INFORMATION EDUCATION AND COMMUNICATION (IEC) FOR IODINE DEFFICIENCY DISORDERS (IDD) CONTROL

By

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THESIS
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DECLARATION

I hereby declare that this thesis entitled "**Information Education and Communication (IEC) for Iodine Deficiency Disorders (IDD) control**" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar title, of any other university or society.

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CERTIFICATE

Certified that this thesis entitled "**Information Education and Communication (IEC) for Iodine Deficiency Disorders (IDD) control**" is a record of research work done independently by Mrs. Vishma. C. A. under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to her.

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Dedicated

To

My Family

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LIST OF ABBREVIATIONS

IEC	-	Information Education and Communication
IDD	-	Iodine Deficiency Disorders
DHS	-	Directorate of Health Services
PHC	-	Primary Health Centre
µg	-	Microgram

INTRODUCTION

1. INTRODUCTION

Man is spaced apart from other animals by amongst other criteria, a protracted period of infancy, childhood and adolescence which is characterised by a continuous process of physical growth and development and functional maturation. Good health is a crucial element in the quality of life, a prerequisite for better educational attainment and essential for national economic productivity. The control of linear growth and development is a very complex process and is influenced by number of factors. One such essential factor is the hormone called thyroxine whose production is assisted by the trace element iodine. The disorders caused due to inadequate amount of nutritional iodine in the diet are called Iodine Deficiency Disorders (IDD). Recently iodine deficiency is a world wide nutritional problem and prevails in large areas of globe (Lamberg, 1993).

IDDs have been in existence since centuries, yet continue to be the greatest world wide public health problem. These affect a large segment of population in all continents of our planet. IDD continue to pose a serious threat to the health and well being, economic productivity and advancement of several hundred million people throughout the world. It affects people of all ages, both sexes and different socio-economic status. Nutritional iodine deficiency reckons its impact right from the development of foetus to all ages of human beings. IDD results in a lowered IQ, impaired learning, mental retardation, delayed motor development, stunting, lack of energy, muscular

disorders, speech and learning defects in children. Pregnant women with iodine deficiency are more vulnerable to spontaneous abortions and still births. Adults with IDD suffer from lack of energy, fatigue and low productivity. Iodine deficiency thus directly affects human resource development, which in turn greatly influences the human productivity as well as national development. Besides affecting the human population, IDD leads to reduced milk, egg, meat and wool yields from animals. IDD thus has a significant effect on human and animal development and the quality of the nation's resources. All these conditions have profound implications for the individual and the family and impose significant economic burden on the community at large. Their effect is hidden and profound.

About 1.5 billion population of the world are at the risk of iodine deficiency (Kochupillai and Godbole, 1986). India is one of the major endemic iodine deficient country in the world. Times of India (1997) reported that "With every passing hour, 10 children are born in the country, who will not attain their optimum mental and physical potential due to neonatal hypothyroidism caused by iodine deficiency". Surveys conducted by the goitre control cell of the Directorate of Health Services of Thiruvananthapuram, among 14 districts have revealed the prevalence of goitre throughout Kerala.

Most of the disorders of nutritional iodine deficiency are irreversible and permanent in nature. The harmful effects of IDDs manifest themselves gradually and are not easily evident. But with the continuous depletion of iodine from natural sources, the situation is expected to worsen in coming

years. Prevention is the only cure for IDD. This disorders have not attracted the public attention due to a general notion that these disorders are not fatal. However they can be easily prevented before they occur by regular consumption of iodated salt. But the use of iodised salt is not widely diffused because of a lack of information and health education on this problem. It necessitates for education about IDD – for motivation and attitudinal change among public. Under these circumstances it was felt worth while to undertake a study with an objective to disseminate information about IDD and to develop a favourable attitude towards its preventive measures, since only a proper knowledge and positive attitude can bring about desirable change as reported by D' Avanzo *et al.* (1995), Goldman *et al.* (1990) and Kolonel *et al.* (1990).

According to Prakash (1999) rural areas are not totally exposed to nutrition knowledge and micronutrient deficiency spreads both in lower income as well as upper income group. Thus, educating the people, making them conscious and helping them to utilize the local resource to improve their diets appear to be the solution. Hence, an IDD program was undertaken in the Vellanad panchayat of Thiruvananthapuram district by developing IEC materials. According to Revikumar (1999) IEC is a concentrated and planned endeavour of reaching people as individual, group or masses, putting across scientific knowledge and educating them to develop, expected behavioural pattern and creating a condition in which they direct themselves towards the accomplishment of pre-designated programme. These techniques form a paradigm to achieve public health goals and to communicate and motivate consumers to change their behaviour (Milton, 1999).

Development programme which aim at bringing about socio-economic changes in the rural masses will succeed only if the extension workers are able to ensure and deliver a direct steady flow of technical information to the right people at the right time in the right way. This calls for the proper selection of IEC materials. According to Santhoshkumar (1990) the visual aids support the spoken word and create visual images which will be remembered long even after the written or spoken word is removed from the audience. Hence, visual aids are prepared which can humanise the problem by giving an obvious apace about the context of IDD.

Studies conducted else where in the use of visual aids proved that, more the number of senses stimulated greater will be the success of communication efforts. Communication through the usage of visual aids enters in to social mobilization in several ways. It ensures commitment at the policy level. This will provide a favourable environment for decision making, including provision of adequate resources.

The scope of the present study is that it will help in the selection and use of appropriate IEC method for imparting knowledge on a public health problem.

REVIEW OF LITERATURE

2. REVIEW OF LITERATURE

Literature pertaining to the topic, 'Information Education and Communication (IEC) for Iodine Deficiency Disorders (IDD) control' are presented under the following heads.

1. Role of Iodine-An essential nutrient in human nutrition
2. What are IDD?
3. Prevalence of IDD
4. Major consequences of IDD
5. Causes
6. Preventive measures
7. Importance of IEC in health promotion programmes.

1. Role of Iodine - An essential nutrient in human nutrition

Iodine is one element out of many elements needed for the proper physical and mental development and growth of the body (Kothari, 1991). Iodine form an integral part of the thyroid hormones thyroxine(discovered by Kendall in 1915) and triiodothyronine (a more active but less abundant form discovered in 1952). These hormones are manufactured in the thyroid gland from its stored iodine and the amino acid tyrosine. Thyroid is one of the several endocrine glands. It consists of two lobes one on either side of trachea connected by an isthumus across the front of trachea. The total iodine content in a healthy adult man is about 15-20 μg. This quantity roughly corresponds to

the amount of iodine contained in two drops of tincture of iodine. There is a definite cycle of iodine consumption and excretion which is maintained by the body.

The main function of iodine in the body is that of serving as an essential component of thyroxine and other iodine compounds of thyroid gland. Consequently the physiological functions of thyroxine are those of iodine also. These hormones accelerates energy production, oxygen uptake and basal metabolic rate. They affect carbohydrate, lipid, protein, calcium and phosphorus metabolism. It increases the output and fat content of milk. The functions of thyroxine further include neuromuscular functions (especially of central nervous system), binding to nuclear receptors to influence gene expressions in larger tissues resulting in biological effect, fatty acid release from adipose tissue, cellular differentiation resulting in growth and development of organ/tissues, health of skin and hair, decreasing the circulating level of cholesterol and conversion of beta carotene to vitamin A. Moreover iodine influences the structure and function of biological membranes and also regulates the nutrient uptake by brain. Failure to have adequate iodine leads to insufficient production of thyroid hormones, which affect many different parts of the body particularly muscle, heart, liver, kidney and the developing brain. Eckstein (1980) reported that with under secretion of hormones growth may be retarded and if the reduction is severe and prolonged will result in failure to mature both physically and mentally. The world's single most significant cause of preventable brain damage and mental retardation is deficiency of iodine.

The daily requirement of iodine is about 100 to 150 μg. This amounts to a pinhead a month. An individual's average life time requirement would add upto less than a teaspoon full of iodine. Delange (1993) discussed the history and experimental basis for various recommended dietary allowances for iodine at different stages of life. He reviewed recommendations by U.S. National Academy of sciences published in 1989 and suggested modifications based on experimental evidence gained from considerations of iodine intake, excretion, retention in full term and pre-term infants. He recommended an increase in the U.S. recommendations for infants of 0.6 months of age from 40 μg/day to 90, infants of 6 months to one year from 50 to 90 μg, children aged 1-3 years from 70 to 90 μg and pregnant women from 175 to 200 μg.

2. What are IDD?

Tiwari (1998) simply defined IDD as the disorders caused due to deficiency of nutritional iodine in the food/diet. The disorders could range from plain goitre to lessened activity of the growth controlling thyroid gland and mental impairment.

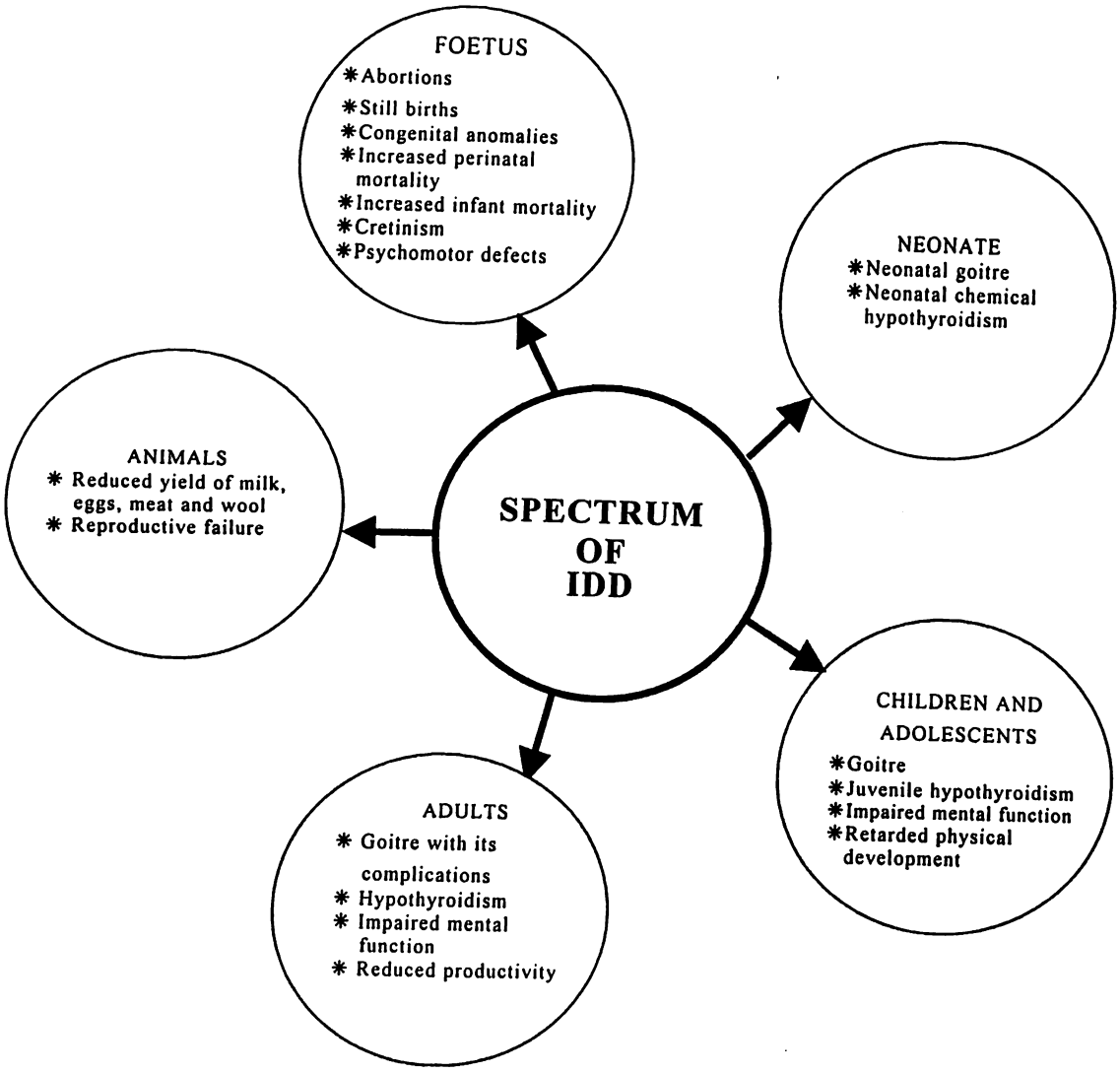
Kheterpaul and Boora (1997) explained IDD to a wide spectrum of iodine deficiency on growth and development including goitre, endemic cretinism, impaired mental function, still birth, perinatal and infant morality. Raghunath *et al.* (1997) hypothesized that altered nutrient supply to the brain, specially at the level of the rate, limiting blood brain barrier transport may be a probable basis for the impaired mental function in IDD.

According to Bhattacharya (1995) it is a burden far greater than that of HIV positive cases. Since wide variety of physiological and neurological disorders are associated with iodine deficiency the term IDD in place of endemic goitre was introduced by Hetzel in1987 (Brahmam, 1998). The adoption of the term IDD reflects a new dimension of understanding of the full spectrum of the effects of iodine deficiency on the foetus, the neonate, child, adolescent and the adult in an entire population. The spectrum of IDD is given in Fig·1

IDD affect every stage of development in human beings. However, Pandav (1993) reported women in child bearing age and children upto the age of 15 years are most susceptible to the iodine deficiency. Swarajyalakshmi and Rao (1991) reported increased prevalence of iodine deficiency in adolescence. They explained that this is may be due to increased demand on the thyroid hormones during period of growth, puberty and adolescence. The over all prevalence of goitre and other IDD is higher in females than males due to increase in perinatal losses, in both instances the difference was found to be statistically significant.

The most devasting consequence of iodine deficiency is on developing human brain (Umesh, 1997). Although maternal thyroid hormones are now believed to cross the placenta the foetus does require iodine to synthesise its own thyroid hormones for its growth and development. The thyroid gland of the foetus starts functioning by the 12^{th} week of gestation therefore if the iodine is not available to the foetus after the 12^{th} week it will not be able to produce thyroid hormones which are critically required for the development of brain as well as for central nervous system.

Fig. 1. SPECTRUM OF IDD



Hetzel (1990) reported that the triiodothyronine content of the brain of iodine deficient foetus is much less than those with iodine sufficient foetuses. UNICEF (1990) estimated that up until 1990 about 40 million children born each year were at some risk of mental impairment caused by iodine deficiency in their mother's diet. If the iodine deficiency is severe it could lead to an abnormality that we see in adult such as cretinism, spastic diplegia and several other mental deficiencies. One should therefore ensure that enough amount of iodine is available to pregnant women so that the growth of foetus in normal. According to Karmarkar (1990) some of these changes which have occurred in the early phase of childhood due to iodine deficiency are irreversible and would be reflected in adult life.

Swarajyalakshmi and Rao (1991) indicated that iodine deficiency of the mother is the cause of hyperthrotropinemia in the new born and the new borns are more affected by iodine deficiency than their mother. Thyroxine is essential for the physical and mental development from early childhood. Apart from the question of mortality the importance of the state of thyroid function in the neonate relates to the fact that at birth the brain of human infant has only reached about one third of its full size and continues to grow rapidly until the end of second year. According to Upadhyay *et al.* (1991) the clinical diagnosis of congenital hypothyroidism in early infancy is often difficult and delay in initiating therapy can lead to irreparable brain damage. Neonatal screening for this disorder is routinely employed in most different parts of the world and is cost effective. In an accompanying editorial in the New England

Journal of Medicine Dr. Robert Utiger, a deputy editor of the journal suggests that money for screening might better be spent on population wide efforts to improve thyroid function by reducing iodine deficiency (Scott, 1999). In populations with high incidence of neonatal hypothyroidism an increased prevalence of nerve deafness and a shift of IQ of children towards lower score were demonstrated. Thus iodine deficiency is of great public health significance of far reaching implication. (Gopalan, 1999).

A study by Agarwal *et al.* (1982) in school children revealed that children surprisingly showed a marked insufficiency in physiological parameters studied thus causing an impairment in physiological and biochemical status. Tiwari *et al.* (1996) studied the effect of prolonged iodine deficiency on learning and motivation. The results are suggestive of neural impairment as well as poor sociopsychologic stimulation, lowered IQ, resulting in learning disability and lowered achievement motivation. According to Pandav *et al.* (1997) iodine deficiency is an important cause of mental handicap and poor educability of children. Unless iodine nutrition is improved in community as a whole these abnormalities may prevent millions of children from achieving their full potential even if learning opportunities are made available to them.

It is apparent that reduced mental function is widely prevalent in iodine deficient communities with effects on their capacity for initiative and decision making Vaidya (1991) reported that in females iodine deficiency could alter reproductive functions.

IDD cause reduced milk, egg, meat and wool yields in animals. Observations made of animals in low iodine area gives evidence of its need for reproduction (Ethel *et al.*, 1998).

3. Prevalence of IDD

As per information available more than 1.5 billion population of the world are at the risk of IDD out of which, it is estimated about 200 million people are in our country. The existence of endemic goitre in an extensive belt along the southern slopes of Himalayas covering over 2400 km comprising the states of Jammu and Kashmir, Punjab, Himachal Pradesh, Bihar, West Bengal, Assam, Sikkim and other northern states, has been known for a considerable time. But now surveys, whenever undertaken, are continuously identifying new pockets of iodine deficiency. In 25 states and four Union Territories, out of 218 districts surveyed, IDD is a major public health problem in 182 districts (Khatri, 1990). Countrywide surveys indicated that no state in the country is free from IDD. It is estimated that in India 167 million are at risk of IDD including 54 million with goitre, 2.2 million are cretins and 6.6 million have a milder neurological deficit. The total number of still births and neonatal death attributable to iodine deficiency is over 90,000. Kochupillai (1999) reports that neonatal hypothyrodism is 10 to 20 higher in some parts of India than in Europe or North America.

4. Major consequences of IDD

Goitre

Nakra (1990) described goitre not just a cosmetic problem but disease which impairs health and productivity. Ramzin *et al.* (1992) considered goitre as a marker of iodine deficiency and is particularly useful because it is easily assessed. When iodine intake is even just mildly deficient the first sign is thyroid enlargement or goitre formation (Helzel, 1989 and Linder 1991).

