medicines through anganwadies are beneficial					
10.	PHC help in creating an awareness about the anaemia among the people					
11.	Iron supplementation to anaemic pre school children improves their health					
12.	Consumption of leafy vegetables by lactating women leads to diarrhea in the child					
13.	IFA tablets supplied through PHC are out dated					
14.	Irregular supply of IFA tablets remain a major programme constraint					
15.	Anaemia is threat to safe delivery					
16.	Germinated, dried and powdered pulses are difficult to get digested.					
17.	Iron rich foods are expensive					
18.	Iron vessels cannot used for cooking					
19.	Jaggery is more nutritious than sugar					

APPENDIX – VII

KERALA AGRICULTURAL UNIVERSITY
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Questionnaire to elicit information regarding dietary practice of the selected respondents with respect to consumption of iron rich foods/iron enhancers, iron inhibitors and regularity in the consumption of Iron supplements

1) Food habits of the respondent: a) Vegetarian, b) Non – Vegetarian

2) Frequency of use of iron rich foods / iron enhancers

Food items	Daily	Weekly Thrice	Weekly Twice	Once in a Week	Fortnightly	Once in a month	Occasionally	Never
Cereals Parboiled rice Rice flakes Wheat Ragi								
Pulses Green gram / Dhal Black Gram / Dhal Soya Bean Peas dry Cow Pea Sprouted Pulses								
Green leafy vegetables Amaranthus Drumstick leaves Chekkurmanis								

APPENDIX-VII Continued

Other vegetables Cabbage Bitter gourd Snake gourd Plantain green								
Roots and tubers Carrot Beetroot Onion Potato								
Fruits Dates Sapota Custard apple Pineapple Amla Guava Orange Lemon Watermelon								
Nuts and oilseeds Groundnut Gingelly seeds								
Others Egg Meat Fish Jaggery								

3) Frequency of use of Iron inhibitors in the Diet

Food tems	Quan tity	Daily							Weekly once	Weekly twice	Weekly thrice	Once in month	Occasi onally
		E.M	B.F	Mid morning	Lunch	Tea time	Dinner	Bed time					
Milk													
Tea													
Coffee													

4) Regularity in the consumption of iron supplements during the month

Date	Morning	After noon	Night
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
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12			
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APPENDIX – VIII

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Body Mass Index of the mother beneficiaries

Pregnant Mothers (30)				Lactating Mothers (35)			
Sl. No	Wt (Kg)	Ht (cm)	BMI	Sl .No	Wt (Kg)	Ht (cm)	BMI
1	52	160	20.3	1	48	153	20.5
2	56	158	22.4	2	52	150	23.1
3	56	152	24.2	3	46	152	19.9
4	65	160	25.3	4	48	156	19.7
5	55	154	23.2	5	53	158	21.2
6	44	152	19.0	6	52	160	20.3
7	45	148	20.5	7	45	148	20.5
8	52	147	24.1	8	52	155	21.6
9	54	160	21.1	9	46	150	20.4
10	40	155	16.6	10	40	152	17.3
11	70	160	27.3	11	42	150	18.2
12	58	155	24.1	12	58	155	24.1
13	45	150	20	13	39	152	16.8
14	42	154	17.7	14	62	152	26.8
15	45	147	20.8	15	60	154	25.2
16	56	158	22.4	16	50	148	22.8
17	52	156	21.3	17	40	150	17.7
18	42	148	19.1	18	60	162	22.8
19	62	158	24.8	19	42	158	16.8
20	42	152	18.2	20	58	150	25.7
21	40	154	16.8	21	39	157	15.8
22	65	160	25.4	22	63	160	24.6
23	54	153	23.1	23	43	145	20.4
24	43	151	18.8	24	40	154	16.8
25	62	158	24.8	25	59	151	25.9
26	68	160	26.5	26	55	152	23.8
27	64	154	27.0	27	40	150	17.7
28	52	156	21.3	28	52	154	21.9
29	45	153	19.2	29	54	156	22.2
30	60	153	25.6	30	50	150	22.2
				31	45	156	18.5
				32	51	160	19.9
				33	53	157	21.5
				34	44	150	19.5
				35	62	156	25.5

APPENDIX –IX

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Actual height and weight of the child beneficiaries

SI.No	Age	Sex	Weight	Std.weight	Height	Std.Height	Weight/Height
1	3	M	12.5	14.6	90	94.9	90.2
2	3	M	13	14.6	97	94.9	87.2
3	4	M	17	16.7	105	102.9	100
4	4	M	17.5	16.7	105	102.9	102.7
5	3	M	11.5	14.6	90.5	94.9	82.6
6	3	M	13	14.6	95	94.9	89
7	5	M	15.5	18.7	110.5	109.9	82.4
8	3	M	15	14.6	98	94.9	100
9	3.6	M	16	15.7	100.1	99.1	100.8
10	5	M	16	18.7	105	109.9	89.6
11	3	M	12.5	14.6	98.2	94.9	82.6
12	4	M	12.5	16.7	95.5	102.9	80.7
13	4.6	M	15	17.7	107	106.6	84.4
14	4.6	M	18	17.7	108.5	106.6	100
15	3	M	9.5	14.6	84.5	94.9	73
16	3.6	M	10.5	15.7	90.5	99.1	73.3
17	3	M	10.5	14.6	88.5	94.9	77.1
18	4	M	14	16.7	103.2	102.9	83.5
19	3.6	F	10	15.1	98	97.9	66.1
20	4	F	13.5	16	102	101.6	83.9
21	3.6	F	14	15.1	100	97.9	90.8
22	4	F	14.5	16	99.5	101.6	92.5
23	3.6	F	14	15.1	100.5	97.9	90.3
24	3.6	F	12.5	15.1	101	97.9	80.3
25	3	F	11	14.1	90.5	93.9	80.9
26	3	F	12	14.1	90.5	93.9	88.3
27	3	F	10	14.1	90	93.9	74
28	3.6	F	10.5	15.1	85	97.9	80.1
29	4	F	16.5	16	102	101.6	103
30	5	F	17	17.7	110.5	108.4	94.2
31	4.6	F	14.5	16.8	100.5	105.1	90.5
32	4	F	13.5	16	100	101.6	84
33	5	F	13	17.7	105	108.4	75.5
34	3.6	F	15.5	15.1	100.1	97.9	100.3
35	4.6	F	12.5	16.8	105.5	105.1	74.3

APPENDIX – X

KERALA AGRICULTURAL UNIVERSITY
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Estimation of Haemoglobin (Cyanmethaemoglobin Method)

Principles

Haemoglobin is converted in to cyanmethhaemaglobin by the addition of KCN and Ferric cyanide. The colour of cyanmethhaemaglobin is read in a photocolorimeter against a standard solution. Since cyanide has the maximum affinity for haemoglobin, this method estimates the total haemoglobin.

Procedure

The procedure for estimation of haemoglobin is by taking 20 µl of blood measured accurately from a haemoglobin pipette and delivered on to whatman No.1 filter paper of size 2 X 4 cm. The filter paper is then air dried and labelled. This can be stored up to one week. The portion of filter paper containing the blood is cut and dipped in 5ml of Drabkins solution taken in a test tube. Wait for 30 minutes. Mix the contents and take the reading at 540 nm of unknown sample and that of standard of known haemoglobin content against a reagent blank (Raghuramulu et al., 2003). This procedure was followed here in the haemoglobin estimation of the sub sample and the reading obtained was tabulated for further investigation.