According to Dunn (1996) goitre is the most obvious consequence of iodine deficiency. However Brahman (1998) defined goitre as non-neoplastic, non-inflammatory and nontoxic enlargement of thyroid gland.

Karmarkar (1990) explained the formation of goitre as follows. Thyroid gland concentrates iodide and produces thyroid hormones namely thyroxine (T_4) and triiodothyronine (T_3). The production of thyroid hormones by the thyroid gland is regulated by thyroid stimulating hormone, which is produced and secreted by pituitary. Under normal physiological conditions 80-85 per cent of circulating thyroxine is derived from thyroid gland is converted into T_3. In the case of iodine deficiency there is a lesser amount of thyroxine in circulation. This results in much greater amounts of thyroid stimulating hormone in circulation as compared to what is found under normal physiological conditions. If iodine intakes are limited for prolonged periods thyroid stimulating hormone continues to stimulate the thyroid gland and an iodine deficiency goitre is developed. Thus it agree with the opinion of Stanbury and Hetzel (1985) that goitre is an adaptation of man to iodine

deficiency. It is also important because it can lead to significant morbidity from compression and altered thyroid function (Venkatesh and Dunn, 1995) Goitre is prevalent in all age groups. A study conducted by Chaturvedi *et al.* (1996) in schools of four villages of Delhi showed various grades of goitre giving a prevalence of total goitre in school children to be 16 per cent.

Cretinism

Gerald *et al.* (1989) defined cretinism as permanent neurologic and skeletal retardation resulting from an inadequate supply of thyroid hormone during gestation. Symptoms generally appear after six months of birth as enough hormone is present in the milk of mother fed to the children. Kumar (1989) explained the symptoms of cretinism as follows.

a) The normal development of the child is delayed as holding up of hand (3 months), dentation (6–7 months), walking and speaking (12–18 months) are delayed.

b) Growth is stunted, fingers club shaped, teeth and bones deformed.

c) Rough, thick and dry skin

d) Idiotic look with large protruding tongue and dribbling saliva.

e) Abdomen pot bellied, umbilicus protruding.

f) Sex organs and secondary sexual characters become retarded.

g) Victims generally deaf and dumb

h) Basal metabolic rate lowered, body temperature low

i) The victim generally susceptible to cold

j) Low blood sugar.

Maberly (1996) reported that iodine deficiency is the leading cause of intellectual impairment and is associated with a spectrum of neurologic and development pathology. Endemic cretinism is manifested as mental retardation, impairment in speech and hearing, squint, disorders of stance and gait, stunted body growth and hypothyrodism (Hetzel, 1987). Joshi *et al.* (1993) stated that the intrauterine period is crucial for the development of cretinism and pregnant women in endemic goitre areas should receive special medical attention. Even milder deficiency in utero can take an intellectual toll. A study conducted by Langer (1995) found that in the districts with the highest goitre prevalence cretinism was also found. In the Republic of Georgia for instance a widespread iodine deficiency is estimated to have robbed the country of 5,00,000 IQ points in the 50,000 babies born in 1990 alone. The depletion of human intelligence on such a scale is profligate, even criminal waste. Ramalingaswami (1999) indicated that each year 12 million children are now being spared irreversible mental impairment from iodine deficiency. Bleichrodth *et al.* (1980) reported that non-cretin children in iodine deficient areas are significantly inferior than counterparts from iodine non deficient areas.

Clinically two types of cretinism are known (1) Neurological cretinism (2) Myxoedematous cretinism.

Neurological cretinism is characterised by mental retardation, deaf mutism, squint, spastic displegia, spastic rigidity affecting the lower limbs leading to characteristic gait and brisk reflexes. Stunting is not a regular feature.

Myxoedematous cretinism exhibit signs of hypothyroidism namely coarse and dry skin, swollen tongue, deep hoarse voice, apathy and mental deficiency. Lazarus (1989) reported that damage in neurologic endemic cretinism occurs in second trimester whereas myxoedematous cretinism may result from foetal thyroid failure in the third trimester.

Neurological cretinism is seen predominantly in area with environmental iodine deficiency while myxoedematous cretinism seen in areas where consumption of foods having goitrogens is common. Tapioca eating population in Zaire is a classical example of endemic myxoedematous cretinism. Shankar *et al.* (1993) made a clinical study of endemic cretinism in Sikkim and found neurological cretinism was the most predominant one. The most salient neurological failure was deaf mutism seen in 74 per cent. They remarked that endemic cretinism is a distinctive and easily identifiable clinical entity and is an important indicator of the severity of iodine deficiency in community.

Hypothyroidism

This condition occurs when the hormones are inadequately produced. It is characterised by coarse and dry skin, husky voice and delayed tendon reflexes. This condition is generally encountered in adults.

According to Coomi (1999) hypothyroidism of thyroid is the most common glandular problem in India after diabetes. Hypothyroidism is a cause of infertility and the treatment improves the chance of conception (Larson and Ingbar, 1991, Ghaneim and Atkins, 1998). According to Lazarus *et al.* (1991) goitre may result if the mother is allowed to be hypothyroid. Hence detection of hypothyroidism in women of reproductive age group is very important as maternal hypothyroid state may adversely affect the foetus even when thyroid deficiency occurs during the first trimester (James, 1999).

Pregnant women with untreated hypothyroidism give birth to children with slightly lower IQs. 15 per cent of children of mothers with hypothyroidism had IQ scores of 85 or less compared with 5 per cent of children of normal mother. According to Singh and Agarwal (1998) patients with type I diabetes mellitus, primary biliary cirrhosis and vitiligo are more prone to develop subclinical or frank hypothyroidism as are patients with pernicious anaemia and progressive systemic sclerosis.

People with hypothyroidism can have symptoms including a constantly tired feeling, lack of energy, hairloss, dry skin, weight gain even though they have little to no appetite, feeling cold all the time, and some times feelings of depression, diminished concentration and memory, facial puffiness, periods much heavier and more prolonged, irregular ovulation (Adrian, 1999). Gillespic (1999) stated hypothyroid women should eat 40 per cent protein, 23 per cent fat 35 per cent low glycemic carbohydrates in 250-300 calories.

Myxoedema

The progressive destruction of epithelial elements in the thyroid gland by the over growth of noncellular components and the formation of cysts and large colloid spaces gradually reduces the capacity of the gland to produce the thyroid hormone and there is slow on set of mild forms of myxeodema. This becomes apparent in people over 40 years of age and occurs more often in females than in males.

Psychomotor defects

Thilly (1981) reported that child population from iodine deficient areas exhibited poor motor co-ordination. A study by Azizi *et al.* (1995) demonstrated that mild to moderate growth retardation, neurological, auditory and psychomotor impairments occur in apparently normal subjects who reside in areas of iodine deficiency.

Socio economic retardation

Shobana (1992) reported that iodine deficiency affects the socio economic development. The people are mentally slower and less vigorous. They are weak in learning and less productive in their work. Also iodine deficiency produces more handicapped individuals who depend on others for their survival, thus diverting community resources.

Additionally intrauterine growth retardation and low birth weight impede children's cognitive and physical development, thus nutritional

disorders cause lower school attainment and consequently, decrease people's long term economic productivity (Tezic, 1998).

5. Causes

Iodine is a relatively scarce element in the crust of the earth. Stanbury *et al.* (1991) indicated that iodine is the only nutrient for which a deficiency in the soil, known to have an adverse effect on human nutrition. Recent studies have shown that iodine content of diets in the non-endemic area is quite ample (250 µg/day) to meet the iodine requirement of all groups. Ultimately all of the iodine taken in the body is derived from soil and water and it is the content of iodine in these natural sources which determines the amount commonly ingested. Nutrition News (1995) reported that deficiency of micro nutrients such as iron and vitamins usually arises due to dietary inadequacy while IDD are mostly due to environmental iodine deficiency. The factors responsible for IDD can be broadly classified into environmental factors and intrinsic factors. While environmental factors lead to endemic IDD the latter contributes to sporadic cases.

ICMR (1989) reported that depletion of iodine in the soil as a result of ecodegenerative activities like deforestation, frequent floods and rivers changing course are mainly responsible for the increasing magnitude of environmental iodine deficiency. Iodine deficiency occurs in regions where topsoil has been depleted of iodine by erosion caused by glacier movement in wind and flooding (Hollowell *et al.*, 1998, Linder 1991). There is no evidence that over one billion people living where the soil have been leached of iodine

in mountains and flooded valleys are at risk of IDD. The effects of iodine deficiency are even seen in coastal areas, because not all people eat sea food due to dietary habits. The deficiency in the soil cannot be corrected.

According to Dube (1992) the food grown in iodine deficient regions can never provide enough iodine to population and livestock living there. Endemic areas include mountainous regions and recurrently flooded planes where iodine in the soil is continuously washed away as well as deserts and oases where iodine is hardly supplied by rainfall (WHO, 1990).

A deficient supply of thyroxine can result from ingestion of an interfering factor called goitrogens. Goitrogens, inherent in some foods are substances that cause a goitre development. Goitrogens are found in millet, kelp, maize, bamboo shoots, sweet potatoes, and lima beans. Goitrogens are known to interfere with iodine metabolism at various levels. Chemical substances include thiocynates, thio oxazolidone, flavanoids etc. Vegetables belonging to genus Brassica are also considered to be goitrogenic. Poulose (1997) explained that cassava contains cyanogenic glucoside linamarin whose degradation release hydrocyanic acid which disrupts the mechanisms by which thyroid adapts to iodine deficiency and thus aggravates the effect of iodine deficiency. Food stuffs containing resorcinols, polyphends are goitrogenic in nature. They are metabolised in the body and metabolite have antithyroid effect which is not over come by giving large amounts of iodine.

Desai (1991) reported excess of Mg^{2+}, Ca^{2+}, Fe^{-} ions in food and water contributed to IDD. According to Artick *et al.* (1999) selenium deficiency

worsens iodine deficiency because of the decrease in the activity of enzymes required for thyroid hormone synthesis.

Ingenbleek (1986) demonstrated that protein energy malnutrition play a role in thyroid dysfunction. Genetic predisposition in highly inbred and isolated group, poverty, poor environmental sanitation, infection, flooding and auto immune phenomena are other reasons.

6. Prevention

The problem of IDD is of far greater magnitude than one of goitre and cretinism. Park (1997) considered it as a national problem with grave socio economic consequences. Iodine deficiency results mainly from geological rather than social and economic conditions. Hence, it cannot be eliminated by changing dietary habits or by eating specific kinds of foods grown in the same area. Rather the correction has to be achieved by supplying iodine from an external source.

According to Pharoah (1993) iodine supplementation is effective in preventing both varieties of endemic cretinism provided it is given before conception, early foetal and infant death may also be prevented. Peterson *et al.* (1995) opined that since low iodine intake is the main cause of IDD, iodine supplementation should be the main preventive measure.

Kochupillai (2000) recalls that in the seventies in the endemic areas like Gonda, many of the school children could not even give their names properly. Many of them could not put together simple jigsaw puzzles like a

photograph torn into four pieces. But now after iodisation programme, the IQ level has increased tremendously.

International council for control of IDD (1995) suggested four ways of iodine supplementation. They are:

1. Iodised salt

Because of food restrictions and shortages during the first world war, scientific discoveries in nutrition were translated quickly into public health policy in 1917 and in 1924 iodine was added to salt to prevent goitre.

Salt is an ideal vehicle for iodine fortification. It is proved that iodised salt is the best means for providing iodine to iodine deficient populations. It is physiological, simple, practical and effective. It is the most commonly accepted owing to a variety of reasons. It is one of the few commodities that come close to being universally consumed by almost all sections of a community irrespective of economic level and the addition of iodine to salt does not impart any colour, taste or odour to the salt. In face iodised salt is indistinguishable from uniodised salt. According to Ted (1999) the incidence of serious iodine deficiency in children aged 8 to 10 years has been out nationally by using iodised salt from 20 per cent in 1995 to less than 10 per cent this year.

Dunn (1996) reported that using of iodised salt is a long range solution for iodine deficiency. Field studies in India have established that fewer cretins are born after the salt iodisation became universal and compulsory in most parts of the country. A study conducted after 10 years after the

programme started found that no cretins were born in Terai region, once considered endemic.

Iodised oil

Unfortunately there will always be groups of people who will not have access to iodised salt as a measure for iodine deficiency control. Iodised oil for oral use may be indispensable for them, as stated by Furnee (1997) who conducted a study to find the effectiveness or oral iodised oil in Malawi. The findings of the study are that the type of iodised oil, goitre, intestinal parasites, sex, adipose tissue, cassava consumption and seasonality are factors which influence the duration of effectiveness of this prophylaxis measure.

Iodine can be incorporated into vegetable oils and can be used to correct iodine deficiency. The most widely used preparation Lipidol is 38 per cent iodine by weight. A single intra muscular injection of 0.5 – 1.0 ml protects from iodine deficiency for 3-5 years. A single oral administration will usually provide satisfactory stores for 1-2 years. The only disadvantage is that direct contact must be made with each subject receiving the oil. It is also very expensive and requires extensive manpower to carry out the programme.

Iodised water

Iodine added directly to drinking water can correct iodine deficiency. A measured amount of iodine, usually concentrated solution of iodine, potassium iodide or potassium iodate is added directly to drinking water in a jar in an amount for achieving a daily intake of at least 150/ μg of iodine. In

order to prevent iodine deficiency, introduction of iodine into a public water supply was tested in Triona. The iodinated water was well tolerated by the population of Triona, and no adverse effects of water iodination including any increase in the frequency of hyper thyroidism was observed. (Squatrito *et al.*, 1986). Observations of Pichard *et al.* (1992) to find the effectiveness of iodinated silicone polymers placed in bore wells for combating goitre in children under 15 years of age was evaluated and found that effectiveness of iodine supplementation was greater in young children with small goitres.

Lugol's iodine

Oral iodine can be directly given in the form of Lugol's solution (5 g of Iodine plus 10 g potassium iodide per 100 ml). The duration of its effect will be considerably shorter than that of iodised oil and repeated applications are required. Advantages are its wide availability and low cost.

In addition to there are other methods like

1. Use of iodised bread

On population where bread is universally consumed this appears to be an effective measure, judging by the results of 3 year trial in Tasmania. Though bread iodine is provided as enriched salt or as a bread improver in the form of potassium iodate (Swaminathan, 1993).

2. Tablets of potassium or sodium iodide

Tablets containing 10 μg of potassium iodide were distributed to infants, children and young adolescents in Tasmania for 16 years before the

introduction of iodised bread and proved highly effective when regular distribution could be maintained.

7. Importance of IEC in health promotion programmes

Nutrition disorders impede the economic development of a country. According to Delange (1994) poor nutritional status will lead to poor educational attainment and decreased economic productivity. Considering the serious consequences of IDD, nutrition research have been directed to developing strategies to control and prevent these major nutritional deficiency disease. Supplying of iodised salt with prescribed level of iodine to the endemic areas can result in eradication of IDD. Since IDD is also accentuated by other nutritional deficiencies and infection there is a need to control these with other nutrition programmes along with introduction of iodised salt in the endemic region (Galtan *et al.* 1991). Amar *et al.* (1999) reported that lack of knowledge concerning some of the other causative factors of endemic goitre has prevented development of appropriate measure for its complete eradication where goitre persists inspite of iodine supplementation. This calls for an integration of health, nutrition and goitre control programme (Rao, 1989). The sensible way is to educate the people regarding need for iodine as a nutrient.

Continuing challenges for public health action include applying emerging knowledge about nutrition on dietary patterns and behaviour that promote health and reduce risk for IDD. Behavioural research indicates that successful nutrition promotion activities focused on specific behaviours have

a strong consumer orientation, segment and target, consumers use of multiple enforcing channel and continually refine message (Contento *et al.*, 1995). Lutynski (1996) reported that nutrition education should be strengthened to convince the population to use iodised salt in household food production.

Nutrition education is concerned with trying to persuade an individual or a group of people to modify their way of life with a view of improving their health and nutrition by the better use of available resources, both traditional and modern and both man made and natural. It has been acknowledged as one of the most important methods of combating malnutrition which is common in developing countries (Igbedioh, 1990). Thus health information system is a basic tool for the progress of any society. Many equate it with transmission of information about health and diseases from the expert professional to the lay client (Somers and Anne, 1977). It has been global experience that any move towards community reformation or transformation had to begin from awareness. It is an objective of health education to disseminate scientific knowledge about prevention of disease and promotion of health. Exposure to knowledge will melt away the barriers of ignorance, prejudices and misconceptions, people may have about health and disease Farquhar *et al.* (1990) opined that exposure achieved by disseminating messages through multiple channels is expected to result in changes such as increased awareness about campaign related issues, greater levels of knowledge about health, higher levels of self efficacy and ultimately healthier behaviours at both the individual as well as broader community wide level. Through education the

public must be motivated to change their habits and ways of living and should be guided into action.

Although efforts to improve the health and well being of people have taken place under a variety of circumstances, the most important settings for nutrition improvement programmes are communities. Field programmes can succeed only when community is well informed and educated about the problems of nutrient deficiencies and the measures of their control, and motivated to utilise the available resources. This involvesuse of multimedia approach, adoption of modern techniques of social marketing on the job training of functionaries. IEC is an absolute necessity for control and prevention of any deficiency. Money and manpower should not be bottlenecks in their endeavour (ICMR, 1994). For applying an IEC it is essential to know more about the components of IEC i.e., information, education and communication.

Information can be simply described as the passing of facts or it may be a chain of facts. It is information which can help and save the lives of many million in the developing world. Now information and technology has increased people's access to outside information. Commercial messages in television and nutrition campaigns can strongly influence attitudes and behaviours. And the behaviour of people is as important as education and culture can actually compensate for deficits in education. According to Salil (1991) education and training are important elements of programme intervention as they relate to increasing the capabilities of community to analyse the situation and enhance common understanding of the problem and

knowledge or how to address the problem. Although efforts to improve the health and well being of people have taken place under a variety of circumstances the most important setting for nutrition improvement programmes are communities. As the greatest force in India probably being inertia, ignorance deals habits and superstition the change we seek calls for a awareness, mobilization, organisation and participation. And communication for behaviour change programs should be carefully designed monitored and evaluated to achieve maximum impacts.