APPENDIX – XI

KERALA AGRICULTURAL UNIVERSITY
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Cut off used for defining different degrees of Anaemia (WHO2001)

Target group	Degree of anaemia	Cut off in terms of Hb level (g/dl)
Pregnant mothers and Preschool children	Severe anaemia	< 7.0
	Moderate anaemia	7.0 - 9.9
	Mild anaemia	10 - 10.9
	Normal	>11
Lactating Mothers	Severe anaemia	< 7.0
	Moderate anaemia	7.0 - 9.9
	Mild anaemia	10.0 - 11.9
	Normal	>12

APPENDIX – XII

KERALA AGRICULTURAL UNIVERSITY
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DEPARTMENT OF HOME SCIENCE

Haemoglobin level of the beneficiaries

Sl. No	Pregnant Mothers (30)	Sl. No	Lactating Mothers (35)	Sl. No	Preschool children (35)
1	9.6	1	10.8	1	10.5
2	10.7	2	10.5	2	9.2
3	10.5	3	10.0	3	10.5
4	11.0	4	9.8	4	11
5	10.8	5	11.2	5	9.8
6	9.9	6	9.5	6	10.4
7	9.8	7	9.8	7	11.1
8	10.2	8	9.5	8	10.2
9	10.5	9	9.2	9	11.0
10	6.8	10	7.9	10	8.5
11	10.0	11	8.5	11	9.4
12	11.0	12	12.1	12	10.0
13	8.8	13	6.8	13	10.2
14	6.5	14	12	14	10.4
15	8.4	15	12.2	15	8.5
16	9.5	16	11.5	16	11.4
17	8.8	17	8.1	17	8.6
18	7.6	18	10.8	18	8.2
19	10.2	19	8.5	19	10.2
20	9.5	20	11.2	20	11.2
21	8.4	21	6.9	21	11.0
22	10.5	22	12.1	22	10.5
23	9.8	23	8.5	23	9.2
24	9.2	24	7.8	24	9.9
25	9.5	25	10.7	25	8.8
26	10.2	26	12.0	26	10.1
27	10.0	27	8.2	27	10.4
28	9.4	28	12.1	28	6.5
29	8.5	29	11.2	29	11.2
30	6.7	30	10.5	30	11.0
		31	8.9	31	10.3
		32	10.2	32	10.6
		33	10.6	33	9.8
		34	7.7	34	10.8
		35	12.0	35	10.2

APPENDIX –XIII

KERALA AGRICULTURAL UNIVERSITY
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Nutritional Status Index of the beneficiaries

SI. No	Pregnant Mothers (30)	SI. No	Lactating Mothers (35)	SI. No	Preschool children (35)
1	20.39	1	15.83	1	16.23
2	21.63	2	15.12	2	15.65
3	21.08	3	15.36	3	17.75
4	22.23	4	16.25	4	18.39
5	21.52	5	15.79	5	15.43
6	17.86	6	16.22	6	16.13
7	19.88	7	14.53	7	18.26
8	20.40	8	15.44	8	17.17
9	21.46	9	14.14	9	18.73
10	18.73	10	14.38	10	14.19
11	22.31	11	14.46	11	15.18
12	21.62	12	16.75	12	17.02
13	18.82	13	13.32	13	17.10
14	19.92	14	16.59	14	17.12
15	18.2	15	16.76	15	15.23
16	20.22	16	15.88	16	18.34
17	20.42	17	14.24	17	15.67
18	17.27	18	16.19	18	13.56
19	21.85	19	16.80	19	16.22
20	19.69	20	15.32	20	17.45
21	17.18	21	13.29	21	17.53
22	21.65	22	17.17	22	17.25
23	20.29	23	14.16	23	15.72
24	19.31	24	14.40	24	16.2
25	20.33	25	15.86	25	14.33
26	21.35	26	16.45	26	17.43
27	20.74	27	15.6	27	18.72
28	19.95	28	16.57	28	13.52
29	18.67	29	16.33	29	18.72
30	20.27	30	15.54	30	18.03
		31	15.09	31	17.97
		32	15.61	32	16.79
		33	15.64	33	15.39
		34	14.14	34	17.57
		35	16.54	35	18.33

APPENDIX – XIV

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Participation Index of the beneficiaries