In the present study IEC materials used to disseminate information includes slide and flash cards. Peterson (1966) reported that more the extension method or teaching aids used, higher will be the persons changing their practices favourably. Selvaraj (1981) found that the involvement of polyperceptory organs was more effective in knowledge gain by the listeners compared to involvement of disensory organs and mono sensory organs. Nagaraja and Reddy (1985) reported that lecture and tape recorded lecture did not differ in their influence on gain in knowledge and retention when combined with slide show and flannel graph. Shah and Gupta (1986) studied the effectiveness of three visual aids viz., flash cards, slides and puppets and found that flash cards were significantly superior to the other two in imparting knowledge in non-formal education. Thus the IEC programme conducted was helpful to disseminate information among the public on IDD.

MATERIALS AND METHODS

3. MATERIALS AND METHODS

This chapter deals with the methodology used of the study, 'Information Education and Communication (IEC) for Iodine Deficiency Disorders (IDD) control', conducted in the Vellanad panchayat of Thiruvananthapuram district with the objective to disseminate information among the public on IDD and to create awareness about the factors influencing the prevalence of IDD by developing IEC materials.

3.1 Selection of area

Vellanad panchayat with an area of 22.19 sq km bordered by Aryanad panchayat on the east, Aruvikkara panchayat on the north and Aruvikkara, Poovachal on the south was selected for the following reasons.

a. Household survey conducted by Medical College team on adult population found the prevalence of IDD in Vellanad panchayat.

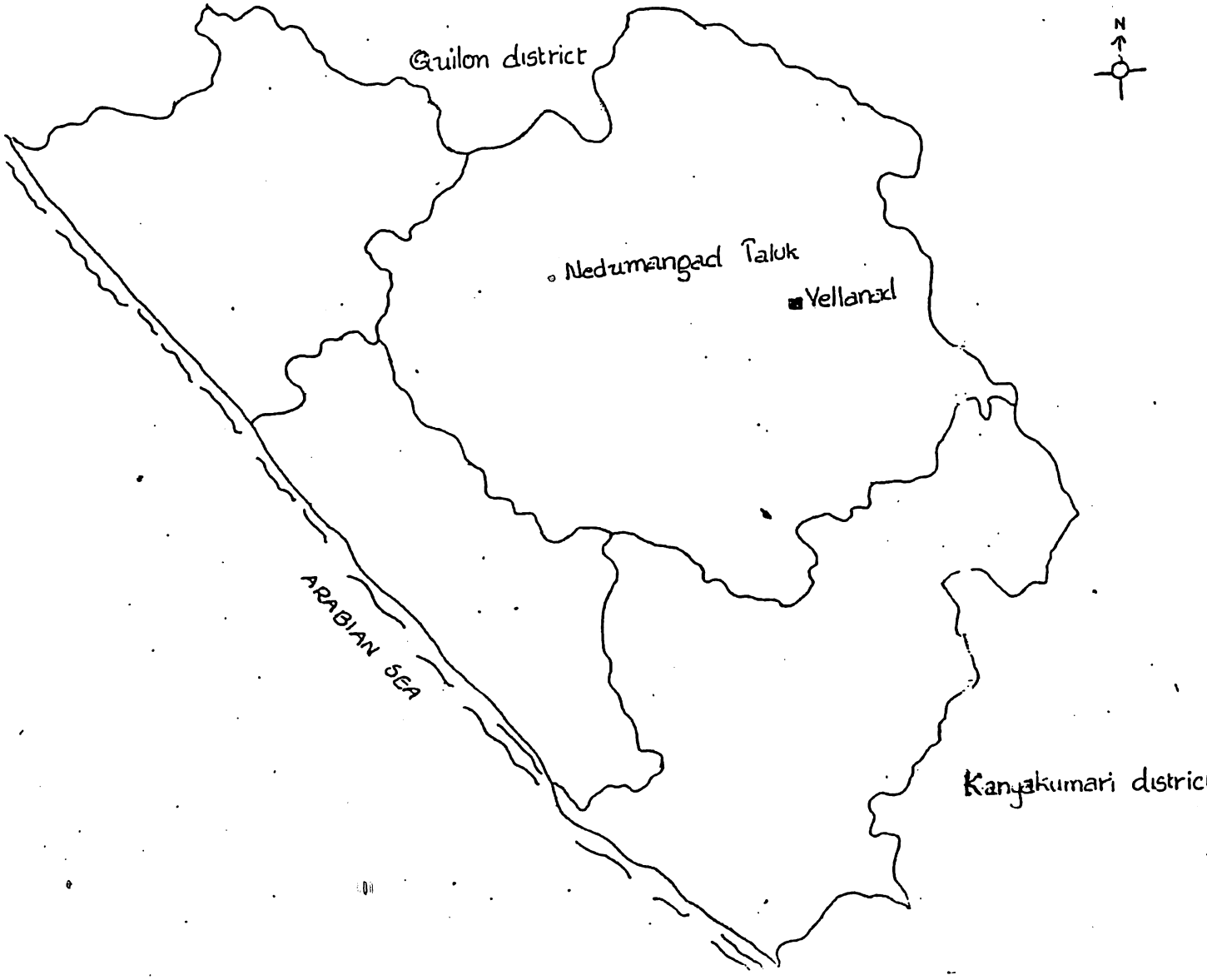
b. Vellanad is a hilly region 22 km away from the state capital constituting about 31.5 per cent high level land. The geographical peculiarities of the land may be the cause of higher prevalence of IDD.

c. Since the area is away from the main city it is less exposed to education programmes similar to the one contemplated.

3.2 (a) Selection of sample

Hundred households selected randomly from the Changa ward of Vellanad formed the study sample. Main occupation of the majority of

Fig. 1 MAP OF THIRUVANANTHAPURAM DISTRICT SHOWING THE STUDY AREA



population in study areas was agriculture, most of them depending on crops cultivated in the area for food.

(b) Selection of sub sample

Among the study population, the 30 women identified as trainers comprised of extension workers, pre-school teachers, anganwadi workers and those who expressed willingness to undergo training.

3.3 Plan of action

a) Survey to collect base line information on socio-economic variables.

b) Dietary survey to assess dietary variables like food consumption pattern and frequency of use of specific foods.

c) Organisation of community self survey to disseminate information on IDD by conducting campaign

d) Development of IEC materials and their standardisation

e) Implementation of IEC materials among the trainees

f) Assessment of knowledge gain of trainees with the use of properly structured check list before and after the training programme.

g) Measuring the change in attitude by suitably structured checklist

h) Statistical analysis for interpreting the collected data.

3.4 Method of study

3.4.1 Baseline survey

According to Arora (1991) the socio-economic background of the respondents such as soico-economic, religious and the family background in general have a very distinct part to play in determining the attitudes and behavioural patterns of the individual. Hence a socio-economic survey was

conducted to collect information regarding the size of the families, occupation, income, educational level and personal habits of the respondents. Interview method was used to conduct the survey.

Evans and Divan (1985) reported that there was no significant difference among the different methods like oral recall, printed questionnaire and interview method. However Britten (1995) reported interviewing as a well established research technique. Accordingly an interview schedule was formulated to collect information regarding socio-economic background. Inorder to elicit information regarding socio economic background of the family, details regarding religion, family composition of the respondents, educational and employment status of parents and the respondents, total monthly income were collected from the respondent through the interview schedule consisting of suitably developed and pre-tested questions. The interview schedule developed is presented in Appendix-I.

The method suggested by Swaminathan (1993) was followed where in the investigator goes around with a schedule for collecting information from the head of the family or house wife regarding family details. Gupta (1987) remarked that the information received from an interview schedule is more reliable as the accuracy of the statement can be checked with supplementary questions. Details about their awareness with particular reference to salt use and about their understanding of the causes and treatment of iodine deficiency disorders were also measured using a knowledge inventory. The inventory developed is presented in Appendix-IV.

3.4.2 Dietary survey

Todd *et al.* (1988) demonstrated that one day dietary record of a group gave a reasonable estimate within 15 per cent of their usual intake. Vishweswararao *et al.* (1999) recommended that any single day or two day weighment method would be as efficient as a tool as that of seven days. The dietary patterns of the selected 100 families were studied accordingly by collecting information on food consumed in a day by recall method.

In this method a set of standardised cups were used. The member of the household who looks and serves food to the family members were asked about the types of food preparations made at breakfast, lunch, afternoon, tea time and dinner. An account of the raw ingredients used for each of the preparations was obtained. Enquiries were made about food frequency consumption to reveal any possible unusual consumption of food item including goitrogens. The schedule structured is presented in Appendix-II.

Based on the survey data the behaviour of the population was analysed since behavioural analysis is the most important procedure for preparing IEC plan as reported by Revikumar (1999). The present study revealed the need for changing the practice of using goitrogens excessively, wrong method of processing tapioca, use of non-iodised salt needs to be changed. A behavioural change model was formulated to

- (a) Create an awareness about IDD

(b) Improve the knowledge and understanding of the community about IDD

(c) To perceive the magnitude of the problem

(d) Develop skills in making use of all available facilities for fostering better health

(e) Promoting a positive attitude to sustain the new behaviour.

From a public health perspective also it is desirable not only to change individual's behaviour but also to improve their knowledge and attitudes as reported by Rajiv *et al.* (1999).

3.4.3 Organisation of community self survey and identification of trainees

Recently it has been proved that a responsible factor for the increasing prevalence of IDD is the low public awareness about the importance of iodine or using iodised salt to maintain an adequate iodine intake for good thyroid health. And UNICEF (1999) reported that there is no substitute for reducing the prevalence of IDD without assessment of the families most threatened by these disorders. Hence with the help of Primary Health Centre, information regarding the prevalence of IDD in the study area was collected through village visits and key informant contacts. Rogers and Storey (1987) noted that widespread exposure to campaign messages is expected for result in increased levels of information seeking and interpersonal communication, greater knowledge about health issues and positive changes in overall health orientation. And as a part of the study a campaign was organised. The co-operation of the local leaders and mothers were obtained for organising a campaign. Care was taken to involve all the local clubs and parents teachers association of the school where the campaign was organised from the planning stage itself. The medical officers from the Directorate of Health Services (DHS) was brought to the place and their help was utilized fully.

Plate No. 1. Campaign on IDD

The campaign was given enough publicity thorough the notice distribution, which is given in Appendix-VIII.

Eventhough nutritional deficiencies are strongly linked to poverty, economic progress does not always improve nutritional status. This appears to indicate that even in well performing, societies, economic progress has been uneven, leaving pockets of poverty in its wake especially among rural population. The economic costs of nutrition disorders are staggering. Devadas *et al.* (1990) found that educating the people, making them conscious and helping them to utilize the local resource to improve their diets appear to be the solution. So as a part of the campaign a nutrition discussion on IDD was conducted by Dr. R. C. Nair, Clinical Consultant of IDD programme, C. Jayalakshmi, Technical Officer and S. P. Revikumar, Training Co-ordinator of DHS Thiruvananthapuram. Since nutrition education is concerned with trying to persuade an individual or a group of people to modify their way of life with a view of improving their health and nutrition by the better use of available resources both traditional and modern and both man made and natural. The class was mainly aimed to women because according to Hautvast (1997) women's special needs have often been ignored by health planners and women have thus had to bear disproportionate share of unmet health needs. Moreover women occupies a key position in primary health care system as she is the family's first point of contact with health services (WHO, 1982). Kalyanbagchi (1999) also opined that improving female education and other social services contribute to lowered childhood malnutrition over the long term. Palmer (1981) reported that women are considered to be more forthcoming than men in providing information. And Sadik (1988) found that

women's contribution to social life provided the essential underpinning of social development. Some male members were also included in the education programme. This reinforces the view of Ramesh *et al.* (1984) that educating one person in the family will have only limited impact on practices. The main objective was to focus attention in a concerted manner on IDD and control measures with a view to stimulate widest possible interest. A group of 30 were selected as trainees. This included preschool teachers and anganwadi workers since they are the key persons in implementing the projects in community. And their communication plays a special role to improve nutrition in their communities (UNICEF, 1999).

3.4.4 Development of information education and communication materials

All the relevant information regarding IDD was collected from different journals, textbooks and news articles. The information thus collected was processed and prepared into lecture script (Gist of lecture given in Appendix-VI) in vernacular language. Fay (1962) reported that visual aids increase upto three times the effectiveness of lecture. The visual aids selected for training includes projected (slide) and a non-projected (flash card) visual aids.

a. Flash cards

The content for flash cards was finalised after a detailed discussion with subject experts. The important points about the iodine deficiency disorders was identified. Flash cards of standard size (30 cm x 50 cm) suited to 30 members were prepared. There were about 11 flash cards. They are presented in the Appendix-IX.

b. Slides

Slides serve best when motion is not necessary. Slides are very helpful during a lecture or discussion to amplify essential facts. As a part of the study a set of 10 colour slides were prepared. These slides were previewed and arranged in a logical sequence so as to supplement the subject matter included in the lecture note.

The IEC materials were tested for their effectiveness by presenting before a selected group of subject experts in the Department of Home Science, College of Agriculture, Vellayani and Directorate of Health Services, Thiruvananthapuram. The relative effectiveness were assessed using a score card. Dimensions assessed included attractiveness, orientation towards the subject, education content, depth of subject coverage, sequence of presentation.

3.4.5 Programme implementation among the trainees

Before the actual conduct of training, a detailed plan of schedule was prepared. The date, time and venue for conducting the experiment were decided in consultation with the trainees to suit their convenience. It was finalised to conduct the education programme on the Changa L.P. School of Vellanad. Suitable modifications were made in the lecture script to suit the presentation of slides, flash cards when they are combined with lecture without deleting any key points included in the lecture, script. Suggestions of subject experts were also made in respect of the sequence and mode of presentation.

Plate No. 2 Education programme using IEC materials

Plate No. 3 Testing the relative effectiveness of IEC mater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To prove the old proverb "one picture is worth of thousand words", efforts were made in using visuals appropriately, suitably, timely, clearly and cogently. Care was taken to ensure that each and every one could get a clear view of the visual aids used. In order to enable the trainees to have a closer view, the flash cards were also taken round the participants. In order to increase the effectiveness of training programme it was supplemented by posters and folders obtained from DHS.

3.4.6 Measuring the knowledge gain using pre-test and post-test

For measuring the knowledge gain, a knowledge test, consisting of 27 questions was constructed and administered to 30 randomly selected persons who do not belong to the identified sample to find out ambiguities, duplications. Before administering to experimental subjects, the test was pre-tested among a group to ensure highest accuracy and precision. All questions had definite answers. A maximum of one for correct answers and zero for incorrect answers were assigned. Thus the maximum possible score was 27 and minimum possible score was zero. The test was administered to the selected group before the training and immediately after the training. The difference in the knowledge scores of respondents between pre-test and immediate post-test were quantified, as gain in knowledge. The statements structured to assess the awareness is given in Appendix-V. The trainees were requested to disseminate the knowledge gained from the class with the public.

Inorder to evaluate the extent of adoption home visits were followed after an interval of one month.

3.4.7 Measurement of the change in attitude

The change in attitude was measured using a checklist containing five questions before and after training. The difference in scores was quantified as change in attitude. The check list used is appended in Appendix-VII.

3.4.8 Statistical analysis

The statistical tools used included mean, frequency, correlation analysis and paired 't' test.

(a) Frequency and percentage

Some of the data were subjected to and interpreted in terms of frequency and percentages.

(b) Mean

The arithmetic mean ($\bar{x}$) is the quotient that results when sum of all items in the series is divided by the number of items. The formula in terms of symbol is :

$$\bar{x} = \frac{\Sigma x}{N} \quad \text{where}$$

$\bar{x}$ = Mean

Σx = Sum of individual items

N = Number of items

(c) Standard deviation (S.D)

The standard deviation was found by taking the differences of each items in the series form the arithmetic mean, squaring these differences,

summing all the squared differences dividing by the number of items and then extracting the square root. The formula in terms of symbol is :

$$S.D = \sqrt{\frac{\Sigma x^2}{N}}$$

S.D = Standard deviation

Σx^2 = Sum of the squared deviations from the mean

N = Number of items

(d) Simple correlation

Simple correlation were computed to find out the relationship between the selected independent variables and the dependent variable to study the interrelationships and degree of association among the various independent variables.

(e) Paired 't' test

It is used to test the significance of two sampling means of paired sample units or dependent sample units.

RESULTS

4. RESULTS

A study was conducted to assess the awareness about Iodine Deficiency Disorders (IDD), a public health problem among people and to disseminate information among the public by developing Information Education and Communication (IEC) materials. The results of this experiment entitled 'IEC for IDD control are presented under the following heads.

4.1. Socio-economic and personal characteristics of the respondents.

4.2. Correlation among the selected socio-economic variables.

4.3. Food consumption pattern of the respondents

4.4. Assessment of awareness about causes, symptoms and preventive measures of IDD.

4.5. Pretest of trainees about the awareness of IDD

4.6. Assessment of the relative effectiveness of the formulated IEC materials.

4.7. Assessing the gain in knowledge after post-test.

4.8. Measurement of the change in attitude.

4.1 Socio-economic and personal characteristics of the respondents

Socio-economic and personal characteristics were analysed with reference to age, sex, religion, caste, employment, income, family size, educational status of the respondent, housing condition, source of drinking water, possession of crops and domestic animals. The data analysed thus is presented below.

Details about the distribution of respondents according to age, sex, religion, caste, type and family size are presented in Table 1.

Table 1. Distribution of respondents according to age, sex, religion, caste, type and family size

Sl. No.	Characteristics	Category	Percentage
1.	Age	Young <25	7
		Middle (25-55)	84
		Old >55	9
2.	Sex	Female	97
		Male	3
3.	Religion	Hindu	92
		Christian	8
4.	Caste	Forward	61
		Backward	3
		SC/ST	36
5.	Type of the family	Nuclear	89
		Joint	11
6.	Family size	Small (1-5 number)	89
		Medium (6-8 number)	9
		Large (>8)	2

As depicted to the Table 1, 84 per cent of the respondents were middle aged, 7 per cent were young and the remaining 9 per cent were old aged. 97 per cent of the respondents surveyed were females and only 3 per cent were male. The table further reveals that among the 100 people surveyed 92 per cent were Hindus, 8 per cent were Christians and none was from Muslim

community. Among the families surveyed 61 per cent belonged to forward community. Only very few (3 per cent) belonged to backward community and 36 per cent belonged to SC/ST community. Majority (89 per cent) belonged to nuclear families. The remaining families were joint families. Among the families surveyed 89 per cent of families were small sized when 9 per cent belonged to medium sized and 2 per cent were having more than 8 members in the family.

b. Educational status

Table 2. Details about the educational status of the respondents

Sl. No.	Qualification	Percentage
1	Illiterate	12
2	L.P. School	5
3	U.P. School	31
4	High school	34
5	College Level	18
	Total	100

The educational status of the respondents reveal that nearly 34 per cent had studied upto high school and 31 per cent had studied upto U.P. School, 18 per cent had studied upto college level and 5 per cent upto L.P. School. Illiterate constituted about 12 per cent of the population.

c. Employment status

Details of the employment status of the respondents are given in the Table 3.

Table 3. Employment status of the families

Sl. No.	Employment	Percentage
1	Agricultural labour	6
2	Coolie	43
3	Government jobs	16
4	Self employment	24
5	Others	11
	Total	100

Employment status of the respondents reveal that 43 per cent of the respondents were coolies while 24 per cent were self-employed. It was also observed that 16 per cent were having government jobs and 11 per cent were engaged in other activities. Only 6 per cent of the population had taken agriculture as their employment.

Number of members employed in the families influence the total income of the family. Hence it was assessed and the details are given in Table 4.

Table 4. Distribution of employed members in the family

Sl. No.	Number of members	Percentage
1	One member	80
2	Two member	15
3	Three member	5
4	More than 3	0
	Total	100

Among 100 families surveyed, in 80 per cent of families only one member was employed, while in 15 per cent of families two members were found to be employed. The number of families with more than 3 members employed were only five per cent.

d. Monthly income

Details about the monthly income of the families were collected and Table 5 represents the income levels of the families surveyed.

Table 5. Monthly income of the families

Sl. No.	Income	Percentage
1	500 to 2000	80
2	2000 to 3500	16
3	>3500	4
	Total	100

Details in the table indicates that 80 per cent of the families had a monthly income ranging from 500 to 2000. While 16 per cent had income ranging from Rs. 2000 to 3500 and 4 per cent were in the income level of 3500 or more.

e. Housing condition

Data was collected about the housing condition of the families and it is presented in Table 6.

Table 6. Details about the housing condition

Sl. No.		Percentage
1	Mud walled	28
2	Tiled	35
3	Terrace	37

Table 6 explains that 37 per cent of house were concrete while 35 per cent had tiled houses and the remaining 28 per cent had mud walled houses.

f. Source of drinking water

Source of drinking water for the study population was assessed and it is presented in Table 7.

Table 7. Source of drinking water

Sl. No.		Percentage
1	Deep well	31
2	Pond	1
3	Stream	2
4	Tap water	35
5	Shallow well water	31
	Total	100

As per Table 7, for 35 per cent of population the source of drinking water was tap water while a 31 per cent depended on shallow well water and another 31 per cent depended on deep well water. The per cent of population depending on pond and stream for drinking water were small.

g. Major Crops to the area

Data regarding the major crops cultivated in one's own land was collected and is presented in the Table 8.

Table 8. Major crops cultivated in one's own land

Sl. No.	Crops	Percentage
1	Bhindi	21
2	Tapioca	17
3	Without any crops	62
	Total	100

It is clear from the table that for 21 per cent of population bhindi was the major crop and for 17 per cent tapioca formed the major crop of cultivation and the remaining 62 per cent had no land of their own, for cultivation.

h. Ownership of animals

In order to assess the extent of prevalence of IDD in domestic animals details were collected and is presented in Table 9.

Table 9. Details about ownership of domestic animals

Sl. No.	Name of the animal	Percentage
1	Buffalo	12
2	Cow	10
3	Goat	1
4	Poultry	7
5	No animals	70
	Total	100

As per Table 9 it was noticed that in 70 per cent of the study population there was no domestic animals. While 10 per cent of population had cows and 7 per cent had poultry. Goat was present in only one per cent of the population and buffalo in 2 per cent. Data was collected in order to assess whether any symptoms of IDD was prevalent among the domestic animals. It was revealed that 17 per cent showed reduced yield of milk and egg.

i. Personal habits

Personal habits such as smoking and drinking of alcohol among male members in the family were assessed and is presented in Table 10.

Table 10. Other habits of male members

Sl. No.	Habit	Percentage
1	Cigarette smoking	36
2	Alcoholism	8

The data reveals that 36 per cent of the sample had the habit of smoking. As far as alcoholism is concerned only 8 per cent had the habit of drinking alcohol.

4.2. Correlation among the selected socio-economic variables

Table 11 presents intercorrelations among the socio-economic variables, age, religion, caste, employment, income, type of family, family size, education of the respondents, number of employed persons, amount of tapioca used, method employed for cooking tapioca and type of salt used.

Table 11 gives an over all picture of the interrelationship that exists among selected variables. It could be read from the table that among the variables studied age had significant and positive correlation with number of employed persons and method used for cooking tapioca. Religion had a significant positive correlation with amount of tapioca consumed. Caste was significantly correlated with income. A significant and positive correlation was found between employment and income, education and type of salt used. Type of the family was significantly related to number of employed persons and amount of tapioca used. Education of the respondents was significantly correlated to the type of salt used. All the other selected variables not exhibited any significant positive relationship.

Table.11. Correlation among the selected Socio-economic variables - Correlation matrix

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}
X_1	1.000												
X_2	-0.2351*	1.000											
X_3	0.1535	-0.1192	1.000										
X_4	0.0446	-0.2626**	0.0854	1.000									
X_5	0.1145	-0.1884	0.2094*	0.4434**	1.000								
X_6	0.0753	0.0320	-0.2189*	-0.0626	0.0600	1.000							
X_7	0.1721	-0.1048	-0.0875	0.584	0.0389	0.6937**	1.000						
X_8	-0.2598**	-0.0586	0.1574	0.2743**	0.1787	-0.1856	-0.1186	1.000					
X_9	0.2108*	0.0826	-0.0381	0.1806	0.3937**	0.2530*	0.2156*	-0.0986	1.000				
X_{10}	-0.0818	0.0820	0.0436	-0.0635	-0.0572	0.1292	0.0079	-0.0639	-0.2375*	1.000			
X_{11}	0.0912	0.3099**	-0.1670	-0.0387	0.0096	0.2146*	0.2034*	-0.1723	0.1023	-0.0156	1.000		
X_{12}	0.2380*	-0.1215	0.0324	0.0387	-0.1594	-0.0885	0.0412	-0.0727	-0.0054	-0.1828	-0.1441	1.000	
X_{13}	-0.1606	-0.1884	0.1463	0.2365	0.1744	-0.0091	0.0810	0.2028*	0.0296	0.0959	-0.1836	-0.0124	1.000

* Significant at five per cent level ** Significant at one per cent level

X_1 Age
X_2 Religion
X_3 Caste
X_4 Employment of the head of the family
X_5 Monthly income
X_6 Number of members in the family
X_7 Type of the family
X_8 Education of the respondent
X_9 Number of employed persons
X_{10} Place of purchasing vegetables and tubers
X_{11} Amount of tapioca used
X_{12} Method employed for cooking tapioca
X_{13} Type of salt used

4.3 Food consumption pattern

a) Food habit

The food habits of the families surveyed were analysed and it is given in the Table 12.

Table 12 Food habits of the families

Sl. No.	Habit	Percentage
1	Vegetarian	7
2	Non-vegetarian	93

Regarding the food habits of families surveyed non-vegetarians (93 per cent) were found to dominate vegetarians (7 per cent).

Food consumption pattern of the families were assessed by determining the meal pattern, frequency of using specific food items and frequency of using goitrogenic items.

Distribution of families of respondents as per food combinations are given in Table 13.

Table 13 Distribution of the families of respondents as per food combinations commonly used for meals

Food combinations	Break fast	Total
Black coffee + cereal	33	
Previous day's left over food	12	
Tea +Cereal	14	100
Cereals +Pulse + Vegetables	10	
Cereals + Vegetables	14	
Cereals + Coconut +Tea/Coffee	17	

Table 13. Continued

Food combinations	Lunch	Total
Cereal + Tuber + Vegetables	30	
Cereal + Fish +Vegetables	35	
Cereal + Pulse + Vegetable + Fish	24	100
Cereal + Vegetable + meat / egg	5	
Cereal + Green leafy vegetable + Fish	6	
	Evening tea	
Tea + Tuber	45	
Tea + Commercially prepared item	10	
Tea + Pulse + Jaggery	12	100
Black coffee	28	
Tea + Cereal	5	
	Dinner	
Cereal gruel	30	
Same as lunch	40	100
Same as break fast	30	

As the table explains it was observed that cereal preparations with black coffee was the commonly used breakfast item for 33 per cent of the population. While 10 per cent of population had cereals along with pulses and vegetables and 14 per cent cereals with vegetables only, 12 per cent consumed previous day's left over food. For another 14 per cent, tea with cereal preparations like ~~and~~ 'uppuma' was the major item for breakfast; while 17 per cent of population preferred 'puttu' and tea/coffee for the breakfast.

Rice with fish and vegetables (35 per cent) and rice with tubers like tapioca and vegetables was found to be predominant items for lunch in most of the families while 24 per cent of the population were of the practice of taking pulses also along with fish and vegetables. It was noticed that only a minority consumed cereal with vegetable and egg/meat (5 per cent) preparation for lunch. The remaining 6 per cent included rice along with green leafy vegetables and fish.

Fourty five per cent were in the habit of taking tuber mainly tapioca with tea during evening time. From among the remaining, 28 per cent take only black coffee, while 12 per cent take tea with pulse and jaggery preparations and 10 per cent depended on commercially prepared bakery items, whereas 5 per cent consumed tea with some cereal preparation.

Cereal gruel along with chutney were found to be the major item for dinner for 30 per cent of population. 40 per cent had the same preparations of lunch for the dinner while the remaining 30 per cent included breakfast items like tea with cereal, tea with cereal and pulse for dinner also.

Frequency of use of specific food items was assessed and the details are presented in Table 14.

Table 14. Frequency of use of specific food items

Food items	Daily	More than twice in a week	Weekly twice	Once in a week	Fort-nightly	Once in a month	Occas-ionally	Never
Cereals	100							
Black gram	2	20	15	31	26	3	3	-
Bengal gram	10	10	3	23	35	9	10	-
Green gram	2	10	13	13	17	16	29	-
Dal	23	19	14	19	10	3	11	1
Horse gram	-	-	-	-	2	1	17	80
Green leafy vegetable	2	13	9	15	20	11	30	-
Bhindi	3	15	14	23	23	12	10	-
Pumpkin	1	6	10	12	12	18	34	7
Tomato	7	18	11	23	24	4	13	-
Brinjal	2	5	6	5	26	16	38	2
Bitter gourd	1	5	22	12	12	20	30	8
Potato	6	14	6	24	25	5	17	3
Onion	92	-	-	1	2	1	3	1
Carrot	-	1	5	21	25	12	24	12
Chilly	98	2	-	-	-	-	-	-
Ginger	19	30	19	11	6	4	8	3
Turmeric	94	5	-	1	-	-	-	-
Mustard	94	3	-	1	1	-	1	-
Fruits	-	-	-	12	17	19	40	12
Milk	79	2	-	-	-	-	1	19
Egg	-	-	-	16	23	18	24	18
Fish	8	38	23	19	9	1	1	1
Dry fish	-	-	-	1	-	4	35	60

It is evident from the table that cereals and spices were included in the daily dietaries of the families.79 per cent of the families included milk in their daily diet. Dal was included as a daily item in 23 per cent of the families. 38 per cent of families included fish in their diet more than twice in a week. Other pulses like bengal gram and green gram were used more than twice in a week by 10 per cent. While 5 per cent of people used vegetables like carrot twice per week, 22 per cent used bitter gourd twice in a week. 31 per cent people were in the habit of using pulses like black gram at least once in a week. It was interesting to note that 80 per cent of population never used horse gram. 30 per cent of population occasionally used green leafy vegetables. Other vegetables like bhindi, pumpkin were included fortnightly and occasionally by 12 per cent and 34 per cent of the sample. For 40 per cent of the population fruits were an occasional item in their diet. Egg was included fortnightly in 23 per cent. Dry fish was a rare item which was used occasionally by 35 per cent and never by 60 per cent. Based on the frequency of use of different food items in the daily dietaries food use frequency scores were calculated as suggested by Reaburn *et al.* (1979). The method is appended in Appendix-III.

Table 15. The food use frequency score obtained by the respondents

Sl. No.	Food items	Food use frequency score
1	Cereals	100
2	Pulses	
	Black gram	65
	Bengal gram	57
	Green gram	50
	Dal	82
	Horse gram	16
3	Vegetables:-	
	Bhindi	60
	Pumpkin	43
	Tomato	62
	Brinjal	43
	Bitter gourd	54
	Potato	57
4	Green leafy vegetables	51
5	Roots and Tubers	
	Onion	95
	Carrot	42
6.	Spices	
	Chilly	100
	Ginger	73
	Turmeric	99
	Mustard	98
7	Fruits	35
8.	Milk	83
9	Egg	36
10	Fish	76
11	Dry Fish	18

According to the scores obtained the frequency of use of food items were classified into three groups.

Table 16. Frequency of use of foods among the respondents

Most frequently used foods scores above 88	Medium frequently used foods scores between 88 and 37	Low frequently used foods scores below 37.
Cereals	Black gram	Horse gram
Spices	Bengal gram	Fruits
	Green gram	Dry fish
	Bhindi	
	Pumpkin	
	Tomato	
	Brinjal	
	Potato	
	Bitter gourd	
	Carrot	
	Milk	
	Fish	
	Green leafy vegetables	

As depicted in Table 16 cereals and spices were the most frequently used food items. Foods like pulses, vegetables, milk, fish and green leafy

vegetables are not so frequently used while pulses like horse gram fruits and dry fish were rarely used foods.

Details about inclusion of goitrogenic food items like, cabbage, tubers are presented in Table 17.

Table 17. Frequency of using goitrogenic foods.

Goitrogenic food items	Daily	More than twice in a week	Two times in a week	Once in a week	Once in two week	Once in a month	Occas-ionally	Never
Cabbage	1	1	-	14	3	12	69	-
Tapioca	12	15	18	20	1	-	33	1
Colocasia	-	4	1	11	5	9	22	48
Sweet potato	-	-	-	2	-	2	40	56

As depicted in Table 17 goitrogenic food item like cabbage was used occasionally by 69 per cent of families while 14 per cent families used cabbage once in a week and it was noticed that there were people who used cabbage daily and more than twice in a week. Even though cabbage was an important item in the meal pattern of the family, cauliflower was not at all used by the sample. Tapioca was used daily by 12 per cent of the sample while 33 per cent included tapioca only occasionally in their menu. Other tubers like colocasia and sweet potato were used occasionally by 22 per cent and 40 per cent respectively. And however it was also observed that a small group of people i.e., 4 per cent used colocasia more than twice in a week.

Table 18. Food use frequency score obtained for the goitrogenic foods

Sl. No.	Goitrogenic foods	Score
1	Cabbage	38
2	Tapioca	60
3	Colocasia	29
4	Sweet potato	19

According to the scores obtained it is again divided into ~~most~~ used frequently, medium frequently and less frequently foods.

Table 19. Frequency of use of goitrogenic foods among the respondents

Most frequently used scores above 52	Medium frequently used scores between 52-21	Low frequently used scores below 21
Tapioca	Colocasia, cabbage	Sweet potato

As table reveals tapioca was the most frequently used goitrogenic followed by cabbage and colocasia as medium frequently used foods. sweet potato is a low frequency used food.

Table 20. Tapioca consumption of the families per meal

Amount(kg)	Percentage
Half a kilo	4
One kilo	73
Two kilos	20
Three kilos	3
Total	100

Table 20 shows that 73 per cent consumed almost 1 kg at a time. While 20 per cent showed a consumption of 2 kg, 3 per cent ~~who~~ consumed 3 kg of tapioca and 4 per cent consumed about half a kg at a time.

An analysis of method used for cooking tapioca was made. It is presented in Table 21.