Sl. No	Pregnant Mothers (30)	Sl. No	Lactating Mothers (35)	Sl. No	Preschool children (35)
1	40	1	42	1	56
2	52	2	45	2	38
3	51	3	38	3	46
4	68	4	35	4	60
5	50	5	62	5	42
6	45	6	45	6	44
7	45	7	52	7	46
8	53	8	50	8	34
9	60	9	42	9	48
10	32	10	35	10	32
11	40	11	38	11	43
12	58	12	68	12	40
13	40	13	25	13	45
14	38	14	54	14	49
15	42	15	56	15	32
16	52	16	50	16	56
17	50	17	36	17	34
18	44	18	48	18	35
19	58	19	40	19	54
20	42	20	48	20	68
21	40	21	32	21	60
22	51	22	54	22	62
23	45	23	42	23	64
24	42	24	35	24	55
25	46	25	44	25	42
26	50	26	52	26	52
27	35	27	40	27	54
28	40	28	58	28	25
29	38	29	50	29	58
30	28	30	38	30	55
		31	28	31	48
		32	45	32	48
		33	48	33	35
		34	34	34	53
		35	54	35	50

APPENDIX – X. V

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Frequency of use of iron rich food/iron enhancers (after the education Programme)

Food Items	Daily	Weekly Thrice	Weekly Twice	Once in a Week	Fort Nightly	Once in a Month	Occa sionally	Never
Cereals								
Par boiled rice	100	-	-	-	-	-	-	-
Rice flakes	-	-	17	50	33	-	-	-
Wheat	-	7	27	67	-	-	-	-
Ragi	-	-	7	50	43	-	-	-
Pulses								
Green gram	-	33	67	-	-	-	-	-
Black gram	-	13	87	-	-	-	-	-
Cowpea	-	-	-	73	27	-	-	-
Peas dry	-	-	-	74	26	-	-	-
Soya bean	-	-	-	-	-	-	20	-
Green leafy Vegetables								
Amaranthus	-	-	-	33	67	-	-	-
Drumstick leaves	-	-	17	67	16	-	-	-
Chekkurmanis	-	-	-	27	73	-	-	-
Other Vegetables								
Cabbage	-	-	-	60	40	-	-	-
Bitter gourd	-	-	-	27	40	-	-	-
Snake gourd	-	-	-	33	67	-	-	-
Plantain green	-	-	-	47	53	-	-	-
Roots and Tubers								
Carrot	-	-	23	43	33	-	-	-
Beet root	-	-	-	40	47	13	-	-
Onion	80	20	-	-	-	-	-	-
Potato	-	-	83	17	-	-	-	-
Fruits								
Dates	-	-	-	23	77	-	-	-
Sapota	-	-	-	-	60	40	-	-
Custard apple	-	-	-	-	-	17	83	-
Pine apple	-	-	-	27	73	-	-	-
Amla	-	-	7	60	33	-	-	-
Guava	-	-	-	-	27	73	-	-
Orange	-	-	-	10	57	33	-	-
Lemon	-	-	-	17	67	16	-	-
Water melon	-	-	-	-	-	-	100	-
Nuts and Oil Seeds								
Groundnut	-	-	7	13	33	47	-	-
Gingelly Seeds	-	-	-	16	50	34	-	-
Others								
Egg	-	-	17	73	10	-	-	-
Meat	-	-	7	27	66	-	-	-
Fish	67	33	-	-	-	-	-	-
Jaggery	-	-	-	17	50	33	-	-

APPENDIX –XVI

KERALA AGRICULTURAL UNIVERSITY
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Folder on "Anaemia and its Prevention" (distributed among the participants)

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Department of Home Science
College of Agriculture
Vellayani

ABSTRACT

NUTRITIONAL AWARENESS AMONG THE PARTICIPANTS OF NATIONAL NUTRITIONAL ANAEMIA PROPHYLAXIS PROGRAMME

P. BHUVANESHWARI

Abstract of the
Thesis submitted in partial fulfilment of the requirement
for the degree of