Table 21. Method used for cooking tapioca

Sl. No.	Method	Percentage
1	Cooking and draining the water once	77
2	Cooking and draining the water twice	23

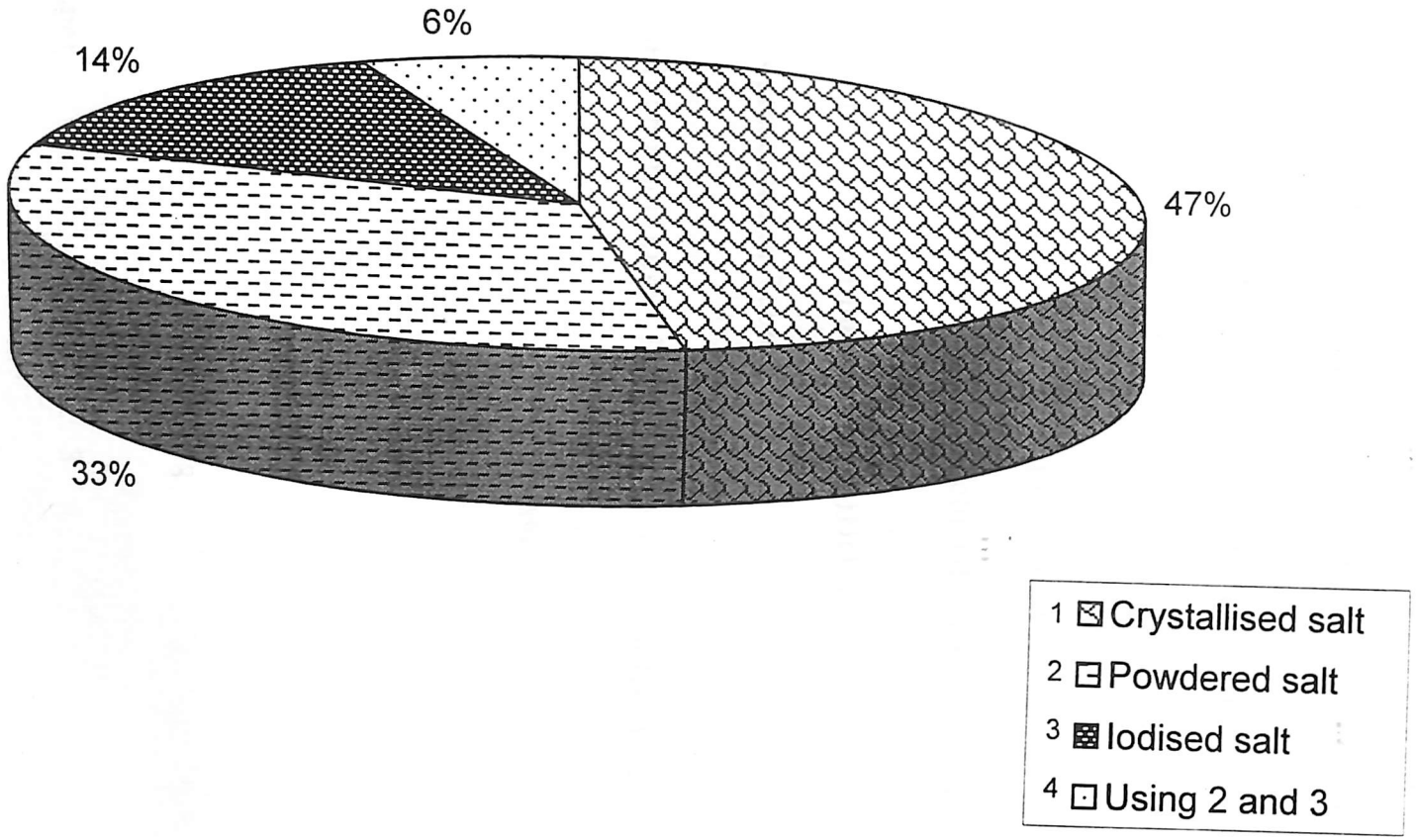
Method used for cooking tapioca indicated that most commonly used one is cooking and draining the water once (77 Per cent) and for 23 per cent the method employed was cooking and draining the water twice. Absorption method as well as steaming and frying were not used for cooking tapioca.

Information about the type of salt used was collected and is presented in Table 22.

Table 22. Type of salt used

Sl. No.	Type	Percentage
1	Crystallised salt	47
2	Powdered salt	33
3	Iodised salt	14
4	Using 2 and 3	6

Fig. 3 Pie diagram showing different types of salt used by the respondents



Above table revealed, 47 per cent of the study population were in the habit of taking crystallised salt. While 33 per cent used powdered salt. And there was only 6 per cent who used both iodised salt and crystallised salt.

4.4 Assessment of awareness about causes, symptoms and preventive measures of IDD

Awareness about causes, symptoms and preventive measures of IDD was measured using knowledge inventory which included a series of questions.

Data about the source of information about IDD and need for iodised salt was analysed and is presented in Table 23.

Table 23. Source of information about IDD and need for Iodised salt

Sl. No.	Sources	Percentage
1	Govt. sources	12
2	Radio	6
3	Television	18
4	News paper	3
5	Unaware	61
	Total	100

The table indicates that nearly 61 per cent of the population surveyed were unaware of IDD. For 18 per cent television was the major source of information. Government sources like hospitals PHC's etc were the source for 12 per cent while for 6 per cent it was radio and for 3 per cent news paper formed the major source.

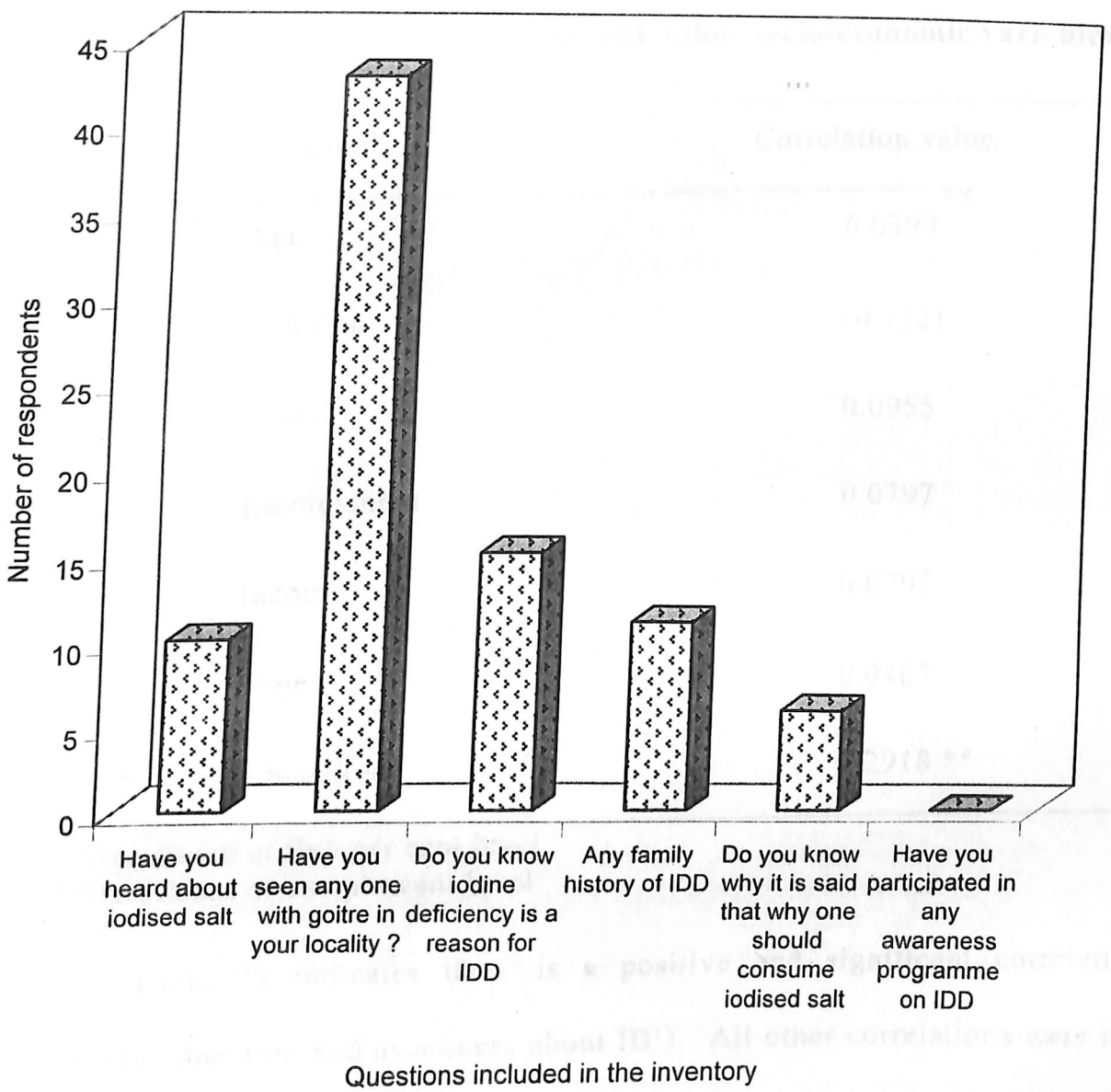
Table 24 gives the details of other questions included in the knowledge inventory.

Table 24. Details of other questions included in the inventory

Sl. No.	Questions	Percentage
1	Have you heard about iodised salt	10
2	Have you seen any one with goitre in your locality ?	43
3	Do you know iodine deficiency is a reason for IDD	15
4	Any family history of IDD	11
5	Do you know why it is said that why one should consume iodised salt	6
6	Have you participated in any awareness programme on IDD	0

From the table it is very clear that eventhough 43 per cent had seen goitre patients and 11 per cent had family history of goitre only 15 per cent know iodine deficiency is a reason for IDD. Only very few (6 per cent) know

Fig. 4 Awareness of the respondents about IDD



why one should consume iodised salt. It was noticed that none of them had participated in any awareness programmes.

4.4.1 Correlation of awareness and selected socio economic variables

Correlation of awareness and other selected socio-economic variables are depicted in Table 25.

Table 25. Correlation of awareness with other socio-economic variables

Sl. No.	Variables	Correlation value
1	Age	0.0399
2	Religion	-0.1321
3	Caste	0.0955
4	Employment	0.0797
5	Income	0.0797
6	Type	0.0467
7	Education	0.2918 **

* Significant at five per cent level
** Significant at one per cent level

Table 25 indicates there is a positive and significant correlation between education and awareness about IDD. All other correlations were not significant.

4.5 Pretest of the trainees about the awareness of IDD

Twenty seven statements pertaining to IDD were prepared. The main purpose of these statements was to test the awareness of the trainees regarding IDD. Statements were based on the important signs of IDD, magnitude of the problem, consequences of iodine deficiency, available sources of iodine, age group more susceptible to iodine deficiency and preventive measures. Knowledge of trainees related to various aspects of IDD are given in Table 26.

Table 26. Knowledge of trainees related to various aspects of IDD

Sl. No.	Aspects	Number of statements	Maximum score to be obtained	Mean score
1	Important signs of IDD	3	3	0.4
2	Magnitude of the problem	3	3	0.8
3	Consequences of iodine deficiency	6	6	0.03
4	Available sources of iodine and causes for iodine deficiency	6	6	0.2
5	Age group more susceptible to iodine deficiency	4	4	0.7
6	Preventive measures	5	5	0.9

Regarding the important signs of IDD the mean score is 0.4 which is the only 13.3 per cent of the maximum score to be obtained for these statements. For magnitude of the problem the mean score is 0.8 which is the only 26 per cent of the maximum score to be obtained. Regarding the consequences and causes of iodine the mean score found to be 0.03 and 0.2

Knowledge of trainees on the age group more susceptible to iodine deficiency and preventive measures is 0.7, 0.9 which is only 17.5 per cent and 18 per cent of the maximum score respectively.

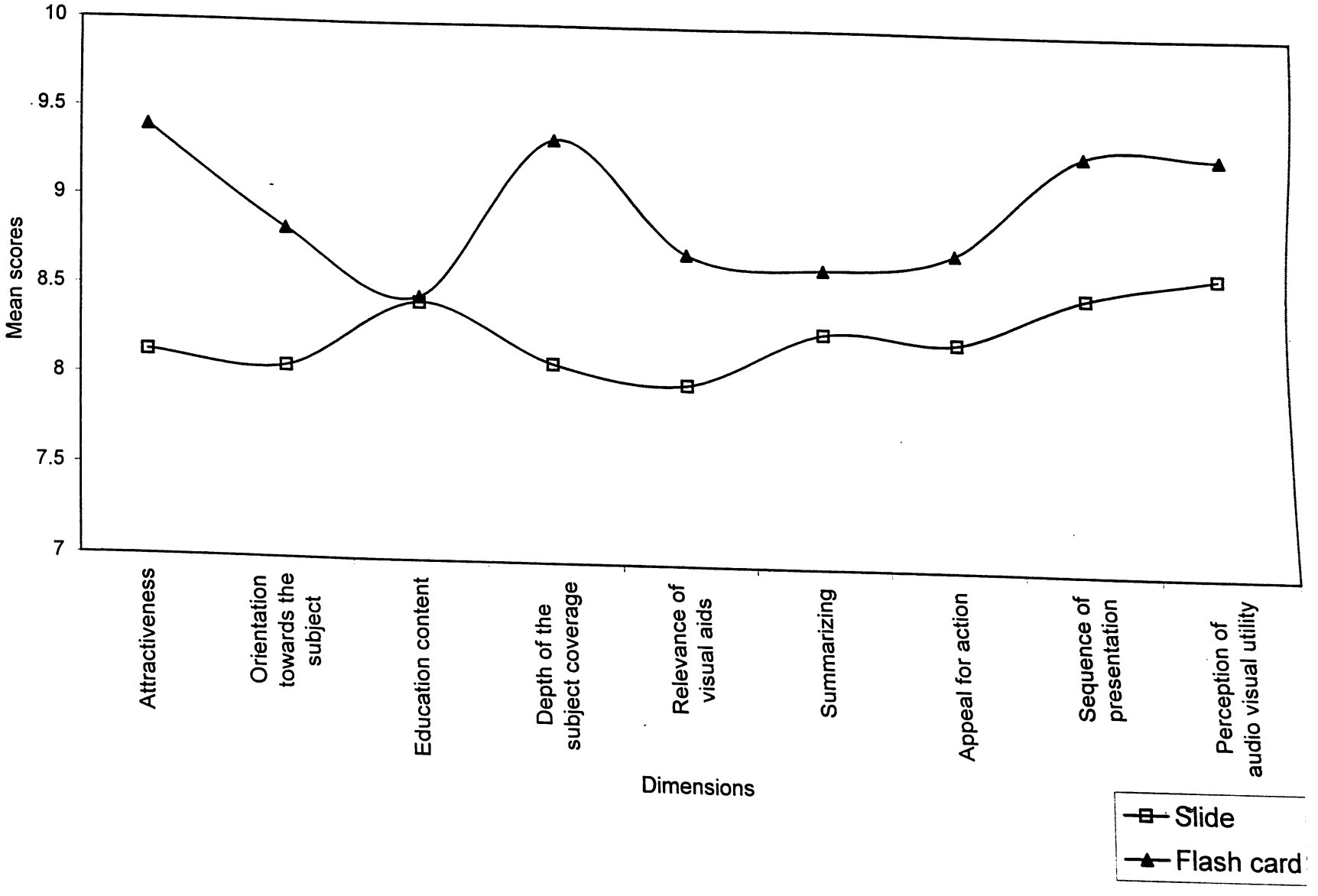
4.6 Relative effectiveness of the visual aids formulated

The effectiveness of the visual aids formulated were assessed through implementation, details are given in Table 27.

Table 27. Assessment of visual aids to find their relative effectiveness

Sl. No.	Dimensions	Mean Score	
		Slide	Flash card
1	Attractiveness	8.13	9.4
2	Orientation towards the subject	8.06	8.83
3	Education content	8.43	8.46
4	Depth of the subject coverage	8.10	9.36
5	Relevance of visual aids	8	8.73
6	Summarizing	8.3	8.66
7	Appeal for action	8.26	8.76
8	Sequence of presentation	8.53	9.33
9	Perception of audio visual utility	8.66	9.33
	Total Mean	8.27	8.98

Fig. 5 Relative effectiveness of visual aids



It is evident from the table that for all dimensions the scores of flash card was found to be more effective with a total mean score of 8.98 and individual scores of 9.4, 8.83, 8.46, 9.36, 8.73, 8.66, 8.76, 9.33 and 9.33 respectively.

4.7 Gain in knowledge after post-test

Gain in knowledge is assessed by the difference between pre and post score knowledge. It is given in the Table 28.

Table 28. Gain in knowledge

	Mean Score	Gain in knowledge
Pre exposure	3.30	
		t = 64.63
Post exposure	26.43	

S.E. of d = 0.3579.

It is evident from the table the training on IDD was very effective.

4.7.1 Relationship between knowledge gain and selected variables

Correlation of knowledge gain and other variables are given in the table.

Table 29. Correlation of knowledge gain with other variables

Sl. No.	Variables	Correlation value
1	Age	0.0899
2	Employment	0.0683
3	Income	0.3145
4	Education	0.2430

Table clearly indicates that there is no significant correlation between knowledge gain and selected socio economic variables.

4.8 Measurement of change in attitude

Change in attitude was measured using a check list of five questions before and after the training programme.

Table 30. Change in attitude

	Mean score	Estimated 't' value
Before training	0.80	
After Training	4.57	19.23

An estimated 't' value of 19.23 shows that training programme has a significant effect on the attitude of people.

4.8.1 Relationship between change in attitude and other variables

Correlation of change in attitude and other variables are given in Table 31.

Table 31. Correlation of change in attitude with other variables

Sl. No.	Variables	Correlation value
1	Age	0.0984
2	Education	-0.0635
3	Employment	0.2846
4	Income	0.2383

Table 31 reveals that for variables like age, employment and income the correlations were positive but not significant and for education the correlation was negative.

DISCUSSION

5. DISCUSSION

The results of the study 'Information Education and Communication (IEC) for Iodine Deficiency Disorders (IDD) control' are discussed under the following heads.

5.1. Ecological and environmental features of the area selected for the study.

5.2. Socio-economic and personal characteristics of the families.

5.3. Correlation among socio-economic variables

5.4. Food consumption pattern of the families

5.5. Assessment of awareness using knowledge inventory

5.6. Planning and conducting of training programme.

5.7. Relative effectiveness of the visual aids

5.8. Evaluation of the training conducted

5.9. Measuring the change in attitude.

5.1.a. Ecological and environmental features of the area selected for the study

Vellanad is located (lattitudinally $8^0 32^l$, $8^0 35^l$ and longtitudinally $77^0 1^l$, $75^0 5^l$) in Nedumangad taluk in Thiruvananthapuram district. 22 km towards the east away from the state capital, Vellanad has slopping land areas along with hilly regions and beautiful landscapes. The panchayat include 11 wards. It is surrounded by Aryanad panchayat on the east, Aruvikara, Poovachal panchayats on the south. Total area of this panchayat is about 22.19 sq.km. Based on the geographical features of the land it can be divided into different

Fig. 6. Map of the study area showing the geographical peculiarities

areas as it is given in the map. The main feature of the land is that it is a hilly region constituting about 31.3 per cent of the total land area. Lack of sufficient water is the chief constraint in agriculture and main crops include rubber, coconut and tapioca. According to the data available from Vellanad Krishi bhavan it was observed that tapioca and coconut constitute about 75 per cent of the total land area cultivated. Karamana river flows along the northern side of Vellanad panchayat and rain is the major source of water for drinking and agriculture.

5.1.b. Socio-economic profile

In order to pass an information to the general public we have to consider socio-cultural back grounds of the people. Moreover, according to Sivanarayana *et al.* (1997) to speed up the process of information dissemination there is a need to formulate communication policy which is based on systematic understanding of communication behaviour. Hence the socio-economic profile of the study population was considered. According to the census report of 1991 the total population in Vellanad panchayat is 25306. Out of this male population constitute about 12511 (49.43 per cent) and female population 12795 (50.56 per cent). The literacy rate of Vellanad panchayat is 91.9 per cent (male literacy rate is 95 per cent; female literacy rate 89 per cent). Eventhough the literacy is very high the population growth rate is also high. Regarding the occupational status of the adult population, 12.6 per cent of the total working population comprised of farmers.

5.2 Socio-economic and personal characteristics of the respondents

Rao (1991) viewed that people living in the rural areas were not able to lead a life worthy of human beings due to poverty and their health conditions was the result of the pernicious combination of several socio-economic factors like unemployment, lack of material advancement, poor housing, poor sanitation, malnutrition, social apathy, absence of will power and initiative to change for the better etc. And Ghosh (1989) observed that social factors like religion, occupation and economic status, education, beliefs and culture had important bearing on health. Derby (1976) reported that among the various factors affecting the nutritional status of an individual, diet with its close association with socio economic factors emerge as an important force of influence. Suter and Hunter (1980) reviewed that nutritional status was also influenced by factors such as psychological, socio cultural and physiological influences. N daba and O' keefe (1985) opined that poor socio economic conditions are the root cause of most of the malnutrition problems observed. As reported by Devadas *et al.* (1980) there is an increasing awareness of the relationship between malnutrition and socio-economic factors. Moreover a study conducted by Joshi *et al.* (1993) to find the socio-economic variables associated with the distribution of endemic goitre, revealed that statistically significant differences were found in the prevalence of endemic goitre in relation to different religions and caste groups, occupations of the parents/ guardians of children and types of houses used for the purpose of living. In order to assess the socio economic status details pertaining to the type of family,

family size, monthly income and caste were ascertained as suggested by Sirshi (1985).

a. Age

Age wise distribution of the respondents indicated that majority belonged to the prime age group of 25.55. 19 per cent were in the old age group and 7 per cent belonged to the young group. This is supported by Park (1997) who opined that the demographic profile of India is fast changing and is characterised by adult population forming 60 per cent. Most of respondents were females and the male respondents were negligible. In most of the families there were only one employed person and probably the head of the family was the bread winner too.

b. Religion

Arora (1991) observed that religion plays a dominant role in the process of socialisation and it maintains the stability of the social system and social relationships and hence the religion and caste of the families surveyed were ascertained. Hindus predominated forming 97 per cent of the family. Because they constitute 57 per cent of the total population in rural Kerala as reported by Kannan *et al.* (1991). The Kerala statistical Institute (1992) also reported the same. Caste is an unique system in India. According to Government of India (1981) the caste system is reported to be mainly responsible for pre-petuating poverty in rural areas. Caste of the study population was assessed 61 per cent belonged to the forward caste and 36 per cent belonged to the SC/ST community.

c. Type of the family and family size

Majority of the families surveyed were nuclear (89 per cent). Gincy (1988) Nagammal (1989) and Thomas (1989) had reported that most of the families residing in the rural/ coastal areas of Trivandrum district were of nuclear type. This is supported by Sadasivan *et al.* (1980) and Suja (1989). Sexena (1986) found that nuclear families are better than the joint families in health and development. Thus in the present study, majority of the families are in advantageous position. Small sized families consisting one to five members predominated the study population. Lisa (1995) reported that growing urbanisation, breaking down of joint family system, and high female literacy as a reason for reduced family size. Family size do have an effect on the nutritional status of individuals as reported by Kumar *et al.* (1976) and according to Devadas *et al.* (1980) that family size has an influence open the development of children in all respects.

d. Education

About 34 per cent of the respondents had high school level education and 18 per cent had college level education. 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. This finding agrees with the studies of Gupta and Rajput (1982) and Bhatnagar and Singhal,(1982) Moreover maternal education is a variable which had influenced the awareness and adoption level of mothers (Neelma *et al.*, 1998). Moreover better the education greater would be the

knowledge and adoption (Venkatakrishnan, 1991 and Ramnath, 1980). Education level of mother affects nutritional status and which in turn affect children's educational attainment. Jain (1984) also supported this view who was of opinion that a literate mother used scarce resources better than did an illiterate mother with higher income. Steek *et al.* (1991) observed that women with more education had food consumption patterns more consistent with current health promotion messages. Otta (1992) opined that mothers with low educational level were found to have less knowledge about various health care practices and did not take proper health measures. Illiterate individuals were also present in the study population. Main reason for illiteracy among women was the poor economic background, failure and early marriage as reported by Kuttykrishnan and Sucheta (1989). This was found true in the present study also.

e. Employment

Under the occupational status the employment of the head of the family was given importance. About 45 per cent was coolies and the number of government employees was very negligible. This may be due to geographical speciality, and its distance from the main city. The usual practice seen was that a minority of population possessed land other majority was working in these fields as coolie.

Larsamma (1992) had found in her study that family income was directly proportional to the number of persons employed in the family. It was

found that in most of the families only one member was employed most probably the father.

f. Income

Family income is considered as an important determinant since it determines the family's status and the socio-economic position in the society to which they belong. The present study revealed that majority of family had a monthly income ranging from Rs. 500 to 2000. Dictary intake was found to be markedly influenced by income level as revealed in the diet surveys conducted by NNMB (1996). This may be a reason for the prevalence of malnutrition among the rural population. According to Jaya and Visala (1997) family income also had a significant influence on the health care practices adopted by slum women. Mehta and Singh (1988) reported that women with a low health status had an extremely poor level of income.

g. Housing condition

By making frequent visit to the field the details about the housing condition of the people were collected. It was found that about 37 per cent were having living conditions above poverty level. Ramachandran (1987) opined that the nutritional status of an individual is affected by living conditions. Twenty eight per cent of the study population was found to be underprivileged living in mud walled house with one room kitchen with a strength of more than four.

h. Source of drinking water

Data about the source of drinking water was also collected as Sheila (1994) reported that water from deep wells can provide a major source of iodine. UNICEF (1990) had reported that lack of ready access to water and poor environmental sanitation were important underlying causes of various types of infections resulting in malnutrition. As per findings of the study majority of the population depended on the tap water. According to the reports of Vellanad panchayat, eventhough there were tap connections the water was not purified and therefore to some extent they were using the water from the lake or stream as such. And this may be the reason for most of the infections as such.

I. Major crops cultivated

Iodine is present in its natural state in the soil and in water. So our daily requirement comes from crops grown on iodine rich soil. Moreover the large scale use of alkaline fertilizers destroys the iodine in the soil which other wise is absorbed by plants and reach us through vegetables. Both geological origin of the soil and its distance from the ocean influence the iodine content of the crop. It was found tapioca and bhindi was the major crops cultivated besides rubber, coconut, and rice. Chakkaphak (1986) reported that due to poverty and lack of knowledge in nutrition, they tend to sell their food products and often buy less nutritious food. This was found true in this case also.

j Ownership of domestic animals

Ministry of Salt Department (1995) reported that iodine deficiency also affects animals and livestock, reducing their milk, meat, eggs and wool yields. In order to assess the effect of iodine deficiency in animals data pertaining to it was collected. The findings of study revealed that only 20 per cent of population possessed domestic animals Among these 85 per cent showed signs of iodine deficiency.

K. Personal habits

According to Prema (1987) personal habits such as smoking and drinking of alcohol are reported to have influence on the occurrence of goitre. Results of the present study revealed that a small section of the male population were smokers and a minority agreed that they had the habit of drinking alcohol.

5.3 Correlation among selected socio economic variables

The present study revealed that age of the respondent had significant association with number of employed persons and method used for cooking tapioca. This shows that as the age advances people show less willingness to adopt a new method of cooking. In the present study a positive and significant correlation was found between age and other variables like employment, income, education and type of salt used. The economic status directly or indirectly influences the purchasing power, standard of living, quality of life, family size and pattern of disease and deviant behaviour in the community. The result is in conformity with that of Juna (1999). A positive correlation

was found between education of the respondent and the type of the salt used. According to Anju *et al.* (1988) education of the respondent have significant association with the knowledge regarding health. Thus the food practice employed in the family is influenced by the education of the home maker. A positive and significant correlation was found between the type of the family and amount of tapioca used. As the number of members in the family increases there is a greater chance of including locally available foods like tapioca in the diet of the family.

5.4 Food consumption pattern of the respondents

5.4.a Food habit

Food habits of the study population observed to be habitual non vegetarian type. Devadas and Eswaran (1986) reported that food habits of the people depended on availability of food which was observed to be influenced by the climate, socio-economic cultural variables, environment, religious superstitions and ignorance. A study conducted by Kanaka *et al.* (1992) to find the risks of alternative nutrition in infancy in a 7.5 month infant with failure to thrive, developmental delay and visible goitre revealed that the mother was a strict vegetarian and the father a lacto vegetarian. Observational studies of Remer, *et al.*,(1999) also reported that vegetarians can have a very low iodine intake. Their results also provide experimental confirmation of literature findings indicating that iodine supply is higher with non-vegetarian than with vegetarian diets. Even though most of the population was consuming non

vegetarian diet the condition is that even those who cat fish and meat, in India, eat more vegetables and cereals as basic food as said by Kochupillai (2000).

5.4.b Food consumption pattern

Behrman and Deolalikar (1986) found that seasonal variations in environmental conditions, food availability, food prices and labour demands have considerable impact on nutrition. Tradition and seasonality also affects the nutritional status of women in a negative way as Bütt *et al.* (1989) reported that in Baluchistan even the rich are deficient in important nutrients due to their traditional food consumption pattern. Bernardo *et al.* (1989) opined that endemic goitre was caused generally by the deficiencies of specific nutrient in the diet even when the content of calories was adequate. Therefore details about the food consumption pattern, frequency of use of specific foods etc were assessed.

Three meals a day namely breakfast, lunch and supper was found to be common pattern of the families surveyed. Food consumption pattern revealed gross inadequacies as far as the women's diets are concerned. This agreed with the findings of surveys conducted by NNMB (1984) that rural families in our state are not in the habit of including all the food components specifically required for a balanced diet. According to Karuna (1993) factors like food preferences, availability of food items in the locality, knowledge of nutritional values of certain food items, relative prices of food articles and urgency of non food expenses were all found to determine priorities in food expenditure. Cereals, tubers and fish are the major items in the meals. Gopalan and Kaur

(1989) also indicated that the cereals predominate the diets of women in general, irrespective of their socio-economic status both in urban and rural areas. Reports of survey conducted by NNMB (1994) among 8 cities including Trivandrum revealed that in all cities cereals and millets formed the bulk of the diet of the slum dwellers. In the present study also rice was found to be the staple food in the diet. The result is in conformity with Shah *et al.* (1983), Preet and Bhavana (1988) and Parvathi and Babita (1989) who found that cereals especially rice continued to be the major staple food item among south Indians. Rice in the form of left over food mixed with water was an important breakfast item among the majority of families. Roots and tubers mainly tapioca and fish also played a similar role in few families. The high intake of tubers especially tapioca would increase the calorie intake substantially without providing other essential nutrients. Only 22 per cent of families had evening snack included in their meal pattern. The tea time meal consists only beverages like tea or coffee with no other refreshments. Thus rice, tapioca and fish dominated the daily meal pattern of the sample studied. This agrees with the findings of Lina and Reddy (1985) that a typical rural Kerala dietary pattern would be based on rice, fish, tapioca and coconut.

5.4.c. Frequency of using specific foods.

Till recently there were no reliable figures for iodine content of Indian food; to enable assessment of dietary intake of iodine. Recently an improved micro method for estimation of iodine in foods has been standardised by NIN and used for analyzing commonly consumed foods for their iodine content (Gopalan *et al.*, 1998). Frequency of using some common foods having iodine

content was assessed. ICMR in 1981 had revealed that an adequate diet or a balanced diet which provided all the essential nutrients in sufficient quantities was necessary for good health. But in the present study it was found that components of a balanced diet was not included in their daily menu. Frequency of consumption of protein food such as egg, meat pulses and milk were low. Consumption of pulses and vegetables were found to be occasional in house holds of the study area. This agrees with the findings of (Antonius, 1987). Report of NNMB (1994) stated that intake of flesh foods was high in Trivandrum and it constituted mostly of fish. Among the study population 35 per cent included fish in their diet more than twice in a week. But the quantity of fish used was found to be too little to provide enough protein. Foods like vegetables which formed the major source of vitamins and iron were rarely included in the diet. Bhavani (1986) also observed similar results among the families from the states located at eastern regions of the country. Fruits were almost absent in the diet. This might be due to high cost, non-availability and ignorance. A food use frequency score sheet was also included in the diet survey since the frequency of use of different food groups would give an indication to the adequacy of the family diet pattern as observed by Nelson (1993).

5.4.d Frequency of using goitrogenic foods

Frequency of use of goitrogenic foods was found to be very high. Goitrogens are the substances in plant foods which increase the need for dietary iodine. The main goitrogenic items included in the diets were cabbage and tapioca. As per the findings of the present study a group of people

consumed cabbage daily. The major reason for the frequent use of cabbage was that it is very easy to prepare. Housewives explained that it was a common item for the children's lunch box. Another practice observed was that outer leaves of cabbage tied together to form small bundles were available from the local market for much cheaper rate. Thus frequent use of a specific food is controlled by few factors such as easy access to the food item, availability at a lower rate, ease of preparation rather than significance of it on a nutritional basis. Colocasia and sweet potato were also used according to the seasonal availability. More details about the amount of tapioca consumed and cooking method followed, revealed that majority of the families used usually one kg of tapioca at a time. There were families who consumed larger quantities of tapioca (3 kg) at a time. It is interesting to note that amount of tapioca used not depended on the number of members of families. While for low economic group it was an item for fulfilling their hunger need for above average group it was an item of preference.

Only 33 per cent drained the water of cooking of tapioca twice. Some people reported that they drained the cooking water according to the variety and nature of the tapioca. Absorption method, steaming, frying methods were never employed for cooking tapioca.

5.4.e Information about the type of salt used

Details about the type of salt used was collected. It was found that majority of the people used crystallised salt. For most of them iodised salt was an expensive item, to be included in the daily diet. Above all they were

not aware of the importance of iodised salt. Housewives reported that because of their habitual practice of using rock salt the problem that they found in using iodised salt was that they were unable to know the measurement for each recipe. For some people all powdered salt was iodised and they were consuming it believing that they are using iodised salt. Thus for a permanent success of eradication of IDD the need of iodization of salt must be recognised and accompanied by a regular system of appropriate monitoring as reported by Dunn (1996).

5.5 Assessment of awareness

An important objective of IEC is to increase the awareness, knowledge, under-standing and commitment at all levels of society so that families and community leaders, policy makers appreciate the significance and relevance of population related issues. So before planning an IEC programme the awareness of the study population about the various aspects of IDD was measured using an knowledge inventory. Nutrition awareness is essential among the general public and especially among mothers and caretakers of small children. The salient findings of the study is that a wider section of the public was unaware of IDD or iodised salt. Television was found to be source of information for a small section of the community. This calls for widespread promotional campaign through mass media, news paper and TV inorder to implement the use of iodised salt, as said by Consiglio (1998).

A study was conducted by Mallik (1998) to assess knowledge, beliefs and practices regarding iodine deficiency disorders in Car Nicobar districts of

Andaman and Nicobar Islands. It was found the no one had correct knowledge of the cause of goitre or any other IDD. Similar finding was observed in the present study also. Some of the respondents even believed that it was caused by the deficiency of some vitamins. But about 43 per cent of the respondents had seen goitre patients in their locality. This may be because of the increased prevalence of IDD in this region. None of them had never participated in any awareness programme. In the present study, the minority who knew that iodine deficiency is the cause for goitre, believe that IDD are limited to goitre alone.

Awareness of the respondents were positively correlated with education. Education exposes the individual to a multitude of facts and information. As the education increases individuals are more bothered about improved health practices.

5.6. Planning and conducting of training programme

Smyke (1991) opined that a person's health is influenced by the availability of health information and health care, both preventive and curative. Aoyama (1999) is also of similar view that people's access to health care, education, clean water and sanitation, affects their nutritional status. Technology alone cannot bring in miracles in improving public health, as human efforts and coordination were as important to achieve success as reported by Medivision (1999). According to Balagir *et al.* (1998) health and nutritional status of under privileged communities had attracted considerable attention in India. Punamkumari and Roy (1988) opined that there is a need to

reach rural household with the new practices inorder to improve their standard of living. This call for effective communication of improved practices through appropriate media.

IEC is a concentrated and planned endeavour of reaching people as individual, group or masses, putting across scientific knowledge and educating them to develop expected behavioural patterns. The objective of IEC programme is to change specific behaviours. Therefore communication for behaviour change programmes should be carefully designed, monitored and evaluated to achieve maximum impacts. According to Park (1997) educational approach for achieving change in health practices and recognition of health needs involves motivation communication and decision making. Since individuals vary so much in their socio-economic conditions, traditions, attitudes, beliefs and level of knowledge a combination of approaches is usually advised.

Behaviour analysis of the study sample revealed that behaviours that have to be changed are the dietary practice of wrong use of tapioca, excessive consumption of goitrogenic foods and consumption of crystallised salt. Data collected through survey showed that the population was completely unaware of the consequences of IDD. So a campaign was organised. Tharaneatharan *et al.* (1998) observed that only after gaining sufficient knowledge people would develop favourable attitude towards adoption. Das and Sharma (1998) reported training as a major catalytic force for augmenting human productivity in all spheres of development. Training was conducted to selected trainees. Women predominated the training programme as UNICEF (1991) reported that

women were identified to be the most undernourished economically the most vulnerable and socially the most depressed group of workers in society, eventhough they performed tasks essential to any society's survival from raising children to growing food and feeding their families. Devadas *et al.* (1982) revealed that rural women were keen in learning nutrition since they realised that good nutrition contributed to the health and well being of their families. If motivated and guided properly they can be instrumental in postering desirable changes in their homes ultimately resulting in improvements in the nutritional status of the community at large. Improving female education and other social services contribute to lowered childhood malnutrition over the long term.