Master of Science in Home Science
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ABSTRACT

Iron deficiency anaemia is a major global nutritional problem and is prevalent in 50-80 per cent of population in different parts of India. Towards reducing anaemia, the government of India (GOI) launched the National Nutritional Anaemia Prophylaxis Programme (NNAPP) in 1970.National Anaemia control and Prophylaxis Programme has been fighting the relentless struggle to control the ailment since 1970, but has not yielded much. Hence a study entitled "Nutritional awareness among the participants of NNAPP" was undertaken to elicit the existing knowledge, attitude and practice on the programme among the participants identify the lacunae and to suggest correct preventive measures among the participants and to study its impact through KAP studies.

For pre test and posttest of knowledge and attitude suitably structured and pre test checklists were used. The dietary practice was assessed through food use frequency studies before and after the education programme. The regularity in the consumption of IFA tablets by the beneficiaries was studied before and after the intervention on consumption basis. The data pertaining to the socio economic and personal characteristics, health and nutritional profile and their participation in the NNAPP of the participants were ascertained with the help of a structured and pre tested interview schedule. The collected data were tabulated, analysed statistically and the results were interpreted.

Majority of the selected participants (84 per cent) in the study belonged to the age group of 21-30 years. Nearly 59 per cent belonged to Hindu community. Most of the participants were from nuclear family with medium level of education, low monthly income and moderate physical amenities. Majority of the families possessed television and radio in their homes and 72 per cent of the participants were members of one or other organization.

Anthropometric measurements revealed that body mass index of 50 per cent of the women beneficiaries were found to fall in the normal range, weight for height of child

beneficiaries revealed that only 31 per cent were normal, 47 per cent were stunted and remaining 20 per cent of the child beneficiaries were stunted and wasted.

Haemoglobin level of the beneficiaries revealed that only 17 per cent were normal.40 percent were moderately anaemic and 37 per cent had mild anaemia. However 6 per cent were found to be severely anaemic. Mean food intake of the beneficiaries revealed that the food group, which met the RDA least, was green leafy vegetables followed by fruits, milk and milk products, fats ad oils, and even sugar. Mean nutrient intake of the women beneficiaries revealed that iron, vitamin B12, vitamin C and folic acid were far below the RDA stipulated. Mean nutrient intake of the child beneficiaries indicated that energy, protein, iron, vitamin C and folic acid were below the RDA.

Nutritional Status Index of the beneficiaries indicated medium and high Nutritional Status Index among 81 per cent of the beneficiaries and only 19 per cent of the beneficiaries were in the low Nutritional Status Index.

Majority of the participants relied more on the anganwadi workers than the PHC staff for iron and folic acid supplements. Less than 25 per cent of the participants participated in the meetings, campaign, nutrition and health education classes consistently.52 percent of the beneficiaries never consumed the IFA tablets. Participation Index of the beneficiaries in the programme related activities of PHC revealed that 58 per cent had medium level of Participation Index.

Data collected on the constraints faced by the beneficiaries revealed that irregular supply of supplements, gastro intestinal side effects, forgetfulness, blind beliefs and lack of awareness were the constraints experienced by the beneficiaries/participants.

The pre test scores revealed the lack of knowledge of the participants about various aspects of anaemia and its prevalence, role of iron and dietary modification, and anaemia control progrmme objectives. The education programme of three days duration

was conducted for the benefit of the participants to impart required information on the above areas.

The education programme had significant effect on the gain in knowledge as well as change in attitude and extent of adoption of practices. Correlation of selected independent variables of participants on the knowledge, attitude and practice revealed that there was significant positive correlation was observed with educational status, participation index and knowledge. Significant positive correlation was observed with age, educational status and attitude.

Comparison of mean scores of pre test and post test knowledge, attitude and practice revealed that education programme had significant improvement in the awareness of the participants.