In the present situation message to be exchanged is to consume iodised salt and prevent IDD. Adoption of new ideas and practices by an individual involves following steps (a) Awareness- here person comes to know about the new idea or practice some very general information, knows little about its usefulness, limitations and applicability to him.

(b) Interest- seeks more detailed information.

(c) Evaluation-person weighs the pros and cons of the practice and evaluates it usefulness-it is a mental exercise.

(d) Trial- Decision is put into practices, need additional information to over come the problem.

(e) Adoption - person decided to adopt the new practice.

Care was taken in the formulation of visual aids so that it will help in the adoption of the new practice.

5.7 Relative effectiveness of visual aids formulated

A combination of media namely posters, slides, flashcards charts and leaflets and folders were administered. Philip *et al.* (1998) observed that usage of visuals through different modes of presentation play very important and crucial domain in affecting effective cognitive and psychomotor domains. Nishi (1997) opined that the purpose of the process of communication is to enable the audience in bring about increased perception, absorption and retention of messages initiated by the communicator. Studies have revealed that why one should not use channel which engage only one sense of communication. Our perception and understanding of the messages according to the findings of different test varies as follows 75 per cent of all the messages perceived is absorbed by eye and 15 per cent is absorbed by ear and rest is almost equally distributed among touch, taste and smell. Combination of seeing and learning can retain about 50 per cent of the material provided. Kaur and Roy (1986) proved the same that teaching with the help of non projected visual aids like chart, flash cards and flannel graph was effective than the lecture method alone.

The relative effectiveness of the visual aids formulated namely flash cards and slide were assessed on the basis of selected dimensions like attractiveness, orientation towards the subject, education content, depth of the subject coverage, relevance of visual aids, summarizing, appeal for action,

sequence of presentation and perception of audio visual utility. The flashcard was found to be more effective. It is supported by Sadyat and Chinnegowda, 1987 who found visual aids increase the effectiveness of lecture. Mohanty and Kalpana (1987) opined that slides were the oddest form of projected aids, flexible in nature and a good medium of advertising. They plan a unique role in attracting the attention and in creating interest. Thus it is recommended that inorder to impact nutrition education to rural women, majority of who are illiterate, several media may be used simultaneously. Mukkahoel and Annamma (1998) also reported that combination of media helped the rural mothers to grasp information and change their attitudes towards favourable side. More over Cole (1987) reported that extension studies have shown that the more the teaching methods used, the higher the percentage of people changing their practices. Thus using a variety of teaching methods will be most effective approach to bring about behavioural changes.

5.8.1 Impact of training in knowledge gain

From the score obtained for post test it is clear that teaching methods has significant influence on the gain in knowledge. Visual aids used along with lecture helped the trainees to get a better understanding of the problem. Thus the results of the present study call for the combination of different IEC methods to eradicate nutritional deficient disorders from the illiterate and rural community especially in areas more prone to disorders. Study conducted by Santhoshkumar (1990) also revealed a positive impact of teaching aids on the knowledge gain.

5.8.2 Relationship between knowledge gain and socio economic variables

Singh and Akhouri (1984) observed age influenced the amount of knowledge gained by respondents. In the present study the relationship between age and knowledge gain was significant but negatively correlated as age increases knowledge gain decreases. Results is in conformity with Vishnoi and Bose (1961) who claimed that age of farmers had no association with their gain in knowledge. According to Das and Sharma (1998) better the education greater would be the knowledge and adoption. But in present study there was no relationship between education of respondents and family size in knowledge gain. According to Narasaraj (1981) family size of the farmers did not influence the effects of media treatments in gaining knowledge. Rajanna (1982) also found that there is no influence of family size on the effects of media treatments in increasing overall knowledge. Present study also revealed that employment and income had significant influence for the gain in knowledge regarding improved home practices. This finding is in agreement with Malavia and Verma (1987) and Somasundaram and Singh (1978).

5.9 Measurement of change in attitude

The trainees were asked about certain aspects of IDD and its preventive measures. A mean score of 4.53 revealed considerable change in the attitude of learners. Change in attitude was correlated with socio economic variables age, education, employment income and family size. The relationships were positive but not significant. The result is in conformity with that of Venkatakrishnarao (1991) who reported that characteristics namely education,

scientific orientation, risk orientation, progressiveness, economic motivation, value orientation, information source utilization and utilization of infrastructural facilities were found to be positively associated with change in attitude.

SUMMARY

6. SUMMARY

Iodine deficiency is the leading cause of preventable intellectual retardation and is associated with a spectrum of neurologic and developmental pathology. The developing foetus, newborn and young child are the most susceptible to the effects of an iodine deficiency diet. If the iodine deficiency disorders is not prevented, the pathophysiologic abnormalities become resistant to treatment and permanent intellectual, neurologic and somatic defects results. As low iodine intake is the main cause of IDD and well processed cassava is not goitrogenic, iodine supplementation in the form of iodised salt is the simplest method of prevention of IDD. Hence a study entitled 'IEC for IDD control' was undertaken to disseminate information on IDD and its preventive measures.

A baseline information on socio economic background, personal characteristics, dietary habits, food consumption pattern and assessment of the knowledge of the public on iodine deficiency disorders were carried out by administering suitably structured schedule.

The geographical features of the land was observed to be a physical barrier in preventing iodine deficiency as it was a hilly region and the soil is subjected to soil erosion. Socio economic background of the families revealed that majority of the families belonged to Hindu community. Most of the families studied were nuclear type with one employed person in the family. The findings of the survey further revealed that a small section of the society

possessed domestic animals and low yield of egg, milk and meat was noticeable.

On analysing the awareness on IDD among study population it was observed that most of them had seen goitre patients in their locality. But they were not aware that iodine deficiency is the cause for goitre or there are other consequences due to iodine deficiency. Majority of them were unaware and not exposed to any type of education programme. Television was the major source of information for a minor section of the people and they knew something about iodine deficiency.

Food consumption pattern of families surveyed indicated that most of them were non vegetarians. Cereals, roots and tubers especially tapioca were the staple foods of these families and occupied dominant position in the daily menu. Cabbage was another food item frequently used. The survey also revealed that people are depending on the local markets for purchasing tapioca. Most of them were using non iodised salt. Findings of the survey stressed the need for a change in the habit of people using non-iodised salt, excessive consumption of cabbage and the wrong method of processing tapioca which is the major item in the daily menu.

A community self survey was also conducted by organinsing an IEC campaign in the local school. Talks on iodine deficiency disorders, magnitude of the problem and its preventive methods were delivered by Dr. R.C. Nair, Clinical consultant, IDD programme, C. Jayalekshmi, Technical Officer, IDD cell, Directorate of Health Services, Thiruvananthapuram and

Dr. S.P. Revikumar, Training Co-ordinator of Directorate of Health Services, Thiruvananthapuram.

The rapport established through community self survey helped to locate 30 women who were engaged in social service activity for undergoing further training. Training was given to them on different aspects of iodine deficiency disorders and its preventive measures. IEC materials namely flash card and slide were formulated for training and their relative effectiveness was assessed. It was found that flash card was more effective than slide. The women in general were very enthusiastic about the information imparted to them through this training programme.

Results of the evaluation of the training programme indicate that there is significant difference in the level of knowledge of women before and after the training programme. It helped the women to change their attitude and to make them conscious of the importance of iodised salt in preventing iodine deficiency disorders. Possessing the requisite knowledge base of course does not always translate into behaviour. Observations on the outcome of the training emphasized that information education and communication approach has facilitated change in food habits and practices among the study sample.

Results of the study reveal that there is a significant improvement in the awareness of the community about issues related to iodine deficiency. Experience with the IEC approach developed reveal that any information education and communication programme will be definitely effective in modifying the community behaviour, if it is linked with a programme of community action. It is also made clear that if opportunity is given, the community is very much willing to come forward for participating in such activities.

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APPENDICES

APPENDIX – I

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE, VELLAYANI

DEPARTMENT OF HOME SCIENCE, VELLAYANI

INTERVIEW SCHEDULE TO ELICIT INFORMATION REGARDING THE SOCIO-ECONOMIC AND PERSONAL CHARACTERISTICS OF THE RESPONDENTS

1. Name of the respondent :
2. Place :
3. Address :
4. Sex :
5. Age :
6. Religion :
7. Caste :
8. Employment of the head of the family :
9. Education of the respondent :
10. Monthly income :
11. Family composition :
    a. Family size :
    b. Type of the family :
    c. Number of employed persons in the family :
12. Housing condition :
13. Source of drinking water :
14. Crops cultivated in your land :
15. Do you possess any domestic animals :
16. Have you ever noticed any reproductive failure, or reduction in the yield of milk, meat and egg :
17. Other habits of the male members :

APPENDIX – II

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE, VELLAYANI

DEPARTMENT OF HOME SCIENCE, VELLAYANI

INTERVIEW SCHEDULE TO ELICIT INFORMATION REGARDING FOOD HABIT, FOOD CONSUMPTION PATTERN AND OTHER DIETARY CHARACTERISTICS

1. Food habit of the family
2. Daily meal pattern of the family
   a. Breakfast :
   b. Lunch :
   c. Evening tea :
   d. Dinner :
3. Frequency of using different food stuffs

Food stuffs	Daily	More than twice in a week	Twice in a week	Once in a week	Fort-nightly	Once in a month	Occasio-nally	Never
1. Cereals								
2. Blackgram								
3. Bengalgram								
4. Greengram								
5. Dal								
6. Horsegram								
7. Green leafy vegetables								
8. Bhindi								
9. Pumpkin								
10. Tomato								
11. Brinjal								
12. Bittergourd								
13. Potato								
14. Onion								
15. Carrot								
16. Chilly								
17. Ginger								
18. Turmeric								
19. Mustard								
20. Fruits								
21. Milk, egg, meat								
22. Fish								
23. Dry fish								

Frequency of using locally available goitrogenic foods

Food stuffs	Daily	More than twice in a week	Twice in a week	Once in a week	Fort-nightly	Once in a month	Occasio-nally	Never
1. Cabbage								
2. Cauliflower								
3. Colocasia								
4. Tapioca								
5. Sweet potato								

5. Amount of tapioca consumed at a time :

6. Method employed for cooking tapioca :

7. Type of salt used :

APPENDIX – III

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE, VELLAYANI

DEPARTMENT OF HOME SCIENCE

FORMULAE FOR MAKING FOOD USE FREQUENCY TABLE

$$\text{Score} = \frac{R_1 S_1 + R_2 S_2 + \text{----------} + R_n S_n}{n}$$

S_n = Scale of rating
R_n = Percentage of respondents selecting a rating
N = Maximum scale rating

APPENDIX – IV

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE, VELLAYANI

DEPARTMENT OF HOME SCIENCE

KNOWLEDGE INVENTORY TO ASSESS THE AWARENESS ABOUT IDD

1. Have you heard about iodised salt ?
2. Have you seen any one with goiter in your locality ?
3. Do you know iodine deficiency is a reason for IDD ?
4. Any family history of IDD
5. Do you know why it is said that one should consume iodised salt ?
6. Source of information about IDD and need for iodised salt ?
7. Have you participated in any awareness programme on IDD ?

APPENDIX – V

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE, VELLAYANI

DEPARTMENT OF HOME SCIENCE

STATEMENTS TO ASSESS THE KNOWLEDGE ON IDD

1.	Iodine deficiency is an important public health problem in India	Yes/No
2.	In Kerala, 13 per cent of the population suffer from iodine deficiency disorders	Yes/No
3.	All those who suffer an iodine deficiency are not goiter patients	Yes/No
4.	Stunting of growth is a symptom of iodine deficiency	Yes/No
5.	All states in India is free from IDD	Yes/No
6.	Iodine deficiency is more prevalent in children below 15 years	Yes/No
7.	Due to iodine deficiency still birth occurs	Yes/No
8.	Iodine deficiency affect the brain growth of the foetus	Yes/No
9.	Stunting of growth, hearing loss, squint are other manifestation of iodine deficiency	Yes/No
10.	Iodine deficiency affect the intelligence of school children	Yes/No
11.	Deficiency of iodine weakens the muscle	Yes/No
12.	Consumption of iodised salt is the simplest method of preventing IDD	Yes/No
13.	In women, iodine deficiency is a cause of infertility	Yes/No
14.	Non iodised salt is banned in Kerala	Yes/No

15.	Public should be informed about IDD	Yes/No
16.	Iodine is not required for the proper functioning of thyroid gland	Yes/No
17.	Iodine deficiency never occurs in people who consume sea foods excessively	Yes/No
18.	Requirement of iodine is same for all age groups	Yes/No
19.	Iodine deficiency occurs only in females	Yes/No
20.	Excessive consumption of cabbage and cauliflower increases the chances for iodine deficiency	Yes/No
21.	Iodine is not present in water	Yes/No
22.	Iodine content in foods is lost during processing	Yes/No
23.	Iodine deficiency affect the domestic animals in the same way as human beings	Yes/No
24.	Among the iodine deficiency the most severe one is intellectual impairment in children	Yes/No
25.	Iodine deficiency is more prevalent in hilly areas	Yes/No
26.	There is no danger in consuming iodised salt by the people who do not have an iodine deficiency	Yes/No
27.	Iodine deficiency disorders should be prevented before they occur	Yes/No

APPENDIX VI

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE, VELLAYANI

DEPARTMENT OF HOME SCIENCE

GIST OF LECTURE ON IODINE DEFICIENCY DISORDERS

- What is iodine ?
- Role of iodine
- Functions of thyroid hormones
- Effects due to iodine deficiency or IDD
  - Cretinism
  - Myxoedema
  - Goitre
  - Hypothyroidism
- Iodine deficiency in different stages of development
- Causes of IDD
- Requirement of iodine
- Sources of iodine
- Methods of combating IDD

APPENDIX VII

KERALA AGRICULTURAL UNIVERSITY
COLLEGE OF AGRICULTURE, VELLAYANI

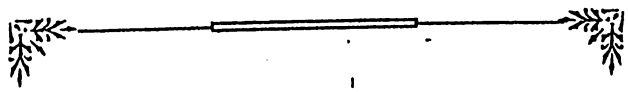
DEPARTMENT OF HOME SCIENCE

CKECKLIST FOR MEASURING THE CHANGE IN ATTITUDE OF THE TRAINEES

1. Iodine deficiency disorders should be prevented by the consumption of iodised salt.
2. Disorders like cretinism, mental impairment etc., are irreversible so they should be prevented by including iodine in the diet.
3. Consumption of cabbage and cauliflower should be limited
4. Iodine is an essential nutrient both in human beings and domestic animals
5. Using the correct method for processing tapioca help to prevent the occurrence of IDD.

APPENDIX – VIII

Notice distributed in the study area about campaign



വെള്ളായണി കാർഷിക കോളേജ്
ഗൃഹശാസ്ത്ര വിഭാഗത്തിന്റെ
ആഭിമുഖ്യത്തിൽ വെള്ളനാട്
പ്രാഥമിക ആരോഗ്യ കേന്ദ്രത്തിന്റെ
സഹകരണത്തോടെ
ബോധവല്ക്കരണ പരിപാടി

വിഷയം

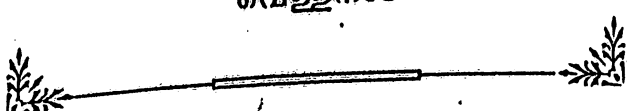
"അയഡിന്റെ അഭാവം
കൊണ്ടുണ്ടാകുന്ന
ആരോഗ്യപ്രശ്നങ്ങൾ"

തീയതി

1999 ജൂൺ 23-ാം തീയതി
ബുധനാഴ്ച

സ്ഥലം

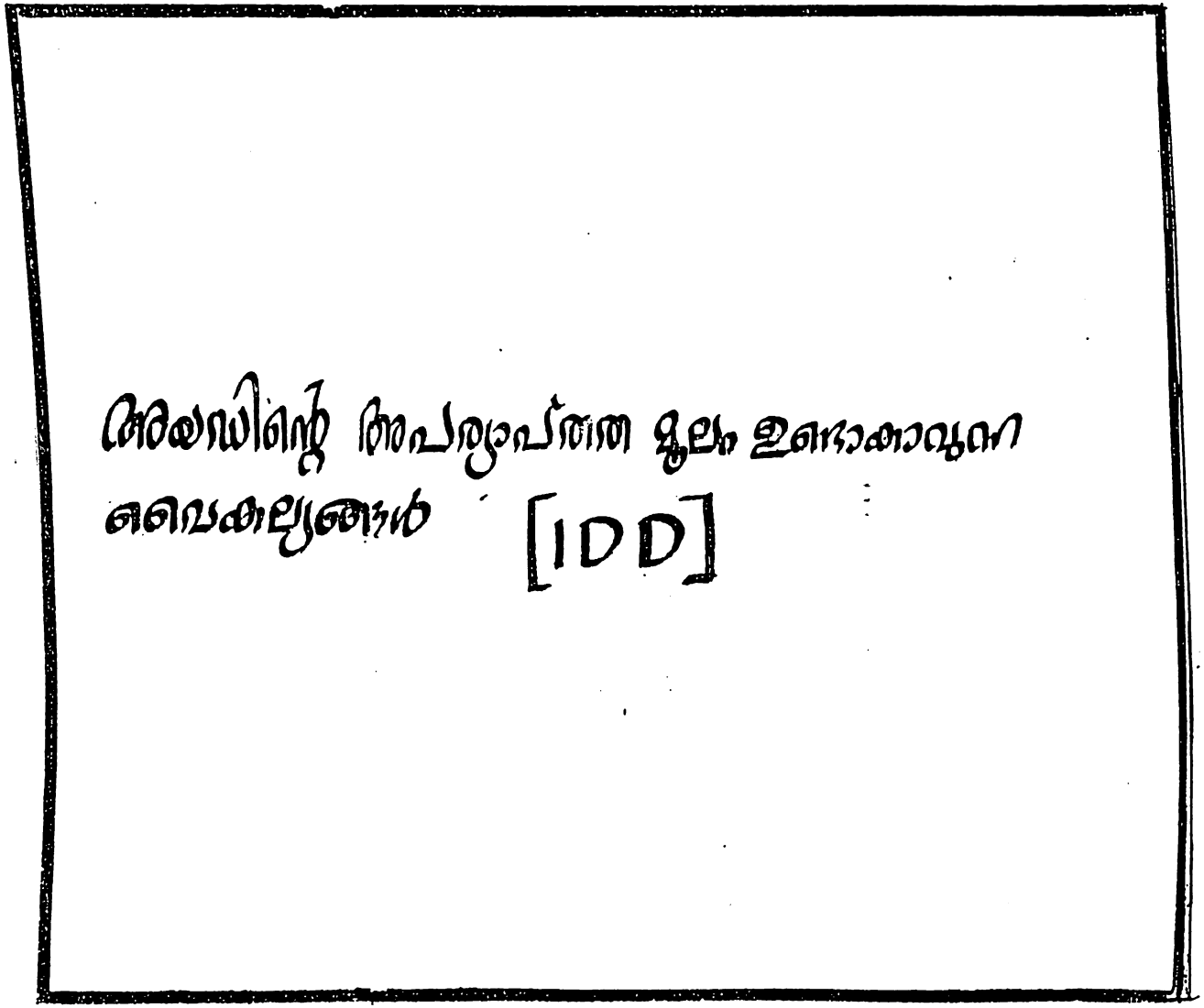
ചാങ്ങ എൽ.പി. സ്കൂൾ
വെള്ളനാട്



APPENDIX IX

Flash cards

FLASH CARD 1

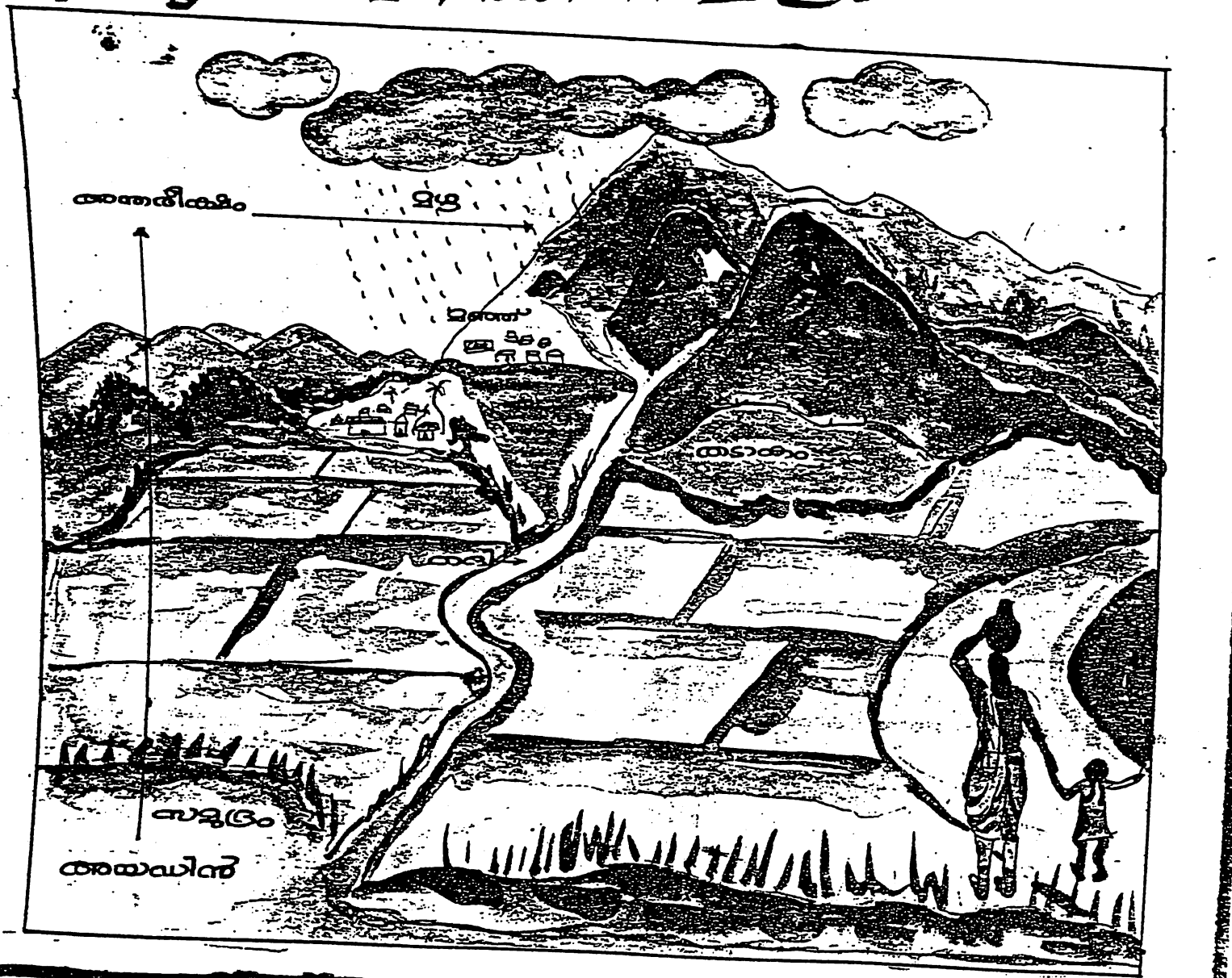


FLASH CARD 2

ശരീരത്തിനാവശ്യമായ അയഡിൻ ലഭിക്കാത്തതു മൂലം
മനുഷ്യന്റെ ശാരീരികവും ബുദ്ധിപരമായ വളർച്ചയിൽ
ഉണ്ടാകുന്ന വൈകല്യങ്ങളെയാണ് അയഡിൻ ശോഷണം
മൂലം ഉണ്ടാകുന്ന വൈകല്യങ്ങൾ അഥവാ IDD-എന്ന്
പറയുന്നത്

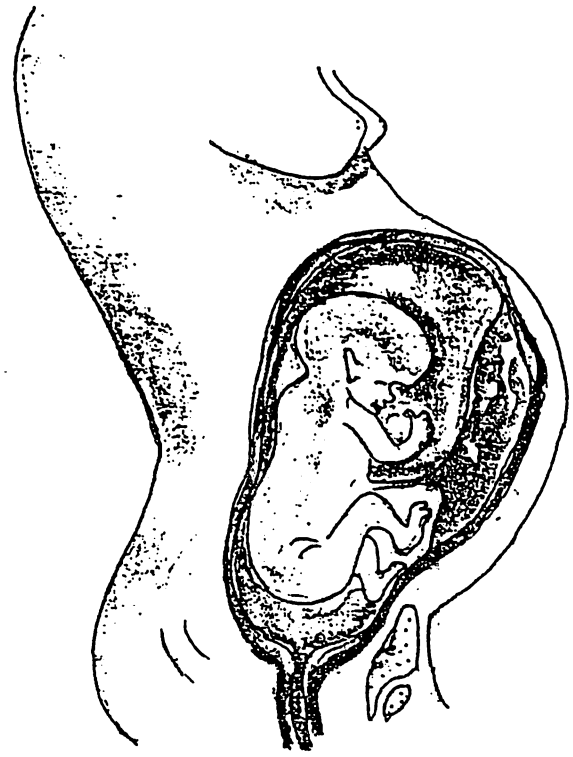
FLASH CARD 3

പ്രകൃതിയിലെ ജലചക്രം



FLASH CARD 4

അമ്മയിൽ അഭാവം ഗർഭസ്ഥ ശിശുവിൽ



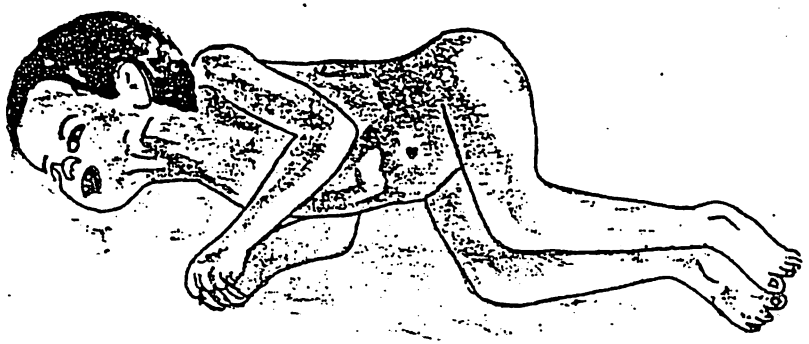
ഇടർച്ചയായ ഗർഭം അലസൽ

ചാപിള്ള ജനിക്കൽ

ശാരീരികവും
മാനസികവുമായ
വളർച്ച മുരടിക്കൽ

FLASH CARD 5

തൈറോയ്ഡിന്റെ അപര്യാപ്തതയുടെ പ്രകടമായ ലക്ഷണം



ക്രെടിനിസം അഥവാ കുള്ളൻ

കുട്ടികളിലും കൗമാരപ്രായക്കാരിലും

കാൽമുട്ടുവേദന

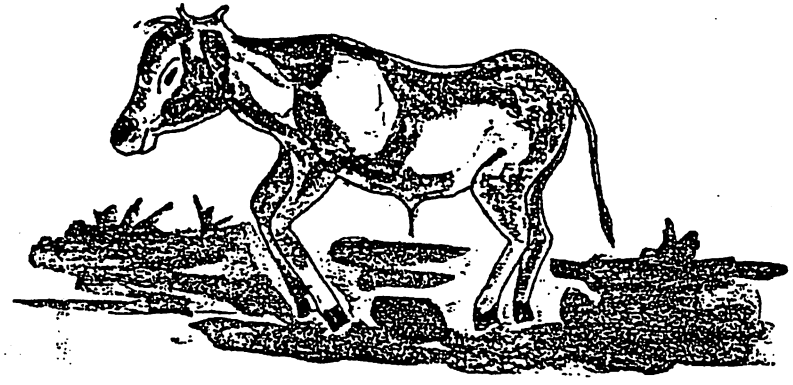
പേശികൾക്ക് തളർച്ച

FLASH CARD 7

ഗോയിങ്ങൽ

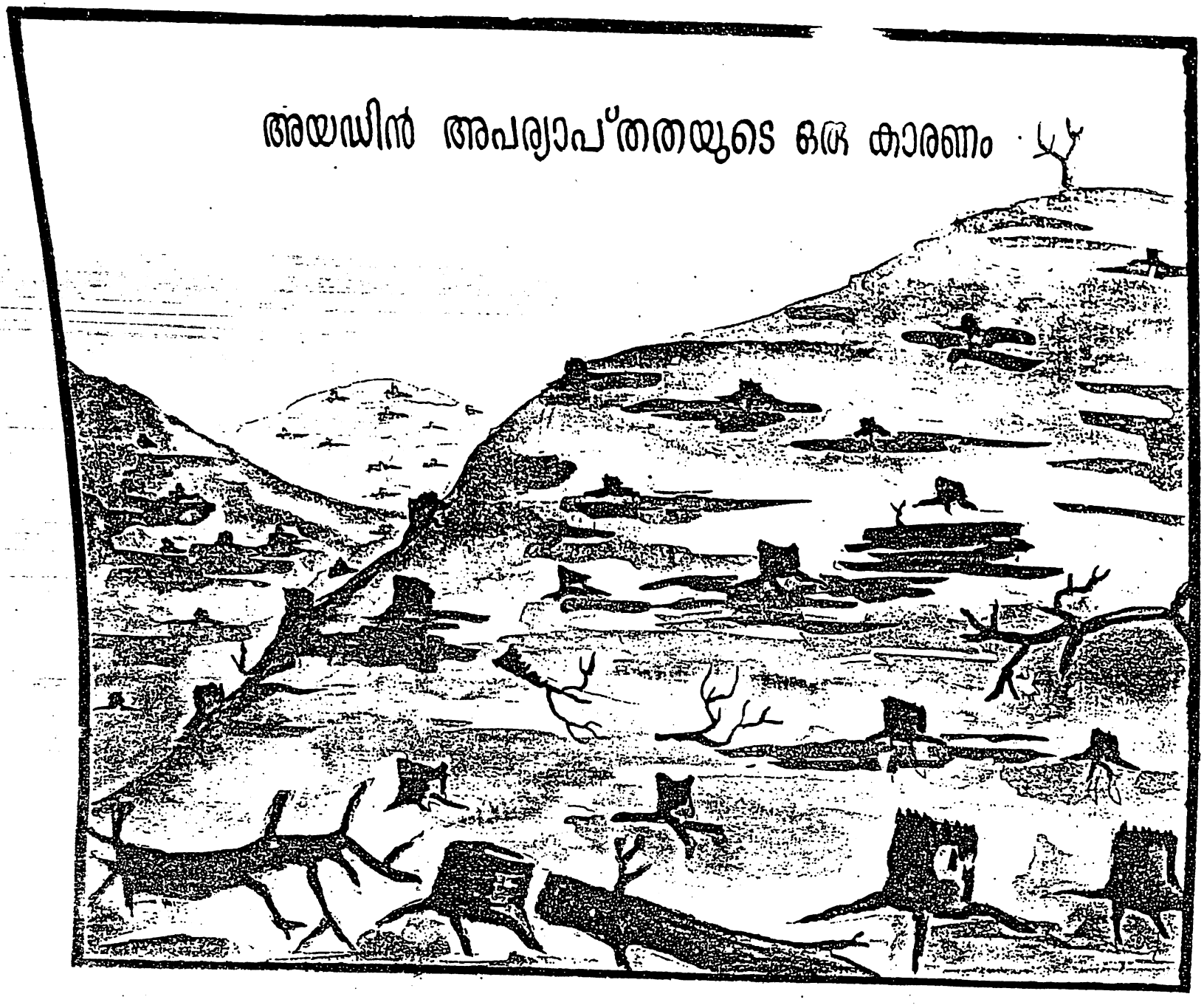
FLASH CARD 8

അയഡിൻ അഭാവം വളർത്തു മൃഗങ്ങളിൽ



പാൽ, ഇറച്ചി മാംസം എന്നിവയുടെ കുറവ്
പ്രത്യുൽപാദന ശേഷി കുറവ്!

FLASH CARD 9

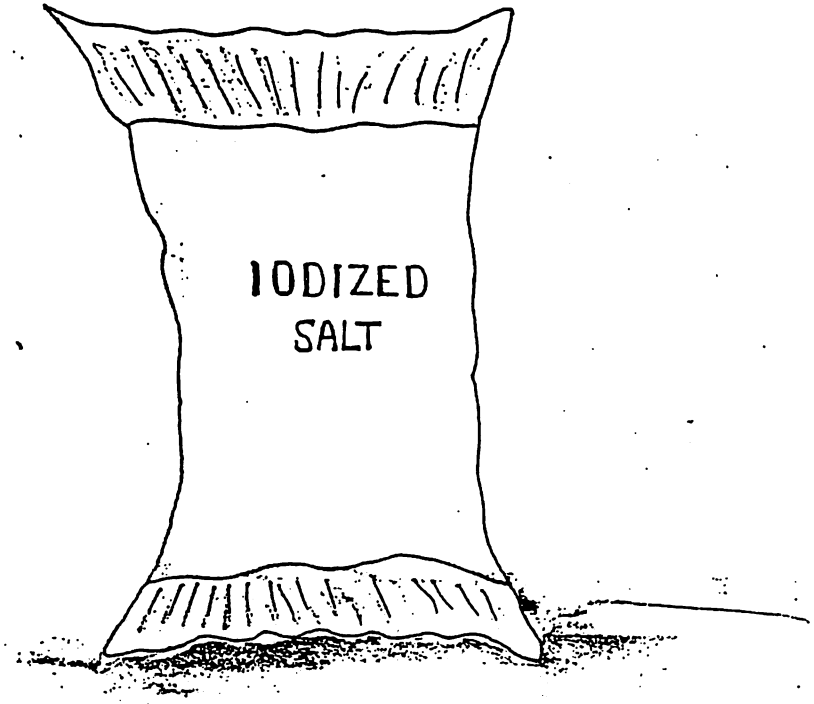


FLASH CARD 10

ഗോയിറ്റ്റോജൻസ്

FLASH CARD 11

ലളിതവും സുഗമവുമായ പ്രതിവിധി



1969

INFORMATION EDUCATION AND COMMUNICATION (IEC) FOR IODINE DEFFICIENCY DISORDERS (IDD) CONTROL

By

VISHMA. C. A.

ABSTRACT OF THE THESIS
SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT
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FACULTY OF AGRICULTURE
KERALA AGRICULTURAL UNIVERSITY

DEPARTMENT OF HOME SCIENCE
COLLEGE OF AGRICULTURE
VELLAYANI
THIRUVANANTHAPURAM

2000

ABSTRACT

A study entitled 'Information Education and Communication (IEC) for Iodine Deficiency Disorders (IDD) control' was conducted at the Changa ward of Vellanad Panchayat to disseminate information among the public on IDD and to create awareness about the factors influencing the prevalence of IDD by developing IEC materials. The socio-economic, personal characteristics, food consumption pattern and the awareness of IDD were assessed.

The results of the survey revealed that an important factor for increased prevalence of iodine deficiency in the particular area is mainly due to the geographical location of the panchayat. Majority of the families surveyed, belonged to Hindu community and were under privileged. The families were nuclear type with less than five members.

On analysing the awareness of study population it was observed that most of them were unaware of iodine deficiency disorders and the importance of iodised salt in the prevention of IDD.

Food consumption pattern of the families indicated that most of them were non-vegetarians. Cereals, roots and tubers predominated their daily menu, with an excessive consumption of tapioca and cabbage. Majority of the population used non-iodised salt and employed wrong method for processing tapioca.

Based on the above results the behavioural patterns to be changed to develop a favourable attitude towards the control of iodine deficiency disorders were identified. A one day IEC campaign was organised in the defined area of study for the conduct of community self survey. It included a

teaching class by resource persons and the women were very enthusiastic in participating in the education programme, and 30 women were selected as trainees for further training.

For the training of selected trainees IEC materials were formulated. It included non-projected (flash card) and projected (slide) aids. The relative effectiveness of these two visual aids were measured and flash card was found to be very effective. Evaluation of the training was conducted and the results indicate that there was increase in the knowledge, with regard to the prevention and control of IDD. The measurement of change in attitude towards the use of iodised salt was also measured. The results indicate that the programme has developed a favourable attitude towards the use of iodised salt as well as an understanding of the role of iodine in the physical and mental health of human beings.